

NEW PRODUCT DEVELOPMENT FRAMEWORK BASED ON UNIVERSITY-COMMUNITY ENGAGEMENT: A CASE OF THAILAND OTOP PRODUCT DEVELOPMENT FOR ELDERLY

SENSANG PHONGAMPHAI¹, JOMVONG TAVICHAKON¹, SANTIANOTAI RUTHAPHAN², AND CHATTINNAWAT WICHA³*

¹Thonburi University, 197 m.8, Banti, Banti, 51180 Lumphun, Thailand. ²Faculty of Science and Technology, Chiang Mai Rajabhat University, 50300, Chiang Mai, Thailand. ³Department of Industrial Engineering, Faculty of Engineering, Chiang Mai University, 239 Huay Kaew Road, Muang, 50200, Chiang Mai, Thailand.

*Corresponding author: chattinw@eng.cmu.ac.th

Submitted final draft: 30 November 2022 Accepted: 2 March 2023

<http://doi.org/10.46754/jssm.2023.04.003>

Abstract: One Tambon One Product (OTOP), Thailand's economic development program has been used to support the local economy, create incomes on the grass root for the locals, and be one of the successful engines to drive local and country economies, which create business opportunities for the locals. This research demonstrates how the new OTOP development related to the role and cooperation between different parties, especially the university and the community that owns the OTOP product can be implemented. This research project is one of the University-community engagement projects to study and initiate OTOP product development from the three provinces of Chiang Mai, Lumphun and Lampang. This collaborative product development leads to three new and innovative products of OTOP based on the large survey and focus group of 1,275 elderly consumers. The value creation technique from local culture was employed to innovate the new products. This research developed the framework consisting of the three strategic stages of development. The cross-collaboration team are the main enabler. The OTOP cooperative ecosystem was tested and it found that this ecosystem can reciprocally benefit all the staffs including help configuring the organisation context and its entrepreneurship.

Keywords: New product, AHP, product development, OTOP.

Introduction

Presently New Product Development (NPD) has been an important driving factor for the success of business. The new product development aims to present a new product to the market, increasing the sale opportunity (Kenneth, 2013). The new product development involves design processes that must serve and match the customer's expectations and needs (Sukhov, 2018). Product development as an innovative strategy includes successive processes of defining requirements and achieving various tasks, which can be conducted through the planned management and cooperation between the entrepreneur and the academia.

University-community engagement helps initiate new product development for universities to support local businesses and improve educational quality (Lehmann *et al.*, 2009). Several New Product Development

programs have been developed from the civic engagement program to enhance university engagement (Stenning & Miyoshi, 2008). The networks of the university and community can significantly empower the innovation process through collaborative and value co-creation.

This collaborative product development and innovation can occur at different stages of the New Product Development process and can be substantially effective when online data are acquired and supplemented directly (Sawhney *et al.*, 2005). The product-development research and framework have been proposed by many researchers emphasising different rationales for product development (Brown and Eisenhardt, 1995) involving proactive product development and tools. This research presents the methodology and framework of new product development interrelated with the University-community engagement mechanisms.

This research illustrates how collaborative innovation is initiated and produces new product innovation for the local government-led initiative for a local product development program called One Tambon One Product (OTOP), a program to support the local economy and create incomes at the grass root for the locals. The OTOP as the main driver for the Thai Government has been initiated to drive the local economy. This program was adopted from the successful One Village One Product model of Japan.

The OTOP was demonstrated to be one of the successful engines to drive local and country economies, which create business opportunities for the local communities to create, market and sell their local product across provinces and countries. This OTOP platform has created many local entrepreneurs and generates local work run by small and medium (SMLE) local enterprises (Natsuda *et al.*, 2012). This program also helps the community to transform their local resources into high-value products economically. This drives the success of rural area development. This program creates collaboration between local community members and generates a system of cooperatives whose business is capitalised based on local resources. This program also increases skilled labour for the locals and drives human resource development for the community (Denpaiboon & Amatasawatdee, 2012).

The product created from the OTOP program consists of various local products grouped into 5 categories or groups of Utensils, Beverages, Cloth, Food and Herbs. For example, the main Utensil product group of OTOP are handicrafts, woven handicrafts, pottery, artistry items and household items. The Cloth product group comprises textiles, cotton clothing, silk garments, and fashion accessories. Other food items, beverages, and non-edible herbal products cover various household items. Since the OTOP products have been made within local communities across different regions, most of the OTOP products are traditional items made within the local communities to represent local style and flavours which is inimitable.

The OTOP program was started around 2001 to support the local economy by increasing the entrepreneurial skills of the local “grassroots” level to generate higher income. This OTOP program increases the market and business of the OTOP (Denpaiboon & Amatasawatdee, 2012). Up to the present, this OTOP program has been used as one of the key enablers for the Thai Government to enhance and synergise the business with the social element of the sustainable development of Thailand (Odthorn *et al.*, 2018). This program involves and induces many collaborative projects to improve competitiveness for the OTOP product.

Several OTOP product development programs have been implemented through collaboration between Thailand universities and the registered local OTOP entrepreneur or cooperative system. This OTOP program has allowed the local communities to improve quality and upgrade the local product (Natsuda *et al.*, 2012). The OTOP program aims to increase the value-added of local resources and reflect pride in the local culture. The OTOP products are typically innovated and developed based on the local culture concept and created from the local community resources. Several OTOP products are developed from home-grown or naturally abundant agricultural materials within the community to increase the value of the locals and the community (Joompha & Pianthong, 2018).

For instance, many OTOP handicraft products have improved in style and quality. A large number of OTOP products have currently been exported to the global market. The OTOP product value thus creating self-reliance and creativity, supporting local labour and human resource development (Kurokawa, 2009). However, all the OTOP product development programs have been run and supported by the Community Development Department Ministry of Interior with limited resources.

The research publications on how the new OTOP development can be implemented have not emphasised the strategy and methodology related to the role and cooperation between

different parties, especially the university and the community that owns the OTOP product.

This research illustrates how the university-community engagement program can contribute to the development of the OTOP product, particularly to its value and scale for the new market. The OTOP product development of all OTOP product groups is mainly designed for general customers with assorted markets. Since Thailand is an ageing society, business opportunities for the elderly are significantly increasing. However, up to present research knowledge, no research explains and presents the framework for increasing the OTOP business for this emerging elderly market. Therefore, this research aims to illustrate the methodology to improve product development, especially in the elderly consumer market in Thailand which is increasing steadily.

This research started by defining and selecting the elderly groups sampled from three provinces of the northern region in Thailand of Chiang Mai, Lumphun and Lampang. A large survey and focus group of 1,275 elderly consumers were conducted regarding their attitudes toward the OTOP product. The results of customer requirements were used to derive the concept and develop the product target. This research presented the customer-focused collaborative framework by extending the actors and their role from the traditional product development paradigm to the new one. The next section explains the literature and methodology on new product development. Section three presents the framework and methodology for developing the new OTOP product. The last section provides a summary and discussion for future research.

Literature Review

The new product development process has come across and involves different business functions, including strategic management, engineering, and marketing (Schilling & Hill, 1998). Successful designs must produce a commercial product, reach the marketplace, and generate an economic return. Several frameworks for

the new product development process have been presented in the literature. For example, Schilling and Hill (1998) provide four basic strategic levels of technology, the organisational context, the construction and use of teams, and the use of tools for the new product development process. Golder and Mitra (2018) recently provided good references and summaries for the new product development process from idea generation and market analysis to product design and development until the commercialisation stage. Even though the tool and technique used to derive product concept are crucial for the success of the project, the most important determinant of the new product's success is the concept of product advantage, where the intrinsic value of the product, including unique benefits to customers, high quality, attractive cost, and innovative features, play the critical role of success factors (Brown and Eisenhardt, 1995).

Various studies of new product development tools and practices show that the success factors analysis has been used as one of the best practices and tools to identify the product function. However, adopting such practices depends on many factors, such as product characteristics, market, cultural aspects, and region. This research emphasised and adopted the process of acquiring customer needs to drive the new OTOP product successfully. The customer focus is a vital part of product development and the information derived from the customer is crucial for this research to derive the product concept.

For a well-structured company, strategies may exist to align the new product development process with current resources and competencies. The methodology and tools applied could be different depending on the competence of the organisation, the nature of the product, the market and the customer. However, the locals developed the OTOP products with mostly unstructured and probably lacking organisation, low levels of technology, and no teams. The locals lack the resources and competence to use the new product development tools. To help improve the locals, such as OTOP product development, Millican *et al.* (2011) addressed

that university-community engagement could be one of the mechanisms for the modern university to both retrieves the traditional civic role of the university and reciprocally enhances education.

Moreover, the university has a unique opportunity to contribute to the economic vitality of the regions they serve (Bozic & Dunlap, 2013). Hence this research hypothesises that university-community collaboration can be one of the pathways for new product development in an environment like the OTOP program where resources and competence are limited. Thus, through work-based educational experiences, both instructor and student can serve good roles of innovators for the OTOP product development program. Both instructors and students can apply theoretical and applied knowledge to the OTOP needs of the new product design, new process creation, and standardised management practices. Therefore, this research then defines the new strategic levels of the actor which is beyond that traditional framework.

According to past research, the market opportunity of OTOP can be improved based on the right strategy and selection of those drivers or variables that relate directly to the OTOP sale and export performances in different markets and contexts (Sousa, 2004; Leonidou, 2004). However, this finding shows May suggest that the success of OTOP may depend on its size, age, and entrepreneurship. These are the general set of indicators or factors that drive the sale and export of the enterprise (Sinkula, 1994; Zou *et al.*, 1998; Leonidou *et al.*, 2002; Ogunmokun & Ng, 2004). This can be hard to obtain a driver or enabler for the OTOP to adopt especially for the new product development process. Therefore, this again indicates that the four-basic strategy of Schilling & Hill (1998) and the tools for the new product development process summarised by Golder and Mitra (2018) may not be theoretically applied by the OTOP. Hence this research will develop a new system of strategy that can enhance the new product development process by using collaborative recourse and competence from the university as the enabler.

There is a strong need for the Thai Government to study and understand the perception of consumers on the OTOP product. Many reports have been given regarding indicators or factors contributing to the success of OTOP business management without considering the consumer inputs or attitude toward the product. The statistical model development on OTOP consumer behaviours is limited. Many researches that aim to enhance the sale and value of the OTOP are mostly focused on improving OTOP products.

Moreover, all the studies are mostly product-based focuses such as wood handicrafts (Phriwanrat, 2014; Tarapitakwong *et al.*, 2017) and processed food (Joompha, 2018) without considering a wider range or group of OTOP products. Even though the results can be used to improve OTOP value, those findings are still limited to specific products and cannot relate to the buying attitude of the consumer. For example, Tuamsuk *et al.* (2013) investigated and identified the knowledge management factors that affect the success of five-star OTOP businesses in Thailand, whereas Thammasang & Poonikom (2016) aimed to select the important set of indicators associated with the knowledge management of OTOP.

Most authors reported only the success factors in business knowledge management without studying the buying opportunity of the market. Thus, current research may not sufficiently provide information on drivers or factors affecting the buying behaviour of the OTOP product. Recently, Phanphet *et al.* (2019) reported that there exist factors that can drive the sale of OTOP products in the elderly market. This affirms that the analysis and acquisition of customer demands must be strategically and orderly implemented early. Hence this research developed a framework that incorporates consumer needs and presents the analytical model based on an extensive focus group study on the elderly to identify the factors which will be used as design measures and marketing concepts for all five major groups of OTOP products.

This research adopted the analytic hierarchy process (AHP) tool to define the priority of the product set for new development. This AHP was developed in early 1970 by Thomas L. Saaty and has been applied and adopted widely to analyse complex multi-criteria decisions such as supplier selection and plant location. The AHP is a systematic and structured approach to the pairwise comparison of the preferences among the alternatives. The decision maker predefines different criteria. This approach transforms the expert judgments into an additive weighting method to identify numerical weighting values for the alternative's objective and fixed set of criteria in a matrix. The decision is then derived from the total overall score calculated from the algebra of the derived weights of the evaluation criteria versus the weights of the alternatives (Saaty, 1980). The application of AHP for industrial product development is serious (Battistoni, 2013). However, for the selection of OTOP product development, the application of AHP is very limited.

The application of AHP in improving the OTOP product is mostly product-based focuses without considering a wider range or group of products. For OTOP product development, the AHP has been applied only to specific single product development, such as wood handicrafts (Phriwanrat, 2014; Tarapitakwong *et al.*, 2017) or processed food (Joompha, 2018). The AHP is also used for the location selection of the OTOP product distribution (Choomrit *et al.*, 2011; Odthorn, 2018) and the logistics and supply chain management (Theppitak, 2013). Even though the results can be used to improve OTOP value, those findings are still limited to specific products and cannot be used by Government to act at the policy level.

No research or report illustrates the strategy to consider the overall structure or groups of OTOP products. Lungtae & Noknoi (2014) applied the AHP technique to define the marketing strategies of Five-Star (OTOP) but only for herbal businesses. The authors considered targeting and positioning the marketing mix and presented the marketing

strategies for OTOP entrepreneurs. However, the data were only collected from a single decision-maker of the presidents of herbal-product enterprises in Songkhla province. The authors only provided the general finding in (1) widening the range of product sizes offered, (2) increasing the distribution channels, and (3) publicising more about the products and promotional activities. The results of the study can be adopted only for a single herbal product sector. Hence this research developed the procedure for applying the AHP to prioritise and scope the product preference of the new development. Then the product development, verification and validation are performed as described by the following procedure.

Methodology

Currently, the OTOP products that are locally made from Thailand's 7,255 Tambons (sub-district) are classified into five groups OTOP products consisting of (i) food, (ii) cloth, apparel, and accessories, (iii) beverages, (iv) herbal product, and (v) utensils, decorative items and souvenirs. The Thai Government has promoted and used all five groups to consistently improve the aesthetic, function, and quality of the OTOP product. These five groups are defined as the product scope for this research to be developed and will be focused on OTOP product development. This family of product scope is conferred using the collaborative cross-team consisting of representatives from the Community Development Department, Ministry of Interior, universities professors and students, including the communities involved in the project.

As described previously, this research will adopt the concept of the product advantage in developing the new product. The product characteristics and flexibility must meet the need of the elderly market. This finding suggests that for OTOP products to be accepted in a new market, such as elderly consumers, the cultural specificity and uniqueness of the OTOP product must be designed to meet the attitude of the consumers. There are different attitudes of

consumers toward the OTOP product. Among those, the perceived quality, reason-to-buy, differentiation/position, price premium, channel member, interest, and brand extensions are common perceptions of consumers (Aaker, 1991). Consumers also consider quality awareness (Fornell *et al.*, 1996) and product quality (Bei & Chiao, 2001). Thus, this research developed a large focus group with IT enablers to determine the customer needs and perceptions and identify factors that correlate with the perception of the OTOP product and the buying opportunity.

Next steps, the framework of this research will prioritise those five OTOP groups. This research proposed and adopted the AHP to summarise and prioritise those alternatives. The AHP approach was developed and presented in 1970. It has been widely adopted to select alternatives under multi-objectives or multi-criteria. The process of AHP starts with identifying and then prioritising the alternatives (Battistoni *et al.*, 2013). The AHP was considered a multi-objective decision-making technique. The AHP is a pairwise comparison approach where each alternative is justified under different criteria. The AHP summarises each alternative's degree of preference or priority through the weights (Belton, 1986). The priorities represented with the product sum of those relative numerical weighting scores are typically used to identify the important values for each decision alternative. To apply the AHP, the objective function must be first specified. Typically, a set of fixed criteria is used. The score can be computed from the sum of the product of the weights of each criterion and the weights of the alternatives (Saaty, 1980).

The AHP has been widely used to decide regarding the OTOP context, such as the selection of OTOP product distribution (Choomrit *et al.*, 2011), the management and practices of OTOP supply chain and logistics (Theppitak 2013), as well as the industrial product development (Battistoni *et al.*, 2013). The AHP was also used to improve the OTOP business. Lungtae & Noknoi (2014) applied the

AHP technique to derive the marketing strategies for the herbal product group. Several researchers analysed specific single product development, such as wood handicrafts (Phriwanrat, 2014; Tarapitakwong *et al.*, 2016) and processed food (Joompha & Pianthong, 2018). The AHP can be applied to select a strategy of OTOP business management that aligns with the value and market opportunity of the OTOP product group for effective promotion. Suttipong *et al.* (2019) used the AHP to prioritise and select OTOP product groups for marketing and product development by simultaneously incorporating all five groups of OTOP products. Suttipong *et al.* (2022) presented the extended version of the Suttipong *et al.* (2019) applying the AHP to extract information on opportunities and needs of the elderly consumer market and used that knowledge to prioritise the OTOP product group concerning business management criteria.

In the view of the AHP concept, these alternatives depicted at the lowest level of the model structure of AHP can identify which of those five OTOP groups product group. This will help put the final boundary of the product development scope to be clearly defined. This systematic and strategic approach helps identify which OTOP category defined as alternatives shall be focused on and emphasised. This prioritisation will align with the championship OTOP system to rank and identify which group of products will be strategically focused. The university-community collaborative assessment of customer needs will lead to new creativity for the new market since the local resource and pride are reflected during the cross-team meeting. After the product realisation phase, the specification and prototype are created. Product verification and validation are followed. The product innovation and business strategy are co-defined from the university-community engagement program. Several training and skill development of products and processes are conducted to assess the newly developed product's feasibility and economic vitality. This research adopted the university-community collaboration as the mechanism to construct the ecosystem for the new OTOP product

development where resources and competence are limited. Thus, through case-based and work-based training, several university professors and undergraduate students of different disciplines have been involved and served as an innovator for OTOP product development. The professor applied their theoretical and applied knowledge to the OTOP new product design, new process creation, and standardised management practices, including packaging and marketing strategy. Therefore, this research then involves and defines the new strategic process and extends the scope of actors beyond that traditional framework.

This research developed the framework according to the following hypothetical procedures as described in Figure 1 consisting of the three strategic stages of development:

Stage 1: Product Scope

Stage 2: Product Portfolio

Stage 3: Product Creation

The research methodology starts by identifying the preferences and needs of the

elderly concerning those five OTOP product groups. The output of the first stage becomes the input for the following stage. The driver and enabler are defined at different stages depending on the stage of development. The cross-collaboration team is the main enabler who defines the product scope and inputs all the requirements from the government regulation, supporting programs and policy. The university-community team are very important in acquiring and summarising customer preferences and needs. Then the team adopted the AHP technique to define and prioritise the specific product development categories and product advantage concepts. Product development, verification and validation are embedded in the second stage to form the product portfolio.

The competence of the university professors and students was used to drive the innovative product through collaborative efforts and teams. At the last stage of product creation, the portfolio and business activity was initiated and enabled by the cooperative-based system of the community. The OTOP cooperative ecosystem

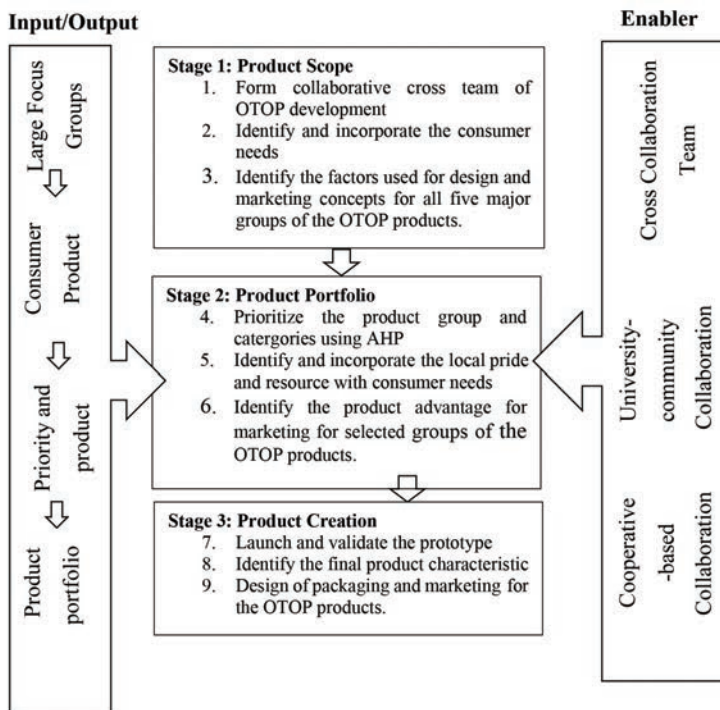


Figure 1: The Framework for new OTOP product development

was tested and it found that this ecosystem can reciprocally benefit all the staffs including help configuring the organisation context and its entrepreneurship. These cooperative-based teams enable the lacking factor and create the driver for the sale and export of the enterprise, as suggested by Leonidou *et al.* (2002) and Ogunmokun & Ng (2004). This research depicted the framework as follows.

Academics and entrepreneurs have validated this framework through the joint seminar in which the implementation results were presented. The discussions on the process and structure were also derived, where the final model is depicted in Figure 1.

Stage 1: Product Scope-Identify the factors used for design and marketing concepts for all five major groups of the OTOP products

The cross-collaboration team started by defining the scope of product development based on those five main groups of (i) Food, (ii) Clothes, apparel, and accessories, (iii) Beverages, (iv) Herbal products, and (v) Utensils, Decorative items and Souvenirs. These five groups were defined as five alternatives for the cross-collaboration team consisting of representatives from the Community Development Department Ministry of Interior, university professors and students, and the communities involved in the project.

Several criteria can be used to select or develop the OTOP product. However, the NPD involves supports and weaves through several processes. Currently, the single criteria based on the 5-star awarding system is being applied to select and choose the OTOP product development to determine which product group needs support. Instead, this research involves several actors and tasks related to groups of government support through the enabler of Cross Collaboration of University-community Collaboration Team to acquire and synthesise the customer needs and perception and the sale opportunity in the new market of the elderly group. This research considered all five groups or categories of the OTOP product. The collaboration team adopted

the large focus group and the survey across the three provinces. The unit analysis is defined as a product group instead of an individual product. The data collection was derived based on the extensive focus group consisting of 1,275 elderly from three northern Thailand provinces: Chiang Mai, Lumphun and Lampang. The selected samples were defined according to the statistical sampling criterion and covered the main respondents consisting of 552 and 723 elderly males and females, respectively.

The respondents were interviewed and asked to evaluate their needs and preference in buying each group of products using three nominal preference scales of [Interested to buy], [Neutral], and [Not interested]. The results of the responses were reviewed and the quantitative analysis and cross-tabulation, Chi-square, and regression techniques were used to develop the statistical analysis model and to identify the factors that relate to the preference and attitudes of the respondents. Factors including occupations and health conditions, also were drawn to define the interest or the success of buying which can also differ depending on consumer demographic characteristics. This research defined a set of different explanatory factors drawn from literature and used to develop the statistical model. For example, the statistical model building and validation were conducted and reported. Figure 2 depicts the data collection steps and consumer needs identification.

Stage 2: Product Portfolio-Prioritise the product group and categories using AHP

This research adopted the AHP to decompose the complex, unstructured problem, holistic approach of OTOP development into a set of components organised similarly to a multi-attribute structure (Suttipong *et al.*, 2019). The methodology started by identifying the preferences and needs of the elderly concerning those five OTOP product groups. The unit analysis is defined as product group level. The priority of each group was derived based on that extensive focus group survey of 1,275 elderly from 3 provinces. The responses consist of 552 and 723 elderly males and females, respectively.

The respondents were asked to evaluate pairwise for the needs and preferences in buying each group of products using a five-preference scale. The AHP technique was used to develop the weights or priority of each product group. Since the success of product and business opportunity depend on several factors, this

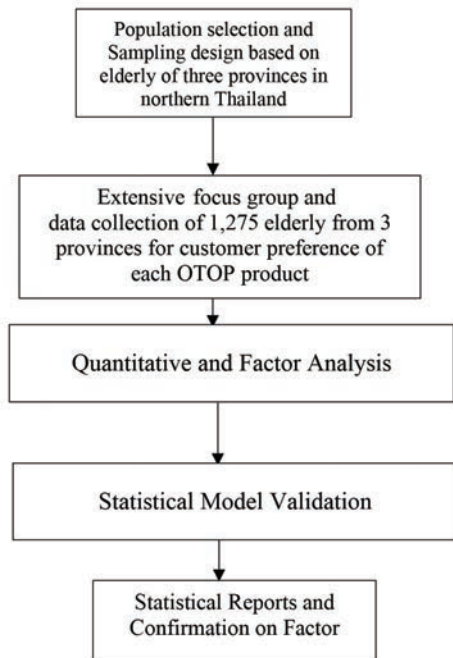


Figure 2: Customer perception Identification

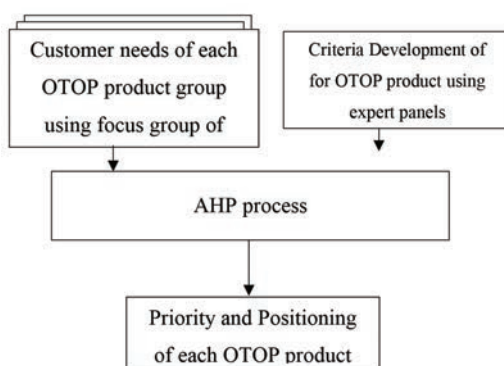


Figure 3: The AHP process of prioritising the OTOP product group (adopted from Suttipong *et al.*, 2019)

research employed expert panels and literature to develop and define four main criteria of Business contribution value to the OTOP program, the Opportunity for new product development, Self-Sustainability of OTOP entrepreneurs, and Environment contribution value to society. Each group of OTOP products was evaluated according to these criteria and the results of product group priority were summarised. Figure 2 & 3 depicts the overall steps of the research.

During this stage of development, the expert panels and literature review were used to define the four main criteria of BOSE model: Business contribution value to the OTOP program, the Opportunity for new product development, Self-Sustainability of OTOP entrepreneurs, and Environment contribution value to society. This model was developed concerning the finding from those success factors, knowledge management process, and effective production management. The environment indicator was incorporated according to the business sustainability management perspective and perceived quality and environment awareness of elderly consumers derived from the focus group. These criteria are then used to calculate the priority of the OTOP product group for development. More details can be referred to by Suttipong *et al.* (2019) and Phanphet (2019) for examples of the factor analysis.

Stage 3: Product Creation- Identify the final product characteristic, packaging and marketing for the OTOP products.

The cross-collaboration team developed the sequential, holistic product creation approach to the market realisation at this stage. The process started with defining the specific product in each group of OTOP products selected. There is a total of three innovative products selected for market testing. The prototype and product function is evaluated by the University-community Collaboration team. After the Final product is conferred, the marketing activities are carried out through the Cooperative-based Collaboration Team. The cooperative system is the ecosystem that drives the organisational

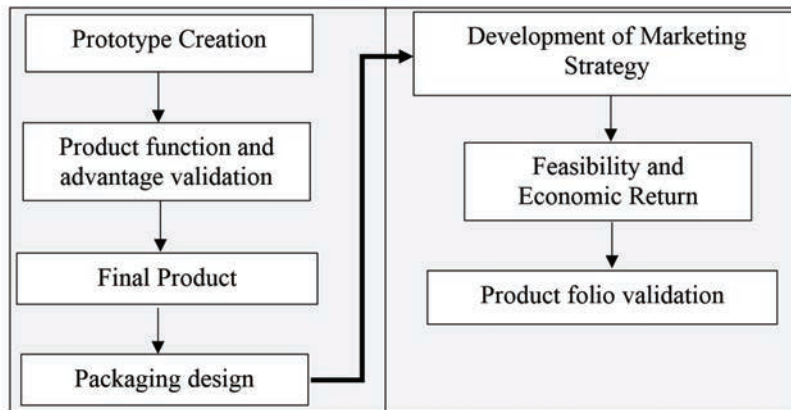


Figure 4: The sequential and holistic approach of the OTOP product creation

structure of the OTOP and configures the organisation's context and entrepreneurship. These cooperative-based teams enable and drive the marketing performance of the OTOP. Figure 4 depicts the overall steps of this stage.

Results and Discussion

According to the analysis, the research shows that the Utensils, Decorative items and Souvenirs group received the highest buying preferences from the elderly consumer segment, followed by Beverage, Cloth and apparel. The attitude of the buying preference of the final model of the analysis was done and presented in Figure 5.

There is strong evidence that the elderly prefer the OTOP product group of the following order

(1 st Preference from Customer)	Herbal products
(2 nd Preference from Customer)	Food
(3 rd Preference from Customer)	Clothes, apparel, and accessories
(4 th Preference from Customer)	Utensils, Decorative Items and Souvenirs
(5 th Preference from Customer)	Beverages

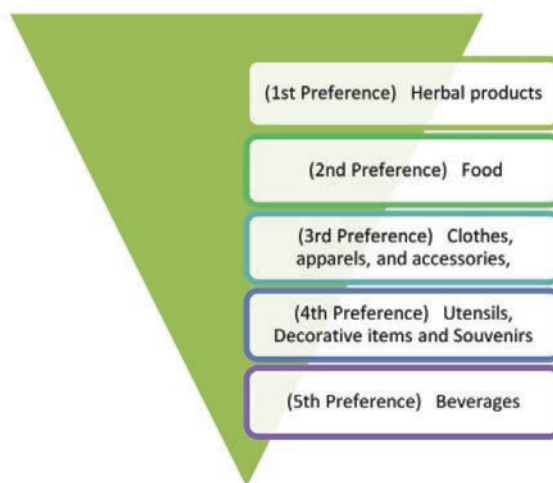


Figure 5: The consumer product preference and needs

However, the assessment of the customer needs and the analysis of the AHP indicates that the overall priority of the product group that should be developed is different from the customer preference. The research team has created the criterion for the AHP technique to be applied to develop the priority of each product group. Since the success of product and business opportunity depend on several factors, this research employed expert panels and literature to develop and define four main criteria of Business contribution value to the OTOP program, the Opportunity for new product development, Self-Sustainability of OTOP entrepreneurs, and Environment contribution value to society. Each group of OTOP products

was evaluated according to these criteria and the results of product group priority were described in Figure 6 and summarised as follows. Figure 7 depicts the overall output from Phase 2 with priority.

- (1st Preference for Product Development)

Utensils, Decorative Items and Souvenirs
- (2nd Preference for Product Development)

Beverages
- (3rd Preference for Product Development)

Clothes, apparel, and accessories
- (4th Preference for Product Development)

Herbal products
- (5th Preference for Product Development)

Food

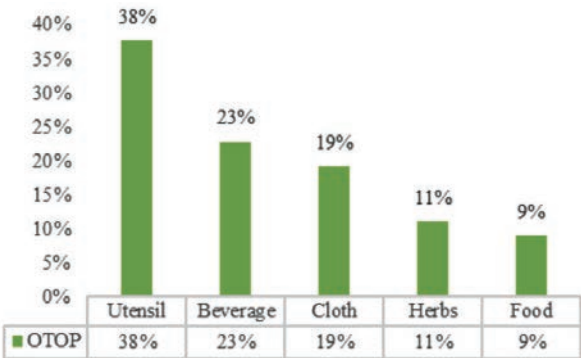


Figure 6: Priority weights of OTOP product group development for the elderly

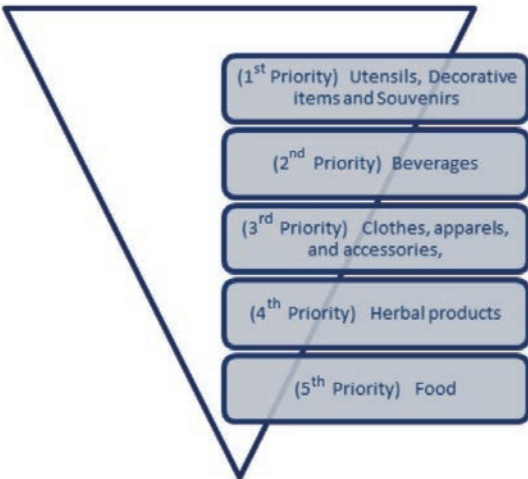


Figure 7: Priority weights of OTOP product group

Next, the product advantage and the prototype of five innovative products were initiated based on the collaborative efforts between the university and communities. The collaboration team have deployed several focus groups to validate the product function and its advantages and determine the final product characteristics. The packaging and the marketing were then given and carried out by the cooperative system of the community. The final three innovative products are tested and sold in the market. The business continuity and the economic returns are evaluated and measured. The OTOP program endorsed the details of the product and its specification. The results of the study showed that this presented framework of the OTOP development represents the practical methodology to improve the OTOP product for the new emerging elderly market in Thailand.

The novelty of the proposed model was emphasised based on the different parties and collaborations between the university and the community that owns the OTOP product. Several multi-criteria AHP techniques were demonstrated, and the framework and model to select and choose the OTOP product development to determine which product group needs support were elaborated. This research involves several actors and tasks that relate to groups of government support through the enabler of Cross Collaboration of the University-community Collaboration Team.

Conclusion

This University-community engagement project proved effective and provided a framework for practitioners who want to initiate new OTOP product development. The framework of this research was tested within the three provinces of Chiang Mai, Lumphun and Lampang using the collaborative product development program. At least, one new and innovative product in each group of OTOP was identified and developed. This defining and selecting of the elderly groups sampled from three provinces of the northern region is vital to the input of the stage of product scope. This research defines the scope of the

product and the customer preferences from the large survey in Chiang Mai, Lumphun and Lampang. The quantitative analysis based on the results of large systematic focus groups by the application of the AHP technique led to identifying the top-ranked groups of OTOP products that need to be strategically emphasised. The analysis results lead to a strategic action plan for product development to be initiated. Then the value creation technique from local culture was employed to innovate the new products based on the collaborative team.

The final innovative products were tested and sold in the market generating economic returns for the communities. The OTOP regulators and offices endorsed the details of the product and its specification. The actual results of the study support that this presented framework of the OTOP development represents the practical methodology to improve the OTOP product for the new emerging elderly market in Thailand. This construct reliability of the proposed framework was also validated during the phase 1 and 2 implementations.

The proposed framework can be adopted by researchers in different provinces and helps the Thai Government to support and run the OTOP program product development policy effectively. However, the effectiveness of the OTOP product development policy deployment also depends on the business management of the entrepreneurs. This research constructs the ecosystem where the cooperative units of the communities are used to configure the organisation structure for running the product development and marketing activity. The results of economic return represent the model validation which can be proven effective. The results presented in this study can be applied to the product in the elderly market other than northern Thailand.

Acknowledgements

This research was partially supported by Chiang Mai University, the National Committee of One Tambol One Product of Thailand, Ministry of Education of Thailand.

References

- Aaker, D. A. (1991). *Managing brand equity: Capitalizing on the value of a brand name*. New York, NY: Free Press.
- Battistoni, E., Colladon, A., Scarabotti, L., & Schiraldi, M. (2013). Analytic hierarchy process for new product development. *International Journal of Engineering Business Management*, 5(42), 1-8.
- Bei, L. T., & Chiao, Y. C. (2001). An integrated model for the effects of the perceived product perceived service quality, and perceived price fairness on consumer satisfaction and loyalty. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, 14, 125-140.
- Belton, V. (1986). A comparison of the analytic hierarchy process and a simple multi-attribute value function. *European Journal of Operation Research*, 26(1), 7-21.
- Bozic, C., & Dunlap, D. (2013). The role of innovation education in student learning, economic development, and university engagement. *The Journal of Technology Studies*, 39(1/2), 102-111.
- Brown, S. L., & Eisenhardt, K. M. (1995). Product development: Past research, present findings, and future directions. *Academy of Management Review*, 20(2), 343-378. doi:10.5465/amr.1995.9507312922
- Choomrit, N., Chantana, P., & Janverod, W. (2011). The study in economic feasibility for OTOP's Distributed Location of Chonburi Province in Thailand. *Proceeding of the 18th International Conference on Industrial Engineering and Engineering Management*, 593-596.
- Denpaiboon, C., & Amatasawatdee, K. (2012). Similarity and difference of One Village One Product (OVOP) for rural development strategy in Japan and Thailand. *Japanese Studies Journal Special Issue: Regional Cooperation for Sustainable Future in Asia*, 29, 52-63.
- Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J., & Bryant, B. E. (1996). The American customer satisfaction index: Nature, purpose, and findings. *Journal of Marketing*, 60(4), 7-18.
- Golder, P. N., & Mitra, D. (2018). *Handbook of Research on New Product Development, Research Handbooks in Business and Management series*. BOOKS ETC LTD.
- Joompha, W., & Pianthong, N. (2018). Development of durian chips product by apply of quality function deployment. *Journal of Science & Technology, Ubon Ratchathani University*, 20(3), 204-218.
- Kenneth, K. (2013). *The PDMA handbook of new product development* (3rd ed.). Hoboken, New Jersey: John Wiley & Sons Inc. p. 34.
- Kurokawa, K. (2009). Effectiveness and limitations of the One Village One Product (OVOP) Approach as a Government-led Development Policy: Evidence from Thai 'One Tambon One Product' (OTOP). *Studies in Regional Science*, 39(4), 977-989.
- Lehmann, M., Christensen, P., Thrane, M., & Jørgensen, T-H. (2009). University engagement and regional sustainability initiatives: Some Danish experiences. *Journal of Cleaner Production*, 17(2), 1067-1074.
- Leonidou, L. C. (2004). An analysis of the barriers hindering small business export development. *Journal of Small Business Management*, 42, 279-302.
- Leonidou, L. C., Katsikeas, C. S., & Samieec, S. (2002). Marketing strategy determinants of export performance: A meta-analysis. *Journal of Business Research*, 55, 51-67.
- Lungtae, S., & Noknoi, C. (2014). The marketing strategies of five-star rated herbal businesses of One Tambon One Product (OTOP) entrepreneurs in Songkhla Province, Thailand. *Proceedings of ICEID 2014: International Conference*

- on Entrepreneurship, Innovation and Development. *International Journal of Economics and Management Engineering*, 8(8).
- Millican, J., Bourner, T., Mason O'Connor, K., Lynch, K., & Owen, D. (2011). Student-community engagement and the development of graduate attributes. *Education+ Training*, 53(2/3), 100-115. <https://doi.org/10.1108/00400911111115654>
- Natsuda, K., Igusa, K., Wiboonpongse, A., & Thoburn, J. (2012). One Village One Product – Rural development strategy in Asia: The case of OTOP in Thailand. *Canadian Journal of Development Studies/Revue canadienne d etudes du developpement*, 33(3), 369-385.
- Odthong, A., Pornprasert, A., & Pornprasert, P. (2018). An appropriate positioning definition of One Tambon One Product of germinated brown rice in Ubon Ratchathani Province. *Journal of SRIVANALAI VIJAI*, 8(2), 95-108.
- Ogunmokun, G., & Ng, S. (2004). Factors influencing export performance in international marketing: A study of Australian firms. *International Journal of Management*, 21, 172-185.
- Phanphet, S., Sukprasert, N., Suttipong, R., Wangmai, A., & Chattinnawat, W. (2019). Factor affecting elderly consumer buying attitude on Thailand OTOP product. *International Journal of Engineering and Advanced Technology (IJEAT)*, 9(1), 942-946.
- Phriwanrat, T. (2014). Properties of Rhizophora Charcoal for product design. *Proceedings of ICCVAD 2014: International Conference on Communication, Visual Arts and Design, International Journal of Humanities and Social Sciences*, 8(4).
- Saaty, T. (1977). A scaling method for priorities in hierarchical structures. *Journal of Mathematical Psychology*, 15(3), 234-281.
- Saaty, T. (1980). *The analytic hierarchy process*. New York: McGraw-Hill.
- Sawhney, A., Verona, G., & Prandelli, E. (2005). Collaborating to create: The internet as a platform for customer engagement in product innovation. *Journal of Interactive Marketing*, 19(4), 4-17.
- Schilling, M. A., & Hill, C. W. L. (1998). Managing the new product development process: Strategic imperatives. *Academy of Management Perspectives*, 12(3), 67-81. doi:10.5465/ame.1998.1109051
- Sinkula, J. M. (1994). Market information processing and organizational learning. *Journal of Marketing*, 58(1), 35-45.
- Sousa, C. M. P. (2004). Export performance measurement: An evaluation of the empirical research in the literature. *Academy of Marketing Science Review*, 9, 1-22.
- Stenning, N., & Miyoshi, K. (2008). Knowledge and networking strategies for community capacity development in Oyama-machi: An archetype of the OVOP movement. *Journal of OVOP Policy*, 1(6), 5-20.
- Sukhov, A. (2018). The role of perceived comprehension in idea evaluation. *Creativity and Innovation Management*, 27(2), 183-195.
- Suttipong, R., Wangmai, A., Phanphet, S., Reungsri, S., & Chattinnawat, W. (2019). Prioritizing and positioning of Thailand's program of OTOP product for elderly using AHP. *International Journal of Engineering and Advanced Technology*, 9(1), 2110-2116.
- Suttipong, R., Phanphet, S., Wangmai, A., Reungsri, S., & Chattinnawat, W. (2022). Extended AHP Approach with Latent factor and Stratum in prioritizing and positioning of OTOP Thailand's program for elderly market. *International Journal of Global Optimization and Its Application*, 1(1), 22-31.
- Tarapitakwong, J., Chartrunguang, B., Somhom, S., & Tantranont, N. (2016). The development of criteria and indicators of OTOP quality in

- wood handicraft production meticulousness using analytic hierarchy process. *Proceeding of 3rd Kamphaeng Phet Rajabhat University National Conference*, 403-415.
- Thammasang, S., & Poonikom, K. (2016). The development of indicators and form of knowledge management in production management case study: Agricultural machine industry in the Northeast of Thailand. *International Journal of Applied Engineering Research*, 11(22), 10912-10922.
- Tuamsuk, K., Phabu, T., & Vongprasert, C. (2013). The knowledge management model of community business: Thai OTOP Champions. *Journal of Knowledge Management*, 17, 363-378.
- Zou, S., Taylor, C. R., & Osland, G. E. (1998). The EXPERF Scale: A cross-national generalized export performance measure. *Journal of International Marketing*, 6(3). <http://tinyurl.com/hm552tr>.