



Commercialization Of Hawaiian Mango Juice Technology For Inclusive Community Development

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Abstract

This report discusses a completed research, development and extension initiative in promoting entrepreneurship in the communities through the commercialization of a research-generated technology - the Hawaiian Mango Juice Technology. It outlines the activities done from technology verification and pilot testing of business plans, identification of a community partner to the actual commercialization of the technology in an established community enterprise. The technology utilizes Hawaiian mango which is an unwanted variety that has wide potential for processing and is abundant in the country. The product is ready-to-drink and is all-natural with calamansi as the source of Vitamin C and to serve also as preservative. Result of sensory evaluation indicated a very high level of acceptability among intended consumers. Likewise, result of financial analysis showed a high level of profitability which gained the interest of the partner cooperative to commercialize the technology. Through a memorandum of Agreement with the Tagudin Samahan ng Magkakalamansi Producers Cooperative, the technology was utilized for income generation. This project funded by the Agricultural Competitiveness and Enhancement Funds (ACEF) through the Department of Agriculture -Bureau of Agricultural Research (DA- BAR) is expected to improve the lives of farmer-member cooperatives and the mango growers in the communities where the juice processing enterprise was established.

Keywords: Technology commercialization, extension, enterprise development, mango juice processing, inclusive community development

Introduction

Rationale

Technology commercialization is the process of transforming research, inventions and ideas from laboratories or universities into marketable products, services or solutions. Commercialization empowers marginalized groups, foster local entrepreneurship and bridge economic divides. This is the focus of the Research, Development and Extension (RDE) programs of the Ilocos Sur Polytechnic State College.

Mango is a versatile fruit that has many uses. Mango producers were motivated to produce more because of the variety of processed products that can be derived from the mango fruit. Researchers however, has concentrated on the native (carabao) mango which has a great potential for export and considered as one of the high value Philippine crops.

According to the Major Fruit Crops Quarterly Bulletin, January - March 2018, Ilocos Region topped the mango producing regions, contributing 55.6 percent to the national total production. Central Luzon ranked second with 18.2 percent share and Western Visayas, 6.2 percent. Carabao mango comprised 81.8 percent of the total mango output this quarter.

While efforts are focused to increase the quality of produce of the native mango, there is that species of mango known as Hawaiian (*Mangifera indica*) that is beaming with fruits even without farmers' intervention. The tree bears fruit in three phases per season, thus availability of the fruit stretches to 5 or 7 months.

Result of a Rural Rapid Appraisal (RRA) conducted in the Magnificent Magic 7 (MM&) municipalities of Ilocos Sur pointed out that there are more than 8,000 fruit bearing mango trees that could possibly be the source of raw material for a mango processing plant. In fact, as a result of the ocular visit to Quirino and Cervantes, almost 60% of the households are tending one or two Hawaiian mango trees. While some juice manufacturing companies are utilizing this variety in their commercial juices, raw materials are usually sourced out in communities where transportation is not a problem thereby leaving Hawaiian mangoes in the upland communities into wastes. Cervantes has the greatest production of unmarketable mangoes like the Hawaiian and Indian mango plus the rejected native mangoes.

Mango is no longer an important crop in Suyo, Ilocos Sur because of low price of the fruits for the past years and due to poor quality as plants were attacked by "Kurikong." Some of the recommendations advanced were: There should be trainings on cultural management of mango and orientations should be conducted to convince farmers in the MM7 communities to return to commercial mango production; and the presence of a ready buyer/market (like a mango processing center) would encourage growers to revive their mango productivity.

As a member of the team committed to make innovations in the Magnificent 7 municipalities of Ilocos Sur, which are upland municipalities, ISPSC has identified the Hawaiian Mango as potential for product development. In fact, it was considered urgent because if no intervention is offered to the growers, a high tendency that this variety of mango will come to extinction because a large number are cut due to the wasted fruits. The absence of technologies discouraged the owners of these trees to maintain them because the unutilized fruits will only serve

as fly attractants in their neighborhood when these are allowed to shed from the trees. It is only in large plantations where mango farmers consider the variety important because they believe that their presence is necessary for a more effective pollination of their Carabao mangoes.

For the past years, Ilocos Sur Polytechnic State College (ISPSC) has conducted researches on the utilization of existing mango processing technologies on the Hawaiian variety. As a caretaker of a juicing equipment made available through the Common Shared Facilities Program of the Department of Trade and Industry, ISPSC has developed technologies utilizing this variety of mango into juice, puree, jam (from the "sapal" or by product in juicing) and pickles. The college also tested the feasibility of producing dried Hawaiian mangoes and wine using the technology developed by Ramon Magsaysay Technological University (Garcia, 2015) for Carabao mangoes. Initial evaluations of these technologies showed that these could be profitable ventures when commercialized. Sensory qualities of the developed products indicated a high level of acceptability by consumers and the willingness to buy the products is attributed to the organic attributes and low sugar content. Minor enhancement of the technologies including shelf-life tests and package enhancements were done at ISPSC Post Harvest laboratory and the researchers believe that pilot commercial production in the research institution (ISPSC) is necessary to develop the most viable business plan to be offered to the beneficiary cooperatives. Through a memorandum of agreement, technologies will be transferred for use right there in the communities where Hawaiian mangoes are of no economic importance, to facilitate high commercialization of the technologies.

General Objective:

The general objective of this project is to commercialize the Hawaiian mango juice processing technology as a means of increasing income of mango growers and farmers in Region 1.

Specific Objectives:

Specifically, it aimed to:

- a. To upscale the production of Hawaiian mango juice;
- b. To expand, maintain and develop additional market opportunities for the Hawaiian mango juice;
- c. To capacitate members of the partner cooperative in Hawaiian Mango Juice Production;
- d. To develop an attractive business plan for mango juice enterprises; and
- e. To establish a village scale Mango Processing enterprise.

Scope and Limitations:

It is limited to the processing of an unwanted variety of mango, the Hawaiian mango, which is a seasonal crop.

Methodology

This chapter outlines the specific methodologies and activities conducted to achieve the specific objectives of the project.

Objective 1. To upscale the production of Hawaiian mango juice

Production of mango juice in commercial scale was done at the laboratory and tested for market acceptability. Packaging materials were also evaluated and product samples were also brought to the DOST Regional Laboratory for microbial analysis and proximate analysis.

Objective 2. To expand, maintain and develop additional market opportunities for the Hawaiian mango juice

The product was launched in the market and the processed mango juice were offered for sale in schools and offices. Likewise, it was used as a main drink served in every activity of the college especially if there were guests from other regions.

Objective 3. To capacitate members of the partner cooperative in Hawaiian Mango Juice Production

Technology transfer and skills training was done at the Tagudin Samahan ng Magkakalamansi Producers' Cooperative (TSMPC) processing house. The specific details of the technology were demonstrated by the technology developer and monitored the strict compliance of the processors to good manufacturing practices during the production activity.

The use of the equipment provided including the refractometer was also well demonstrated to the production staff of the cooperative.

Objective 4. To develop an attractive business plan for mango juice enterprises

As a result of the trial commercial production and marketing of the mango juice at the ISPSC Postharvest laboratory, a business plan was developed for offering to the prospective partners for commercialization.

Objective 5. To establish a village scale Mango Processing enterprise.

Three possible cooperators were considered as partner to commercialize the mango juice processing technology. These were the Quirino Mango Growers Association Cooperative of Quirino, Ilocos Sur.; the Cervantes Mango Farmers of Cervantes and the Local government Unit of Tagudin, Ilocos Sur. Initial discussions were made with the partner LGUs including Cervantes, Quirino and Tagudin. However, due to travel restrictions due to COVID 19 pandemic and considering the stability of the TSMPC as recommended by the local government unit of Tagudin, the TSMPC was finally selected.

Extensive meetings and discussions to arrive at an agreement that was mutually beneficial to both parties were done. A MOA signing ceremony was done and the technology was transferred through training of the cooperative staff. Some equipment were issued to the cooperative in support to their production operations.

Samples of the produced mango juice were also sent to the DOST Microbiological Laboratory for microbial analysis and also for proximate analysis. This was deemed necessary to ensure the safety of the products before these will be offered to the market. Result of the proximate analysis was needed to complete the product label as required.

Products were launched in a greater audience/group and advertised in various offices, schools and marketplaces. ISPSC also assisted the cooperative in the marketing of its initial production.

Discussion/Innovations

This chapter presents the major activities conducted in the project and the significant findings for each of the major activities.

Upscaling Production of mango Juice

In this component activity, the mango juice processing technology was verified and enhanced for trial commercialization. As a result, the following component processing technologies were verified:

Hawaiian Mango Puree (developed). This makes use of the Hawaiian mango variety that are fully matured and follows the following procedures: 1. Washing of fruits; 2. Peeling; 3. Juicing; 4. Pasteurization; 5. packing in PE bags; 6. Freezer Storage.

Hawaiian Mango Juice (developed and commercialized). The mango puree is diluted with purified water and syrup plus calamansi juice as the stabilizing ingredient. The distinct taste of calamansi enhanced the sweetness of the mango that makes the juice drink very acceptable.

Hawaiian Mango Jam. The technology converts the “sapal” or mango fibers left after extracting the juice from the ripe mango fruits into a palatable sandwich filling or dessert topping, the mango jam. It is manufactured by cooking the “sapal” in sugar until it reaches the spreading consistency.

Market Promotion of Hawaiian Mango Juice and Identification of Potential Partner

Market Information. To create a wider market for the product proposed for commercialization, institutional linkages were established and product promotion and coordination was made with the following as potential institutional buyers of the products including the Local Government Units (LGU) – Tagudin, Santa Maria, Cervantes, Quirino, Narvacan, Candon; Provincial Government of Ilocos Sur; Department of Education (Dep ED) District Offices and Schools. The total volume of products marketed was 42 boxes for 3 weeks.

Farmer Cooperators/Associations/Groups involved in the Hawaiian Mango juice Processing Project

a. TAGUDIN SAMAHAN NG MAGKAKALAMANSI PRODUCERS' COOPERATIVE

Address: BITALAG, TAGUDIN, ILOCOS SUR

Number of Farmers Involved: 100 FARMER MEMBERS (34 Males, 66 females)

Project intervention: Earned income from mango and calamansi produce will earn income share in the cooperative's income from the enterprise; Selected members will be upgraded in terms of mango production and postharvest management skills.

b. SUYO MANGO GROWERS ASSOCIATION

Address SUYO, ILOCOS SUR

Number of Farmers Involved: 55 (38 males/17 females) (Hawaiian mango owners)

Project intervention: Potential sources of raw materials

Enterprise Development

Development/Promotion of IEC Materials. A Techno guide on Hawaiian Mango juice was developed and used as guide in the training of the TSMP Cooperative production staff. A copy is hereby attached on the Appendices.

Conduct of Training. After the MOA signing, a training was conducted among the personnel of TSMPC on Hawaiian mango juice processing. As requested by the cooperative, the technology shall not be transferred to all the staff, rather, the head of the production team must only know the proportions/measurement of the ingredients. All the others were however trained in all the other procedures.

Aside from the hands-on experience on mango processing, a training on entrepreneurship (book keeping, cash management) was provided to the staff of the cooperative.

Furthermore, Current Good Manufacturing Practices (cGMP) and food safety seminar was also provided to the trainees/participants and most especially to the prospective employees of the enterprise to prepare for the FDA licensing requirements.

Information Dissemination. The details of the project was presented at the Global Agribusiness Management and Entrepreneurship (GAME) Conference hosted by the University of the Philippines to create awareness that a mango juice processing technology is being commercialized to add value to the Hawaiian mango variety and as a source of income for farming families. Certificate of Presentation is attached at the Appendices.

Conclusions And Recommendations

The following conclusions are deduced from the results of the project implementation:

1. Hawaiian mango juice is highly acceptable as a healthy refreshing drink
2. Availability of supplies and equipment guarantees a successful commercialization of a technology as it affects the volume and quality of production in the enterprise being established
3. Hawaiian mango juice production is a profitable enterprise that can help improve lives of farmers.
4. Technology commercialization fulfills the role of research for inclusive community development.

The following are hereby recommended:

1. Continuous product development and research must be done on the transferred technology.
2. Enhancement of the processing facility of the established enterprise may be given priority by the cooperative to include the purchase of additional freezers, and use of better packaging options.
3. Necessary equipment and supplies must be made readily available before transferring technologies for commercialization to ensure its success; and
4. SUCs like the ISPSC may promote commercialization of research-generated technologies through their extension activities, thereby contributing to inclusive community development.

References

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PICTORIALS

Figure 1. Pictures of Hawaiian mango products developed in this project:



The MOA Signing Event



The technology brochure

