

## Value Added Teak Industry Management by Creative Economy

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**Abstract:** The Government of Thailand has encouraged the planting of teak for replacement of existing natural forest wood, where recently teak woods have been grown more than ten million trees and in the industrial cutting. Apparently, teak wood has the high value with special features than other types, which has been used the same value as other woods. Wood carving is one of the major crafts of the northern of Thailand, which is also accepted as creative economy. It is also the National policy for creative economy, which is the highest value added in supply chain of teak wood. The intelligent tutoring systems (ITS) of teak wood is the research proposal for maximum value added, which is developed from three parts in Thailand, where they are from the expert knowledge of wood carving, carving instructor and succeed students, which is used Nonaka's Ba ( Physical Ba , Virtual Ba) for environmental studying.

[Phuatngam S, Chandarasupsang T, Chakpitak, Yupapin PP. **Value Added Teak Industry Management by Creative Economy.** *Life Sci J* 2014;11(9):731-737]. (ISSN:1097-8135). <http://www.lifesciencesite.com>. 111

**Keywords:** Knowledge management; Learning center, Teak industry, Creative economy, Economy policy

### 1. Introduction

Wood and products of wood carving and decoration have been inherited in Thailand for years, where it was initially used in living and household, which it is currently more divergently supplied. Recently, there is a machine has been developed to produce the use for energy-saving and in the production, which has becomes one of the professional income families and increased in the rural households. These can be extended to the industrial production for small and medium enterprises that can produce more goods and exported to the foreign suppliers. This brought into the country with a total annual income at least one billion baht (350 million US\$). Crafting is the strategic policy for increasing the competitive advantage in Thailand Northern Provinces, especially, Phrae golden teak land, in which there have been both wood processing craft and skilled carpenter for years. Since 1937, raw long grain production has been planted to replace the wild forest, where currently there is teak plantation of aged 20-25 years more than 10 million trees, where they are increased gradually each year. Generally, woods can be cut to utilize the world furniture market, which has been imported only wood from plantation and it is urgently needed. To increase the value of golden teak world for international furniture market with high quality, which will bring the highest income of natural resource. This is required the use of technology and business management to develop a body of knowledge in the form of furniture design, museum and library of knowledge of wood and wood crafts, which are both

agricultural science, and wood processing, culture, history and business identity management [1].

In this paper, the learning center is designed to use with teak industry, where the environmental awareness is the big issue and concern in this model. From the obtained results, it is found that the teak planting replacement is required to replace the used teak substantially.

### 2. Background

The supply chain industry of teak in Thailand reported that the upstream industry is related to all teak cultivation such seed sowing, plant seeding, teak growing, teak maintenance, wood cutting and hauling the lumber pieces etc [2]. The midstream industry includes wood processing plant, teak furniture and handicraft production, which will take a piece of scrap wood and wood as raw material production of goods. The downstream industry includes construction, wholesale business, retail businesses and exporting. The creative economy is defined by The United Nations Conference on Trade and Development (UNCTAD) by the development concept based on creativity that affects the country development both in economical and social aspects [3], which is the important process in income distribution, job employment, and earning from abroad as well as promoting social harmony, connecting diversity of cultures, developing human beings in terms of economy, society, and culture together with technology. The intellectual capital and tourism is the economical format that utilizes fundamentals to develop countries in all levels, which is divided four

types of creative economy by united nations conference on trade and development(United UNCTAD) [4], where they are (i) heritage or cultural heritage, which is the industry related to history, archeology, and culture like art works and handicrafts, accessories, precious metals as well as cultural sites, e.g. historical sites, museums, libraries, (ii) arts is the industry based on arts, for examples, artworks and antiques, (ii) media is the industry producing creative media, for instance, printing media, broadcasting both radio and television, audiovisual works, etc., and (iv) creative works is the industry presenting goods and services according to various customers, for examples, designs, fashions, architectures, etc. The creative industry according to the Thailand gross domestic product (GDP) is divided into nine groups, where they are crafts, designs, fashions, films and videos, broadcastings, performing arts, advertising, publishing and architectures. Even though the general approach is used to value added of the wood industry, the researcher thinks that the creative economy philosophy can also help to the wood industry value added.

The intelligent tutoring system (ITS) media system and versatile that meets the specific needs of the student is intelligent by providing the knowledge of teaching and providing the information to the various classes, which gives many benefits to students in various interactions. There are many researches in the teaching of artificial intelligence systems (ITS), where presently there is the media that is capable to response the specific learner. From Beck et al (Beck et al, 2009) reported the presented five parts as shown in Figure 1, in which the student model represents the learning module of expert system, where the domain expertise is the main of ITS, which shows the variation of the skills taught in each presentation. To use this model, the instructors are able to compare the solution of the problem of the learner and the instructor. The model is recorded by each learner preliminary for collecting to the teacher to use in the pedagogical expertise, which is in the form of teaching process, when to review and when new teaching. This model is responsive by each of learners. Next, the domain knowledge model is composed of teaching material using communication module, which is related to the communication with the students and including types of knowledge and stored, declarative knowledge text files, elements of diagram, procedural knowledge sequence, text diagram, procedure program semantic knowledge articulated diagram, episodic knowledge animation, simulation and video.

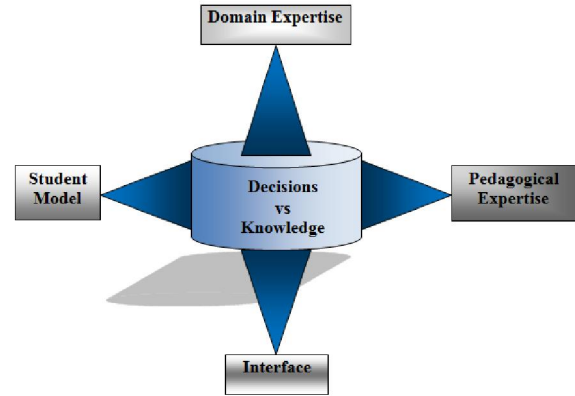


Figure 1. The intelligent tutoring system

The public knowledge and personal knowledge gave the definition of tacit knowledge as it is in minds of people [6, 7], where the behavior of people and in the concept and goes out by interacting with them. It comes from the skills, life experiences, self-believe and crystallized. It is difficult to retrieve for electronic tools where in overall, the knowledge is interacted between tacit knowledge and explicit knowledge. Explicit knowledge is knowledge that we can be recognized through various communication tools, public content and constant content. Tacit knowledge is important for organizing work, which is changed from tacit knowledge to explicit knowledge. The knowledge will be useful for a variety of key business cost-effectively for example personal knowledge as a result of experience in computer technology. Nonaka et al presented that it is duty of organization management and all level set up the organization of learning using KM for knowledge creation [5]. Knowledge creation required four tasks which they are (i) provide a place where individuals can come together to interact with the knowledge, where the inventor uses the word “ba”, which means place, (ii) provide the process SECI in ba continuously. Socialization is used to meet internal and external personnel practitioners to obtain tacit knowledge, (iii) externalization change tacit knowledge into explicit knowledge, (iv) combination put the transformed explicit knowledge into the existed explicit knowledge and internalization, which gives the explicit knowledge taken to staff throughout the organization becomes each tacit knowledge. This cycle continues relentless to produce knowledge assets and used as valuable including bring in and out for ba continuously. The knowledge assets are five types, where they are (i) Knowledge of work skill, (ii) how to and experience, (iii) ideas, (iv) systematic knowledge such as technology, (v) active knowledge of working process and (vi) knowledge management.

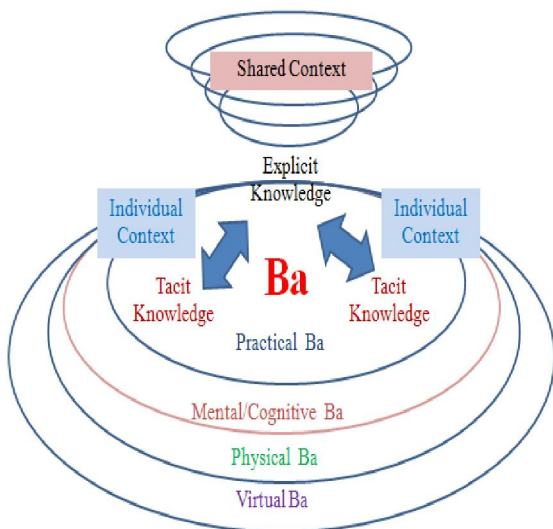


Figure 2 Shows the Ba knowledge creation platform

In Figure 2, Ba is used to bridge the gap between information (sharing) and knowledge (sharing). The creation and utilization of "Ba" in terms of both organizational (organizational structures, systems and cultures) and IT systems attributes contribute to knowledge sharing and creation, as knowledge is always contextual. The value of a knowledge asset is not fixed, which depends heavily on the strategic orientation of the firm and the characteristics of "Ba" there in. In other words, knowledge assets are incomplete assets. "Ba" is where knowledge became "visible". In Figure 3, the SECI model and COP theory will be employed from capture, analysis, validation, modeling, sharing, and learning the new knowledge creation for personality enhancement model for firming SMEs. The knowledge of Thai traditional and local wisdom has many important special tacit characteristics, which requires exploring and involving both explicit and tacit natures. According to the transformation of knowledge, the SECI model has four phases and the process, which will repeat like a spiral [5], where some tacits can be transferred straightforwardly to other people as tacit knowledge. The tacit knowledge can also be expressed and externalized into explicit knowledge, which can be combined and therefore new explicit knowledge can be produced. The explicit knowledge should be internalized and become one's own tacit knowledge before it can be applied and generated. All of transferring and transformation of knowledge creation produce within appropriate *Ba*, which they are physical and virtual places, tools and environment facilitating the learning processes.

To create "Ba" as a platform, the social designing is created by "Ba" organizationally. The quality of "Ba" or platform for knowledge creation

relates to the firm's social capital. Hence, the designing social network is an important task for management and leadership. There are ways to create "Ba" or social designing, where case (i) it is possible to utilize existing body of network such as SNS (Social Network Services) or blog network as means of interacting with the firm's social capital, and case (ii) it is also possible by changing and managing physical workplace. The knowledge engineering and management (KE) is used to facilitate the knowledge creation, retention, transferring and utilization the knowledge using both information technology and management disciplines. The knowledge engineering provides the method and methodology to design and construct knowledge systems, which covers the capturing, analyzing, modeling, validating and storing a domain of knowledge. The knowledge engineering is the process of codifying an expert's knowledge and experience in a form that can be stored, accessed and processed by a computer system, which helps organization transform tacit knowledge resides in people's head into an explicit form in order that it can be stored and distributed to the users. The knowledge engineering is originally set up as a new discipline in artificial intelligence (AI) with the objective of providing methods and tools for constructing knowledge based systems in a systematic and controllable way [8, 9], which involves the integrating knowledge into computer systems in order to solve complex problems normally requiring a high level of human expertise. At present, the knowledge engineering refers to the building, maintaining and development of knowledge-based systems [10, 11].

The core element in knowledge engineering process is concerned with how to acquire the knowledge, where over years the knowledge engineers have developed a number of principle, methods and tools, in which the knowledge acquisition an efficient and effective activity have been made. In this work, the principles having been laid out for such efficient and effective acquisition rely on the followings , where (i) CommonKADS template knowledge model is a tool that helps to clarify the structure of a knowledge intensive business task [10, 12], where it provides a specification of the data and knowledge structures required for the application. The model is developed as part of the analysis process. It is therefore phrased in the vocabulary of the application, meaning both the domain and the reasoning task.

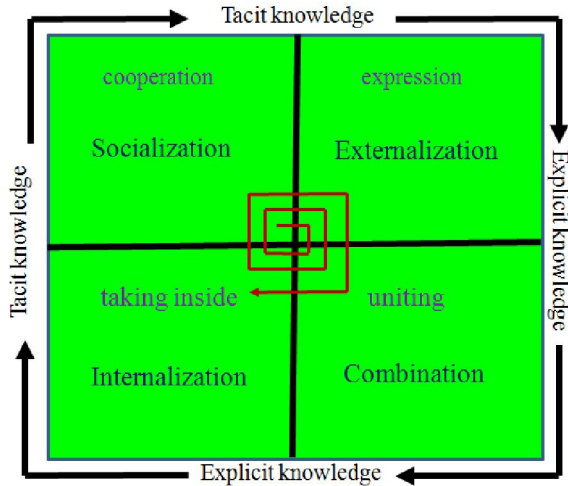


Figure 3. The knowledge management model

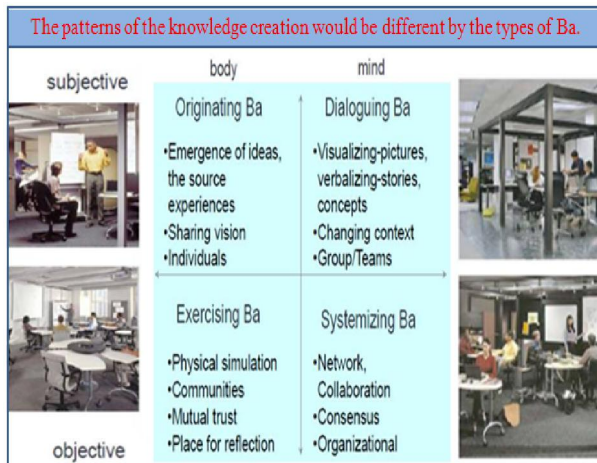


Figure 4 shows the type of Ba

A knowledge model composes of three categories; each capturing a related group of knowledge structures and can be described as followings: (i) *Domain knowledge* specifies the domain-specific static information and knowledge objects that involved in an application, for examples, cable, joint, and termination, (ii) *Inference knowledge* describes how domain knowledge can be used to carry out a reasoning process and describe the basic inference steps on how to make use of the domain knowledge, (iii) *Task knowledge* describes what goals and application pursue (e.g. classification, diagnosis, assessment), and how these goals can be realized through a decomposition into subtasks and inference ultimately. Figure 5 shows an overview of knowledge categories in the knowledge model. At the right shows the example of the knowledge elements in installation workmanship assessment of underground cable.

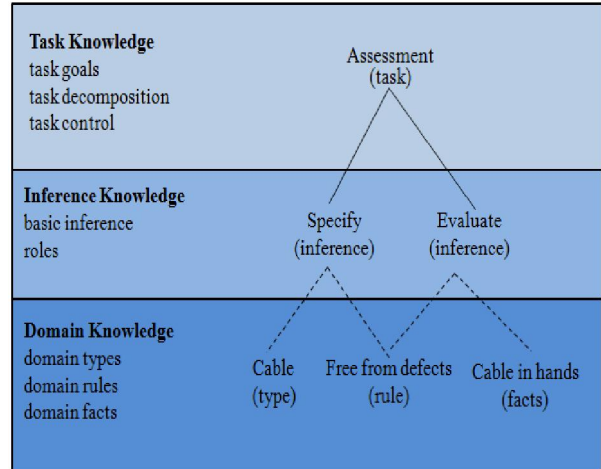


Figure 5. Overview of knowledge categories in the knowledge model

### 3. Research Methodology

In section A, the analysis activity of supply chain to add maximum value under the creative economy. In Thai teak supply chain, there are many parts that can add value. In this study, the concept of creative economy can explain activity of the supply chain to add maximum value. There are many activities of teak wood supply chain in Thailand, where the major activities can be named as Figure 3, which are activities (i) seed production activity, (ii) seed planting activity, (iii) teak cultivation activity, (iv)swan timber activity (v) furniture factory and craft activity, and (vi) distribution. Each activity produces value to teak supply chain which is the management of a network of interconnected business involved in the ultimate provision of product and service packages required by and customer especially foreign market. It is found that the major activities of teak supply chain have relationship with creative economy for highest value added as table below. From table above, the major activities (i) to (vi) have no relationship with Thailand creative economy for value add of teak wood industry in Thailand. It is really different of activity (v), which is named furniture factory and craft. This activity can add value if is transformed and distributed in form of teak craving. The information supports that the furniture factory and craft of Thailand teak wood with Creative Economy can add highest value because the number of craft in 2005 has only 301 US\$ with market share of 20% and growth rate only 5.6% , which is very low number. There are needed to increase the value, where the market share and more growth rate. In section B, the intelligent tutoring system (ITS) is given, where there are two steps for setting up intelligent tutoring system, which they are step (i) deals with many target groups from the six activities of the industry, which are the samples of teak expert



interviewers and the successful producers and distributors, step (ii) the analyses with Common Kads, which is a modeling framework that covers all aspects of knowledge-based application for knowledge capture, where the result of section B is the knowledge of creation the learning center. In section C-the application of 'Ba', from table above, it is integrated the knowledge from section B of each activity which is classification of knowledge of each activity for setting up proper BA. The result is placed of each activity for creation the intelligent tutoring system for example activity (v), which is suitable for virtual Ba. The place for activity (v) in the learning center is needed to have the virtue tool and components such computer, VCD, Video and electronic device. In section D-the theme analysis, from the above table, it shows the knowledge from section B knowledge of each activity of industry. This is set for proper of the visitor or learners in the intelligent tutoring system for example the teak growers must learn for development of teak cultivation for added value. They can search the specific activity (Activity (ii) and (iii)) at the intelligent tutoring system, which is sufficient and time saving. The result of section D can be assigned the proper path of researchers for each activity in the learning center.

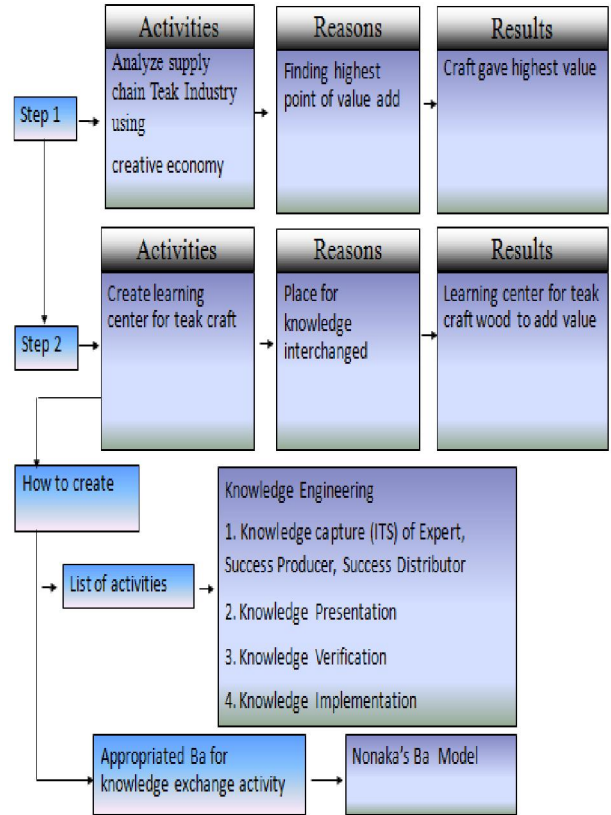


Figure 6. The conceptual framework

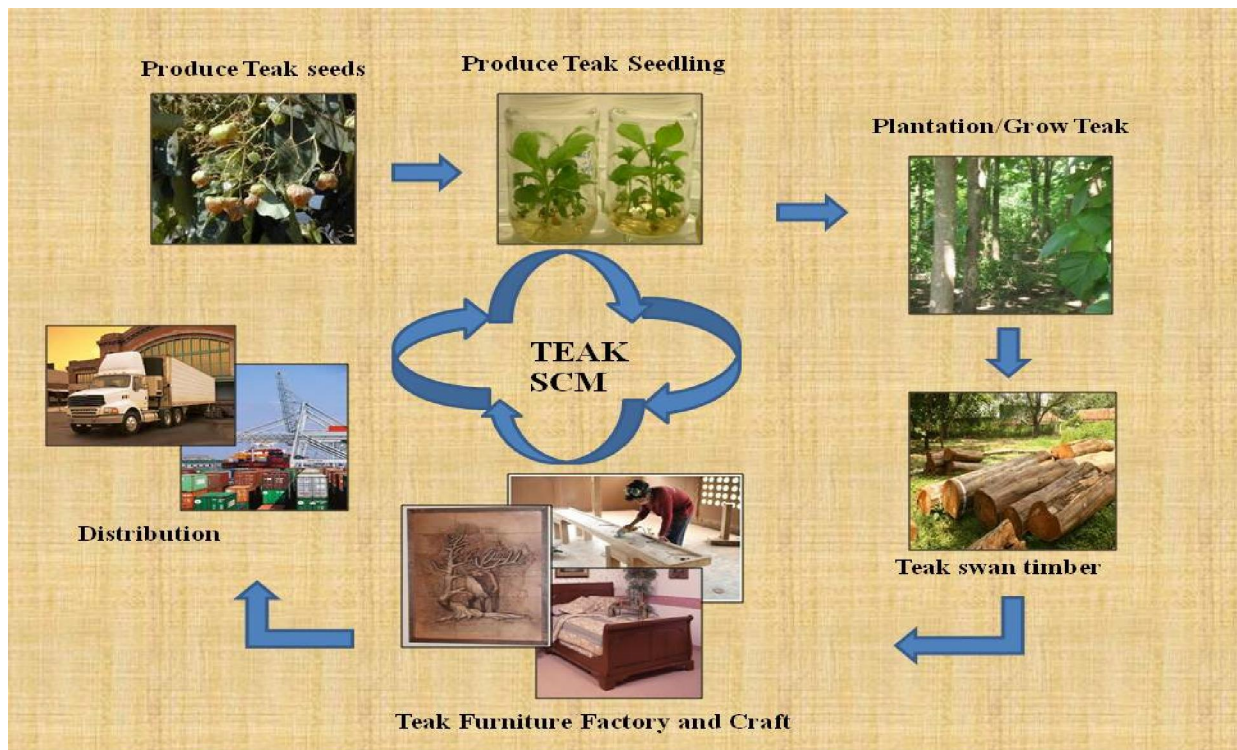


Figure 7. The major activities of teak supply chain

Table 1. Relationship between major activities of teak supply chain and creative economy for highest value added

No.	Activity Parts of Teak Supply Chain	Thai Creative Economy						
		Arts& crafts	Music Visuals	Design	Music	New media	Publishing	Visual art
1	Seed Production	Non	Non	Non	Non	Non	Non	Non
2	Seed Planting	Non	Non	Non	Non	Non	Non	Non
3	Teak Cultivation	Non	Non	Non	Non	Non	Non	Non
4	Swan timber teak	Non	Non	Non	Non	Non	Non	Non
5	Furniture Factory And Craft	Add value	Non	Non	Non	Non	Non	Non
6	Distribution	Non	Non	Non	Non	Non	Non	Non

Table 2. Top 10 Exports among developing economies of Arts and crafts, 2005

Rank	Developing economy	Value (In millions of \$)	Market share (%)	Growth rate (%)
		2005	2005	2000-2005
1	China	5,602	24.10	14.1
2	China, SAR of Hong Kong	2,266	9.75	-6.9
3	India	1,063	4.57	11.6
4	Turkey	951	4.09	14.8
5	Pakistan	626	2.69	34.5
6	Iran (Islamic Republic of)	621	2.67	-1.9
7	Indonesia	387	1.67	4.0
8	Thailand	301	1.30	5.6
9	Republic of Korea	286	1.23	0.6
10	Malaysia	265	1.14	14.2

Table 3. Relationship Ba and information types

No.	Activity of SCM	Type of Information	Type of Ba
1	Produce Teak seeds	Declarative	Physical Ba
2	Produce Teak Seedling	Procedural	Physical Ba
3	Plantation/Grow Teak	Declarative	Physical Ba
4	Teak swan timber	Declarative	Physical Ba
5	Teak furniture factory and craft	Episodic	Virtual Ba Physical Ba
6	Distribution	Declarative	Virtual Ba

Table 4. Group of the interesting themes

No.	Activity of SCM	Theme
1	Produce Teak seeds	Seeds producer
2	Produce Teak Seedling	Seeding producer
3	Plantation/Grow Teak	Grower
4	Teak swan timber	Swan timber producer
5	Teak furniture factory and craft	Manufacturer, Exporter
6	Distribution	Exporter, Buyer, Seller

#### 4. Results

The learning center is designed for values added teak wood industry in Thailand. The learning center rooms are created by the knowledge with model ITS, which is arranged by a proper BA. For convenience,

the theme is set for learners and researchers properly, comfort ability, cost and time reduction. The activity five is the major theme because it can give the highest value for Thailand creative economy.



Table 5. Rooms in learning center

Room No.	Activity of SCM	Knowledge	Information	Information Type	Ba Type	Theme
1	Produce teak seeds	Howto selecting, Goods seeds	Size, Germination	Declarative	Physical Ba	Seeds producer
2	Produce teak seedling	Duration of good teak seeding	Mother seeding, Tissue culture	Procedural	Physical Ba	Seeding producer
3	Plantation/Growteak	Teak plant care	Environment, Soil, Water, Temperature	Declarative	Physical Ba	Grower
4	Teak swan timber	Create high price	Girth, Age	Declarative	Physical Ba	Swan timber producer
5	Teak furniture factory and craft	Creative economy, Value added	Carving, Culture, Architecture	Episodic	Virtual Ba, Physical Ba	Manufacturer, Exporter
6	Distribution	Law, Quality, design	Product, Package, transport	Declarative	Virtual Ba	Exporter, Buyer, Seller

## 5. Discussion and Conclusion

We have proposed the problem for value added teak wood industry, which is solved by the learning center. The teak industry uses learning center to create the knowledge by reducing the cost and time. This research can be applied to create the location for the same style added value. The research steps, procedures and the result of knowledge creation with ITS, common KADs and the learning center blueprint in more details and obviousness have been designed. The expected research outcomes and guidelines in solving teak problems of Thailand are established. The promotion of Thailand economy is increased the creative economy from the teak industry, where the learning center of teak can add the value to the teak products via handicrafts. Such model of learning centers is for future building and also for other knowledge concept, where it is not suitable for guidelines.

This learning center provides the knowledge of teak which is related to the creative economy. This is linked center of every section of teak supply chain learner. It starts at the beginning of seed producer, seeding producer, grower, swan timber producer, exporter, buyer and seller. The environment of the learning center is set up by physical environment and virtual environment. The electronic devices are used in the proper way for more interesting of learning information in each teak section. The value added of this learning center is shown in terms of reducing time and cost. The center is gathered tacit knowledge of teak craving, where the technique of the expert system can be involved with this the model for teaching the value added creative economy.

One of interesting targets is that the merging of cross cultures in the new area will be established by the corporative link in 2015, which is called Asian Economic Corporation (AEC), in which the open sources for a big population will be originate, which will bring the large population of 600 million from at least 10 countries and include the teak industry usage.

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