THE PRODUCT DEVELOPMENT OF THE HAND-WOVEN COMMUNITY ENTERPRISE: A SOCIAL NETWORK ANALYSIS

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ABSTRACT
The objectives of this study were to investigate social network analysis for product development of the Ban Sai hand-woven community enterprise in material procurement, production planning, and product development. This study was conducted utilizing a mixed-methods approach. Social network questionnaires, observation, and in-depth interviews were used to collect data. Quantitative data was evaluated using social network analysis tools (Uci.net and Netdraw), while qualitative data was assessed using qualitative data analysis software. (Atlas.ti). A social network analysis of material procurement revealed that five groups were involved in this activity. There were two people that took part in the network analysis of production planning. However, the research findings revealed that three people were involved in product development activities. The above outcomes lead to the following suggestion. The relevant official department should encourage a group to purchase raw materials in bulk and assist the group in learning production planning skills and developing new product development knowledge.
Keywords: Social Network Analysis, Production Development, Hand-Woven Community

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INTRODUCTION

Thai woven fabrics and fabric products are one of the unique characteristics of the country that has been recognized for the beauty of colors and the intricacy of patterns and has its own unique characteristics which has been influenced by customs, traditions, beliefs and cultures in society that have been inherited for a long time. The production of woven fabrics, whether woven from cotton or silk, will require manual labor in almost every step. Weaving each piece of fabric requires a lot of time and delicacy, with the process having to be sequenced first-after in order to create a correct and beautiful pattern. It is considered a handicraft that is the local wisdom of Thai people that has been passed down from generation to generation (Utiswannakul, 2016). For this reason, folk woven fabrics are valuable and highly valued. It is desired by consumers and is a very important handicraft in terms of representing identity, culture and local wisdom. Economically, weaving fabrics can create jobs and income for local people including generating income for the country as an export product and a product for foreign tourists.

Although weaving is practiced throughout the country, the Ikat cotton fabric of the Ban Sai weaving community enterprise, Ban Mi District, Lopburi Province, has an outstanding reputation due to the unique pattern of Tai Phuan people who have inherited the weaving process and fabric pattern from generation to generation. It has evolved into a job for the next generation to create cash while preserving local wisdom to ensure its survival (Rodjun, 2010). However, weaving organizations continue to face manufacturing concerns such as fabric pattern creation and product processing, weaver labor shortages, production planning, public relations, and marketing issues. The approaches for studying the analysis of past weaving problems emphasize the application of modern management principles, resulting in recommendations for increasing management knowledge, the use of decision-making aids in production, and the introduction of machinery and technology in weaving. Although these techniques are effective for directing the growth and adaption of weaving groups, they necessitate a significant increase in skills and know-how, as well as significant funding from public and private institutions (Rauf & Pervaiz, 2016). Furthermore, certain methods are difficult to apply because they surpass the capability of the weaving groups. As a result, the researcher wants to obtain fresh insights on operational challenges by proposing a realistic guideline for developing the weaving group's operations in this study. The method that would be applied in this study comprises the application of the concept of social network analysis to propose a guideline for improving the operation of the weaving group to be practical and to gain a new perspective in considering the problems of the weaving group.

In this study, the researcher utilized the idea of social network analysis to a group of weaving fabric manufacturers in order to assess their working connection and determine how much collaboration they had, as well as who is in a position to participate in network activities. Recently, social network analysis has been applied in many disciplines. This includes its use in business planning and product development (Leenders, & Dolfsma, 2015). However, relatively few social network studies are utilized to examine small businesses or community enterprises. This study intends to generate knowledge for the operation of small business enterprises by concentrating on villagers' business groups who use cultural capital and local wisdom to design their own goods, bringing social networking principles to group operations. The objective of this research is to investigate the operations of the Ban Sai hand woven community enterprise in terms of raw material procurement, production operation, and product development using social network analysis approaches. The analysis results will provide an understanding of the weaving group's functional structure, which will be used as a guideline for operational development in the fields of raw material procurement, production development, and product development, resulting in an increase in operational development and enhancement of the group's operational efficiency. The findings of the social network

analysis will allow them to propose a more efficient method of expanding the weaving group's activities.

LITERATURE REVIEWS

The study of the interconnections between people, groups, organizations, or communities as a collection of correlations is known as social network analysis. Depending on the degree of correlation in the nodes, each set of correlations or relationship structures will have various patterns (Borgati, Everett, and Johnson, 2018). The study of the structural pattern of interactions that contribute to synergy or the factors restricting collaboration is therefore the subject of social network analysis. Furthermore, social network analysis will aid in understanding the function of individuals in the network as well as the impact of those in positions to effect other members of the network and the overall network (Carrington, 2014). There are two research approaches for examining social network analysis. The first method is to examine all network members, which is appropriate for small groups and networks with simple access to members. The second technique, ego network, is appropriate for bigger groups and networks. This necessitates the use of a sampling method to pick the population for the investigation (Fuhse, 2020). A total of 60 weavers were chosen for this investigation.
The notion of centrality actor was applied in the social network analysis. The centrality actor is the individual who plays a vital role and is the center of the network, knows the most people in the network, and is known by the most people in the network. He is the person with the most links to other personas and is in the position closest to them. This individual is now the most powerful person in the network (Light and Moody, 2020). The indegee centrality is used to calculate centrality. The more that individual connects or is the focal point of the network, the more popular or prestigious that person will be in the network (McCulloh, Armstrong & Johnson, 2013). The researcher used this concept in studying the woven cloth group to find leaders in each area: procurement of materials, production operation, and product development to determine who is the most centrality actor, how it plays an important role in the group, how they can perform the roles according to their positions in that group, how they are responsibilities and are able to manage the work for the group to run smoothly, and what the problems and obstacles are.

RESEARCH METHODOLOGY

This research had a sequential explanatory design. The quantitative data collection was on the social network data by studying the elements of social networks in terms of people who are centrality actors. It was collected from all 60 members of the Ikat cotton weaving community enterprise. For the qualitative data collection, the observation and in-depth interviews were done on 12 persons. For the tool used in social network analysis, the researcher used the computer program UCI.NET 6.2 (Borgatti, Everett, & Freeman, 2002) and then presented the data in the form of sociogram using the Netdraw program. For the qualitative data, I used the Atlas.ti computer program to organize and for analysis, data coding, producing memos, and forming families of codes based on themes detected in the interview data. Furthermore, following transcription, this dataset was imported into the Atlas.ti V.8 application to create an ordered storage file system by identifying and storing content in one location that facilitated faster and easier administration of the interview data. This combined process streamlined obtaining data associated with codes, themes, or documents.

RESEARCH RESULTS

Ban Sai hand-woven community enterprise was established in 2002 in Ban Mi District, Lopburi Province. There were 60 members in this weaving group, which belonged to the Thai Phuan ethnic group, and they acquired weaving skills from their ancestors who moved from

Xieng Khwang, Lao People's Democratic Republic, more than 200 years ago (Cheesman, 2015). Weaving for everyday usage and religious rites was common in the early days. Later, the government encouraged the establishment of a community company to provide individuals with a profession and a secure income. Previously, a single weaver would weave each step of the way. Later, when demand for woven cloth expanded, they were unable to weave in time. As a result, the weaving had been divided according to expertise like an industrial production system which increases production more (Chanorn, 2016).

The management of community enterprises can be divided into 4 groups based on the division of labor. Group 1 is a group of executives which consists of the president and president 's assistances (codes in social network analysis are a1, a2 and a3). Group 2 includes people who prepare raw materials or prepare threads (The code for analyzing social networks is b1) and people who perform warp cotton and wart cotton (The code for analyzing social networks is b2, b3). Group 3 is a making mudmee group or making Ikat cotton. There is a total of 14 people (codes in the analysis of social networks are c1, c2, c3, c4, c5, c6, c7, c8, c9, c10, c11, c12, c13 and C14). Lastly, Group 4 includes all weaving people. Currently, there are 40 weavers in the group. The weaving group can be divided into 3 subgroups: 1) the weaving group in Ban Sai, with a total of 16 people (codes for analyzing social networks are e1, e2, e3) , e4, e5, e6, e7, e8, e9, e10, e11, e12, e13, e14, e15, and e16), 2) The group outside Ban Sai but still in Ban Mi District, totaling 11 people (code in Social network analysis: f1, f2, f3, f4, f5, f6, f7, f8, f9, f10 and f11) , and 3) 13 weaving people located in different districts (code for social network analysis: g1, g2, g3, g4, g5, g6, g7, g8, g9, g10, g11, g12 and g13).

Part 1: Social network analysis in the material procurement

The network's structural pattern is multi-centered, indicating that material procurement is spread among group members. Some members are directly involved in the acquisition of supplies. However, the person who play important roles in the material procurement are a1, c3, e1, f1, and f2 as in Figure 1) These members who have high indegree centrality act as a bridge or a mediator and responsible for purchasing thread for others. The study's findings revealed that the weaving group's raw material purchases were dispersed. It is organized into five sub-groups, each with its own members and a leader who purchases and distributes threads for its members. There were also exchanges between sub-groups among themselves. This system of purchasing raw materials is dispersed. As a result, when acquiring raw materials is spread out, negotiating power is diminished, making it hard to band together to purchase in big numbers, resulting in higher raw material costs.

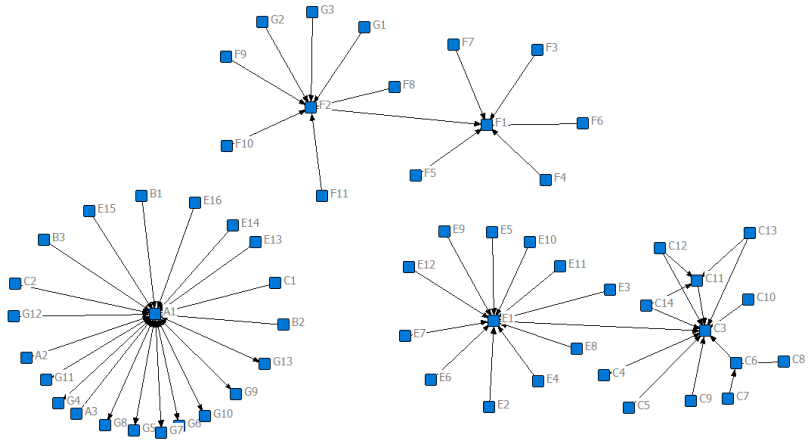

Figure 1 Network structure of material procurement

Part 2: Social network analysis in production planning

Production planning is the examination and determination of future plans for what will be produced, when it will be produced, and how many will be produced. The weaving group's production planning comprises of planning for thread preparation, designating designs for those who create Ikat cotton, and allocating patterns to weavers. According to the conclusions of Figure 2, production planning is made by the president and the sub-network head. The top six members with the highest indegree centrality are the most engaged in planning: a1, c3, e1, f2, f3, and g1) These personnel are involved in practically every aspect of production planning, including mudmee pattern and weaving planning. According to group president interviews, knowing the personal qualities of mudmee and weavers is required for planning and duties. The president must be aware that he or she is competent in mudmee or weaving designs, and if he is inexperienced, he will assign simple chores. The nature of the network structure revealed that production planning would be spread, with the president appointing sub-group leaders to further plan the output. According to the findings, all sub-group members (c3, e1, f2, f3, and g1) are related to the president (a1), implying that the president is crucial to the overall production planning of the Ban Sai weaving group. Subsequently, responsibility for planning production with network members will be delegated to sub-group leaders. In conclusion, the president has the biggest influence on the group's production planning. However, there are two major problems with production planning. First, all production planning is done by memorization. There is no systematic message recording which can cause errors. Secondly, members who prepare weft and prepare warp (c1, c2, c3) are positions that can be performed alone in the group. The person in that position therefore has quite a bargaining power with the group. Sometimes there is a problem that can't make it in time, affecting the whole weaving.

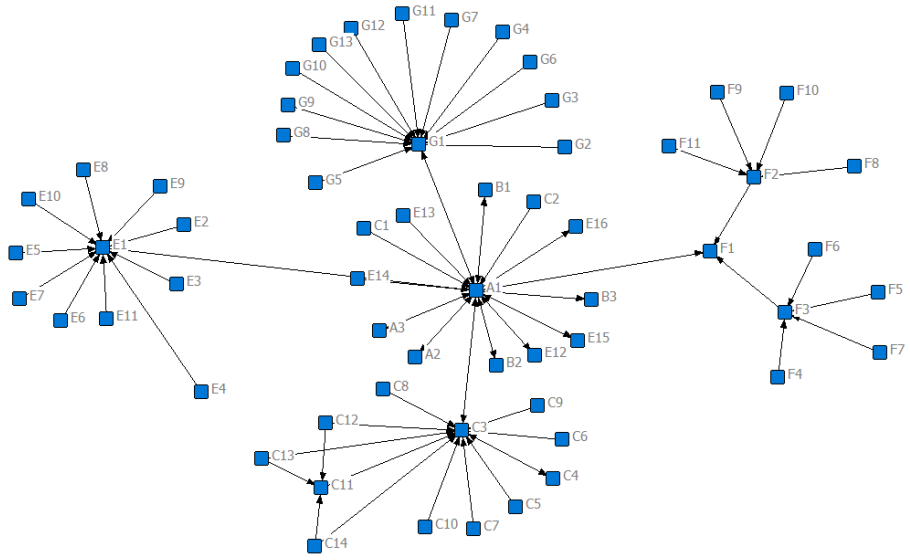

Figure 2 Network structure of production planning

Part 3: Social network analysis in product development

One of the most essential concerns of the Ikat cotton weaving group is product development, particularly fabric creation in order to be marketable. The group often creates new patterns while retaining existing patterns and then locating additional patterns to make a perfect mix desirable in marketplaces. Figure 3 presents the product development network structure of 60 according to the number of group members. There are seven isolation members; b1, b2, b3, c13, c14 and e16) The structure of the network is multi-centered, distributed among a1 , g1 and c3) The study of the network structure shows that there are 7 members who are not

involved in product development and 3 are involved in product development. The people who played a key role in product development were a1, the group president, followed by g1, the sub-network leader, and c3, who responsible for making Ikat cotton weaving group. These members play an important role in all process of product development. The product development effort would be launched by the group president (a1), who thinks about and creates new fabric designs. It will then be transferred to C3, which is cutting mudmee designs. Finally, g1 is the weaver. In summary, product development is limited to only three persons, resulting in limited product development since only three people are involved and unable to design fabric patterns to suit new market demand.

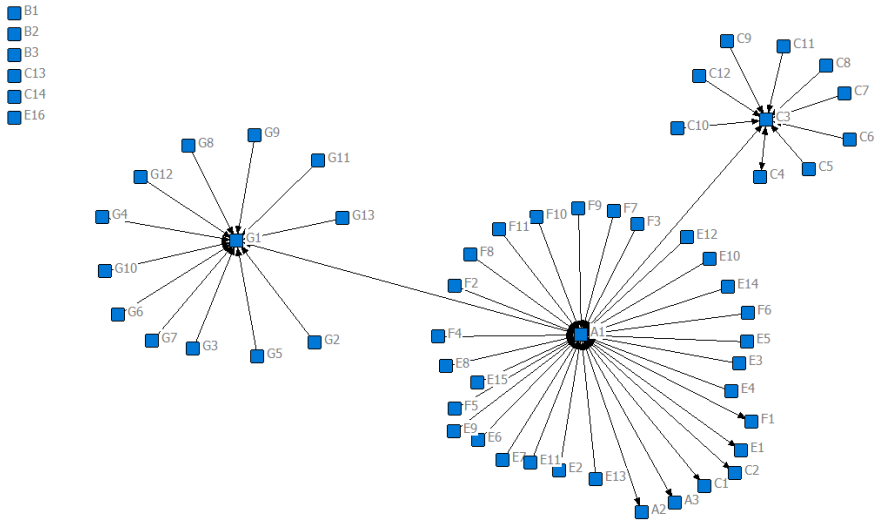

Figure 3 Network structure of product development

DISCUSSION AND CONCLUSION

This research aims to study the social network structure and to analyze the social network in the operation of Ban Sai hand-woven community enterprise in material procurement, production planning, and product development. The findings revealed five types of distribution in the social network analysis of material procurement. Due to separate purchasing, they were forced to pay a premium price for the supplies. The production planning social network research discovered that it was concentrated on the group's president and 5 sub-networks. Few people are active in social network analysis in product development, resulting in relatively little product creation. The following discussion may be made based on the findings of this investigation.

1) According to the analysis of the social network of raw material procurement, it was found that procurement was divided into 5 groups. Due to the nature of the purchase of such raw materials, the raw materials obtained had a high price because they were purchased separately, resulting in a small amount of yarn each time. According to the study of Chunthone (2014), which examined the management and development of woven fabrics, it was suggested that the best management of the raw materials used in woven fabrics is to group purchases in order to buy in large quantities. This will result in cheaper raw material costs. As a result, the weaving groups in the area should collaborate as much as possible, particularly through the group's president, who may contact traders in Bangkok to send supplies on a regular basis. It is possible to recommend that relevant agencies should develop a strategy to encourage weaving groups to obtain knowledge and awareness of the benefits of purchasing raw materials in bulk. This will result in a significant volume of purchases each

time, lowering the cost of obtaining raw materials while also reducing the problem of raw material shortages.

2) For the production planning, it could be observed that the production of Ikat cotton weaving is more difficult since it can be split down into numerous processes, whereas in the past, one person did every step. Later, as the demand for Ikat cotton weaving expanded in tandem with the promotion of the product as a community product, the community enterprise was founded, prompting the group to segregate production into sub-divisions within the industrial system. In order to produce more, an effective production management system should be implemented in multiple phases. This is congruent with the findings of Prajonsant (2016), who studied textile production management and discovered that it requires systematic production management with a rigorous planning procedure in order to produce work from one stage to the next on time. This will cut prices and time spent. Some scholars advocate for the use of industrial production management systems to aid in production planning and decision-making tools to increase production efficiency. However, the investigated Ikat cotton weaving group still lacks a structured production management system. There is no documentation of the operation, and there is no strict work schedule. Everything relies totally on the memory system. Errors in production planning might occur from time to time. This is consistent with the findings of research on the development of the local weaving industry, which discovered that the main weakness of the weaving group in Thailand is a lack of knowledge in production planning and a lack of systematic data recording, resulting in production planning errors and higher weaving costs (Distanont, Khongmalai, & Distanont, 2017). Therefore, responsible agencies should have a policy to support knowledge building in production planning and inventory management, and systematically record data. In addition, there should be a workshop to assist the group in preparing for effective production plan in the future.

3) In term of product development, the study discovered that those who play a vital part are a leader and group members totaling three people, while other members are not involved at all. The design of various patterns is also invented and developed by leveraging the thoughts of a few people, causing the pattern's development to be delayed. This differs with Soodsang's (2015) research, which discovered that product design, particularly in traditional weaving, necessitates brainstorming to generate various ideas and produce the greatest goods. Furthermore, customer behavior has a significant impact on product design. If customers do not enjoy or fit their demands, they may attempt buying once and then stop. As a result, product development must be as close to the target customer behaviors as feasible in order to suit the demands and ultimately lead to a choice to purchase the items. As a result, the key flaws of the operations of the examined weaving group include designing the product without focusing on the involvement of other members and being unaware of consumer wants. It is important to suggest that associated agencies should give promotion and assistance to encourage the weaving group to gain knowledge and grasp the importance of creating goods, as well as to raise the value of products in a variety of methods. Customer feedback should be analyzed in order to refine and develop fabric designs to fulfill market demands.

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Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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