Chapter 1

Introduction

1.1 Background

1.1.1 Teak History

Teak wood has been one of the few rare types of long known wood in human history. The origin actually dated back to the ancient time when no records were made. Teak has been used by humans for thousands of years by Egyptians, Indians, and many countries in Asia. Edward Balfour wrote about Teak wood in 1885 that Teak was used as the guiding lines in the arches of Karli Temple and was commonly used 2,000 years ago. Pliny noted that Teak roof of the Temple of Apollo (the Roman - Greek) at Utica, which was completely protected in his era, was very durable and last for 1,178 years. In Persia 1811, an American explorer discovered many pieces of Indian Teak wood in perfect condition in the ruins of the ancient city of Vijayanaga. In the South of India, 1 ½ inch thick Teak wood was used as wooden structure and found in excellent condition. It was also found that the processed Teak used in the same structure aged over 500 years old. In the temple of Salaetle, caves, and other temples in the West of India, Teak was also used as components and found in good condition for 2,000 years. The botanical title of Teak was Tectona grandis Linn f. in the Family of Verbenaceae. This was considered a large Family comprising of 75 genera and 1300 species scattered in India, Southeast Asia, and Malaya Archipelago. Tectona grandis was regarded as the best quality wood that is nowadays produced from Thailand, Myanmar, and India. The finding qualities of Teak known around the world were durability, high decay resistance, where the shape maintaining ability under humid condition, medium solidity, easiness to work with tools, convenience in terms of decoration, and light weight. The valuable property of Teak was RESIN or oil in the wood, which made it immune to infestation of termites and fungi. Timber, on the other hand, usually experienced decaying process and damages caused by various reasons. Teak, after being processed

in forms of veneer, plywood, flooring wood or other wood products could display the durability feature. The oil in Teak wood can protect it from acid, from which it cannot be affected by rusty when it is fixed by metallic equipments, for nails. These special features of Teak wood are not found in any other types of wood. Teak also possesses other qualities needed for specific requirements, especially in ship building, ship deck and floor wood products. Teak in ship building was used for barnacle destruction resistance. Teak was referred to be the "Queen of Timber" or the “Tiara of Tropical Forests” in the Southeast Asia (Moonsan,1998) where the fine properties of Teak made it expensive, in which the illegal logging was regularly found in conserved forests.

1.1.2 Overview to Teak Industry in Thailand

In 1989 the Thai government instituted a policy to prevent illegal logging, which affected the structure of the furniture manufacturing in Thailand, especially Teak furniture. Under such a change, the domestic Teak, as raw materials, was replaced by imported Teak from abroad. For a long term wood production, forestation is promoted to compensate natural logging. Currently, more wood from forestation was increasingly used. In the past, Teak cutting was set at 60 years. The requirement was amended later as the Department of Forestry allowed Teak cutting at the age of 30 years. Remarked that the 60-year-rotation specified by Department of Forestry was considered too long and a great disadvantage in terms of economic value. The 40-year-old Teak reached the height of 205 cm (girth at 1.30 m from the ground), which indicated that Teak had an average growth rate of 5.1cm a year. It only took 37 years that Teak can grow to the desired size of 190 cm. This rate was calculated from natural planting, without proper irrigation and fertilizer, where only weed eradication and extension cutting was provided. It was evident that Teak rotation could be reduced when the plantation employed science and technology to assist the Teak growing process. With proper treatment by providing water and fertilizer as practice in economic trees plantation, Teak was considered one of the fast-growing species. The examples can be found in some countries in South America such as Peru and Brazil, where Teak was grown economically and the cutting was set only 12-15 years. In Thailand, it was possible that Teak cutting could be within 15 years. In 1993, Department of Forestry promoted the private sector to engage in economic forestation, where Teak was widely grown

throughout the country. Currently, the product from Teak forestation in Phrae Province is over 10 million trees. At the age of 20-25 years, Teak trees can be cut down and the wood had high quality for the global furniture market. (District Administration, Phrae, 2013) At present, the international market is only accepted the imported wood from forestation. It was, therefore, urgent that added value is given to Teak by producing high quality of Teak furniture for higher markets. To do that, technology and business administration are required to provide education in terms of wood furniture design, museum, and library for logging and wood handicraft. The improvements are needed for planting and processing technology, culture and arts, history, and business administration such as creation of commercial identity. (Korwanich, 1992)

1.1.3 The Export Value of Teak Furniture of Thailand

Wood products, wood carvings, and decorative items of wood in Thailand have originated for long time, where the original production had the main purpose for household use, yet the products now are available in a greater variety. Production has been improved by introducing tools and machinery in certain processes. Consequently, the wood products and carvings become a crucial occupation that generates income for the households, especially in the rural areas. The industry can be extended into small and medium-sized enterprises that are capable of producing goods in a great quantity that can be exported to foreign countries, which can bring income to Thailand approximately one billion Baht a year. The wood products and carvings are considered as the decorative items with great acceptance and given as gifts for various occasions such as New Year's day, birthdays, and house warming. The major producers are located in the Northern provinces such as Chiang Mai, Chiang Rai, Lampang, Lamphun, Phrae, Nakhon Sawan and Ayutthaya, where Bangkok is the central region. Marketing of wood products and wood carvings for the domestic markets consists of 2 types of markets; retailing and wholesaling. The major distributing places for retail are tourist destinations for nationwide shopping malls markets, Jatujak market, and Suan Lum Night Bazaar. Distributors of the wholesale market include the major producers in the northern and central regions such as Soi Prachanaruemit, Jatujak Market, and Suan Lum Night Bazaar. Major exporting markets of wood products and carvings can be currently divided into two categories. The main markets include the US, EU, and Japan.

The new markets include the Middle East, Africa and Asia. The analysis of overall exports of wood products and wood carvings of Thailand shows that the trend is in the stable state. From the statistics of export values in the past three years, the average value is similar, where in the year 2003 the export value was around 10,500 million Baht. The value was worth 10,900 million Baht in 2004 and 10,100 million Baht in 2005. It is expected that in the year 2006 and the rest, where the figures tend to be increasing steadily. This is because major client countries such as EU, USA, Switzerland, Japan, and Canada are advanced economically. Their citizens are employed with high income and have good quality of life and that encourages them to purchase more household appliances and home decorative items, which include the wood products and carvings. Partly, this is a result from the participation of Thai entrepreneurs in international trade fairs, helping foreign consumers to recognize wood products and carvings. There have been strong and continuous efforts to support and organize exhibition of OTOP products in Thailand, which significantly promotes wood products and carvings in their channels of distribution. It is estimated that the value of exported wood products and carving is worth about 11,000 million Baht by the end of 2006 that the products are labeled as OTOP products. With this in mind, the trends or marketing conditions of OTOP products are primarily associated with wood products and carvings. From the report of the Department of Export Promotion, Ministry of Commerce in March 2006, the 16 exported OTOP products are ranked as follows; (1) Cosmetics, soap and acne cure products , (2) Silver jewelry, (3) Furniture and parts, (4) Tableware, (5) Textiles, (6) Clothes, (7) Wood carvings and decorative items, (8) Wooden utensils, (9) Candles, (10) Souvenirs and ceramics, (11) Fabric, (12) Wood frame, (13) Artificial flowers, foliage, and trees, (14) Food seasonings, (15) Rice products and (16) Processed fruits.

From the data above, wood products and carvings are in the 7th and 8th ranks of OTOP products of the highest export values. The total export value of OTOP products during January - December 2005 was 973 million USD, compared to the year 2004 that amounted was 873 million USD, where the growth rate was 11.4 percent. The growth of exports in the four groups of OTOP products indicated that herbs for health and beauty was the highest growth rate, which was followed by food and beverages, textiles and clothing supplies, and home decorative items including wood products and carvings, respectively. Other information shows the market circumstances and trends of

wood products and carvings that can be used for analysis and determining the essential market trends for production planning of this type of product, which is the data concerning OTOP sales in OTOP of The World Expo held in October 2005. The details can be shown as following details.

The products had been purchased the most of products such as golden glass, decorated egg shells, leather products, wood products, artificial flowers/Sa paper, ceramic, lacquer ware bowls, spa products, home textiles, and basketry. Retail products had the highest sales including wood products, textiles, ceramics, handicrafts, spa products, lacquer ware bowls, metal products, and artificial flowers/natural paper.

The countries with the highest orders were the United States, Britain, Australia, Canada, United Arab Emirates, Netherlands, Italy, Hong Kong, Qatar, Taiwan, and China, respectively.The regions of ordered the goods were Europe, Asia, Middle East, North America, and Africa.

The analysis of market trends in both domestic and export markets in 2006 and future prospects shows the important information on the development of wood products and wood carvings as well as other craft products, which it is likely that these products will meet the demands of the domestic and foreign markets. The qualified features should be as follows; (1) Trend of fashion and style, (2) Easy to use or favorable trend such as environmental friendly, (3) High value - added products, (4) Unique quality with high quality of design, (5) Comfortable, warm, and lovely features, (6) Displayed the sophisticated art and (7) Special functions.

As mentioned above, it was evident that wood products and wood carvings as well as other crafts of Thailand play a key role on Thai economy and society at a greater extent. However, handicraft industry is still facing the following problems, where they are (1) the increasing wage rates, (2) limitation of raw materials in the production, (3) slow development of advanced production techniques, (4) lack of data concerning consumer demand in both domestic and foreign markets, the competitors in the export markets gain an advantage in terms of lower rate of wages and have better quality of wood materials (Teak, Padauk wood, Makha wood, Mango wood, and Santol wood), (5) Competitors in the export markets have developed the production technology consistently. They also have also used the modern features in the design.

Table 1.1 Illustration of 10 types of goods which generated highest net export values in 2013

Rank	Type of goods	Export Value (million Baht)	Remark
1	sugar	746,293.61	
2	Canned seafood and processed seafood	685,418.54	
3	Rubber products	666,838.99	
4	Frozen shrimp	607,976.36	
5	Canned fruits and processed fruits	321,065.35	
6	Tapioca products	243,617.99	
7	Cement	241,854.37	
8	Plastic products	191,169.12	
9	Wood furniture and parts	139,601.81	
10	Cloth	59,616.53	

To solve the problems of manufacturing enterprises in Thailand, it should focus on the developments in different areas. The advantage of Thailand in terms of craftsmanship is used to deserve value and high prices. The government and private sectors of Thailand should cooperate seriously and continuously in conducting the research on the trends of market demands of wood products and carvings. The results can be served as a guiding principle in the development of quality, style and production volume for Thai manufacturers. Market structure of wood products and wood carvings as well as other craft markets that attract target consumers should also be studied. The results of the studies could be beneficial for trading contacts between Thailand and international partners in the future. If Thailand is capable of expanding the markets of wood products and wood carvings in the target markets, it will provide an opportunity for Thailand to export other handicraft products and gain benefits in terms of volume and increased values. Moreover, it is an opportunity to bring more revenues into the country; it also gives the benefits for the country in terms of the continuity of employment in Thai handicraft industry, which reduces the migration of rural labor into

big cities. Thailand's economy could be stable and the wood industry contributed to the creation of added value to the local materials, while the preserving cultural heritage and traditions of Thailand could express in forms of handicrafts. (Product Development and Distribution Section, Department of Industrial Promotion, 2013)

From Table 1.1, in 2013 it was found that the ratio of export wood furniture and part was nine from ten orders, however, the value and export ratio could be increased by design developments and new markets.

Table 1.2 The furniture production quantity.

Rank	**Materials**	**(%)**
1	Wood	60
2	Leather	20
3	Metal and plastic	20

From Table 1.2 the maximum ratio of furniture manufacturing in Thailand classified according to types of raw materials about 60% is wood. (Kasikorn Research Center, 2011)

Table 1.3 The ratio quantity of material in the export wood furniture

Rank	**Materials**	**(%)**
1	Rubber Wood	65
2	Teak and others	10

From Table 1.3, the export ratio of Teak furniture was less than 10% of total export furniture in 2013 (Kasikorn Research Center, 2013)

In 2013, the exports of wood furniture accounted for 58.94 % of the furniture and parts exported by Thailand. Other types of furniture included rattan, water hyacinth, plastic, metal furniture, furniture parts, mattresses, and pillows, respectively.

There was 60 percent of the wooden furniture exported by Thailand, which was made of para rubber trees. The remaining of 40 percent was made of solid wood

such as plywood and particle board (30 %), and the hard wood such as rose wood, Burma Padauk, and Selangen batu wood (10 percent). The wood furniture produced for export was mostly Knock-Down furniture such as table ware, sofa and shelves, etc. (Department of International Trade Promotion, 2010)

Table 1.4 Export Teak furniture values

Details of products	2006	2007	2008	2009	2009 Jan-Feb	2010 Jan-Feb
1. Furniture and parts	46,500.58	44,625.37	40,982.14	34,140.54	4,886.52	5,836.47
1.1 wood furniture	23,346.60	20,676.42	18,279.51	17,045.50	2,508.34	2,667.25
1.2 metal furniture	2,172.93	2,661.55	3,252.06	1,894.75	334.65	352.11
1.3 cushion, mattress, and pillows	2,459.56	2,178.51	2,211.98	1,902.00	254.32	283.74
1.4 other furniture	10,632.58	10,107.10	7,960.69	6,706.13	938.42	1,068.43
1.5 parts of furniture	7,888.91	9,001.78	9,277.90	6,592.17	850.78	1,464.94
2. Wood and wooden furniture	40,391.82	40,928.50	41,466.84	41,549.11	5,046.20	7,421.26
2.1 wooden utensils	3,108.97	3,125.13	2,919.95	2,276.00	369.64	354.21
2.2 wooden construction equipment	4,728.71	4,856.78	3,697.23	2,447.82	485.24	340.35
2.3 wooden picture frames	4,098.49	3,154.25	2,729.79	2,639.86	385.36	357.59
2.4 wood carvings and wooden decorative items	1,942.05	1,950.01	2,025.89	1,536.79	272.18	217.28
2.5 processed wood	10,204.58	9,437.96	8,843.56	11,759.82	920.70	2,338.40
2.6 veneer wood	299.30	284.65	186.39	87.24	10.29	18.73
2.7 particle wood	8,262.85	8,038.28	8,585.57	7,747.67	1,106.75	1,328.67
2.8 M.D.F. wood	5,977.39	7,727.47	8,054.94	8,324.74	806.79	1,720.54
2.9 wood and other wooden products	1,772.48	2,353.97	4,423.52	4,729.18	689.25	754.48

Furniture made of para rubber trees had the higher export value because, since January 15th, 1989, the government issued a decree closing the forest concessions nationwide, which was caused a shortage of hardwood such as Teak, rosewood, Burma Padauk, and other timber wood. As a result, hardwood had to be imported from abroad with the expensive prices.

Form Table 1.4, the wood furniture and craft export ratio is small comparing to the total export furniture

From above Tables, the export wood furniture ratio is lower than the other products, especially, the Teak export with is less than 10% of total wood furniture. In order to increase the Teak and other wood furniture, it is necessary to solve the Teak export.

According to the information presented in this Section, the value of Teak products was relatively lower than other types of wood despite that Teak possessed better qualities and potential. It can be concluded that the process or approach used to manage the Teak products was not efficient enough. This research, therefore, aimed to propose the new options in adding value to Teak products. The next Section will be described the Supply Chain of Teak to facilitate the analysis of added value.

1.1.4 Teak Supply Chain in Thailand

The vertical Teak supply chain in Thailand consists of 3 sub-industries, which are given below.

(1) The upstream industry: Teak planting nowadays requires seeds or rootstocks. However, the seeds used by most farmers are of lesser quality. As natural sources of Teak seeds are decreasing, from which the Forest Industry Organization (FIO) is determined to employ technology in tissue culture to increase the number of seedlings to be sufficient for the planting substitution. The result is not yet sufficient for reforestation. The certain technologies should, therefore, be applied with screening and preparing good quality of seeds for farmers. The capability for tissue culture should also be enhanced so that the seedlings for reforestation sufficient for at least 5,000 acres can be produced. Tissue culture technology seems to be the only method that is able to increase the number of seedlings in a great quantity and with good quality in the future. Also the important issue is the development of Teak strains that can resist the beetles through bio-molecular technology. It also requires investment in research development on elimination and prevention of the outbreak of beetle wood, for examples, they can be the bio-control technology and organic production technology as well as organic substances. The aim is to urgently prevent the outbreak and minimize the damages, which is, therefore, critical that the certain development efforts are made for human

resources, research and development, and necessary infrastructure for the upstream industry. A goal is set for the upstream industry that 24,000 kg of good quality Teak seeds are produced each year and 2 million seedlings of Teak with a survival rate of 90% are produced. It is also expected that each year losses from an outbreak of beetles is reduced at a rate of 20% of the Teak plantations.

(2) The middle stream industry focuses on optimizing the production and processing of Teak wood to add more value, which is found that Teak growers are now selling Teak wood as a whole lot to the manufacturers. The prices are relatively low compared to the time for Teak trees to grow. The government should seek means to encourage farmers to earn more revenue in shorter time by including farmers to participate in the value chain with added value. For the initial assemble of furniture, the government should invest on factories, in which the requirements that cannot be done by farmers. It is also found that during the processing of wood operated by small entrepreneurs and FIO, there is a great loss and the products are not assured with good quality and do not meet the demands of the customers. A more effective manufacturing process that can reduce the loss during the processing should be invented to reduce the loss of least 8% by the use of computerized software as well as advanced machinery. The goal should be the price of Teak products that can be raised at least 6 times.

(3) The downstream industry focuses on developing channels of distribution and communications to stimulate purchasing of products and on increasing its exports by 20%. The sales value is expected to be increased 10 folds. To achieve the goals, Teak Valley, a center for displaying, selling, and learning about Teak, is established in Phrae Province to serve as a significant tourist site with environmental conservation focus in the north or Thailand, where the information technology and database are also used in the management of production and operation.

From the review and analysis of Teak Supply Chain, the efforts were made to add value to Teak both in the upstream, which focused on the cultivating development and cutting, and the downstream, which involved the reduction of logistic costs. However, the sales value has yet to increase. This research, therefore, focused on the middle stream which employed knowledge, art, and culture or existing intangible assets to maximize the values more efficiently.

1.1.5 Creative Economy

The United Nations Conference on Trade and Development (UNCTAD) defines "Creative Economy" as a concept of development centered on creativity that affects the development of countries in terms of economy and society. Creative Economy is an important process of the distribution of income, job creation, and generating revenues from abroad. It promotes social unity and serves as linkages of biodiversity in forms of human cultures, human resources, economy, and society with technology, intellectual property, and tourism. The transformation that happens is patterns of economic activities that employ traditional knowledge to the economic development of countries in all levels (United Nations, 2004).

UNCTAD classifies creative industries into four categories as follows.

(1) Heritage or cultural heritage is a cluster of industries related to history, archaeology, culture, and traditions, for examples, they can be the handicrafts, basketry, jewelry, and precious metals. This category also includes the cultural sites such as ancient sites, historic museums, and libraries.

(2) Arts category is a cluster of industries related to art such as art exhibition, performing arts, and ancient items.

(3) Media is the group that produces creative works and communicates with mass, for examples, they can be the publishing, radio and television broadcasting, and audio-visuals.

(4) Creative works group presents products and services to meet different demands of customers, for examples, they can be design, fashion, advertising, and architecture. For Thailand, creative industries are categorized according to the national income accounts. They are divided into 9 groups detailed as followings; (1) Crafts, (2) Design, (3) Fashion, (4) Film and Video, (5) Broadcasting, (6) Performing Arts, (7) Advertising, (8) Publishing, (9) Architecture (Samakoses, 2002).

Table 1.5 The relationship of value adding of Teak according to the creative economy

Activity in supply chain of teak industry	Thai handicraft	Creative economy of Thailand
1.The Upstream Industry - Seed and sample preparation - Planting and maintenance of teak - Cutting, drawing, and sawing 2. The midstream industry - Wood processing plants - Groups of teak furniture manufacturing and handicrafts 3. The downstream industry - business groups of construction and sales	1. Beadwork 2.Collage 3.Benjarong 4. Wood Carving 5. Needlework	1.Crafts 2. Designs 3.Fashions 4. Films and Videos 5.Broadcasting 6.Performing Arts 7. Advertisings 8. Publishing 9. Architectures

From Table 1.5 shows the relationship between activity in supply chain of Teak industry and creative economy. In this research, the supply chain is applied to analyze the Teak industry in Thailand, and identify the place with highest potentials.

It is found that in the midstream which relates to handicrafts, more values can still gained. Hence, the concept of creative economy is then applied in this thesis to increase and capture the value of Teak furniture especially in the midstream. This is because in creative economy crafts are identified as intangible assets which could be used to support economy in Thailand.

Under creative economy, Creative economy of Thailand has nine types. Creative economy are accepted throughout that add value. Teak wood carving is part of crafts. So carving can create value as well. Teak wood supply chain is analyzed to identify the place with highest potential. Group of Teak furniture manufacturing and handicraft are appropriate to bring the test to add value to return Teak furniture. Carving and manufacturing were captured knowledge, analyzed knowledge and synthesized knowledge. Then knowledge was used to increase value for Teak wood furniture later.

1.1.6 Styles

The Colonial architecture was first introduced to Thailand in the reigns of King Rama V and King Rama VI. The architecture was often referred to affectionately as "Western Block." The patterns of the Colonial buildings can vary which were the influences of different races or ethnic groups. At the beginning, Colonial style was basically the adoption of architecture from the colonizing in the colonized countries. The patterns were then adjusted to be consistent with the weather conditions of local vernaculars. The buildings of this model can also be referred to as "Colonial Architecture" and many colonial buildings still maintain the classic influences while others are partly influenced by the romantic group as seen in the building decorated with carved wood known as the "Ginger Bread House." The early colonial architecture came with the missionaries who came to propagate Christianity in the colonized lands and vicinities, from which the mission style was therefore included in this group.

To confirm the recognition and adoption level of the colonial products, one research was conducted to investigate the adoption level of the colonial luxury goods to European countries. Although this research focused initially on the consumable products, it also implied the applicability to other luxury products under colonial context as well. The results have shown the upward trend in both quantity and the retail prices of the colonial luxury goods since early modern period (DeVries, 2008). This adoption trend and increasing value associated with colonial design/style was confirmed by the study of building architecture. In this study, it has shown that house with colonial design was sold 8.5 percent more than otherwise identical ranch-style home

The introduction of the creative economy concept has opened up many marketing opportunities and the potential to add more value to the domestic products. This creative economy concept has been adopted worldwide with different approaches according to each country's strengths. These include for example, the creative city focusing on game, software and animation, or the cultural city with the focus on the digital arts (Creative Economy,2013). Thailand is no exception to the adoption of the creative economy concept to boost its domestic economy. In the higher level this covers many different areas, and the handicraft and more specifically the Thailand furniture industry are included. The final report on the Thailand furniture industry under the creative economy concept has clearly indicated that there is potential to increase value

for the furniture products. In order to fulfill this potential, it is suggested that the furniture product needs to have unique/recognized design with functionality. British colonial style, American colonial style, Spanish colonial style and French colonial style have clearly been mentioned in this report on the Thailand furniture industry as unique and recognized design with potential on value adding (Thailand Furniture Industry Final Report,2014).

Style was used to enhance the beauty and value of the goods or the buildings. It can be the style or the combination of colonial culture. This research employed style as a part of value adding to Teak products focusing on the Colonial style. The same principle can also be applied to other styles. As reviewed above, it can be seen that the colonial style has been around for decade around the world and hence well known to the global publics as a whole. Therefore, for the products to appear and be recognized with greater audiences, this colonial style is appropriate and will be used as one of the tools to add value to the teak furniture in Thailand.

1.2 Definition of Terms

Knowledge Analysis and Data Structuring (CommonKADS): CommonKADS is the leading methodology to support structured knowledge engineering. CommonKADS enables to spot the opportunities and bottlenecks in how organizations develop, distribute and apply their knowledge resources, and so gives tools for corporate knowledge management. CommonKADS also provides the methods to perform a detailed analysis of knowledge-intensive tasks and processes. Finally, CommonKADS supports the development of knowledge systems that support selected parts of the business process.

Knowledge creation (SECI Model): Developed by Takeuchi and Nonaka, SECI (Socialization, Externalization, Combination and Internalization) is probably the most well known and comprehensive theory of organizational knowledge creation. The model views the process of knowledge creation as taking place in four phases. Socialization is the process of converting tacit knowledge into tacit knowledge by sharing experiences. Externalization is the process of converting tacit knowledge into

explicit concepts. Combination is the process of combining and systematizing explicit concepts into a knowledge system. Internalization is the process of converting explicit knowledge into tacit knowledge through learning by doing or by relating to the experiences of others. The movement through the four modes of knowledge conversion is represented not by a circle but by a spiral. Knowledge gets amplified as it moves through the four stages of knowledge conversion.

Value adding's perspective: There are many different perspectives for value adding. In this thesis is focused on adding value to the quality of beauty and functionality products, Perspectives pricing minor.

Input/Process/Output (IPO): IPO is selected and applied for the capturing, analysis and modeling of the relevant experiences.

1.3 Research Objectives

1. To analyze and present problems focused by the Teak industry, especially from the value adding's perspective.

2. To develop and propose an alternative framework which could assist in value adding to Teak Furniture Industry by knowledge management application.

1.4 Research Questions

1. How able can the creative economy concept be used to create value to teak industry?

2. How can knowledge management be able to solve knowledge worker problem in Teak industry for value adding?

3. How can knowledge engineering tools and techniques be used to capture, analyze and synthesize the knowledge models in Teak industry?

4. How can joint be applied about functionality in the furniture to add the value to teak products?

5. How to develop simplistic evaluation method on value added in Teak industry?

1.5 Scope of Study

1.5.1 Research Problems

(1) Due to increasing degree of natural forest penetration by publics, the commercial teak plantation from the government has been introduced. This commercial teak plantation together with advanced technology and knowledge, the possible age of teak available to be used as raw materials is reduced from 40-50 years to approximately 25 years.

(2) It is expected that the available teak materials from the commercial teak plantation in the country will be around 10 million trees in the next couple of years. If these available resources were not used or manufactured effectively, it would be considered as great economic losses.

(3) However, currently the exports of teak furniture has experienced declining values when compared with its naturally good characteristics. In another word, the value of the teak products does not match well with its characteristics.

(4) The issue of low value of teak furniture is due to the manufacturing process with repetitive patterns.

(5) Hence, an alternative and innovative approach is needed in order to increase the value to the teak industry and its teak products, and is the focus of this research.

1.5.2 Conceptual Framework

(1) High level concept of this thesis focuses on adding intangible value (colonial style in this research) to the teak products and aims for the new, high end markets instead of competing with low end wood furniture market as currently.

(2) Firstly, the knowledge engineering approach is used in this research to capture, analyze and model the knowledge pack on the colonial style. This knowledge pack can then be used later in the knowledge creation to create innovation in the teak furniture.

(3) Secondly, in order to identify the point where the value can be added, the supply chain of the teak industry is analyzed. Hence, the knowledge workers within the supply chain of the teak industry can then be identified. In this research, the focus is on the knowledge workers at the manufacturing process and crafting process.

- Emphasizing on the functionality
- Emphasizing on the aesthetic aspect

(4) Thirdly, the experiences of the two knowledge worker groups mentioned in the previous step are then captured, analyzed and modeled using the developed knowledge engineering approach. The result knowledge packs can then be used in the knowledge creation for the creation of new knowledge for value adding to the teak products.

(5) Fourthly, knowledge creation is applied in this research as a governing framework for the creation of the new knowledge in the teak furniture. In the socialization step, manufactures and carvers are organized to socialize and discuss about their experiences together. In the externalization step, experiences are then explicit into knowledge concepts using knowledge engineering approach. In the combination step, the knowledge on joint is combined to explicit knowledge concepts to form the new knowledge (innovation). Then, in the internalization step, this new knowledge (with joint combined) is tested.

(6) Finally, an alternative and innovative teak furniture (chair) with the utilization of joint is constructed as the archetype in this research. This archetype is developed based on the new knowledge created from the SECI step mention above.

1.5.3 Scope of population

(1) Five experts with carving experiences no less than 10 years for the knowledge engineering to develop the knowledge pack.

(2) Two experts with experiences in the furniture manufacturing no less than 20 years for the knowledge engineering to develop the knowledge pack.

(3) Fifteen operational personnel in furniture manufacturing for the knowledge engineering to develop the knowledge pack.

(4) In depth interview with fifty managers of commercial housing projects and company executives for the result validation.

(5) In depth interview with fifty customers who are interested in wood furniture for the result validation.

1.6 Expected Research Outcomes

(1) It was expected that the study could obtain the solutions to the problem of declining value of Teak wood in Thailand.

(2) This research could possibly contribute to the national economy by increasing the Creative Economy of Teak wood furniture industry.

(3) There was a framework of analysis that could add value to Teak furniture products through carving arts.

(4) There was a framework of analysis that could add the value of Teak furniture products to be used in the colonial architecture.

(5) This research could serve as a guideline for constructing framework to add value to other raw materials and in other architectural styles.

(6) The results of this research could be further expanded to achieve further knowledge or more proper framework of analysis in the future.

1.7 Research Novelty

(1) New knowledge for faster process that allows the two worker groups work together and enhancing value. This is possible with the application of knowledge creation, knowledge models constructed by Knowledge Engineering Methodology (CommonKads), and new knowledge on joints for small objects proposed in this thesis.

(2) Alternative method to capture and develop knowledge models in Teak industry using knowledge engineering methodology. In this research the knowledge models include the knowledge model on wood crafting, furniture manufacturing, and alternative joint for small object.

(3) The proposition of joint for small object instead of using nails in conventional furniture manufacturing. This new knowledge on joint was developed and enhanced by combining experiences on crafting furniture manufacturing and existing joint knowledge using knowledge creation and knowledge engineering.

1.8 Thesis Organizations

Following this introduction, the literature review will be described in chapter 2. The proposed solution methodology will be described in chapter 3. The implementation and validation of the methodology will be described with the case study. The details and the results of which are shown in chapter 4. Chapter 5 draws the conclusions as well as the future works proposed by this research.