

Developing a Standard Design Management for SMEs: A Case of Plastic Baskets in Thailand

By

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Abstract

This study sought to create a framework for standardizing design management for a SME community in Thailand, with a focus on plastic woven items that struggle with a lack of innovation in product design, branding, packaging, and marketing competitiveness. Dynamics that explain the connection between design uniqueness and competitive performance may benefit from this study. This study was based on a qualitative examination. The case study used the Kutthong Plastic Weaving Group in Thailand. The needs analysis indicated that the community needed innovative product designs, distinctive production methods, and branding to set their products apart from those of their competitors in the market. A framework for product innovation development, packaging, production process development, machinery development, improved raw material quality, brand development for the product, the production process, product innovation, labor-saving machinery scales, and a standard design management system were provided by the experts in response to their needs. The 3,171,429 SMEs in Thailand with similar threats may benefit from this study. This study is applicable to SMEs with comparable situations. In order to implement this study, future research should conduct a needs analysis to identify relevant knowledge and skill gaps for the SME community and one product under the future study.

Keywords: Plastic Baskets, SMEs, Standard Design Management

Introduction

The training of new design knowledge or design resources in Small Medium Enterprises (SMEs) with little or no design experience has been at the core of design support programs in several countries. This includes Thailand where how design and design management capability is built in SMEs with little or no prior design experience is insufficiently investigated. Even though there were 3,171,429 SMEs in Thailand in 2021, the key problems of SME products are lacks of uniqueness on product design, branding, packaging, as well as poor analyses of the marketing competitiveness and dynamics that characterize the relationship between uniqueness in design and competitive performance. For this reason, the Ministry of Science and Technology solved these problems with innovative design and management systems to raise them to trade standards for market competitiveness by creating branding.

To achieve the research objective, this study, this research examined local SME handicrafts in the northeastern region of Thailand that have received funding from the national policy aiming to develop local innovation capabilities. This research examined the production of plastic baskets as a case study. This study specifically identified and discussed design management capabilities and analyses, their role in mediating the relationship between improved production and competitive performance, using a strategic role of design management which is being increasingly recognized as one of the solutions to SME's problems with the aim to use the design-driven innovation based on knowledge of science, technology

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and innovation to drive products in the plastic strand weaving group to create jobs, create career and create added value in the community.

The contents of this study fall into six parts. This article consists of the following five sections. Section 1 (Introduction) provides the rationale for the study. Section 2 (Literature Review) consists of the prior study, the research gap, a conceptual framework for the study and the research questions. Part 3 (Research Method) describes the research methodology of this study. Part 4 (Results of the Study) explains the research findings. Section 5 (Conclusion and Discussion of the Study) summarizes the research findings, discusses the finding in comparison with the findings of prior study, limitations of the study, suggestions for further study and implications of the study.

2. Literature Review

Several scholars (e.g., Kramoliš & Staňková, 2017; Carneiro et al., 2021; Kramoliš et al. 2020; Bilan et al., 2020; Kramoliš & Šviráková, 2019, 2022) indicate that design is becoming more important, can improve financial condition, and increase competitiveness. These benefits are a results of effective design management.

Design management is the umbrella term for the continuing procedures, commercial judgments, and business plans that foster creativity and produce well-designed goods, services, communications, settings, and brands. Design management, at its most fundamental level, aims to connect design, innovation, technology, management, and customers to deliver competitive advantage. In order to promote collaboration and synergy between "design" and "business," it is both an art and a science to empower design. The purview of design management includes everything from the tactical management of corporate design functions and design agencies—including design operations, staff, methods, and processes—to the strategic promotion of design throughout the organization. It incorporates design thinking, which is the application of design methodologies to broader business issues which several sectors get involved with the success. Among the sectors is professionals who practice design management who are actively involved in design thinking and managing industrial design, graphic design, service design, environment design, brand identity, fashion design, interface design, interior design, and experience design.

2.1 Prior study on design management for SMEs

A number of studies (e.g. Kummitha, 2019; Alarcón et al., 2015; Audretsch et al., 2009; Iduarte & Zarza, 2010; Kootstra, 2009; Lindman et al., 2008) found that the design-driven management positively influences the capacity of small and medium-sized enterprises (SMEs) products and consequently their competitive performance. For example, the findings of Carneiro et al. (2021) indicated that excellent design does not happen by accident but is the outcome of a controlled process. Design is also the (strategic) selection and the mobilization of the many activities, procedures, skills, and organizational resources required for the development of that product.

2.2 Prior study on benefits of design management for SMEs

Some studies (e.g., Santos et al., 2018; Carneiro et al. 2021) concentrate on the benefits of design management for SMEs with little or no design experience. Acklin (2013) suggests a thorough model of design management absorption that includes indicators to track the development of absorption as well as design management capabilities that enable design absorption in SMEs with little to no prior design experience. The approach makes it possible

to examine and direct the steps businesses take when utilizing design as a strategic resource for the first time. To better understand how to boost innovation performance, Fernández-Mesa et al. (2013) discovered an intriguing interaction between organizational learning, design management capabilities, and product innovation. This conclusion demonstrates that design management, as a flexible capability, develops via learning and enables the firm to shift with the environment.

2.3 Prior study on factors affecting innovation capabilities

There are numerous factors influencing innovation capacities such as the availability of adequate organizational resources, an entrepreneurial mindset, knowledge development, and external networks (Ali et al., 2020), goal setting and concept development and divergence and convergence (Berends et al., 2011), understanding diverse enterprises' attitudes and prior knowledge (Fonseca Braga, 2017), favorable, direct relationships between design management as a capability, change, and performance in a knowledge-based society (Ceptureanu et al., 2016), management's mindset and awareness of design (Kramoliš, 2016), organizational learning capability and dynamic competence mediates this relationship, CEOs' design decisions (Fernández-Mesa et al., 2013; Dickson et al., 1995), and design innovation-specific appropriability procedures (Filippetti and D'Ippolito, 2017), technology 4.0 (Gerlitz, 2016), product development costs and market acceptability (March-Chorda et al., 2002), managerial challenges to product development (namely a dominant owner/manager, a concentration on time and money above other variables, and a failure to comprehend product design) (Millward & Lewis, 2005), and performance evaluation instrument and strategic and managerial tools (Moultrie et al., 2006).

2.4 Prior study on SMEs innovation capacities

Innovation capacities that influence SMEs' success fall into various types. Landoni et al. (2016) investigated six SMEs in the Italian region of Lombardy that had received money from a policy intended to strengthen design innovation capacities. They identified and discuss five different design innovation capabilities and they analyzed their role in mediating the relationship between investment in design and competitive performance. Five fundamental design innovation capabilities—holistic vision, how humans give things meaning, applying new technology, visualizing and materializing, and managing the design process—mediate the relationship between design investment and competitive performance. No matter what types of innovation capacities, to increase their SME's capacity for innovation, Saunila (2020) suggested that the manager needs to acknowledge many elements that influence innovation capabilities.

2.5 Prior study on innovation modeling and support

Innovation modeling and support vary by circumstance. For example, Scozzi et al. (2005) proposed approaches for modeling and assisting innovation processes in SMEs, where lack of specialized resources. Hidalgo and Albors (2008) emphasized knowledge rather than research (technology-push theory) and interaction between enterprises and other actors. Both public and commercial enterprises have been developing business innovation management approaches and technologies. Wormald and Evans (2009) studied the integration of industrial design capability within UK SMEs. They argue for university-company partnerships to help SMEs adopt industrial design procedures. The UK government's "Knowledge Transfer Partnership" (KTP) programs are used to start and improve SMEs' industrial design capabilities. Two case studies highlight design management difficulties and the importance of industrial design knowledge for SMEs. It covers the pros and cons of hiring graduate-level industrial designers for product innovation in manufacturing SMEs. Industrial design and a

well-managed KTP program can help SMEs succeed in global marketplaces. As there are a variety of circumstances, effective modelling is context-specific. The next part focuses on SMEs in Thailand.

2.6 Prior study on SMEs in Thailand

The prior study on SMEs in Thailand directs towards a variety of approaches to improve Thai SMEs' performance. Several approaches involve: training such as training for entrepreneurs of SMEs (Thassanabanjong et al., 2009) and a webinar training as a supporting tool for SMEs (Ariya et al., 2021); funding such as the accuracy of financial information on Thai SMEs' performance and ability to obtain external funding (Sarapaivanich & Kotey, 2006); exporting such as e-commerce: e-commerce adoption for export market (Ueasangkomsate, 2015), Thai small and medium-sized businesses' export performance and cultural savvy, focusing on the mediating roles of organizational capacities (Charoensukmongkol, 2016), and the linkages between bribery, the political system, and government assistance and how these affect Thailand's small and medium-sized businesses' ability to export (Charoensukmongkol, 2016); and marketing competitiveness such as success factors for social commerce systems (Vongsraluang & Bhatiasavi (2017), Global value chains, trade, and SMEs (Korwatanasakul & Paweenawat, 2021), intellectual resources (Na-Nan et al., 2020) and developing a competitive edge for Thai SMEs as they move towards the Thailand 4.0 era (Kruasom, 2017).

Other studies gear towards a variety of topics relating to improving SMEs' performance: innovation such as innovative big data maturity assessment app for smartphones (Limpeeticharoenchot et al., 2020) and creative and innovative SMEs (Sriboonlue & Puangpronpitag, 2019); technology such as the performance's relationship to technical capabilities (Chantanaphant et al., 2013); creativity such as culture-related influences on creativity in a Thai SME (Rujirawanich et al. (2011); supply chain improvement such as using the integrated personnel development concept to improve the performance of SMEs' supply chains (Phrapratanporn et al., 2019); and integration of theory in practice such as Thai SMEs' performance and the sufficiency economy (Suttipun & Arwae (2020).

2.7 Research gap

Only a few pertinent studies have been done on design management. One study by Muenjohn and McMurray (2017) investigated the effects of work ethics, workplace innovation, and design leadership (WVE) on SMEs in Thailand and Vietnam. The findings indicated that WVE influences leadership behavior based on a study of 696 useable questionnaires administered to small and medium firms (SMEs) in Thailand and Vietnam. Moreover, design leadership significantly affects the four workplace innovation aspects, supporting an interactionist theory viewpoint. The results also showed that leadership conduct mediates the association between WVE and workplace innovation when looking at the understudied Thai and Vietnamese SME environment. The study contributes to the literatures on design leadership, innovation, and values in this way.

The other study by Kato and Charoenrat (2018) focused on management of small- and medium-sized businesses' business continuity who experienced disasters to a significant extent. The results indicated that perceived disaster readiness, business continuity knowledge, and training needs were strongly connected with a scale of business size, operation period, and catastrophe experience, even though understanding of pertinent training needs vary among SMEs. The study thus emphasized the significance of providing assistance to small enterprises, especially those located in rural areas, with the framework of the study and research question as shown in the next part.

2.8 Framework of the Study and Research Questions

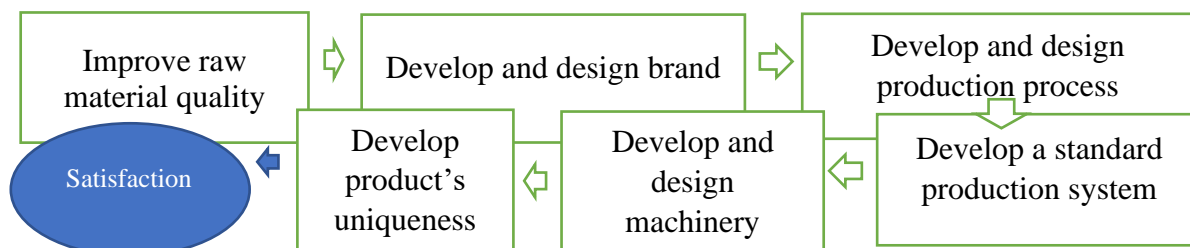


Figure 1 A framework for standardizing community products in Thailand

Figure 1 illustrates a framework for standardizing community products in Thailand. The framework consists of these steps: improve raw material quality, develop and design packaging, develop and design production process, develop a standard system, develop and design machinery, and develop product uniqueness. All these steps were then assessed to verify the entrepreneurs' satisfaction for further development.

Practically, this study aimed to propose a framework for standardizing community products in Thailand. verify the framework. To achieve the objectives, the research question as shown in the next part.

2.9 Research Questions

The primary purpose of this study aimed to design and create unique handicrafts in order to provide a framework for standardizing community products in Thailand, with a specific focus on plastic woven products. To achieve the purpose, three research question was determined:

1. What are the needs of entrepreneurs for plastic woven products?
2. What are practical development guidelines for entrepreneurs making plastic woven products?
3. How satisfied are entrepreneurs with plastic woven product needs-based products?

3. Method

3.1 Research design

This was a pilot study, based on qualitative study, which aimed to develop design management for SME plastic baskets. The participants in this study were members, manufacturers, and entrepreneurs of the Kutthong Plastic Weaving Group, Ban Kutthong, Kutthong Sub-district, Chiang Yuen District, Maha Sarakham Province, Thailand. This group was established and started operating a community enterprise since 2016, with a total of 25 members in the group. This group produces plastic woven products, such as baskets and rice boxes, which are woven from plastic threads or from reed threads. This group sells their products at their community shop. All their experience, the availability of space, their basic tools for product production, and their readiness to learn and experience indicated that this group is ready to learn and adopt new ideas to develop their own business. The two researchers have ten-year research experience. The two assistants are doctoral students in the field of business and art design.

3.2 Instruments for data elicitation

The instruments for data elicitation in this study included the following: an entrepreneur needs analysis survey, a focus group discussion, product development and experiment, and in-depth interviews. Below are the details of each instrument.

3.2.1 An entrepreneur needs analysis

The goal of the entrepreneur needs analysis survey is to understand the entrepreneurs' needs and their position in the overall market in these aspects: product innovation development, packaging, production process, and machinery.

3.2.2 A focus group discussion

To provide solutions to the entrepreneurs' needs, five experts as the project advisory group from the Art Research Center for Development (ARDC) of the Faculty of Fine and Applied Arts. This center was established in 2006 with the goal to foster product design and development through research and academic service for communities, professional groups, community enterprise entrepreneurs, and small and medium enterprise entrepreneurs (SMEs).

3.2.3 Product development and experiment

These instruments aimed to develop a machinery labor-saving support for female producers, especially a tool for bending the wire frame for structural work. Different local equipment was tried and applied with the production process till the producers agreed with its efficiency for their products. Then, the knowledge was transferred to community the producers.

3.2.4 In-depth interviews

In-depth interviews consisted of two sets: the Kutthong Plastic Weaving Group's needs and the entrepreneurs' satisfaction with the guidelines for the needs of entrepreneurs. On the former, the in-depth interviews of the group's leader aimed to draw insights of the following needs: product innovation development, packaging, production process, and machinery. On the latter, the in-depth interviews of the group's leader aimed to draw insights of the entrepreneurs' satisfaction with the products developed according to the guidelines for the needs of entrepreneurs of plastic woven products on the advantages of the guidelines on these issues: raw materials, design and packaging, production process, machinery, and the product's uniqueness and innovation. The results of the in-depth interviews provide suggestions on improving raw material quality, developing and designing the product's brand, developing product's uniqueness and innovation, developing and design machinery, and developing a standard production system.

3.4 Data analysis

The qualitative data drawn from the focus group discussion and the interviews was coded, recorded, and interpreted logically by the researchers and two research assistants. The flexible, inductive, and iterative interpretation was fundamentally concerned with understanding, interpreting and making sense of the data according the objective of the study. Each of the four researchers and assistants searched for similarly coded descriptions when obtaining information, manually categorizing and placing the codes under the proper nodes. They categorized, reasoned, conceived, and summarized the same, comparable, or related codes. They also recoded to assure the correctness of the codes. On the basis of their agreement, the contents were compared, and a conclusion was reached. The study's conclusion was derived from all of the instruments for data elicitation based on triangulation, including the focus group discussion, the entrepreneur needs analysis, the analyses, the development and experiment, and

the interviews of needs analysis and satisfaction of development in this study, in order to give the results of the study credibility. The results of the study are presented as shown in the next section.

4. Results Of The Study

Drawing upon the results of the entrepreneur needs analysis survey, this study revealed the findings.

4.1 *The entrepreneurs' needs analysis*

In response to the first research question (What are the needs of entrepreneurs for plastic woven products?), the SWOT analysis of Kutthong Plastic Weaving Group revealed its strengths and opportunities. Plastic weaving products are still in high demand on the market, there is a sizable market for innovative and creative items. The public sector also keeps supporting the products indefinitely. This group's shop is close to commercial districts where the target clients are, and it has labor to increase the production base. However, this group has weaknesses and threats such a lack of accessible raw materials, unreliable raw material supply, a crowded market, a lack of a variety of products, a lack of product recognition, a lack of labels and brands, and a lack of distribution channels.

To promote the group's business, it is necessary to draw insights of the group's needs. The in-dept interview of the group leaders revealed these key insights. On product innovation development, new product designs and alternative materials in production were required to provide creativity and distinguish their products from those already on the market. On packaging, the group does not yet have its own product brand and label. The members desired to have their own brand and label. On production process, the group wished to develop speedier production processes by relying primarily on human labor. On machinery, the group desired to create a labor-saving machine for production in order to reduce labor. Solutions to the needs are presented in the next part.

4.2 *The suggestions for the need analysis of the entrepreneurs*

In response to the second research question (What are practical development guidelines for entrepreneurs making plastic woven products?), the following are suggestions and practical development guidelines made by experts and consultants in response to the aforementioned needs. The suggestions fall into 4 parts: product innovation development, packaging, production process, and machinery development. Below are the details of each part.

4.2.1 *The product innovation development*

The experts suggested the utilization of waste plastic water bottles to make plastic filament as the primary material or in combination with already-existing filament used by producers. This will decrease the cost of purchasing plastic filaments. In addition, this waste plastic serves to create the distinctiveness of the products by making their design stand out and be noticeable. This will also be appealing to a wider spectrum of consumers.

4.2.2 *The product packaging*

The experts suggested incorporating the local cultural identity of the community into the design of the package and the product's brand. To do this, the entrepreneurs created three designs and select one design as the product label. This creation and selection process was under the supervision of the academic, industrial, marketing team.

4.2.3 The production process development

Previously, the entrepreneurs primarily relied on human labor. 90% of the labors were female. This made the production process slow. To expedite the process, the researcher suggested the following solutions.

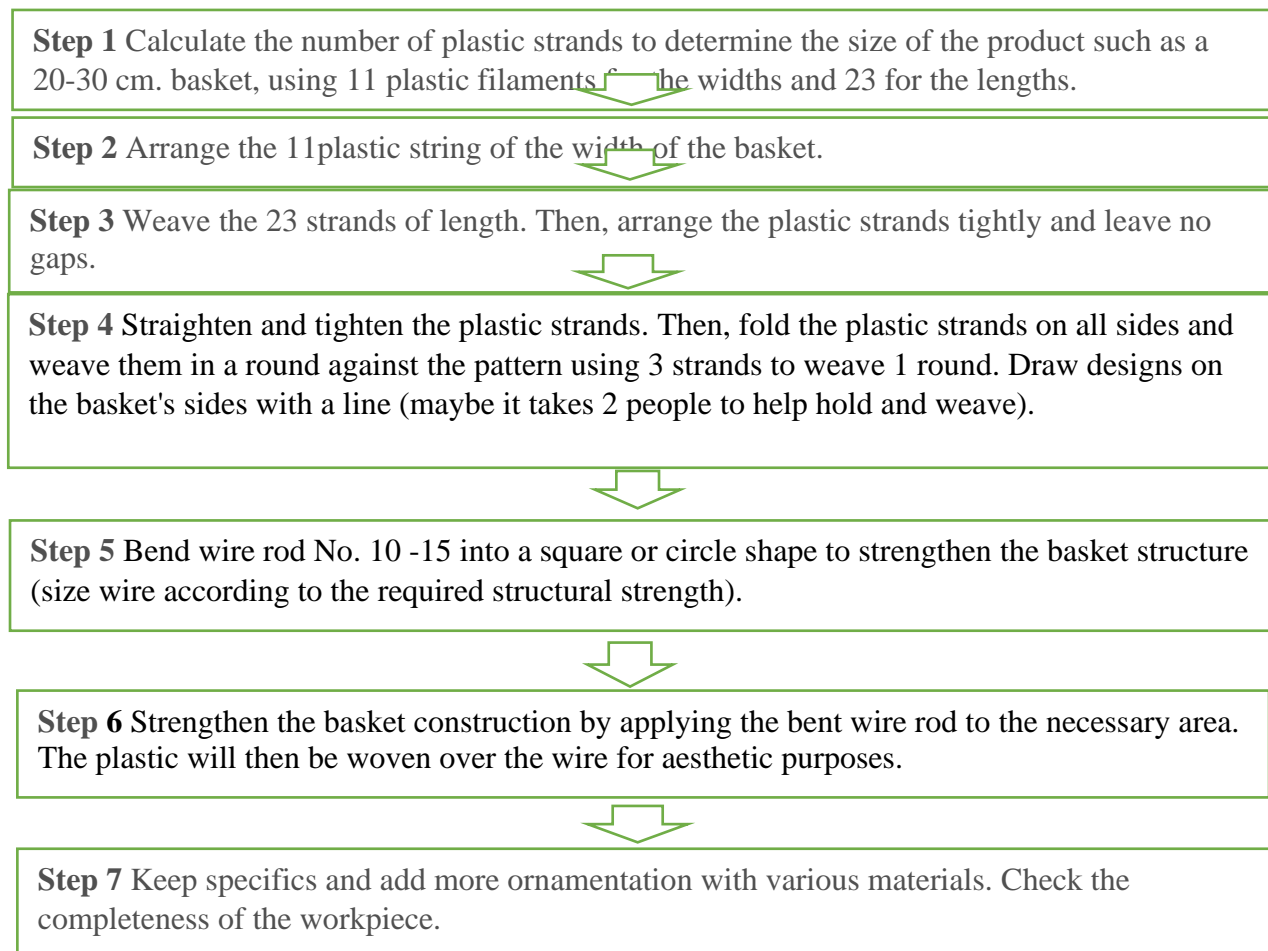


Figure 2 The production process of Kut Thong plastic weaving group

Figure 2 presents the production process of Kut Thong plastic weaving group. It is evident that steps 4-6 in the production process required expertise, labor, and efforts as crucial elements, particularly the base component that is weaved into the side of the product. Calculating the size of the plastic filament to be used and making the effort to keep the line straight and firm in order to prevent shape distortion will take some time. This approach restricts the ability to create alternative shapes that go beyond the weavers' current scope of knowledge.

In order to construct plastic woven items that can have their size and proportion adjusted to a variety of product shapes, the project advisory group has invented a set of "equipment" as shown in **Figure 3**.



Figure 3 A proposed innovative set of "equipment"

Figure 3 presents an innovative set of equipment for erecting the structure and weaving of plastic strands. This equipment can speed up the production process, which benefits trained weavers by reducing their workload and production time by thirty minutes per piece and makes it simple for others of the community who lack experience to learn.

4.2.4 Machinery development

As the Kutthong plastic weaving production group wished to develop a machine to save labor in production, the wire utilized in the production process must be particularly strong. In order to strengthen the basket construction in step 6, it is challenging for the weavers to put the bent wire rod to the required location. In addition, it is rather difficult to bend the wire to the necessary size, proportion, shape, curve, and angle because the weavers' traditional tools are only wire cutting pliers. Possessing adequate strength and expertise is required. It should be mentioned that all the manufacturers and weavers are female. As a result, labor-saving machinery is required for them to make bending wire steel frames easier. Labor-saving machinery tools for bending the wire frame are presented in **Figure 4**

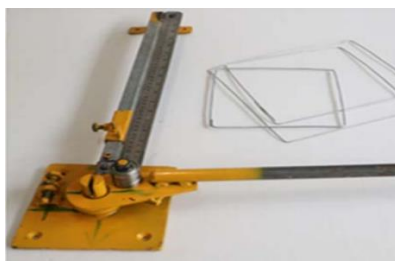


Figure 4 Labor-saving machinery tools for bending the wire frame

Figure 4 shows labor-saving machinery tools (square bending type). By extending from the labor-saving machinery tools for bending the wire frame to get up to work plastic weaving structure, the wire was then bended into plastic wickerwork structures to achieve faster and more convenient production.

4.3 The Entrepreneurs' Satisfaction with the Products

In response to the third research question (How satisfied are entrepreneurs with plastic woven product needs-based products?), the results of this research question were drawn from in-depth interviews, consisting of the following five topics: improving raw material quality, developing and designing the product's brand, developing product's uniqueness and innovation, developing and design machinery, and developing a standard design management system. The results of the focus group and in-depth interviews as shown below.

4.3.1 Improving raw material quality

“Developing plastic strands from waste drinking water bottles to be used in conjunction with plastic strands leads to more varied patterns and designs.”

[Interviewee no. 1]

“Because of this, our products stand out from both their original items and competing goods on the market.”

[Interviewee no. 2]

Previously, the group use only plastic strands imported from other areas. After the manufacturers adopted the consultants’ advice to use discarded drinking water bottles, the creation of plastic strands from the discarded materials to be combined with other plastic strands results in more diverse patterns and designs that set the products unique apart from both their original products and other items available on the market as shown in Figure 5.



Figure 5 *Diverse products made of combined materials*

Figure 5 illustrates diverse patterns and designs of products created from plastic strands combined with the discarded drinking water bottles materials. This makes our products unique and different from their original products and other products in the market.

4.3.2 Developing and designing the product’s brand

To design a brand, the entrepreneurs integrated cultural capital and community identity into the brand design, the results are shown in **Figure 6**.



Figure 6 *The product’s brand*

Figure 6 presents the product’s brand. This brand aimed to create product’s recognition and differentiate the community’s products from the competitors’ products.

4.3.3 Developing and designing production process

Process design and equipment can easily increase production potential. The process can run faster than ever, help reduce production costs, and produce various product forms that are different from before. This increases the opportunity to compete in market and can increase income for the Ban Ku Thong community. This also expedites their corporation as shown in **Figure 7**.



Figure 7 *The community's corporation*

Figure 7 presents the community's corporation. The corporation created a better environment. They were more optimistic about their small community business.

4.3.4 Developing product's uniqueness and innovation

"Community products are unique. Products that are different from competitors' ones in the market. The group has revenues increased by 10 percent."

[Community leader]

The increased revenues are a result of the developed products which were made more unique. The additional materials made the products more distinctive and attractive. The newly developed brand made the products more noticeable. There are a variety of products. Some of the products are shown in **Figure 8**.





Figure 8 *Developed products*

Figure 8 presents some developed products. They could produce a higher number of goods with more various designs. This led to more economic opportunity for the community such as higher revenues, more recognizable products, and wider markets. The key factors to this success are brand creation, product distinctiveness, and higher productivity, partly due to the developed local machinery support.

4.3.5 Developing and designing machinery support

“A set of equipment for bending the wire frame to form a plastic weave structure to the desired size, proportion, shape, arc and angle to achieve the required wire that reduces time and labor in production.”

A set of equipment was developed with the purpose of labor-saving support. The machinery labor-saving support is shown in Figure 8.



Figure 9 *The machinery labor-saving support*

Figure 9 presents the machinery labor-saving support. It is used for forming plastic woven products that can scale, proportionate, and form structure of products in a wider variety of shapes. It can reduce molding time at different rates as the results of the interview below:

“Reduces production time approximately 30 – 45 minutes per piece in the weaving process of the product”

[Less experienced interviewers]

“Reduces production time per piece 45 –60 minutes in the process of cutting, bending metal wire product structure coordination”

[More experienced interviewers]

4.3.6 Developing a standard design management system

This was a pilot study but there are some contributions for other 3,171,428 SMEs in Thailand in an attempt to developing a standard design management system and reduce key

problems of SME products (namely lacks of uniqueness on product design, branding, packaging, as well as poor analyses of the marketing competitiveness and dynamics that characterize the relationship between uniqueness in design and competitive performance). Drawing upon the aforementioned results, the contributions can be summarized as shown in Figure 10.

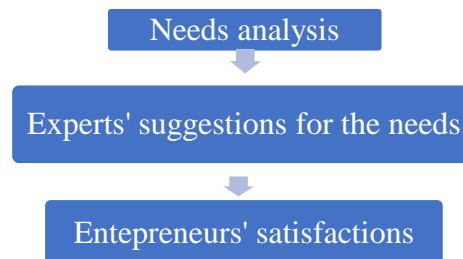


Figure 10 *Proposed development of a standard design management system*

Figure 10 presents the proposed development of a standard design management system. The system should include at least these steps: needs analysis, experts' advice for development, and satisfaction evaluation. The initial step should begin with the entrepreneurs' needs analysis to understand the strengths, weaknesses, opportunities and threats of their products. In addition, as the entrepreneurs are local people, they need to cooperate with the experts from academic, economic, industrial, and marketing sectors who can provide suggestions and solutions relevant to their needs. They need to cooperate with the experts to solve their key problems such as product innovation development, product packaging, production process development, and machinery development. Lastly, the entrepreneurs' satisfaction of the developed system needs to be evaluated such as raw material quality, the product's brand, the production process, the product's uniqueness and innovation, and machinery support.

5. Conclusion And Discussion

This section presents a summary of the research findings, the discussions of the finding in comparison with the findings of prior study, the limitations of the study, the suggestions for further study and the implications of the study. Below are details of each topic.

5.1 Conclusion of the Study

The primary purpose of this study aimed to design and create unique handicrafts in order to provide a framework for standardizing community products in Thailand, with a specific focus on plastic woven products. To achieve the purpose, three research question was determined: What are the needs of entrepreneurs for plastic woven products? What are practical development guidelines for entrepreneurs making plastic woven products? How satisfied are entrepreneurs with plastic woven product needs-based products? This pilot study, which was based on a qualitative investigation, sought to establish design management for SME plastic baskets. The Kutthong Plastic Weaving Group, Ban Kutthong, Kutthong Sub-district, Chiang Yuen District, Maha Sarakham Province, Thailand, members, manufacturers, and business owners participated in this study. An entrepreneur needs analysis survey, a focus group discussion, a product development and trial, and in-depth interviews were the instruments used in this study to elicit data.

In data analysis, each of the four researchers and assistants manually categorized and placed codes under the appropriate nodes after finding similarly coded descriptions. They

categorized, reasoned, developed, and summarized similar codes. Recoding ensured code accuracy. Their agreement was used to compare and draw a conclusion. In order to establish the study's results credibility, the focus group discussion, entrepreneur needs analysis, analyses, development and experiment, and needs analysis and development satisfaction interviews were used to draw the study's conclusion. The study's findings can be concluded as follows.

In response to the first research question (What are the needs of entrepreneurs for plastic woven products?), key insights from the needs analysis. Product innovation development required creative product designs and alternative production materials to differentiate their products from competitors. The group's packaging is unbranded. Members wanted their own label. The group wanted to speed up production using human labor. The group wanted to build a production machine that saved labor. The solutions to the needs are presented in the results of the next research question.

In response to the second research question (What are practical development guidelines for entrepreneurs making plastic woven products?), the findings can be concluded as follows. On the product innovation development, the experts advised using waste plastic water bottles to generate plastic filament, either alone or in combination with producer filament. Plastic filaments will be cheaper. Waste plastic also makes the products' designs stand out. More consumers will like this. On the product packaging, the experts advised infusing the community's culture into the package and brand design. Entrepreneurs generated three designs and chose one for the product label. Academic, industrial, and marketing teams oversaw this creation and selection. On the production process development, the created innovative set of equipment for erecting the structure and weaving plastic strands speeds up the production process, which helps expert weavers by decreasing their workload and production time by thirty minutes per item and makes it easy for community members without experience to learn. On machinery development, the labor-saving mechanical tools for bending the wire frame to start the plastic weaving structure made production faster and easier.

In response to the second research question (How satisfied are entrepreneurs with plastic woven product needs-based products?), the findings can be concluded as follows. First, to improve raw material quality, after following the consultants' advice to use discarded drinking water bottles, the manufacturers created plastic strands to combine with other plastic strands, creating more diverse patterns and designs that set their products apart from both their original products and other products on the market. Second, to develop and design the product's brand, the entrepreneurs used cultural capital and community identity to design their brand. Third, to develop and design production process, the created equipment may quickly enhance production potential, run faster than previously, minimize manufacturing expenses, and produce numerous product types. This enhances market competition and community revenue. Fourth, to develop product's uniqueness and innovation, the extra materials enhanced the items and products vary. Fifth, to develop and design machinery support, the labor-saving machinery scales, proportionates, and forms items in more shapes. This reduces molding time by 30–45 minutes each item for less experienced interviewers and 45–60 minutes for more skilled interviewers. Lastly, to develop a standard design management system, three steps are proposed: local entrepreneurs' needs analysis, development in response to their needs and experts' advice, and assessment of entrepreneurs' system satisfaction.

5.2 Discussion of the Study

The findings of this study lend support to the prior study (e.g., Kramoliš & Staňková, 2017; Carneiro et al., 2021; Kramoliš et al. 2020; Bilan et al., 2020; Kramoliš & Šviráková, 2019, 2022) that design management yields several benefits such as finances and

competitiveness. This study raised revenues by 10% for entrepreneurs. In addition, the findings of this study lend support to the prior study (e.g. Kummitha, 2019; Alarcón et al., 2015; Audretsch et al., 2009; Iduarte & Zarza, 2010; Kootstra, 2009; Lindman et al., 2008) that design-driven management boosts SMEs' product capacity and competitiveness. The increased revenues by 10% for the local entrepreneurs is a result of the introduction of the design management system to the entrepreneurs who have limited or no design experience. They gained the experience from new external network such as experts. This factor was verified by prior study that contributes innovation capabilities like goal setting and concept development (Berends et al., 2011), understanding diverse enterprises' attitudes and prior knowledge (Fonseca Braga, 2017), favorable, direct relationships between design management as a capability, change, and performance in a knowledge-based society (Ceptureanu et al., 2016), management's mindset and awareness of design (Kramoliš, 2016), organizational lean (Moultrie et al., 2006).

This study differs from previous Thai SMEs research. The prior study indicated the following are factors affecting SMEs' performance such as the accuracy of financial information on Thai SMEs' performance and ability to obtain external funding (Sarapaivanich & Kotey, 2006); e-commerce adoption for export market (Ueasangkomsate, 2015), Thai small and medium-sized businesses' export performance and cultural savvy, focusing on organizational capacities' mediating roles (Charoensukmongkol, 2016), and the linkages between bribery, the political system, and govern (Kruasom, 2017). This study, however, found that design management is the key factor for the entrepreneurs with little or no management knowledge and solutions to their problems can be done by experts' knowledge transfer and simple technology. This finding is consistent with prior study (Thassanabanjong et al., 2009; Ariya et al., 2021) that training can help. This study indicated that specialists' knowledge transfer and simple technology enable them lack originality in product design, branding, and packaging, as well as weak analyses of marketing competitiveness and dynamics that describe the relationship between design uniqueness and competitive performance.

5.2 Limitations of the Study

This study is limited to one SME community and one product. It can be applied to SME that share similar contexts.

5.3 Suggestions for further study

In order to apply this study, future study should conduct a needs analysis to identify appropriate knowledge and skill shortages for the SME community and one product under the future study.

5.5 Implications of the study

This study can help the 3,171,429 SMEs in Thailand that lack originality in product design, branding, packaging, and marketing competitiveness and dynamics that describe the relationship between design uniqueness and competitive performance.

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