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CAPACITY BUILDING OF TRIBAL WOMEN FOR FRUIT PROCESSING - A CASE STUDY AT JIRANG, MEGHALAYA, INDIA

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ABSTRACT

Fruits and vegetables, being perishable in nature poses a challenge to farmers living in remote villages with poor road network and communication infrastructure for realising economic benefits due to limited access to markets and associated risks. Jirang block of Ri- Bhoi district in Northern Meghalaya is characterised by difficult terrain and poor road network. Jackfruit, pineapple, cassava, banana and several other fruits and vegetables are grown in the most of the area. The farmers are unable to realise their economic benefits owing to limited access to market and lack of processing facilities and lack of awareness among farmers about primary and secondary processing methods. It results in considerable wastage of seasonal fruits and vegetables. Society for Action in Community Health (SACH), a voluntary organisation working for holistic rural development in two blocks of District Ri Bhoi in Meghalaya State of India, along with the women farmers from five villages in Jirang block were concerned about this loss of economic opportunity. They started with simple processing and marketing of Jackfruit into fried chips initially at the village level, and then cluster level, in order to prevent the wastage, and simultaneously, to provide livelihood opportunities to local women. They started a small processing facility for fried jackfruit, and for processing of other fruits and vegetables. Women took part in the training last summer and visited nearby markets to get advice from other small entrepreneurs. Initial success encouraged the women farmers to diversify in to other fruits and vegetables to find a steady source of income. Capacity building has been a main factor, besides appropriate technology and its adaptation by the tribal women, contributing to the success of these women. The paper argues that systematic capacity building approach, with consistent handholding support during implementation, is essential for sustainable impact on the livelihoods of rural families living in hilly areas. It presents structured analysis of the efforts of the tribal women farmers, and the voluntary organisation SACH, in using simple food processing technologies for enhancement of livelihoods.

KEY WORDS: Capacity building; marketing strategy; tribal women farmers; fruit processing; secondary processing

1. INTRODUCTION

Jackfruit (*Artocarpus heterophyllus*) of Moraceae family is an evergreen adapted to humid tropical and sub-tropical climates. In Meghalaya it grows well in the southern and northern slopes. It is used as a vegetable when raw and as a dessert fruit when ripe. Its seeds can be eaten boiled, roasted, or dried, or they can be ground to make flour, which is mixed with wheat or other flours to make bread or other products. Jackfruit is cultivated in Meghalaya on 1646.6 ha with an estimated production of 16754.2 Metric Tonnes. In Ri Bhoi district, it is cultivated on 89.6 ha with an estimated production of 882.3 Metric Tonnes in 2016-17[1]. In addition, almost all households have one or two jackfruit trees in their courtyard, and many trees grow in the wild. The fruit is perishable and cannot be stored for long time because of its inherent compositional and textural characteristics. In every year, about 30%-34% of jackfruit goes waste in the glut season (June-July) during harvest, transport and storage [2].

Society for Action in Community Health (SACH), a voluntary organisation working for holistic rural development in two blocks of District Ri Bhoi in Meghalaya State of India, along with the women farmers from five villages in Jirang block were concerned about this loss of economic opportunity. They started with simple processing of Jackfruit into fried chips and its marketing at village level, and then cluster level, in order to prevent the wastage, and simultaneously, to provide livelihood opportunities to local women. They started a small processing facility for fried jackfruit, and for processing of other fruits and vegetables. Within less than two years, it became successful enterprise offering supplementary income to the rural women. The paper focusses on the three main components contributing to achievement of the twin goals of reducing the wastage and increase income of the women, as per the follows:

- Effective product mix based on seasonal availability of local raw material
- Strategic market focus based on local-to-local market
- Processual capacity building, with strong component of handholding support

2. MATERIALS AND METHODS

2.1 Need identification : Society for Action in Community Health (SACH) is a voluntary organisation working for promotion of health, education, livelihoods, water and sanitation in various parts of the country since 1988. SACH, with extensive experience in design and delivery of various rural development projects, is presently working to strengthen livelihoods of rural families in 25 villages from two blocks of District Ri-Bhoi in Meghalaya State of India (Fig.1: Location Map). It is a tribal area characterised by undulated topography with high rainfall and humid tropical climate for most part of the year. The area has good biomass production, with a variety of fruits and vegetables growing in the wild, as well as cultivated in the farmlands and domestic backyards. The problem of wastage of various fruits and vegetables in periods of glut was identified during baseline study conducted by SACH in 2017. Maximum wastage was found in case of Jackfruit, followed by pineapple and papaya among fruits. It was found that the main reason for wastage was lack of facilities of storage, post-harvest processing and access to markets.

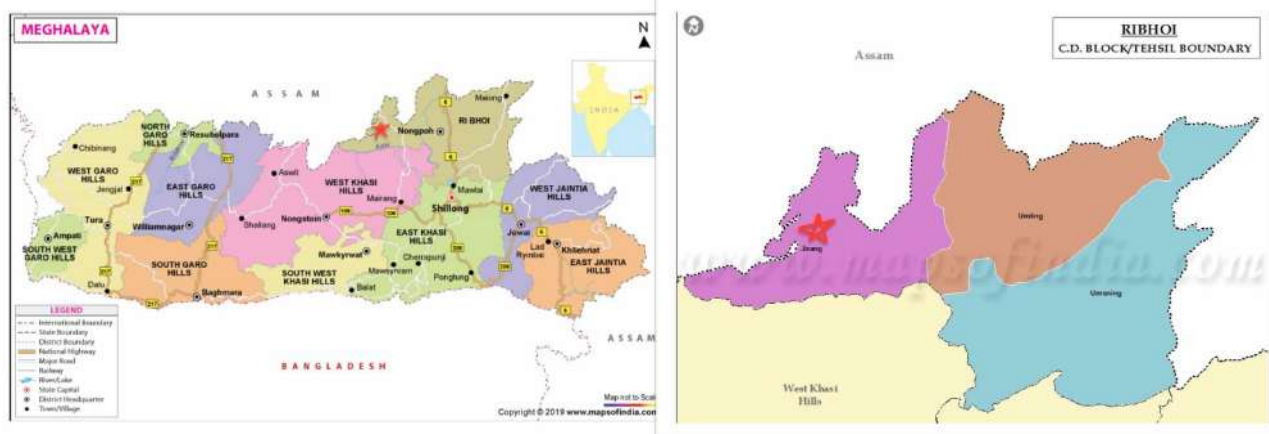


Fig.1 : Location Map

Setting up of a Food Processing Unit at village Jareibasai, Block Jirang, District Ri Bhoi in Meghalaya was a development intervention of Society for Action in Community Health (SACH) to strengthen livelihoods of rural households while reducing the wastage of fruits and vegetables in times of glut. It was meant to provide the families with supplementary income from an activity with part time engagement. Fifty women from smallholder farming families were identified from a contiguous cluster of five villages comprising Gunapati, Jareibasai, New Amkrem, Nongrim Jirang, and Umkrem Dykhong. For setting up the food processing unit, a plot was identified atop a small hillock spread over an area of about 60m x 40m in village Jareibasai. It belonged to the tribal council of three villages Nongrim Jirang, Jareibasai, and Umkrem Dykhong. The land was obtained by the women's group from the tribal council on lease for this purpose.

2.2 Product Strategy : It was decided to focus on a few products with relatively simple processing requirement but with higher potential of reducing wastage. This decision was made in view of the seasonal availability of raw material, and the shelf life of raw material and finished product, as also due to limited capital available for investment in plant and machinery. It was also driven by seasonal availability of raw material locally. Two main products identified for the first year were chips (or wafers) and jams (or marmalade). The chips and wafers were made from four raw materials, viz., raw jackfruit (from March to May), tapioca (from October to February), raw banana and potato. The timings of banana and potato were determined based on the price of raw material at different times of the year (whenever it was available at low price). Information on availability of raw material and prices was gathered through focused group discussion with farmers and local traders. It was used for cost analysis and to define the strategy on scheduling (as per seasons). In addition, primary processing of fresh ripe jackfruit into bulbs, with or without seed separated, packed in small plastic bags were sold in local weekly *Haats* and shops on highway during June-July (Table 1).

Table 1 : Product Mix as per Seasonal Availability

Raw material	Season of availability	Retail Price
Raw jackfruit for chips	March - May (early June)	Rs 10 - Rs 30 per fruit
Ripe jackfruit for cubes	May - July	Rs 5 - Rs 20 per fruit
Tapioca	Oct - Jan	Not known, never sold
Raw banana	Always (esp. Jan-Feb, Oct-Nov)	Rs 10 - Rs 20 per dozen
Potato	Always	Rs 5 - Rs 20 per kg
Ripe jackfruit seeds	May - August	Not known, never sold

2.3 Processing Technology : It was decided to use appropriate and environment friendly technology in the food processing unit. It was guided by the principle of keeping it simple for adoption by the tribal women who had limited access to education, but were familiar with traditional methods of food preservation. Simple methods of primary and secondary processing they were familiar with, were in line with the modern methods of food processing. As observed by Marshall (2012), fermentation of fruits and vegetables, which could make otherwise inedible food stuffs safe, nutritious, and palatable, improving digestibility of protein and carbohydrates, removing natural toxins, and decreased cooking times [3].

Plant and machinery. Given the limited or negligible access to electricity, biomass fuels were used as heat source, coupled with solar energy for drying and heating when sun is shining (non-cloudy days and non-monsoon months). Efficient cook stoves based on Top-Lit Up-Draft Gasification principle were procured and used for most operations, whereas traditional cook stoves (*Chulha*) was used when high heat was required. In view of the limited choice of energy sources, a combination of machinery available in the market and fabrication or assembly of some simple devices was deployed.

Table 2 : Equipment and Machinery Used

Machinery purchased	Local fabrication
Heating devices <ul style="list-style-type: none"> • Biomass stove - large (3kg/hr+) • Biomass stove - small (<1kg/hr) • Wood or oil fired boiler 	Drying devices <ul style="list-style-type: none"> • Dryer (with twin source of hot air) • Solar collector for dryer

<ul style="list-style-type: none"> • Steam jacketed kettle 	
<ul style="list-style-type: none"> • Pressure cooker (2-3 sizes) • Roasting pan (Kadhai 3 sizes) • Vessels for frying (SS pans 3 sizes) • Utensils for washing • Hand tools and trays (as per RRTC list) • Hand grinder • Power grinder/ flour mill 	<ul style="list-style-type: none"> • Eccentric drum mixer (cum coating pan) • Sand jacket for frying (Aluminium vessels in 3 matching sizes)
<ul style="list-style-type: none"> • Weighing scales • Plastic sealing machine • Almirahs/ cupboards • Work tables and stools • Labels and stamps 	<ul style="list-style-type: none"> • Platform for washing • Platform for drying

Process. The chips and wafers were prepared by deep frying using a descript vegetable oil (sunflower oil for jackfruit and cassava chips and soybean oil for banana chips). Standard processes, including pre-processing of raw material, prescribed by the Rural Resources and Training Centre, Umran, Ri Bhoi and State Food Processing Laboratory, Shillong, were used. For jackfruit seed flour making, standard technology of mechanical grinding (advocated by Tamil Nadu Agricultural University - TNAU and Central Food Technology Research Institute - CFTRI) was used. Further, the production methods and process were in line with the requirements of FSSAI.

2.4 Marketing Strategy : It is decided to use a simplistic marketing approach in the first one or two seasons or for the first few Metric Tonnes of product. The strategy was guided by two main principles. The first was the Competitive-Positioning Compass (after Moore, 2006) [4], which suggested Developing the Mainstream Market, which was well within the means for the women's group to achieve. Further, it targeted the Generalist customers (*op. cit.*) interested in a proven and stable product. The second principle was to emphasise on local-to-local marketing. Based on the experience of SACH staff of promoting livelihood activities across a wide spectrum of sectors and geographies, it was considered prudent to tap the local markets first, and then gradually expand to nearby towns, but not distant areas. Main reason for this conservative approach was the seasonal nature of products, which cannot fulfil the demand of regular customers round the year. Another reason was the limited outreach owing to high transport costs *vis-a-vis* low margins. Based on these considerations, the strategy comprised of the following five components.

Market assessment. A rapid market assessment was carried out through structured interaction with select shopkeepers and existing processors over a period of two weeks, as a formal market study was not warranted at present. It was done with the objective of assessing the local market size, so as to determine the market strategy for the first year. A rough estimate of the local market size was about 500 kg of chips and 100 kg of floor per month as per the follows (Table 2). It was decided to plan for the tapping of 25% of the potential within one month, 50% within two months and 100% within three months.

Table 3 : Estimate of Local Market Size

Product	Market	Sale potential
Chips and wafers - all types (500 kg/month)	Retails shops (200 kg/month)	10 villages x 2 shops x 10 kg/month
	Schools (60 kg/month)	5 schools x 12 kg/month
	Village <i>Haats</i> 240 kg/month	3 <i>Haats</i> x 20 kg/week

Market channels. It was decided to focus on only three marketing channels in the first year. It was decided to consider expanding the markets to nearby cities or semi-urban markets like Guwahati (25km), Byrnihat (60 km), Nongpoh (75 km), and Shillong (125 km) after gathering experience of local markets for about year.

- **Local shops :** Each village has about 2-3 grocery and Pan shops, who would be given supply with 7 days of credit (or 50% down payment and 10 days of credit).

- **Weekly Haats :** Three Haats in the vicinity, namely, Rani Jirang (10 km), Jirang (19 km), and Patharkhama (23 km) were identified. On a *Haat* day, about 3-5 kg of packets were handed over to the interested sweat meat shopkeepers in the morning and the money was collected, along with any unsold packets, in the evening.
- **Schools :** Makeshift stalls were set up in front of schools during recess as outlets of nutritious food supplement for children.

This decision was based on considered understanding of the advantages of local-to-local strategy, and simultaneously, the challenges of local-to-global marketing channels. The former approach of selling locally made products in local market are suited for

Products and branding. Initially for a few months, the chips were sold in transparent polypropylene bags with photocopied product labels. In the meantime, SACH designed the packaging, brands and logos for chips as well as other products (Fig 2). As a first step, distinct product labels, in form of stickers, were prepared for four types of chips and one type of flour.



Fig.2 : Photographs of package labels

Product pricing. Practical pricing was estimated based on the trial production data and a ‘cost-plus’ formula was used to determine the price. It was decided to keep the price low at the beginning for two reasons, viz., firstly to introduce a new product at competitive price, and secondly, to make nutritious food available to local population. Preliminary analysis indicated that the cost of production of jackfruit fried chips was around Rs 120 per kg. Thus, wholesale price could not be less than Rs 240 per kg (it translated to Rs 4 for 15g pack and proportionately for the larger packs).

Promotion. Product promotion strategy could not be developed elaborately for two main reasons, viz., lack of opportunities and lack of funds for promotion. Therefore, it was decided to focus on word-of-mouth publicity through local vendors and shopkeepers. Some promotional literature was distributed through SHGs and School Sanitation Committees on nutritional benefits of chips and flour. Similar posters were displayed at the shops and outlets. In future, it proposes to hold demos on common recipe of foods using jackfruit seed flour in SHGs (and also at the kiosks/ desks in *Haats*). At present, the women’s groups are looking for opportunities to display and sell their products in promotional events or exhibitions organised by various

agencies of Women and Child Welfare, Rural Development, Horticulture Boards, etc. In order to further facilitate marketing of the products, SACH has initiated the process of setting up a retail store on the Guwahati-Shillong Highway.

2.4 Capacity Building strategy : This was the most critical component of the project. In the context of livelihoods enhancement of tribal women, capacity building is looked at as a comprehensive approach towards economic development and social empowerment. Capacity building was looked beyond conducting of training events and exposure visits.

Guiding principle. The strategy encompassed two aspects of human resources development and organisational development. The first deals with the process of preparing individuals with the understanding, skills and knowledge and experiential learning that enables them to function effectively (individually and as a group). The latter deals with the management systems, not only within an organisation, but also management of relationships between different organisations.

Concept of capacity. Capacities are described in terms of a set of knowledge and skills, and an ability to use them in a given project context. This set of knowledge and skills gets continuously upgraded, sometimes subconsciously, thus enhancing capacities of the individual. Capacity building is expected to bring in new knowledge and skills or refine and enrich existing knowledge and skills. It is expected that the concerned stakeholders (community members, community organisations, project staff and implementing organisation) use these increased knowledge and skills to attain the desired results, which in turn are strongly linked to involvement of the community in the different stages of project cycle [5].

Capacity building inputs. Capacity of the tribal women were developed on three disciplines, viz., processing technology, marketing, and enterprise management. These followed a simple four step methodology based on the logic of Kolb's Adult Learning Cycle (*op. cit.*). Four steps included (i) initial training on basic knowledge and skills, (ii) practice to try out the skills and knowledge imparted with regular handholding support from SACH staff, (iii) observation and analysis of results, and (iv) experimenting with newly acquired understanding or knowledge. These are briefly explained below.

(i) Initial training : Fifty women were identified for undertaking different roles in the food processing enterprise - collection or procurement of raw material, processing, and marketing. Eighteen women members were trained in basic processing concepts and technology, including pre-processing of raw material, at Rural Resources and Training Centre, Umran, Ri Bhoi and at State Food Processing Laboratory, Shillong. Additional training and hands on guidance was provided by Krishi Vigyan Kendra (KVK) of Indian Council of Agricultural Research (ICAR), Umiam. Eight women members were trained in house by SACH staff in marketing, including market assessment and cost analysis. Ten women members were trained in house by SACH staff in quality assurance while procuring raw material and its primary processing at farm level.

(ii) Practice : The first opportunity to practice the knowledge and skills was provided to the procurement team to assess the raw material availability and its price fluctuation across the seasons. This was done through a series interactions with the farmers and traders within the cluster. Once they obtained some information, it was tabulated and analysed. The seasonal chart (Table 1 above) was prepared by this group of women members. Before start of procurement, they were trained on quality checks for different types of raw material.

The processing group was guided to produce trial batches of chips and other products. The products were first tested internally among the members and oral feedback was used to analyse the reasons for satisfactory or unsatisfactory quality of the product.

The marketing group was then guided to visit the shopkeepers and traders within the cluster and test-market the initial products. The feedback from the sellers was used to map the market potential (Table 3 above).

(iii) Conceptualisation : Based on the analysis of feedback, improvement could be done in procurement schedule, product quality, pricing and marketing strategy. The women members used to meet every fortnight to reflect upon the experiences, and fine tune the planning for the next few weeks. It resulted in preparation of simple charts in local language defining the process, the quality parameters of raw material and the quality parameters of the products.

(iv) **Future planning** : Based on the above, future plans for procurement, processing and marketing were prepared by the women members. Initial success, and the newly acquired skills to gather market trends, gave them the confidence to venture into newer products like citrus jam, marmalade, bamboo shoot pickle, and other pickles.

6. CONCLUSIONS

The following main conclusions could be drawn from the case study.

6.1 Success Factors : Secondary processing of perishable fruits and marketing of the processed products could be managed by semi-literate women within a short period of time due to three main factors, namely, product selection based on seasonal availability, market segmentation with focus on local-to-local marketing, and systematic capacity building in technical and managerial aspects.

6.2 Capacity Building : Capacities of rural women in processing technology, market analysis and management of micro-enterprise could be built using an approach with continual handholding support. Initial training, followed by opportunity to practice under expert supervision, and a review process to reflect upon the positive and negative experiences led to building skills and knowledge in a short time and with long lasting effect.

6.3 Quality parameters : Review and reflection methodology used in the project helped the women develop quality parameters for the products and improve the processing methods and tools on their own.

6.4 Continuous improvement: Capacity building is a continuous process, which does not stop at an event like training programme or a demonstration session or a review meeting. Women were encouraged to periodically review their experiences and reflect upon the factors of their success, and use this learning in improving the performance further. It helped induct an attitude of constant improvement in processes and products.

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