Canning technology in traditional food: case study portrait of SMEs technology transfer product commercialization in Indonesia

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Abstract. Emerging technologies in canning technology can preserve food within a certain period, mainly traditional foods with the development process of transfer technology. Through SMEs, the prospect of traditional food canning can use as a way out in increasing sustainable economic value. This research aims to illustrate the development of traditional food canning technology processes by transferring technology towards product commercialisation in SMEs. This research used a qualitative approach with descriptive analysis through field study approaches, library studies, information tracing related to the development of traditional food canning processes through technology transfer stages. This study's results are an overview of the best practices in traditional food canning products with their advantages and competitiveness. SMEs edified into canning technology training programs. The result is 2.38% resigning because of something; 2.38% expressed inability to participate in the transfer program, 14.29% participated in the re-program, and 80.95% were declared to have graduated from the technology transfer program. This study reveals information product canning technology for traditional food as reference and recommendation tailored to SMEs' implementation.

1. Introduction
Emerging technologies in canning technology can preserve food within a certain period, mainly traditional foods with the development process of transfer technology. Through SMEs, the prospect of traditional food canning can use as a way out in increasing sustainable economic value. This research aims to illustrate the development of traditional food canning technology processes by transferring technology towards product commercialization in SMEs. This research used a qualitative approach with descriptive analysis through field study approaches, library studies, information tracing related to the development of traditional food canning processes through technology transfer stages. This study's results are an overview of the best practices in traditional food canning products with their advantages
and competitiveness. SMEs edified into canning technology training programs. The result is 2.38% resigning because of something; 2.38% expressed inability to participate in the transfer program, 14.29% participated in the re-program, and 80.95% were declared to have graduated from the technology transfer program. This study reveals information product canning technology for traditional food as reference and recommendation tailored to SMEs' implementation.

Along with increasing business competition, there is a change in economic value where high demand for products will increase productivity in the production process mostly when covered by small and medium enterprises (SMEs). New dimension engages with the hope of the settlement of new technology that appears as a solution for the users. Inline competition between industries through the technology development that turns any system of the world economy is experiencing a shift towards forming the global economic system. The development of current technology is not something new to increase national competitiveness [1]. The Indonesian SMEs' portrait recently shows that technology capacity on production begins to move forward due to customer behaviour's high demand. Directly impact SMEs' utilisation to adopt more innovation activities from the product produced by linking with the market requirement.

The emergence of products derived from traditional foods associated with canning technology is currently inseparable from the many types of featured foods when viewed from demographic elements. The advantages of traditional food have become a product that has economic value and shows the image of a region with high selling power. A consideration where SMEs businesses can take advantage of existing competition and takes part in process commercialisation. High demand for products geographical location needs to see from the commodities produced, where the abundance of natural resource wealth is used as a reference in developing a creative economy in a region. Traditional food is one of its most attractive elements as far as tourism is concerned. As it can be the main attractor for special interest tourism (gourmet or culinary tourism), but it also adds to the unique and authentic character of the place. Traditional food is a complex, not well-defined and sometimes very controversial concept, related to specific cultural identity, historical period and heritage [2]. Based on the description, it can say that traditional food has a high selling value when packed well and can certainly provide convenience for consumers in the process of consumption. In other words, when packaged through a specific aesthetic will give curiosity, thus giving rise to purchasing power for consumers.

In application, the development of canned traditional food not separated from the production process in which the technology used is developed. There is a process by which technology updates are carried out to perform the canning process correctly and follow the required standards. The application of current technology results tends to lead to much commercially-stage, through the Know How to process (skills), which is another way or form of a technological embodiment implemented in production. The activities either as technical information, data or knowledge resulting from experience or proficiency can be used in practice, especially in the SMEs sector. A portrait of the utilisation of technology carried out by SMEs is one of the efforts to catch up in the development of market-oriented products. This utilisation is an action of technological development through the process of technology transfer implemented in a production activity to support the product's efficiency and effectiveness. On the other hand, success in applying technology transfer can have a positive effect to survive in global competition. Besides, it can also make a product potential when viewed from existing market segments towards commercialisation and enter the existing market.

The purpose of this paper intended to provide an overview of the implementation on traditional food canning technology by SMEs through the process of transferring technology that produces a product that has high competitiveness, with the development of local, regional potential. Concerning the purpose of the above study, efforts need to explore the potential of creative industries based on local culture based on food canning technology. Existing local culture needs to be developed as one of the strengths of growing local culture and increasing community creativity that can be of economic value, especially SMEs, especially in Indonesia.
This paper expected to analyse implementation transfers technology, related to traditional food
canning technology that can see from various sides. Especially utilisation done by technology users
and the prospect of a transfer technology through the process of commercialisation. Beyond technical
technology knowledge, this research can use as a recommendation to utilise technology that is
currently needed to improve SMEs' national economy.

1.1. The Role of Canning Technology in Expanding Traditional Food Products
Canning technology is a solution in the tight competition of a business. The form offered is through
packaging that becomes the benchmark of the production of a product, with consideration in scope and
the transfer of technology carried out to improve its activity process. Canning technology defined as a
method of preservation of foodstuffs in a sealed and airtight container, which heated in such a way, so
that the foodstuff is durable. It does not suffer physical, chemical, or biological damage [3]. When
talking about food, tradition is a vast subject that can describe at different levels, within social groups
as small as a family or as a function of the time scale. Traditional foods are also often related to local
foods and artisan food referring to specific ingredients, the production and know-how. It could be the
grandmother's food or by the native people of the country (ethnic food). Food quality can define as the
sum of food characteristics that determine the satisfaction of the consumer and compliance with legal
standards. Thus, food quality is a combination of numerous factors, such as organoleptic properties
(for example flavour, texture) nutritional value (for example caloric content, fatty acid composition),
shelf life (for example microbial number) and safety conditions (for example presence of pathogens).
Some of these (for example, microbial numbers) can relatively easily quantify, while others are
complicated to assess (for example, taste). Thus, food quality cannot depend strongly on the priority
among food quality, and quality indicators are needed. They must be weighted since their relative
importance depends on product, trends, producers and market [4]. Thermal processing techniques
emphasise the achievement of commercial sterility while minimising changes in nutritional value and
eating quality. However, no matter how minimal the heating source is, thermal processing can
promote reactions that could affect foods' overall quality [5]. Quality loss can result from microbial,
chemical, enzymatic or physical reactions. Various factors influence quality loss, such as the product's
composition and the processing and storage conditions [6].

Nowadays, canning technology becomes one of the prospecting types of machinery to reduce the
amount of heat used to preserve food in a relatively long time. This technology proves in the food
industry in line with the capability to enhance economic development. The picture that arises is how
canning technology becomes a turning point in dealing with the saturation of a
product marketing
process. Therefore, traditional food businesses not separated from capturing business opportunities by
relying on a technology that has proven its success.

Food packaging used to protect food from environmental contamination and other influences (such
as odours, shocks, dust, temperature, physical damage, light, microorganisms, and humidity). It is key
to ensuring the quality and safety of food, while also extending shelf-life and minimising food losses
and wastage ([7][8][9][10]). Food plays a significant part in all aspects of human life, including from
fulfilling basic physiological needs to building social interactions and psychological expression [6].
Food has become an expression of identity and culture and has emerged as one of the popular aspects
of cultural tourism [11]. In generals the transition of traditional types of food that exist packed into
cans, it is possible to be proportionate in producing high economic value. Mainly when associated
with the development of the times and the needs of consumers. Exploring the different ways
traditional food markets have been affected by, and have adapted to, changes in fresh food
provisioning, the article examines the connective spaces and places that link market actors and
consumers as fresh food moves across the geographical regions and through the marketplace. It argues
that how traditional food markets adapt to change is dependent on their geography, history and a
regional approach to food and farming. Moreover, within each city, the effects of retail restructuring
and the attendant spatial and temporal tensions between traditional and modernised fresh food
provisioning systems [12].
1.2. A Portrait of Transfer Technology SMEs on Canning Technology in Indonesia

In the development of technology utilisation, especially in Indonesia, it is still seen in a weak position where not all industries can transfer technology optimally. Limitations in several production process levels become a weak point and require time, effort and high costs in applying a validated technology. A portrait in the transfer of technology, primarily SMEs provides a systematic advantage in improving the competitiveness derived from the resulting product derivatives. This turning point creates a work environment based on productivity with improvements at every level of the production process. Management preservation on canning food needs to accelerate in enhancing possibility in the development of business-oriented. Commercialisation can develop economic value and brand image of a product that came from a rural area [13].

The emergence of several SMEs that apply canning technology does not come easily. The journey has several stages that require improvements in each process, and it is not easy to do. Therefore, a learning process that requires assistance from the owner of the technology comes from proven research and development. One example of a Research Unit for Natural Product Technology (BPTBA) Indonesian Institute of Sciences that has successfully developed traditional food canning technology with some excellent advantages in food preservation, especially in cans. Inside canning technology, there is a primer method for sterilising food by heat in hermetically sealed (airtight) containers, with the output allows ready-to-eat foods. All products neither frozen nor dehydrated remain safe and wholesome during months or even years of storage at room temperature. With proper treatment, the use of additives or preservatives can eliminate.

BPTBA has done the canning process since 1995. With first product is tempeh in can packaging. The product briefly teamed up with Dr Jonathan Agranoff, from the UK. In 2004 began to be canned some traditional food, one of which is Gudeg, typical food from Jogjakarta. In 2010, canned Gudeg began to be marketed freely by CV. Buana Citra Sentosa, where year to year production is increasing. Since then, traditional food canning technology on the scale of SMEs has become known by the public and many SMEs interested in using the technology for their respective products.

In the development of new products, usually carried out several stages, including:

1. Pre-research
   At this stage, it will know whether a food is worth packing or not, what packaging matches the food, how the packaging process carried out effectively and efficiently, how the optimisation of the packaging process carried out and whether there are organoleptic changes to the cuisine or not after the packaging process carried out.

2. Research
   This stage is done more deeply toward food. Several tests are conducted on products or foods that have been successfully packaged, including heat adequacy tests, chemical tests, standardised physics, metal and microbial contamination tests, nutritional adequacy figures and product stability tests.

3. Market Test
   This step was to determine the level of consumer conformity with the products to be marketed. At this stage, there will be input from consumers regarding the organoleptic nature of the product, packaging type, display label, sale price, and market strategy to be carried out by SMEs.

2. Material and Methods

This research was done only at the pre-research stage, where the survey for pre-research was conducted from July to August 2020 on 42 types of cuisine from 42 SMEs. The selection of SMEs began with a Webinar "Ngaji Technology LIPI Jogja2 – Traditional Food Canning, Food Distribution Solutions in Pandemic Times" in anticipation of businesses choked by the COVID19 pandemic. This webinar held on June 26, 2020, with 1600 participants through Zoom Meeting. The selection made by opening the registration form through link bit.ly where the form contains: SME name, SME address, SME in charge, type of cuisine produced, ownership of kitchen facilities, ownership of licensing.
After the selection and logging of SMEs, further scheduling of the canning pre-research process, pre-research processes are carried out on food to ensure the feasibility of food to be packaged or not, what packaging is suitable, how the packaging process carried out effectively and efficiently, how the optimisation of the packaging process carried out and whether there are organoleptic changes to food. The next stage is the evaluation of the product after it packed with cans.

This paper used qualitative research methodology study, with the literature approach on data mining and information related to the topic of study, by surveying traditional food businesses (SMEs) who did canning activities and located in Central Java, Yogyakarta and Cirebon. The target of data collecting is mainly a business engaged in traditional food canning, which has different market segments. The data population is 42 SMEs and has a strong commitment to implementing technology in traditional food canning that is characteristic of a region. On survey activities conducted from July until August 2020, that remains data capture production of traditional products, focusing on regional and traditional foods productions. With questionnaire were conducted through direct interviews, and 42 surveys obtain electronically). This questionnaire fills with majority question to be answered by top management from SMEs form on SME name, types of cuisine, overall appearance, colour, taste, aroma, texture, comments/feedback. The baseline of this research used the organoleptic test with the hedonic method that collects empirical material and analysed with Microsoft Office Excel 2010 spreadsheet and descriptive statistics.

Figure 1. show research framework on portrait canning technology in traditional food, which determine the concept of technology assistances readiness program on packaging BPTBA based on market needs during pandemic Covid-19.

**Figure 1.** Research Framework on Evaluation Readiness Packaging Production

### 3. Results and Discussion

Technological innovation is a need to increase added value for the industry. Focus on essential input in implementing governance patterns in the production of a product. Therefore, it is necessary to transfer technology that has added value in improving the production measures that have carried out. SMEs
needs to introduce new technology in production activity, especially line processing, in this technology transfer was needs to collect more source product knowledgeable about applying in machinery process. In canning, technology should consider good food preservation were dependent on advances in the sciences, especially chemistry and microbiology.

As mentioned earlier, several stages are required in developing a new product, including the pre-research stage, the research stage, and the market test stage. In the pre-research phase conducted on 42 types of cuisine from 42 SMEs, a canned packaging process was carried out on the products, after quarantine, against the product was evaluated. The evaluation carried out organoleptic against the canned cuisine. In contrast, the evaluator is a SMEs that produces the food itself because expected that the results can be canned under SMEs’ expectations. Table 1 describes the result of the evaluation performance of product canning for traditional food during pandemic Covid-19.

### Table 1. The Result of Evaluation Performance of Product Canning

| No | Name of SMEs            | Kind of Foods                        | Average |
|----|-------------------------|--------------------------------------|---------|
| 1  | Bolosego                | Oseng Mercon                         | 5       |
| 2  | Tela Corp               | Tongseng Domba                       | 3       |
| 3  | Tengkleng               | Tongseng                             | 4       |
| 4  | Bu Sudar                | Sambel Goreng Kentang                | 4       |
| 5  | Aneka Snack             | Sambal Teri                          | 4       |
| 6  | Mr. Clock               | Bakso Kuah                           | 4       |
| 7  | Mbok Mangun             | Sambel Rasa Rendang                 | 4       |
| 8  | Sarira Rasa             | Ayam Ungkep                         | 4       |
| 9  | Gudge Pincuk            | Gudeg Nangka                         | 5       |
| 10 | HR Food                 | Rendang Domba                        | 5       |
| 11 | Kismi Extreme Food      | Belalang Bacem                       | 5       |
| 12 | Yu Narni                | Gudeg Nangka                         | 5       |
| 13 | Widagdo Catering        | Oseng Kikil                          | 4       |
| 14 | Nyi Gnat                | Sambel Teri                          | 5       |
| 15 | Mallika Snack           | Rendang Belut                        | 5       |
| 16 | Trinaco                 | Nata De Coco                         | 5       |
| 17 | Dapur Kecomrang         | Rendang Daging                       | 5       |
| 18 | Ibu Sumarni             | Buntil                               | 4       |
| 19 | Mina Abadhi Farm        | Mangut Lele                          | 5       |
| 20 | Taragak Randang         | Rendang Sapi                         | 5       |
| 21 | Safiera Food            | Bumbu Nasi Kebuli                    | 5       |
| 22 | Remen Eco               | Pepes Bandeng                        | 4       |
| 23 | Sate Kambing Wiro       | Tongseng Kamming                     | 5       |
| 24 | Warung Si Mbok          | Ingkung Ayam Kampung                 | 5       |
| 25 | Saung Pepes             | Pepes Ikan Mas                       | 4       |
| 26 | Pa Bos                  | Rendang Daging                       | 5       |
| 27 | Alang Alang Tumbuh      | Mangut Lele                          | 5       |
| 28 | Endhers Rendang         | Rendang Sapi                         | 4       |
| 29 | Griya Olah Salak        | Pesmol Nila                          | 5       |
| 30 | Dapur Lawuh             | Lawuh Sambel Ayam                    | 5       |
| 31 | Selera Baru             | Tongkol Asam Pedas                   | 5       |
| 32 | Omah Srikaton           | Empal Kelem                          | 5       |
| 33 | Eyang Ibu               | Sambal Tongkol                       | 5       |
| 34 | Ayam Ninit              | Ayam Goreng Tulang Lunak             | 5       |
| 35 | Rose Culinary           | Opor Lele                            | 5       |
| 36 | Pas Berkah Tani         | Sate Jamur                           | 4       |
| 37 | Agha Food               | Semur Bandeng                        | 5       |
| 38 | Mbah Yong               | Bumbu Soto                           | 5       |
| 39 | Abon Cap Koki           | Terik Daging                         | 5       |
| 40 | Ferindata Food          | Garang Asem                          | 5       |
From organoleptic pre-research evaluation results, 42 types of food are produced by 42 SMEs based on sensory process, shown in figure 2.

![Sensory Analysis of Food Produced by SMEs](image)

**Figure 2.** Sensory Analysis of Food Produced by SMEs

In the picture, after the canning process, most of the food products resulting from SMEs are exceptionally preferred by consumers with a value of 5 (highly preferred). Simultaneously, there are some foods after canned there is a decrease in quality; for example, the texture is too mushy, the colour fades. However, overall the performance of the canned food is better compared to the fresh food. Sensory evaluation widely used to assess quality in the food industry and other agricultural industries. Sometimes this assessment can give a cautious assessment. In some respects, sensory judgment even exceeds the accuracy of the most sensitive instruments [14]. The sensory evaluation method can classify into several groups: Difference Test, Selection/Acceptance Test Group, Scalar Testing Group, and Description Testing Group. Hedonic tests included in the Acceptance Test [15]. Hedonic tests designed to measure the degree of liking for a product. Category scales ranging from like overly, though neither like nor dislike, to dislike too, with varying numbers of categories, are used. Panellists indicate their degree of liking for each sample by choosing the appropriate category [16].

From the pre-research results with the criteria of food value, it can use as a benchmark whether SMEs can continue to foster the next stage of the research phase. From the results of calculations on SMEs' food performance and readiness, divided into SMEs that pass pre-research, SMEs that pass with improvement, SMEs that do not pass pre-research (fail). The result was described in figure 3.
Figure 3. SMEs Who Graduate and Do Not Graduate from Pre-Research Programs

Seen from the evaluation of SMEs graduation obtained 2.38% (1 SME) failed to participate in the coaching program because one of his family members exposed to Covid-19. It is was declared a failure in the pre-research development, there is 2.38% (1 SME) too many recipes taken to the pre-research program, so it is not focused. Furthermore, it recommended that one prescription or product is selected only to put the next stage. There are 14.29% (6 SMEs) passed with prescription improvement. There are 80.95% (32 SMEs) who are declared to pass pre-research and proceed to the next stage.

4. Conclusion
The trajectories development in food technology reveals many functions related to SMEs’ maturity in long-term agenda. BPTBA’s function on the mentoring program is one way to see productivity levels in traditional food canning during the covid-19 pandemic. Concerning looking at the effectiveness and efficiency of the food production process in cans carried out based on government-issued health protocols. The results of pre-research will continue to the stage of research that has the value of conformity by entering the coaching program for the research stage in the management of the license to the National Agency of Drug and Food Control. SMEs edified into canning technology training programs. The result is 2.38% resigning because of something; 2.38 inability to participate in the transfer program, 14.29% participated in the re-program, and 80.95% were declared to have graduated pre-research results safer program. This study reveals information product canning technology for traditional food as reference and recommendation, which tailor to SMEs’ implementation.

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