

Prioritizing and Positioning of Thailand's Program of OTOP Product for Elderly using AHP

Ratanaree Suttipong, Athiwat Wangmai, Suwattnarwong Phanphet, Saowaluk Reungsri, Wichai Chattinnawat

Abstract: *One Tambon One Product (OTOP) is one of the major enabler of Thailand to stimulus local entrepreneurship to support locally made products of Thailand's 7,255 Tambons (sub-district). This OTOP program has been initiated since 2001 and has substantially generate incomes for local entrepreneurs. Currently, five groups of OTOP product have been promoted and used by Thai Government to guarantee the quality of the OTOP product. However this research aims to utilize the nexus model of academia-policy maker and business to develop an approach to derive the product improvement policy to increase business market opportunities for the elderly consumers in Thailand. This research studies and identified differences of needs among each group of product. This research conducted large systematic focus groups on 1,275 elderly consumer together with expert interview and quantitative analysis to identify the top three groups of OTOP product that need to be strategically emphasized. Four new criterions of Business, Opportunity, Self- Sustainability, and Environment were developed and used as criteria to identify and prioritize the needs of those five OTOP groups. The AHP technique was employed to identify the weights and compare the five major groups with respect to those developed criteria. This results were used for the government to position the OTOP product that meet the need of elderly consumer segment. The results of the analysis lead to strategic action plan for product and process development of northern Thailand OTOP development program. This proposed concept helps Thai government to effectively exercise OTOP program policy mobility and evolution.*

Keywords: OTOP, AHP, Product Development.

I. INTRODUCTION

The Thailand One Tambon One Product (OTOP) program has been initiated since 2001 under government initiatives and supports. This OTOP program has successfully contributed to the local economy enhancement. This government-led initiative model has been adopted from the Japanese One Village One Product (OVOP) success model.

Revised Manuscript Received on October 15, 2019.

Ratanaree Suttipong, Department of Industrial Technology, Faculty of Science and Technology Chiang Mai Rajabhat University. Email: nokdum2513@gmail.com

Athiwat Wangmai, Department of Industrial Technology, Faculty of Science and Technology Chiang Mai Rajabhat University. Email: athiwat229@gmail.com

Suwattnarwong Phanphet, Department of Industrial Technology, Faculty of Science and Technology Chiang Mai Rajabhat University. Email: suwattwong@gmail.com

Saowaluk Reungsri, Department of Industrial Technology, Faculty of Science and Technology Chiang Mai Rajabhat University. Email: jazzjazz_7217@hotmail.com

Wichai Chattinnawat*, Department of Industrial Engineering, Faculty of Engineering, Chiang Mai University. Email: chattinw@eng.cmu.ac.th

This OTOP program has been proven to provide local communities with opportunity to market local product and thus creating local employment [1]. This program also influences the success of rural development helping community members to efficiently utilize their local resources to create globally accepted products that reflect pride in the local culture. This also enhances self-community development to utilize agriculture capitals for local business management such as cooperatives and shifting the community business to industrial business [2]. This self-reliance and community creativity also leads to supports of the local skilled labor and human resource development [1]. Several studies pointed out that the effectiveness of this OTOP program is largely driven by government intervention and relied on the five star product grading championship system [3].

Eventhough this system helps local producers to assess their performance status and hence position their product and business, the OTOP program is lacking approach or methodology to use the championship system to define which group of product that shall be strategically focused with new creativity for new market. This leads directly to the strong needs for Thai government to develop a systematic approach that can integrated with the championship system to enhance OTOP product development. In order to develop and maintain sustainable competitiveness for the OTOP program, the systematic approach of product and market development must be continually implemented. Moreover this process should be equiped with information that links the need of the customer to the product strategy and policy development process [3]. Futhermore, the expansion of the OTOP to larger market group is needed especially the growing market of elderly in Thailand. This research aims to utilize the nexus model of academia-policy maker and business[4] to develop an approach to derive the product improvement policy to increase business market opportunities for the elderly consumers in Thailand. This proposed concept helps Thai government to effectively exercise OTOP program policy mobility and evolution.

Currently there are several product development projects that aim to increase the business value of the OTOP product. Nonetheless, those projects provide only the strong supports relationship between customer needs and the existing specific product value (Joompha and Pianthong, 2018). This proposed method presents hierachical process to prioritize and position the OTOP product for new elderly market using the Analitic Hierarchy Process (AHP).

Prioritizing and Positioning of Thailand's Program of OTOP Product for Elderly using AHP

This research methodology starts from outlining the potential groups of product with respect to the needs of the elderly customer. This large surveys of 1,275 customer were conducted and their needs were analyzed to define the priority of OTOP product development and position. The next section explains the literature and methodology used. Section 3 presents the analysis methodology and details of the AHP implementation. The last section provides summary and discussion for the research.

II. LITERATURE REVIEW

The analytic hierarchy process (AHP) developed early in 1970 by Thomas L. Saaty has been extensively applied to analyze especially the complex multicriteria decisions such as supplier selection, plant location and etc. The AHP is a structured approach based upon pairwise comparison to derive and summarize the preferences and priority of the alternatives with respect to the different criteria among policy or decision makers. This approach transforms the expert judgments into additive weighting method to identify numerical weighting values for the alternatives objective and fixed set of criteria in the form of 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 [5]–[7]. The application of AHP for industrial product development are numerous [8]. However, for selection of OTOP product development, the application of AHP is very limited.

The application of AHP in improving the OTOP product are mostly product-based focuses without considering wider range or group of product. For OTOP product development, the AHP has been applied only to either specific single product development such as wood handicraft [9], [10], processed food [11]. The AHP are also used for the location selection of the OTOP product distribution [12] as well as the logistic and supply chain management [13]. Even though the results can be used to improve OTOP value, those findings are still limited to specific product and cannot be used by Government to take actions at the policy level.

There are no research or report that illustrates the strategy to consider the overall structure or groups of OTOP products. Lungtae and Noknoi [14] applied the AHP technique to define the marketing strategies of Five-Star (OTOP) but only for the herbal businesses. The authors considered the concept of targeting and positioning the marketing mix and presented the marketing strategies for OTOP entrepreneurs. However the data were only collected from 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, (3) publicizing more about the products and promotional activities. The results of study can be adopted only to single herbal product sector. Hence in order for the Government to develop national policy for holistic OTOP product development, the information on all OTOP groups are needed to be considered including their business strategies.

The OTOP business management and strategy contribute to the importance of each OTOP product group. This plays an important role as decision criteria for policy to prioritize

needs for promotion. Many researchers aim to define indicators or factors contributing to the success of the OTOP business management without considering the product priority. For example, Tuamsuk et al. [15] studied the knowledge management model of community business of OTOP champions. The authors investigated and identified the knowledge management factors that affect the success of the five-star OTOP businesses in Thailand. The authors found that in order to improve the businesses, the knowledge management practices of OTOP group business must employ conventional main factors such as organization leader's concept, culture, staff and knowledge eagerness. Similarly, Thammasang and Poonikom [16] adopted the AHP to select the important set of indicators that associated with the knowledge management with the production management of OTOP. In general, those authors found that the success factors in the knowledge management consist of vision and clear policy of executive, staff's communication skill, to set the knowledge management team, organization's suitable culture and staff's work teaching skill. However those findings do not relate the business management with product priority and cannot be adopted for OTOP product improvement or development policy. Hence this research adopted the AHP to construct the knowledge how to prioritize which group of the OTOP product in relation to business-related criteria that aligns with the elderly market opportunities and needs.

III. METHOD

This research decomposes complex, unstructured problem, holistic approach of OTOP development into a set of components organized similar to multi-attribute structure (Belton, 1986). This research considered all five groups or categories of OTOP product. The research methodology starts from identifying the preferences and needs of elderly with respect to those five OTOP product groups. The unit analysis is defined as product group instead of individual OTOP product. The priority of each group were derived based on the extensive focus group survey of 1,275 elderly from 3 provinces in northern Thailand consisting of Chiang Mai, Lumphun and Lampang. The responses consist of 552 and 723 of elderly males and females respectively. The respondents were asked to evaluate in pairwise for the needs and preference in buying each group of product using 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 research employed expert panels and literature to develop and define four main criteria of Business contribution value to the OTOP program, Opportunity for new product development, Self-Sustainability of OTOP entrepreneurs, and Environment contribution value to society. Each group of OTOP product was evaluated according to these criteria and the results of product group priority were summarized. **Figure 1** depicts the overall steps of the research.

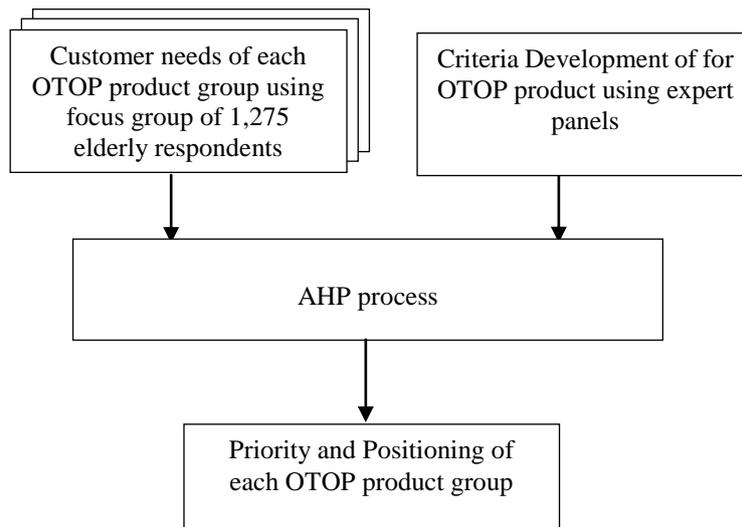


Fig. 1. Research Methodology

The Thai product of OTOP are currently divided into 5 main groups of (i) Food, (ii) cloth, apparel, and accessories, (iii) Beverages, (iv) Herbal product, and (v) Utensils, Decorative items and Souvenirs. These five groups were defined as five alternatives for Thai government to focus and

promote for OTOP product development. Since the purpose of this research is to prioritize these alternatives in the view of the AHP concept, these alternatives were depicted at the lowest level of the model structure of AHP.

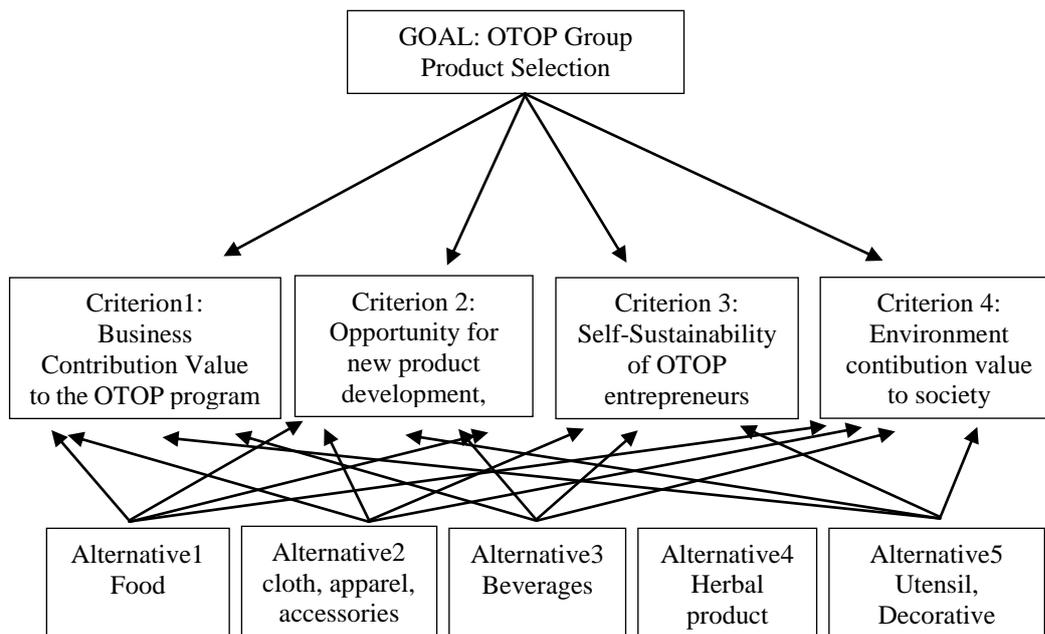


Fig. 2. AHP Structure

In this research, the expert panels and literature review was used to define the four main criteria of BOSE model: **B**usiness contribution value to the OTOP program, **O**pportunity for new product development, **S**elf-Sustainability of OTOP entrepreneurs, and **E**nvironment contribution value to society. This model was developed with respect to the finding from those factors of success, knowledge management process, effective production management. The environment indicator was incorporated according to the business sustainability management perspective and perceived quality and environment awareness of elderly consumer derived from the focus group.

IV. RESULTS AND DISCUSSION

First, the pairwise comparison of the 1,275 elderly preference with respect to each OTOP product category or group were summarized with respect to 5 point scales as shown in **Table 1**. The analysis reveals that the inconsistency is at a low level with the Consistency Index (CI) and the Consistency Ratio (CR) both less than 0.1. This ensures that the information derived from extensive focus groups and elderly judgments can be considered sufficiently coherent and can be used in the decision making process.

Prioritizing and Positioning of Thailand's Program of OTOP Product for Elderly using AHP

The analysis reveals that the derived set of weights can be displayed in Figure 2 showing the decreasing weight from Utensil, Beverage, Cloth, Herbs, and Food. This research also tested whether the weights are different among male and

female elderly. There is no strong evidence suggesting the differences. Hence the weights will be used for prioritizing each OTOP product group in the next step.

Table 1. Comparison Matrix of Elderly Preferences

	Utensil	Beverage	Cloth	Herbs	Food
Utensil	1.00	2.84	2.84	2.50	2.24
Beverage	0.35	1.00	2.57	2.37	2.13
Cloth	0.35	0.39	1.00	2.36	2.18
Herbs	0.40	0.42	0.42	1.00	2.25
Food	0.45	0.47	0.46	0.44	1.00

MaxEigenValue = 5.38 R.I. = 1.12
C.I. = 0.095052 C.R. = 0.084868

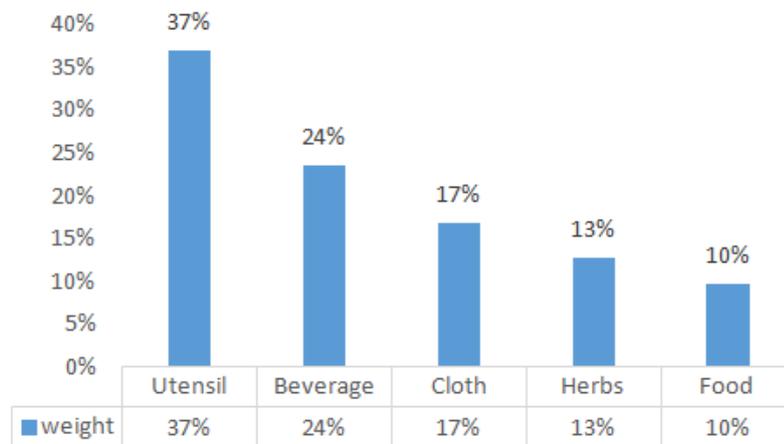


Fig. 3. Derived Weights of Each OTOP Product Category based on Elderly Needs

Second, the weights of each criterion were derived based on the panel opinion and were standardized and summarized with respect to 5 point scale as shown in **Table 2**. Similarly both CI and CR are less than 0.1 ensuring that the information derived from expert group judgments are

consistent and coherent for using in the next AHP calculation. Figure 3 shows the weights derived for each criterion.

Table 2. Standardize pairwise comparison of expert judgement on each criterion

	Business	Opportunity	Sustainability	Environment
Business	1.00	3.25	2.50	3.25
Opportunity	0.31	1.00	2.50	3.25
Sustainability	0.40	0.40	1.00	2.50
Environment	0.31	0.31	0.40	1.00

Max
Eigen
Value = 4.23 R.I. = 0.9
0.077786 0.0864297
C.I. = 74 C.R. = 1

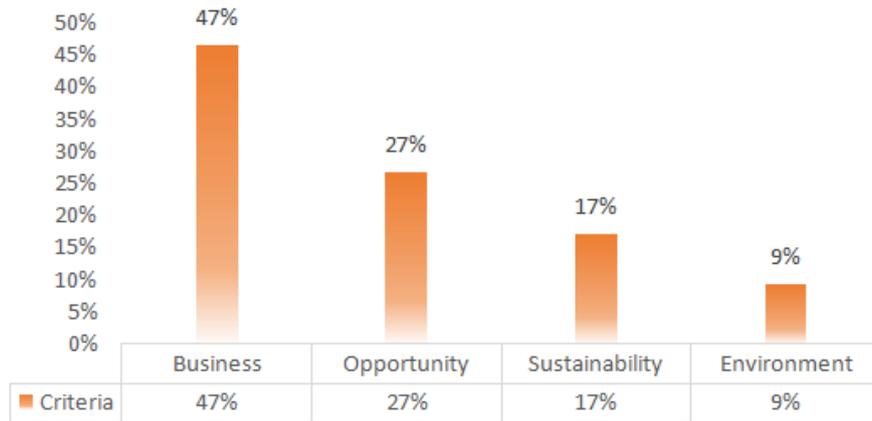


Fig. 4. Derived Weights of Criteria

Next, the evaluation of each OTOP group alternative was carried and compared with each criteria based on the expert judgements. The pairwise comparison and the AHP were summarized in Table 3 (a-d).

Table 3. Standardized unit of pairwise comparison of expert judgement on each criterion

Business	Utensil	Beverage	Cloth	Herbs	Food	Eigen Vector
Utensil	0.39	0.59	0.38	0.31	0.17	37%
Beverage	0.12	0.18	0.38	0.27	0.17	22%
Cloth	0.16	0.07	0.15	0.31	0.24	19%
Herbs	0.10	0.06	0.04	0.08	0.32	12%
Food	0.22	0.10	0.06	0.03	0.10	10%
	1	1	1	1	1	1.00
Opportunity	Utensil	Beverage	Cloth	Herbs	Food	Eigen Vector
Utensil	0.41	0.61	0.38	0.29	0.23	38%
Beverage	0.13	0.19	0.38	0.29	0.23	24%
Cloth	0.17	0.07	0.15	0.29	0.30	19%
Herbs	0.13	0.06	0.05	0.09	0.16	10%
Food	0.17	0.07	0.05	0.05	0.09	9%
	1	1	1	1	1	1.00
Self-Sustainability	Utensil	Beverage	Cloth	Herbs	Food	Eigen Vector
Utensil	0.41	0.63	0.30	0.31	0.26	38%
Beverage	0.11	0.17	0.43	0.24	0.20	23%
Cloth	0.23	0.07	0.17	0.31	0.26	21%
Herbs	0.13	0.07	0.05	0.10	0.20	11%
Food	0.13	0.07	0.05	0.04	0.08	7%
	1	1	1	1	1	1.00
Environment	Utensil	Beverage	Cloth	Herbs	Food	Eigen Vector
Utensil	0.44	0.63	0.44	0.32	0.20	41%
Beverage	0.12	0.17	0.34	0.24	0.20	21%
Cloth	0.13	0.07	0.14	0.32	0.26	18%
Herbs	0.13	0.07	0.04	0.10	0.26	12%
Food	0.18	0.07	0.04	0.03	0.08	8%
	1.00	1	1	1	1	1.00

Lastly, the overall evaluation of each OTOP group alternative were aggregated and the weights of each criterion

were then used to define the overall priority can be summarized in Table 4 and Figure 5. The analysis shows

Prioritizing and Positioning of Thailand's Program of OTOP Product for Elderly using AHP

that the weights derived from the AHP are consistent and similar to the weights derived from the elderly consumer needs.

This research does not find statistical significant different among two sets of weight.

Table 4. Overall AHP Calculated Priority Weights for Each OTOP Product Group

	Business	Opportunity	Sustainability	Environment	Total Weights
	47%	27%	17%	9%	100%
Utensil	37%	38%	38%	41%	38%
Beverage	22%	24%	23%	21%	23%
Cloth	19%	19%	21%	18%	19%
Herbs	12%	10%	11%	12%	11%
Food	10%	9%	7%	8%	9%
	100%	100%	100%	100%	100%

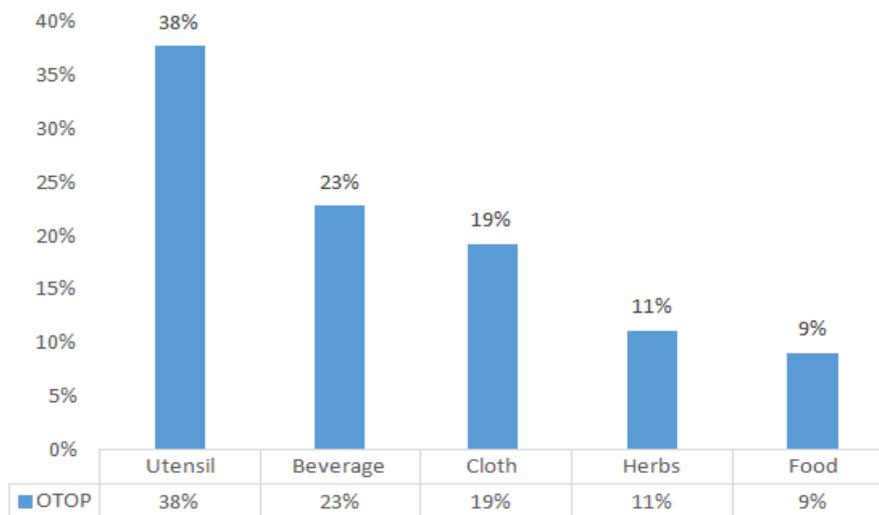


Fig. 5. Priority Weights of OTOP Product Group

V. CONCLUSION

The analysis reveals that there are differences in market opportunity for elderly among the five OTOP product category. The analysis of large focus group reveals that the elderly perceived differently on different function and usability of each product group. The Utensils, Decorative items and Souvenirs group received highest buying preferences from elderly consumer segment followed by Beverage, Cloth and apparel. Since the product development for those high potential OTOP group will be supported by Thai Government, the policy maker need to also consider other support performances of the OTOP entrepreneurs. This will ensure that the new product development on those high priority group such as utensil can help expanding the economy and improve the economic, social and environment impact of the existing program. The national policy with holistic view need to be developed by considering factor driving the business success and other performance as well.

The effectiveness of the OTOP product development and its policy deployment depends on the business and management of those entrepreneurs. Thus the results of this research can be used to position the right group of OTOP product and develop strategic action for OTOP product and

process development of northern Thailand. This proposed concept helps Thai government to effectively exercise OTOP

program, policy, mobility, and evolution.

This reliability of the proposed methodology depends on the consistency and the selection of the responded focus group. This research defined and selected elderly groups using combined systematic sampling approach by considering community as sampling unit. The results of AHP reveals that the consistency and the coherence of the AHP results can be accepted. This study then suggested the three highest priority of the OTOP product group that shall be used to develop the product development strategy. The also suggested the new positioning of the OTOP product for the elderly market

ACKNOWLEDGMENTS

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

REFERENCES

1. K. Natsuda, K. Igusa, A. Wiboonpongse, and J. Thoburn, "One Village One Product—rural development strategy in Asia: the case of OTOP in Thailand," *Can. J. Dev. Stud. Can. d'études du développement*, vol. 33, no. 3, pp. 369–385, 2012.
2. C. Denpaiboon and C. Amatasawatdee, "Similarity and difference of one village one product (OVOP) for rural development strategy in Japan and Thailand," *Japanese Stud. J. Spec. Issue Reg. Coop. Sustain. Futur. Asia*, pp. 52–62, 2012.
3. K. Kurokawa, "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)," Stud. Reg. Sci., vol. 39, no. 4, pp. 977–989, 2009.
- V. Noble, "Mobilities of the One-Product policy from Japan to Thailand: a critical policy study of OVOP and OTOP," Territ. Polit. Gov., pp. 1–19, 2018.
 - T. L. Saaty, "A scaling method for priorities in hierarchical structures," J. Math. Psychol., vol. 15, no. 3, pp. 234–281, 1977.
 - T. L. Saaty, "Decision making with the analytic hierarchy process," Int. J. Serv. Sci., vol. 1, no. 1, pp. 83–98, 2008.
 - T. L. Saaty, "Analytic hierarchy process," Encycl. Biostat., vol. 1, 2005.
 - E. Battistoni, A. Fronzetti Colladon, L. Scarabotti, and M. M. Schiraldi, "Analytic hierarchy process for new product development," Int. J. Eng. Bus. Manag., vol. 5, no. Godište 2013, pp. 5–42, 2013.
 - T. Phriwanrat, "Properties of Rhizophora Charcoal for Product Design," World Acad. Sci. Eng. Technol. Int. J. Chem. Mol. Nucl. Mater. Metall. Eng., vol. 8, no. 4, pp. 333–335, 2014.
 - J. Tarapitakwong, B. Chartrungruang, S. Somhom, and N. Tantranont, "A Classification Model for Predicting Standard Levels of OTOP's Wood Handicraft Products by Using the K-Nearest Neighbor," Int. J. Comput. Internet Manag., vol. 25, no. 2, pp. 135–141, 2017.
 - W. Joompha and N. Pianthong, "Development of Durian Chips Product by Apply of Quality Function Deployment," J. Sci. Technol. Ubon Ratchathani Univ., vol. 20, no. 3, pp. 204–218, 2018.
 - N. Choomrit, P. Chantana, and W. Janverod, "The study in Economic Feasibility for OTOP's Distributed Location of Chonburi Province in Thailand," in 2011 IEEE 18th International Conference on Industrial Engineering and Engineering Management, 2011, pp. 1593–1596.
 - T. Theppitak, "Direction of Thailand Logistics Management in the Next Decade," Univ. Thai Chamb. Commer. J., vol. 33, no. 2, 2013.
 - S. Lungtae and C. Noknoi, "Logistics and supply chain management of One Tambon One Product in Songkhla province: a case study of Koh Yo hand-woven fabric," Eur. J. Soc. Sci., vol. 29, no. 4, pp. 561–568, 2012.
 - K. Tuamsuk, T. Phabu, and C. Vongprasert, "Knowledge management model of community business: Thai OTOP Champions," J. Knowl. Manag., vol. 17, no. 3, pp. 363–378, 2013.
 - S. Thammasang and K. Poonikom, "The Development of Indicators and Form of Knowledge Management in Production Management Case Study: Agricultural Machine Industry in the Northeast of Thailand," Int. J. Appl. Eng. Res., vol. 11, no. 22, pp. 10912–10922, 2016.

AUTHORS PROFILE



Ratanaree Suttipong has received her master degree in the Education Program in Vocational Education from Chiang Mai University, Chiang Mai, Thailand, in 2001.

She is currently working as a lecturer in Art Industrial Technology department, Ceramic Technology, and Product Design program of Industrial Technology Department, Faculty of Science and Technology Chiang Mai Rajabhat

University, Chiang Mai, Thailand.



Athiwat Wangmai has received his Bachelor degree in the Department of Education Program in Industrial and Technology Education from Chiang Mai Rajabhat University, Chiang Mai, Thailand, in 2013 and master degree in the Education Program in Vocational Education from Chiang Mai University, Chiang Mai, Thailand, in 2017. He is currently working as a lecturer program in Industrial Art Industrial

Technology Department, Faculty of Science and Technology Chiang Mai Rajabhat University, Chiang Mai, Thailand.



Suwattananarong Phanphet has received his BS degree in the Department of Industrial Education from Rajamangala University of Technology Lanna, Chiangmai, Thailand, in 2000 and an MS degree in the Department of Industrial Engineering from Chiangmai University, Chiangmai Thailand in 2004. In 2017, he received a PhD degree in the Department of Industrial

Engineering from Chiangmai University, Chiangmai Thailand. Act. SubLt. Dr. Suwattananarong Phanphet is currently working as a lecturer in the Program Chairperson of Industrial Art Industrial Technology Department, Faculty of Science and Technology Chiang Mai Rajabhat University, Chiang Mai, Thailand. He has published 5 paper in international journal, 23 papers in international conferences. He has extended the research into the area of Finite Element Method, Perception

and Collaboration for Decreasing Effect of Climate Change though STEM Education System and Design of Experiment.



Chiang Mai, Thailand.

Saowaluk Reangsri, Highest Education: Master's Degree (Vocational education), Chiang Mai University

University or Agency: Chiang Mai University
Field of Expertise: Vocational education, Industrial arts and Multicultural education
She is currently working as a lecturer in Art Industrial Technology program of Industrial Technology Department, Faculty of Science and Technology Chiang Mai Rajabhat University,



Wichai Chattinnawat is an associate professor of Industrial Engineering at Chiang Mai University in Thailand. He holds Ph.D. and M.S. in Industrial Engineering, and a M.S. in Statistics from Oregon State University. His research focuses on statistical process control, quality engineering, applied statistics for quality improvement, as well as concurrent design of quality and productivity. Assoc. Prof. Wichai Chattinnawat has extended the research into the area of Material Flow Cost Accounting (MFCA) Analysis and Application in Industry. He was appointed by Thailand Productivity Institute as MFCA trainer. He conducted MFCA research for National Science and Technology Development Agency (NSTDA) of Thailand and provides consulting to leading firm in Thailand in applying the MFCA to reduce cost and improve efficiency. He has been regarded as a leader in the MFCA technique in Thailand