The Value Addition of Banana Trees with New Products in Ban Hae Community, Ang Thong Province

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Abstract - Bananas are classified as important economic crops of Thailand. They can be grown in all regions of the country and throughout the year. However, previous research has not yet found the maximum potential of banana trees. Many studies mainly focus on the processing of banana fruits. This research, however, focuses on developing the potential of banana trees with the concept of creating value-added products that generate income for the community. The objectives of this research are to 1) create the prototype of paper produced from banana trees, 2) add the value of products made from banana trees, and 3) disseminate research results and new products from banana trees to the community. This mixed-method research employed a case study and survey research method. Data were collected by interviewing 10 community enterprise representative who were involved in processing bananas in Ban Hae, Ang Thong province and selected by purposive sampling to in-depth interview from 86 members. There were also three product design and development experts selected by purposive sampling. There were also 100 customers who were selected by accidental sampling. The research instruments included a questionnaire and an interview. Qualitative data were analyzed by means of content analysis and quantitative data were analyzed by means of descriptive statistics including frequency, percentage and standard deviation. The design and developments of the products were used as a basic concept for this research to add their value. This research suggests that communities can create value-added from useless banana trees transformed into packaging to replace purchases from external sources. As a result, reducing costs. It also provides a unique identity for the community products.

Keywords— Value-Added, Creating, Banana Trees, New Product

I. INTRODUCTION

“Bananas” are indigenous to South and Southeast Asia (where Thailand is one of those regions) and are commonly cultivated in developing countries [1]. Bananas are easy to grow and their preferred condition is hot climate. Bananas can be grown everywhere in Thailand. Bananas have been associated with Thai people's way of life for a long time. Thailand has an area of approximately 481,639 rai of bananas, divided into 328,456 rai of cultivated bananas, 63,233 rai of lady finger bananas, 62,525 rai of Cavendish bananas, and about 27,425 rai of other banana varieties [2]

Thai people know how to make use of the banana trees and different parts of the banana can be used for consumption, religious ceremonies, daily rituals, and art works. In addition, bananas are processed into food, snacks, beverages, and medicines, etc. [3][4][5] However, previous research has not found the maximum potential of the banana plant. Many studies have focused mainly on the cultivation of bananas for export, the processing of banana fruit or banana leaves [6][7][8][9][10][11][12][13][14][15]. Ban Hae Subdistrict, Muang Ang Thong District, Ang Thong Province is one of Thailand's provinces with an area of 4,570 rai, which is 2,645 rai of
agricultural area. Most of the occupation that had been done in the past was farming and agricultural occupation still exists which accounted for about 80% of the total land area. The condition of the agricultural area has changed from the former farming to a vegetable garden and a village where most bananas are grown for selling fruits and leaves, with bananas being processed as food and snacks. Ban Hae Subdistrict Administrative Organization has promoted and pushed such as organizing a contest, organizing a Shom Shop Shim project, Kluay Kluay exhibition, and the Pracharath market project. Activities in the event have brought various kinds of bananas to showcase more than 30 types of food processing products from both savory and sweet bananas from 2017 to the present [16][17]. There is also a group of farmers formed the Ban Hae Farmer Housewives Group which has 86 members. A community enterprise of baked banana sheet group was established as an OTOP product, a prominent product category, which was established to process bananas in order to develop products and help farmers in case of oversupply. At present, there is a large production capacity for domestic sales [18]. However, even with processing to support the production, it is known among farmers that banana plants at the age of 10-15 months. When the bunch and the fruit is mature or fully ripe, then the plant must die [19], causing most of the banana stems that farmers cut, sell, or process the fruit to be cut off and become waste and a burden on the farmer group. Only 10% are used for raising animals (Information from researchers interviews). The above information provided the rationale for this study to focus on the potential development of banana plants. The idea is to create a value-added product that generates income for the community and is unique by creating new products from the ripe banana plants such as paper and various household or community enterprises to generate income and build a sustainable career for the community, enabling the community to continue to be self-reliant. It also creates a brand of products in the community and creates an image that will make the community famous. The community can apply the knowledge gained to develop it with other products that will occur in the future in order to be in line with the National Strategy [20] and the 5-Year Development Strategy and to achieve that vision that “The country is stable, sustainable, and a developed country with development according to the philosophy of sufficiency economy.” This has led to the development of Thai people to be happy and respond to the achievement of national interests in order to improve the quality of life, generate high income, become a developed country, and create happiness for Thai people for a stable society. The country can compete in the economy through the development of entrepreneurship and community economy, skill development, entrepreneurship further [21].

II. RESEARCH OBJECTIVES
The objectives of this research article were 1) to create a prototype for making paper from banana trees, 2) to create added value for banana trees to new products, and 3) to disseminate research results and transfer knowledge to the community of banana tree product producers.

III. LITERATURE REVIEW
Sufficiency Economy Concept for Farmers
Sufficiency Economy is a philosophy initiated by His Majesty King Bhumibol Adulyadej, pointing out the way of existence and conduct of people at all levels, from the family level, the community level, and the state level. Development and administration of the country to be carried out in the middle way, especially the economic development to keep up with the globalization world according to the royal initiative based on the principle of "New Theory" in 3 steps. The first step is self-sufficiency, self-sustaining on the basis of frugality, and eliminating spending. The
second step is to unite forces in the form of groups to do production, marketing, management, including welfare, education, and social development, etc. The third step is to build a network of professional groups and diversify economic activities by collaborating with the business, NGOs, and government sectors in finance, marketing, production, management, and information.[22][23][24] The significance of the Sufficiency Economy concept consists of three main components: Firstly, it is an economic system that adheres to the principle of "self-reliance" by focusing on the production of crops to meet the needs of household consumption first. When there is enough left over from consumption, production for trade is the second priority. Surplus produce that goes to the market will be the profit of farmers. The second is that the sufficiency economy focuses on the integration of villagers. Villagers groups or village organizations act as operators of various economic activities and cover integrated agriculture, handicrafts, food processing, trading business, and community tourism, etc. As these villagers’ organizations are strengthened and have a broader network, all farmers in the community will be cared for to earn more, and to get all problems solved [25]. In this way, the overall economy of the country is able to grow stably. This means that the economy can expand with better income distribution conditions. Third, a sufficiency economy is based on the compassion, generosity, and unity of community members in working together to achieve their careers. The benefits therefore not only mean income in one dimension, but also include benefits in other dimensions such as building stability for family institutions, community institutions, the ability to conserve natural resources and the environment, and developing learning processes of the community based on local wisdom, including preserving the good traditions of Thailand to last forever [26][27][28].

Information about bananas
There are 2 types of bananas that farmers in Ban Hae sub-district mainly plant. The first type is cultivated banana, a banana that is widely cultivated in Thailand (Scientific name: Musa sapientum Linn). It is a type of banana developed from a cross between a wild banana and a musa balbisiana. Because cultivated banana fibers are easy to peel, the fibers are tough, soft, and not too hard. The second type is Cavendish bananas (scientific name: Musa sapientum Linn.Fam). The stem is a pseudostem, about 2.5-3.5 m tall. Approximately 20 cm in diameter along the stem. There is a slight black dot on the outside and light green on the inside. The stripes are pink. This banana is an industrial crop [29].

Banana tree is a plant that has 6 major components as follows: 1) The underground stem is called a tuber or rhizome. At the head there is a bud, which grows into a tree and produces several suckers, called tillering. The suckers or the plant seen above the soil is actually not the stem. It is called a pseudostem. This part is caused by the compaction of the leaf sheaths arising from the growth point of the underground stem. The leaf sheaths hold the petiole and leaf. At this point, flowers grow after the ends in leaf growth of the last leaf before flowering that is called the flag leaf. 2) Roots are a root system that extends more broadly than deep vertically. 3) The seeds are round and rough. The seed coat is black, thick and tough. The flesh in the seeds is white. They propagate by separating suckers or rhizomes. 4) Flowers, flowers of bananas separate into inflorescence. In the inflorescence, there is a group of inflorescences in groups. Between the clusters of individual inflorescences there are decorative petals, known as bracts. It has a magenta barrier. The female flower cluster is at the base and the male flower cluster is at the end of what is called male bud. Between the female flowers and the male flowers, there are bisexual flowers. However, some varieties are not in the inflorescences. Each bouquet has flowers arranged in two rows. If they are female flowers, these flowers will continue to grow as a result. 5) Fruit, Banana fruit is
A group of female flowers that develop into a fruit is called a comb. Inflorescences grow into one bunch. Therefore, 1 bunch of bananas may have 2-3 combs or more than 10 combs depending on the banana variety and care. The fruit of the banana grows without fertilization, so most bananas are seedless. 6) Leaves are large leaf plates with a width of about 70-90 centimeters and a length of 1.7-2.5 meters. They have rounded leaf tips and oblong leaf shapes. The base of the leaves is rounded and the leaf plates are green [30]. There is a saying that bananas are versatile trees and can be used anywhere from root to shoot. In the past, when rice was scarce, humans would boil, steam, or burn the roots of bananas as a substitute for rice other than eating fruit [31]. However, nowadays, most of the uses of bananas, fruits, and banana leaves are used for eating fresh, bananas are used for cooking, and the leaves are used as packaging materials. In addition, bananas are processed into various products such as savory, sweet, snack bars, plates, decorative products, various containers, including making rope from banana trees, etc. [32][33][34][35][36][37]. These are based on farmer interview data. A community enterprise representative said most farmers today are not making the most of the banana stem.

**Value Added Creation Concept**

Value Added Creation Concept is the creation of added value to the original product and is a marketing tool for product development, distribution, advertising, and market promotion. These things result in higher prices and are considered as an effort to develop products that are valuable in the eyes of consumers in marketing. Creating added value is the development of products to achieve maximum consumer satisfaction and exceed customer expectations. The added value can be caused by adding something beyond what the consumer expects. Therefore, today's business can be seen that it is not just selling the main product or service alone, but must have a part of adding value that will make consumers feel more useful [38]. Creating added value can be created in a number of ways, such as creating added value from product design and creating added value from manufacturing processes. Sometimes it has to be done at the same time in order to achieve the final success is to get products and services that have "added value" for the target consumer group [39][40]. Therefore, creating added value from banana trees into new products is essential.

Each manufacturer therefore seeks opportunities to develop and enhance the product features offered to customers. The tool to help farmers and community enterprises to survive and thrive is to satisfy their customers over their competitors that is to attract them by creating added value that makes customers feel more than satisfied [41]. In this research, the meaning of creating value added from banana trees with new products refers to how to create new products from banana trees or how to generate additional income for farmers and community enterprises in their occupation. Creating added value is the key to sustainability.

**New Product Concept**

"New product" refers to a product that has been developed or has improved the existing product of the business to have better features. It may be the process of conceptual transformation towards products with sensory and intangible properties to meet the needs of consumers. Developing new products will reduce costs, generate income for entrepreneurs, and increase the chances of business success [42][43][44][45]. From the literature review on the new product development process, there are many different processes [46][47][48]. It can be summarized in 3 phases:
1) **Pre-Development phase** is the collection of concepts in the development of new products with a clear purpose of what the product needs or in what direction it is called the idea gathering.

2) **Development phase** is the concept of developing a product and bringing the product to survey the satisfaction of consumers with that product in order to confirm that the new product to be brought to the market is desired by the consumers for consumption.

3) **Post-Development** is the phase of product development at full capacity and implementing a strategy that includes the production and distribution phase and the Follow-up and evaluation phase.

Based on the concepts and theories and the literature review, the research team created the research conceptual framework as follows:

![Image of Research Conceptual Framework]

**Figure 1 : Research conceptual framework**

**IV. RESEARCH METHODS**

The researchers have designed the research tools and methods of research systematically to ensure the accuracy and pertinence of the study results. Topics can be categorized into the following steps:

* **A. Sample selection:** In the case study approach, subjects were selected based on purposeful sampling according to [49] concept. In the type of purposive sampling that have different characteristics and are unique. In this study, samples were selected from community enterprises, Ban Hae Sub-district, Muang District, Ang Thong Province as a case study for adding value with new products from banana trees. New products from banana trees are community enterprises that use products from banana trees. There are members who have planted banana trees to process their products into outstanding, successful enterprises, and have been certified as one of the five-star OTOP in Thailand as mentioned above. There are also 3 qualified product design and development experts chosen by pure sampling and 100 customers chosen by accidental sampling.

* **B. The research tool used interview forms and questionnaires.** Qualitative data were analyzed by means of analyzing content data and quantitative data using descriptive statistics, frequency, percentage, and standard deviation. Product design and development were used as the basis for this research to increase their value.

* **C. Data Collection Method:** In-depth interviews were used to collect data with the group of chairman, staff, community enterprise members, and community enterprise network groups. The study also collects information from additional documents such as business plan documents and income-expense accounts, etc. The researchers made an appointment with the informant in advance every time. The interview was conducted in October-November 2020. Preparation of the
researchers is a research study from 2 researchers who have prepared before going to the area by following steps. 1) The study of background data of the sample is a study of the general context of banana-growing agriculture in Ban Hae Community and Ban Hae Community Enterprise by searching the website or the internet that disseminates information from the Ban Hae Subdistrict Administrative Organization, Muang Ang Thong District, Ang Thong Province, including telephone inquiries, preliminary information and permission to schedule an interview. 2) Review of relevant literature is a study of additional information before going to the actual site by reviewing documents related to banana plants, product value-added approaches, and quality research methods based on case studies, etc. to obtain information used to create an interview form before going to the actual site. 3) Preparation of the protocol is the preparation of a manual to be used during the actual interview with the interviewee in order to have a systematic and standardized procedure for interviewing as shown in Table 1 as follows.

**Table 1 Interview Guide**

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP 1 Introduction of the research</td>
<td>An introduction of the research team to the interviewees to get acquainted with them and to inform the research objectives and to express their gratitude for the time being taken by the interviewees to participate in this research.</td>
</tr>
<tr>
<td>Step 2 Interview Questions</td>
<td>Part 1 is the general information of the interviewees for 3 items. The second part is about 5 items of community context, original product, and new product development needs.</td>
</tr>
<tr>
<td>Step 3 Summary of Interview Results</td>
<td>Summarize the key points for the interviewees for acknowledgment and summarize the overall information from the interview together and thank the interviewees once again.</td>
</tr>
</tbody>
</table>


**D. Interview technique:** involves recording written information in a journal during the interview along with a still photograph. The researchers have always asked for permission from the informant first. During the interview, there will be breaks and interrogations outside of the questions prepared by the researchers in order to prevent the informant from occurring too stressed. For the interview questions, the researchers prepared the questions in the semi-structured interview format as a guideline to develop the questions to get relevant and comprehensive information according to the research objectives [38].

**E. Data analysis:** is based on the interpretation and analysis of data collected by [50] which can be divided into 3 steps: open coding, axial coding, and selective coding. The data analysis in this research study used a statistical packaged program, which is a computer program that is suitable for both qualitative and quantitative research, which can be used to assist in the interpretation of the text data obtained widespread popularity [51]. However, in the interpretation and analysis of the data, the two researchers still play the most important role. In interpreting and analyzing the data in this study, frequency, percentage, and standard deviation were used for data analysis.

**F. Reliability check:** Credibility or reliability in this quality research study, the researchers applied a triangulation technique according to the concept of [52] which can be divided into 3 techniques as follows. 1) Researchers Triangulation is a technique to reduce interpretation errors by using the perspectives of two researchers together to interpret and analyze the data back and forth many times. Even the data studied were not different, so the analysis was stopped for further steps. 2) Datasets Triangulation is a technique of collecting data from various sources in order to obtain more comprehensive information by means of in-depth interviews. Three groups of informants
consisted of Ban Hae Farmer Housewives Group, Chairman, and members of the Ban Hae Banana Sheet Muen Community Enterprise Group, Ban Hae Subdistrict, Ang Thong Province. The number of interviews was 3 times, 1 hour each. Data is collected from other documents, including business plan reports and income-expense accounts, etc., for interpretation and numerical analysis related to value-added banana products. 3) Methods Triangulation is a technique for analyzing data that shows the value-added product from banana plants in two ways. The first method is a descriptive lecture section describing research findings related to the method of prototyping of paper produced from banana plants and product design and development by experts. The second method is a numerical analysis of the description of research findings relating to consumer demand for community products from 100 customers in order to quantitatively analyze content data in the form of numerical data. The quantitative questionnaires were examined for content validity. Validity by bringing the interview form and questionnaire created to 3 experts to find the IOC (Index of Item – Objective Congruence). The acceptable IOC values for each question are from 0.50 onwards. It was shown that all questionnaires and interview forms used in this research were of acceptable quality [53]. It was found that the interview form consisted of 5 items. IOC values were between 0.87–1.00. The opinion questionnaire of experts, housewives, farmer groups, enterprise representatives and consumers contained 20 questions. IOC values were between 0.80–1.00. The consumer satisfaction questionnaire consisted of 5 items. IOC values were between 0.85–1.00 which was greater than 0.50. These showed that the tool can be used for quality research and can be used to collect data effectively.

V. RESEARCH RESULTS
The result in the first aspect was that the Ban Hae community grows bananas commercially. The rest was processed into banana rolls. When the business became more profitable, the community was established as a community enterprise for processing baked banana sheet rolls in Ban Hae Subdistrict, Mueang Ang Thong District, Ang Thong Province and sold out in large numbers. The problem was that after harvesting, the community often cut down almost 100% of the banana tree and did not use it, turning it into organic waste.

Figure 2 Banana cultivation, processing and grouping of people in Ban Hae Subdistrict, Ang Thong Province

The researchers therefore studied the production of paper from banana trees by using the Mechanical Process method of making banana fiber sheets. Banana fibers were mixed with hemp, bleached, beaten with a Hollander pulp spreader and dried in the sun. After that, the banana fiber sheets were tested for efficiency, which can be used as well as proposed methods for producing paper from banana trees as follows:

Step 1 Take the banana plant after harvesting and cut it into 1 foot pieces, cut 4 halves, and soak in water for 1 night. (If the banana tree that is cut down is freshly cut, soak it for 5-7 nights) as shown in Figure 3.
The process of fermenting the banana plant to prepare the paper

**Step 2** Wash the fermented banana plant with water and bring it to a boil in a pot mixed with caustic soda. The proportion is 60 kg of banana plants: 2 kg of caustic soda and mixed with dried flax (cut 1 foot, fermented for 1 week, amount 5 kg). Mix together and boil for 3 hours, then scoop out and wash with clean water. Rest for about 10 minutes, as shown in Figure 4.

The process of boiling the banana plant and its ingredients

**Step 3** After the boiling is complete, remove the unspoiled pulp and process it in a Hollander blender. 30 kilograms of bananas were blended together until it was finely milled into cotton wool for 15 minutes per mill and then poured out into the sump as shown in Figure 5.

The process of spinning banana plants in a Hollande blender.

**Step 4** Cut the paper from the banana tree by bringing a tank to put the banana tree that has been finely blended and mixed in the paper pit, mixed with clean water by putting about 50 cm. (size of the pond 130 cm wide, 85 cm high, and 50 cm of inside base height). Bring the paddle to stir in the pond to break the paper into cotton wool and bring the teak frame (width 56 cm, length 80 cm) created to scoop the paper according to the desired thickness. (There were 3 sizes of paper thickness, namely No.00 is 100 grams per sheet, followed by 01 is 85 grams, and the last number 03 is 65 grams thick) as shown in Figure 6.

The process of cutting paper from a banana tree to form a frame in a cement pond.

**Step 5** Take the paper that has been molded from the frame sheet and let it dry for about 10 minutes. After that, take a container with a circular mouth to spread the paper so that the paper is evenly smooth and dry in the sun for 2-3 hours depending on the weather. After that, the paper is
collected and put in bags for preparation to be sold or used to create the next product, as shown in Figure 7.

![Image](https://www.turkjphysiotherrehabil.org)

**Figure 7 Procedure for adjusting paper surface uniformity and drying in the sun**

The resulting product is paper from the banana tree as shown in Figure 8.

![Image](https://www.turkjphysiotherrehabil.org)

**Figure 8 Paper produced from the banana tree**

**The result of the second aspect**, the design and development of banana products were based on participation from the selection of 2D drafts by key informants. After that, the researchers prepared a 3D draft to be considered for the prototype product and evaluated the 3D draft of the product by a group of 3 experts, 10 manufacturers, and 100 consumers, totaling 110 people. The results of the study were as follows: The participants were 65 female (59.09%) and 45 (40.91%) male. Participants were aged 45-54 of 48 people (43.64%), followed by 35-44 of 24 people (21.82%), 55 years and over of 14 people (12.72%), and aged 25-44 and under 25 years were the same of 12 people (10.91%). Participants were 30 company employees (27.27%), followed by 25 civil servants/state enterprise employees (22.73%), 17 private businesses (15.45%), 15 farmers (13.64%), 14 students (12.73%), and 9 housewives (8.18%), respectively. The results of the product draft evaluation were as follows:

Table 2 Results of evaluation results of product design and development from banana plants

<table>
<thead>
<tr>
<th>Products</th>
<th>Number of people</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>16</td>
<td>14.16</td>
</tr>
<tr>
<td>Model 2</td>
<td>45</td>
<td>39.82</td>
</tr>
<tr>
<td>Model 3</td>
<td>52</td>
<td>46.02</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>113</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The results of the evaluation of the 3D drawings of the women's handbags products revealed that the product models from the 3D drafts of the 3 packaging types chosen by the sample the first included the third model with 52 people representing 46.02%, followed by the second model with 45 people accounting for 39.82%, and followed by the first model with 16 people or 14.16%.

Table 3 Mean and standard deviation of the sample satisfied with the community product.

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Table 3 found that consumers were satisfied with the banana tree paper products of the third model at the 4.34 opinion level, followed by the second model at the 4.09 opinion level, and the first model of product has a 3.95 rating. All three consumer products were satisfied at a high level. For the third product category, consumers were satisfied with the highest level of functionality (4.63), followed by material (4.57), aesthetics (4.28), and durability (3.88), respectively. In terms of the second product model, consumers were most satisfied with material (4.45), followed by product usability (4.24), aesthetics (3.85), and durability (3.81). Products with the first model were most satisfied with materials (4.44), durability, functionality (3.81), product usability (3.78), and aesthetics (3.75), respectively.

All three consumer products have a high level of opinion in all aspects.

**Table 4 Mean, standard deviation, and opinion level of the consumer sample with community product demand.**

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
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<tbody>
<tr>
<td>G</td>
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<tr>
<td>S.D.</td>
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<tr>
<td>4.63</td>
<td>3.81</td>
<td>3.78</td>
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<tr>
<td>4.44</td>
<td>4.24</td>
<td>4.28</td>
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<tr>
<td>4.45</td>
<td>4.09</td>
<td>3.95</td>
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<td>4.54</td>
<td>4.51</td>
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<tr>
<td>4.67</td>
<td>4.67</td>
<td>4.44</td>
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</tbody>
</table>

**Figure 9: Three prototypes of paper products made from banana trees**

The result of the third aspect of the prototype product created in 3 models is shown in Figure 9 as follows, the first model. In this regard, the prototype product was taken to survey the consumer's demand to see the opinions of the sample group in Ban Hae community from farmer housewives, group of housewives of community enterprises to process banana rolls, and consumers as shown in Table 4.

Table 4 Mean, standard deviation, and opinion level of the consumer sample with community product demand.
The survey results in Table 4 showed that the samples and consumers had the highest level of demand for products from the community.

VI. DISCUSSIONS

The results discussion according to research objectives are as follows:

A. Create a prototype of paper made from banana trees.

The research indicated that banana trees can be made into paper for commercialization benefits that was consistent with research by [54]. Banana by-products have been studied in which bananas were an important crop widely grown in tropical countries around the world. The stems were a by-product of bananas that can be processed for commercial use. [55]. This was consistent with other researchers who have discovered that the production of paper from banana plant material can be commercially produced and developed [56][57][58][59][60].

B. Create value with new products from banana trees.

After the successful trial of paper production from banana trees, paper can be added to add value by producing [61] 3 models of new products. However, in all 3 models of products, consumers were satisfied at a high level in terms of product utility, material, aesthetics, and durability. In addition, new products that have been created were still in demand by consumers at the highest level. This was consistent with the research of [62] who studied the feasibility of product development, design, and development of products according to community product standards. Product development was divided into five forms, and all forms of consumer demand were at the highest level. This was also consistent with the research of [63] who researched the development of handicraft products from banana rope. It was found that consumers were satisfied with the texture, aesthetics, durability, and usability at a high level.

C. Dissemination of research results of new products from banana trees to the community.

The researchers have brought the prototype product to transfer knowledge of paper production and created added value to the community. The participants were the most satisfied. This was consistent with the research of [64]

VII. RECOMMENDATIONS

A. Recommendations for Practices

1. Strengthening the management of agricultural produce in the community is a learning process for people in the community to drive more efficient livelihoods, business management, and career creation. Each of these communities has a different dynamic. If learning and sharing with each other will result in proper adaptation and development.

2. Creating added value for the banana tree, which is the most effective agricultural product in the community, should receive cooperation from internal and external communities and support from various organizations. In particular, the government sector has a strong need to strengthen in the early stages of adding value to the banana trees in the community.
3. Creating a new product is very important to the creation. The added value of agricultural products, especially bananas, which are local plants, will bring commercial benefits to the community.

B. Recommendations for Further Research
1. The samples tested in this study were only in Ban Hae Community, Muang District, Ang Thong Province. The further research should be done with other communities and compared to developing methods and ways to add value to banana plants in order to create a new body of knowledge for further research.

2. This research was carried out only in the field of adding value to banana trees. Therefore, research on various types of local agricultural products should be carried out as a guideline to add value to local agricultural products by encouraging people in the community to participate in the process of participating in the creation of new products in order to generate income and to continue sustainable development.

3. This research result was developed mainly by qualitative research. The results revealed an interesting issue from the process of spinning the banana pulp in the septic tank. If it is done commercially, there will be a lot of effluent discharge which will have a negative effect. Therefore, further research should be done by analyzing and experimenting with effluents for further development of new products such as compost.

CONCLUSION
Bananas are a low-cost food source in developing countries. The majority of the population uses bananas for food, but the composition of bananas is versatile and beneficial. The result was that the Ban Hae community was able to produce paper from banana trees. The creation of this product was not new, but its commercial benefit to the community has been achieved through the conduct of research in this project for the utilization of agricultural by-products and waste for commercial and income benefits. This was because the product created was essential to reducing waste and the loss of valuables unused, as well as reducing the reliance on natural wood which was expensive due to limited availability. The result of the community was that the community can generate income from the production of 3 sizes of paper: 100 grams with a wholesale price of 14 baht per sheet, 85 grams of banana paper with a wholesale price of 9 baht per sheet, and a size of 65 grams with a wholesale price of 6 baht per sheet. For retail prices, all sizes were sold for the same price, which was 35 baht. In addition, the community can create added value by developing new products from paper made from banana trees by designing and developing prototype products that are made into 3 types of packaging for household use and for use as the packaging of baked banana sheet community enterprises of Muan, Ban Hae Subdistrict, Mueang District, Ang Thong Province. This results in community enterprises reducing costs and generating increased revenue. This research will help other communities in Thailand and banana growing countries to use the research as a model for creating and developing products to distribute income to the community and further develop the country.

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