

# CONTENTS

	<b>Page</b>
<b>Acknowledgement</b>	<b>b</b>
<b>Abstract in Thai</b>	<b>e</b>
<b>Abstract in English</b>	<b>g</b>
<b>List of Tables</b>	<b>n</b>
<b>List of Figures</b>	<b>p</b>
<b>List of Abbreviations</b>	<b>v</b>
<b>Statement of Originality in English</b>	<b>w</b>
<b>Statement of Originality in Thai</b>	<b>x</b>
<b>Chapter 1 Introduction</b>	<b>1</b>
1.1 Background	1
1.1.1 Teak History	1
1.1.2 Overview to Teak Industry in Thailand	2
1.1.3 The Export Value of Teak Furniture of Thailand	3
1.1.4 Teak Supply Chain in Thailand	9
1.1.5 Creative Economy	11
1.1.6 Styles	13
1.2 Definition of Terms	14
1.3 Research Objective	15
1.4 Research Question	15
1.5 Scope of Study	16
1.5.1 Research Problems	16
1.5.2 Conceptual Framework	16
1.5.3 Scope of population	17
1.6 Expected Research Outcomes	18
1.7 Research Novelty	18
1.8 Thesis Organizations	19

## CONTENTS (Continued)

	<b>Page</b>
<b>Chapter 2 Literature Review</b>	<b>20</b>
2.1 Chapter Overview	20
2.2 Teak	20
2.2.1 Thai Teak and Natural Resources	21
2.2.2 Teak Supply Chain	23
2.2.3 Patterns of teak joint	26
2.2.4 Reviews of Other Literatures in Teak	27
2.3 Furniture Industry in Thailand	30
2.3.1 General Description of Furniture Industry in Thailand and its Exporting Values	30
2.3.2 Review of Other Literatures in Teak Furniture	35
2.4 Teak Handicrafts and Carvings	39
2.4.1 Relationship between Wood Products, Handicrafts, and Carving	39
2.4.2 Patterns of Handicrafts and Carvings	43
2.4.3 Types of Carvings	44
2.4.4 Reviews of Other Literatures in Handicrafts and Carving	46
2.5 Global and Thai Creative Economy	53
2.5.1 General Description of Creative Economy Framework	53
2.5.2 Reviews of Other Literatures in Creative Economy Framework	58
2.6 Colonial Style Architecture	61
2.6.1 Analysis of the Identity of Colonial Architecture	63
2.6.2 Place of Colonial Architecture	66
2.7 Knowledge Engineering Methodology	72
2.7.1 The CommonKADS Methodology	73
2.7.2 Knowledge types and knowledge map classification	74
2.7.3 Knowledge mapping techniques	75
2.7.4 Template Knowledge Model	79
2.7.5 Review of Other Literatures in Knowledge Engineering	81

## CONTENTS (Continued)

	<b>Page</b>
2.8 Knowledge Creation	85
2.8.1 Theory of Knowledge Creation	86
2.8.2 Review of Other Literatures in the Knowledge Creation	89
2.9 Framing Solution Methodology Based on Literature Review	93
<b>Chapter 3.Methodology</b>	<b>94</b>
3.1 Sources of Data	94
3.1.1 Documents	94
3.1.2 Population	94
3.1.3 Instrument	96
3.1.4 Data Collection	96
3.1.5 Data analysis	98
3.2 Chapter Summary	98
<b>Chapter 4.Experimental Results</b>	<b>99</b>
4.1 Results and Analysis of the Teak Furniture Product from the Value's Perspective	99
4.2 Results of Proposed Knowledge Management Model which could assist in value adding to Teak Furniture Industry	103
4.2.1 Development of the Proposed Knowledge Management Model	103
4.2.1.1 The first cycle of knowledge creation	105
4.2.1.1.1 Socialization	105
4.2.1.1.2 Externalization	105
4.2.1.1.3 Combination	111
4.2.1.1.4 Internalization	114
4.2.1.2 The second cycle of knowledge creation	114
4.2.1.2.1 Socialization	114
4.2.1.2.2 Externalization	115
4.2.1.2.3 Combination	118
4.2.1.2.4 Internalization	118
4.2.1.3 The third cycle of knowledge creation	118

## CONTENTS (Continued)

	<b>Page</b>
4.2.1.3.1 Socialization	118
4.2.1.3.2 Externalization	119
4.2.1.3.3 Combination	119
4.2.1.3.4 Internalization	119
4.2.2 Framework and Tools for Results Analysis	119
4.2.2.1 Relationship of Knowledge Creation Process, Production Process and Changes in the Value of Teak Furniture	
4.2.2.2 Value added analysis by the comparison between furniture and house sale prices	120
4.2.2.3 Value added analysis by style and carving	121
4.2.2.4 Value added analysis by product sourcing by purchasers	121
4.2.2.5 Time production comparison between before and after knowledge sharing	121
4.2.3 Results of Proposed Knowledge Management Model	121
4.2.3.1 The first cycle of knowledge creation	122
4.2.3.2 The second cycle of knowledge creation	152
4.2.3.3 The third cycle of knowledge creation	177
4.3 Value Add Analysis of Teak Furniture in Colonial Style	192
4.3.1 Value add analysis of House and Furniture Comparison Prices	192
4.3.2 Value Add Analysis using Carving and Style	193
4.3.3 Customer value Add Analysis	194
4.3.4 Production Time Analysis	196
<b>Chapter 5. Conclusion and Discussions</b>	<b>198</b>
5.1 Conclusions	198
5.2 Discussions	201
5.3 Recommendation	209
5.3.1 Recommendation from this research	209
5.3.2 Further research recommendation	209

## CONTENTS (Continued)

	Page
Reference	210
Appendix A	221
Curriculum Vitae	227



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved

## LIST OF TABLES

	<b>Page</b>
Table 1.1 Illustration of 10 types of goods which generated highest net export values in 2013	6
Table 1.2 The furniture production quantity	7
Table 1.3 The ratio quantity of material in the export wood furniture	7
Table 1.4 Export Teak furniture values	8
Table 1.5 The relationship of value adding of teak according to the creative economy	12
Table 2.1 The patens and property of joint	26
Table 2.2 Comparison of Thai creative economy and creative economy abroad	55
Table 2.3 Cultural capital of creative economy	56
Table 2.4 Case study of comparison of creative economy in different countries	57
Table 2.5 Overview of analytic types	79
Table 2.6 Classification General Characterization	80
Table 3.1 Details of the experts in teak chair manufacturing	95
Table 3.2 Details of the experts in teak Carving	96
Table 4.1 The knowledge transcript of the Teak manufacturing technique	123
Table 4.2 Characterization of Colonial style furniture	141
Table 4.3 Show Product process and Knowledge Management process after combine KP1 and KC	150
Table 4.4 The knowledge transcript of wood carving technique	153
Table 4.5 Show Product process after combine KP1, KC and KP2	175
Table 4.6 Show Product Process after combine KP1, KP2, KP3 and joint	185
Table 4.7 Shows the relationship among space, selling prices, and cost of furniture	192
Table 4.8 Results from the Comparison of Price Rate of Colonial Style Chairs and Chairs in Other Styles without Uniqueness	193

## LIST OF TABLES (Continued)

	<b>Page</b>
Table 4.9 Results from the Comparison of Price Rates between Two Different Styles of Chairs	194
Table 4.10 Effect of house price, area and style to furniture selection	194
Table 4.11 Production time usage in each step before knowledge sharing of the producer	196
Table 4.12 Time consumer in each step of chair production before knowledge sharing of carver being used	197
Table 4.13 Chair production in each step of knowledge sharing	197



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved

## LIST OF FIGURES

		<b>Page</b>
Figure 2.1	Thai teak resources in the northern part of Thailand	21
Figure 2.2	Vertical supply chain of Teak industry in Thailand	25
Figure 2.3	The ratio of furniture manufacturing in Thailand classified according to types of raw materials	31
Figure 2.4	Market value of furniture	32
Figure 2.5	Investment value of furniture and parts companies registered in the stock exchange of Thailand	33
Figure 2.6	Engraving pattern	44
Figure 2.7	Bas relief pattern	44
Figure 2.8	High relief or half-sided visual image pattern	45
Figure 2.9	Round relief pattern	45
Figure 2.10	The importance of creative economy: Economic Value (GDP)	54
Figure 2.11	Identity of Colonial built in square and symmetrical shapes	63
Figure 2.12	Identity of Colonial the emphasis is on the central door	64
Figure 2.13	Identity of Colonial the Colonnade was used as the arch or facade to provide the entrance – exit area	64
Figure 2.14	Identity of Colonial the windows and doors are designed to be in the same line or row	65
Figure 2.15	Identity of Colonial the Extended balcony is usually built around the buildings	65
Figure 2.16	The Dutch Embassy Residence is a Colonial house	66
Figure 2.17	The American Embassy Residence is a Colonial house	67
Figure 2.18	The British Embassy Residence is a Colonial house	68
Figure 2.19	The France Embassy Residence is a Colonial house	69
Figure 2.20	The Portuguese Embassy Residence is a Colonial house	70
Figure 2.21	River Pavilion, Bank of Thailand	71
Figure 2.22	SECI model	86
Figure 4.1	Proposed Knowledge Management Model	104



## LIST OF FIGURES (Continued)

	<b>Page</b>
Figure 4.2 The CommonKADS model	106
Figure 4.3 The IPO template	108
Figure 4.4 Hierarchy of knowledge-intensive task types based on the type of problem being solved	112
Figure 4.5 Inferences structure for the classification method	113
Figure 4.6 Diagram shows Relationship of Knowledge Creation Process, Production Process and Changes in the Value of Teak Furniture	120
Figure 4.7 Illustration of Manufacturing Knowledge meeting and interview	122
Figure 4.8 Task and Inference of input technique wood manufacturing	126
Figure 4.9 Task and Inference of process technique wood manufacturing	127
Figure 4.10 Task and Inference of output technique Teak wood manufacturing	128
Figure 4.11 Inference and Domain concept of the requirement to manufacture Teak chairs for utilization	129
Figure 4.12 Inference and Domain concept of the difficulties in producing Teak chairs for utilization	129
Figure 4.13 Inference and Domain concept of good qualities of personnel	130
Figure 4.14 Inference and Domain concept of the budget for Teak chair manufacturing for utilization	130
Figure 4.15 Inference and Domain concept of the tools required for Teak chair manufacturing for utilization	131
Figure 4.16 Inference and Domain concept of the tools required for Teak chair manufacturing for utilization	132
Figure 4.17 Inference and Domain concept of the precautions and limitations in Teak chair manufacturing for utilization	133
Figure 4.18 Inference and Domain concept of any manuals and standards for Teak chair manufacturing for utilization	133
Figure 4.19 Inference and Domain concept of the solutions to the difficulties in Teak chair manufacturing for utilization	134

## LIST OF FIGURES (Continued)

	<b>Page</b>
Figure 4.20 Inference and Domain concept of effectively develop Teak chair manufacturing for utilization	134
Figure 4.21 Inference and Domain concept of find funding and spend money for Teak chair manufacturing for utilization	135
Figure 4.22 Inference and Domain concept of use tools to manufacture Teak chairs for utilization	135
Figure 4.23 Inference and Domain concept of use tools to manufacture Teak chairs for utilization	136
Figure 4.24 Inference and Domain concept of the solutions to problems of Teak chair manufacturing for utilization	136
Figure 4.25 Inference and Domain concept of any reports of Teak chair manufacturing for utilization	137
Figure 4.26 Inference and Domain concept of Solutions to problems of Teak chair manufacturing for utilization	137
Figure 4.27 Inference and Domain concept of measure good Teak chair manufacturing for utilization	138
Figure 4.28 Inference and Domain concept of any reports on money spent on Teak chair manufacturing for utilization	138
Figure 4.29 Inference and Domain concept of any reports on the use of tools for Teak chair manufacturing for utilization	139
Figure 4.30 Inference and Domain concept of conduct reports on the planning or instructions for Teak chair manufacturing	139
Figure 4.31 Inference and Domain concept of Innovation	139
Figure 4.32 Inference and Domain concept when combine KP1 and KC	149
Figure 4.33 The traditional chair created from cycle 0	151
Figure 4.34 The Colonial-style chair in cycle 1 created from the proposed solution methodology	152
Figure 4.35 Illustration of Carving Knowledge meeting and interview	152
Figure 4.36 Task and Inference of input technique wood carving	158

## LIST OF FIGURES (Continued)

	<b>Page</b>
Figure 4.37 Task and Inference of process technique Teak wood carving	159
Figure 4.38 Task and Inference of output technique Teak wood carving	160
Figure 4.39 Inference and Domain concept of requirement to excel wood carving	161
Figure 4.40 Inference and Domain concept of complications in wood carving	161
Figure 4.41 Inference and Domain concept of qualities of a good teacher	162
Figure 4.42 Inference and Domain concept of the budget required for excellent carving	163
Figure 4.43 Inference and Domain concept of tools and equipment required for wood carving	164
Figure 4.44 Inference and Domain concept of plan and organize the process of wood carving	164
Figure 4.45 Inference and Domain concept of precautions and limitations of wood carving	165
Figure 4.46 Inference and Domain concept of manuals and standards for wood carving	166
Figure 4.47 Inference and Domain concept of solutions to the complications of wood carving	167
Figure 4.48 Inference and Domain concept of the methods of carving development	167
Figure 4.49 Inference and Domain concept of are the methods to find funding	168
Figure 4.50 Inference and Domain concept of use the carving tools	168
Figure 4.51 Inference and Domain concept of manage plan and sequences of carving	169
Figure 4.52 Inference and Domain concept of Solutions to wood carving	169
Figure 4.53 Inference and Domain concept of reports of wood carving	170
Figure 4.54 Inference and Domain concept of Solutions to carving that are considered acceptable	170
Figure 4.55 Inference and Domain concept of measure good carving	171

## LIST OF FIGURES (Continued)

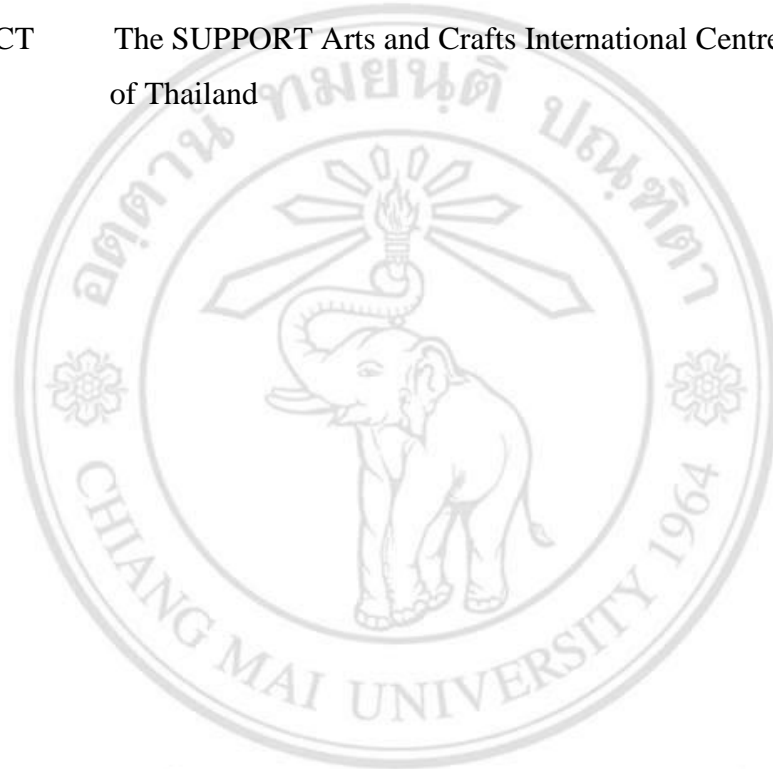
	<b>Page</b>
Figure 4.56 Inference and Domain concept of reports on money spent on carving	171
Figure 4.57 Inference and Domain concept of reports on instruments used for carving	171
Figure 4.58 Inference and Domain concept of reports on plans or process of carving	172
Figure 4.59 Inference and Domain concept of Innovation	172
Figure 4.60 Set of Carving with sharing knowledge	173
Figure 4.61 Inference and Domain concept when combine KP1, KC and KP2	174
Figure 4.62 The Colonial-style chair in cycle 1 created from the proposed solution methodology	176
Figure 4.63 The Colonial-style chair in cycle 2 create from carving for value added	176
Figure 4.64 Illustration of carving and manufacturing knowledge sharing conference	177
Figure 4.65 Task and Inference of input technique Teak wood for sharing knowledge	178
Figure 4.66 Task and Inference of process technique Teak wood sharing knowledge	179
Figure 4.67 Task and Inference of output technique Teak wood knowledge sharing	180
Figure 4.68 Inference and Domain concept of requirement to excel wood for sharing knowledge	181
Figure 4.69 Inference and Domain concept of solutions for sharing knowledge	182
Figure 4.70 Inference and Domain concept of innovation for sharing knowledge	182
Figure 4.71 The innovative joint with sharing knowledge	183
Figure 4.72 Inference and Domain concept when combine KP3 and joint	184
Figure 4.73 The Colonial-style chair in cycle 2 create from carving for value added	186

## LIST OF FIGURES (Continued)

	<b>Page</b>
Figure 4.74 Apply joint for the Colonial-style chair from cycle 3	186
Figure 4.75 The using of Joint replacement by nail in the small area	187
Figure 4.76 The usage Parts sent to carvers	188
Figure 4.77 The backs of the chairs	188
Figure 4.78 Leg of chairs	189
Figure 4.79 Foot of chairs	189
Figure 4.80 Arms of chairs	190
Figure 4.81 Decorates the wall by back of chairs	190
Figure 4.82 Easy to repair the part of chair	191
Figure 4.83 Easy to Transportation and packing	191

## LIST OF ABBREVIATION

FIO	Forest Industry Organization
UNCTAD	The United Nations Conference on Trade and Development
NESDB	National Economic and Social Development Board of Thailand
ASEAN	Association of Southeast Asian Nations
SACICT	The SUPPORT Arts and Crafts International Centre of Thailand



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved

## STATEMENT OF ORIGINALITY

- New knowledge for faster process that allows the two worker groups work together and enhancing value. This is possible with the application of SECI model, knowledge models constructed by CommonKADS and new knowledge on joints for small objects proposed in this thesis.
- 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.
- 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 SECI and knowledge engineering.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved

## ข้อความแห่งการริเริ่ม

- ความรู้ใหม่ที่ช่วยให้คนสองกลุ่มทำงานร่วมกันได้อย่างรวดเร็วขึ้นและเพิ่มมูลค่า ด้วยการประยุกต์ใช้รูปแบบ SECI แบบจำลองความรู้ที่สร้างขึ้น โดย CommonKADS และความรู้ใหม่เกี่ยวกับข้อต่อสำหรับวัตถุขนาดเล็ก ที่นำเสนอในงานวิจัยนี้
- วิธีการของ วิศวกรรมความรู้ ถูกเลือกมาใช้เพื่อจับความรู้และพัฒนาในรูปแบบความรู้ในอุตสาหกรรมไม้สัก ในงานวิจัยนี้แบบจำลองความรู้รวมถึงรูปแบบความรู้เกี่ยวกับงานหัตถกรรมการแกะสลักไม้สัก การผลิตเฟอร์นิเจอร์ไม้สักและการเลือกข้อต่อสำหรับวัตถุขนาดเล็ก
- เรื่องของการใช้ข้อต่อสำหรับวัตถุขนาดเล็กแทนการใช้ตะปูในการผลิตเฟอร์นิเจอร์ทั่วไป ความรู้ใหม่เกี่ยวกับข้อต่อได้รับการพัฒนาและเพิ่มเติมโดยการรวบรวมจากประสบการณ์ในงานหัตถกรรมการแกะสลักไม้สักและการผลิตเฟอร์นิเจอร์ไม้สัก โดยนำความรู้ของข้อต่อที่มีอยู่เดิมของคนสองกลุ่มมาแลกเปลี่ยนความรู้ร่วมกันด้วย SECI และวิธีการของวิศวกรรมความรู้

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved