



CONSERVATION AND RESTORATION TREATMENT  
OF NINETEENTH CENTURY ROYAL MALAY  
TEXTILES THROUGH SCIENTIFIC ANALYSIS

BY

MINA JANPOURTAHER

A thesis submitted in fulfillment of the requirement for the  
degree of Doctor of Philosophy  
(Built Environment)

Kulliyyah of Architecture and Environmental Design  
International Islamic University Malaysia

SEPTEMBER 2018

## ABSTRACT

The objects under research represent three 19<sup>th</sup> century Songket pieces belonging to the Royal family of Malaysia, preserved in the National Museum of Malaysia collection. Two of these represent the Indonesian art in their weaving technique and motifs, while the third one displays Indian influence. There is a lack of awareness among Malaysians on the preserving of songket textiles towards identifying deterioration factors, preventive conservation and restoration of historical songket textiles. This study aims to establish a new method for the conservation of historical songket textiles. In order to conserve and restore the samples, identification of the material technology on natural and metal threads, weaving as well as dye and motifs were carried out. The fabrics were graphically documented by macroscopic and microscopic observation and the degree of damage was assessed. It became evident that by exposing fabrics to improper storage and display technique had caused considerable harm to the physical, chemical and mechanical parts of the samples. This project is integrated in three phases: historical analysis, scientific analysis and experimental research. In historical analysis the background history of Malay songket textile is studied to identify the materials and techniques through the published and unpublished literary references. Scientific analysis is used to analyze the materials used in songket textile under investigation by examining the natural and metal fibers using chemical analysis, field emission scanning electron microscopy (FESEM) and energy dispersive spectroscopy (EDS) and identification of dye and pigments using Fourier transform infrared spectroscopy (FTIR). The condition survey was carried out and analyzed through the original historic samples to identify its feature and behavior against physical, chemical and biological agencies. The experiments on the historical samples were also done to evaluate the materials composition through scientific analysis in order to choose the best method for conservation and restoration techniques and to prepare a scientific guideline for preservation of songket textile. Finally, after accurate survey and examination, the researcher developed a new approach of conservation and restoration that was adopted in the National Museum of Malaysia.

## ملخص البحث

تمثل غايات قيد البحث ثلاث قطع "سونجكيت" من القرن التاسع عشر، تعود ملكيتها إلى العائلة المالكة في ماليزيا، وهي محفوظة نسيجية في المتحف الوطني الماليزي. وتمثل اثنان من هذه الفنون الفن الإندونيسي في تقنياتها النسيجية والزخارف، في حين أن الثالثة تعرض النفوذ الهندي. هناك نقص في الوعي بين الماليزيين بشأن الحفاظ على منسوجات "سونجكيت" فيما يتعلق بتحديد عوامل التدهور، الحفظ الوقائي، واستعادة منسوجات "سونجكيت" التاريخية. إن هدف الدراسة هو إنشاء طريقة جديدة لحفظ منسوجات "سونجكيت" التاريخية. ومن أجل الحفاظ على العينات واستعادتها، تم تطابق التكنولوجيا الجوهريّة على الخيوط الطبيعية والمعدنية، والنسيج، وكذلك الصبغة والزخارف. وقد تم توثيق الأقمشة بيانياً عن طريق الملاحظة بالعين المجردة والملاحظة المجهرية وتم تقييم درجة الضرر. أصبح واضحاً أنه من خلال تعريض الأقمشة لتخزين غير لائق والعرض التقني قد سبب ضرراً كبيراً للأجزاء المادية والكيميائية والميكانيكية للعينات. هذا المشروع متكامل على ثلاث مراحل: التحليل التاريخي، التحليل العلمي، والبحوث التجريبية. في التحليل التاريخي تم دراسة تاريخ خلفية نسيج الملايو "سونجكيت" لتحديد المواد والتقنيات من خلال المراجع الأدبية المنشورة، وغير المنشورة. يستخدم التحليل العلمي لتحليل المواد المستخدمة في نسيج السونجكيت قيد البحث من خلال فحص الألياف الطبيعية، والمعدنية باستخدام التحليل الكيميائي، والمجال الميكروسكوبي الإلكتروني للانبعاثات (FESEM) وظيف تشتت الطاقة (EDS) وتحديد الصبغات والمواد الملونة باستخدام تحويل فورييه للأشعة تحت الحمراء، التحليل الطيفي (FTIR). وقد أجري مسح الحالة وتحليله من خلال العينات التاريخية الأصلية لتحديد سماتها وسلوكها ضد الوكالات الفيزيائية، والكيميائية، والبيولوجية. كما أجريت التجارب على العينات التاريخية لتقييم تركيبة المواد من خلال التحليل العلمي من أجل اختيار أفضل طريقة للحفظ وتقنيات الترميم وإعداد مبادئ توجيهية علمية للحفاظ على النسيج سونجكيت. وأخيراً، بعد المسح الدقيق، والفحص وتحديد الهوية، والطريقة الأكثر موثوقية، وضعت الباحثة نهجاً جديداً للحفظ والترميم الذي اعتمد في المتحف الوطني في ماليزيا.

## **APPROVAL PAGE**

The thesis of Mina Janpourtaher has been approved by the following:

---

Rashidi Othman  
Supervisor

---

Hamzah Mohd Salleh  
Internal Examiner

---

D'zul Haimi Md Zain  
External Examiner

---

Harozila Binti Ramli  
External Examiner

---

Wahabuddin Ra'ees  
Chairman

## DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Mina Janpourtaher

Signature .....

Date .....

**INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA**

**DECLARATION OF COPYRIGHT AND AFFIRMATION OF  
FAIR USE OF UNPUBLISHED RESEARCH**

**CONSERVATION AND RESTORATION TREATMENT OF  
NINETEENTH CENTURY ROYAL MALAY TEXTILES  
THROUGH SCIENTIFIC ANALYSIS**

I declare that the copyright holders of this dissertation are jointly owned by the student and IIUM.

Copyright © 2018 Mina Janpourtaher and International Islamic University Malaysia. All rights reserved.

No part of this unpublished research may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without prior written permission of the copyright holder except as provided below

1. Any material contained in or derived from this unpublished research may be used by others in their writing with due acknowledgement.
2. IIUM or its library will have the right to make and transmit copies (print or electronic) for institutional and academic purposes.
3. The IIUM library will have the right to make, store in a retrieved system and supply copies of this unpublished research if requested by other universities and research libraries.

By signing this form, I acknowledged that I have read and understand the IIUM Intellectual Property Right and Commercialization policy.

Affirmed by Mina Janpourtaher

.....  
Signature

.....  
Date

## ACKNOWLEDGEMENTS

In The Name of God S.W.T, Most Gracious, Most Merciful.

I would like to extend thanks to the many people, who so generously contributed to the research work presented in this thesis.

Special mention goes to my first supervisor, Assoc. Prof. Dr. Mandana Barkeshli for having confidence in me. My PhD has been an amazing experience and I thank Dr Mandana wholeheartedly, not only for her tremendous academic support, but also for giving me so many wonderful opportunities.

In addition, I would like to express my sincere appreciation to my second supervisor Prof. Dr. Amir Hossein Zekrgoo who has always been available to answer my questions and for his guidance during my research. I would also like to thank my Co-supervisor Assoc. Prof. Dr. Rashidi Othman; His kind support and suggestions have been precious for the development of this thesis content.

My gratitude goes to my beloved husband, Mohsen Golshiri and my lovely parents, Tooba Taghipour and Mehdi Janpourtaher who had helped and supported me throughout this journey. My heartfelt thanks and deepest appreciation goes to them for the endless contributions in completing this research.

Not to forget, I would also like to thank the Department of Museums Malaysia (JMM) and the National Museum of Malaysia especially the conservation unit for their technical support during my research. This research would not have been possible without the generosity of the National Museum, for allowing me to study and work on a number of valuable historical songket textiles and to his colleagues, for their corporation and assisting me in every way.

Thanks and may God bless you all.

## TABLE OF CONTENTS

Abstract .....	iii
Abstract in Arabic .....	iv
Approval Page.....	v
Declaration .....	vi
Copyright Page.....	vii
Acknowledgements.....	viii
Table of Contents .....	viii
List of Figures .....	xiv
List of Symbols and Abbreviations.....	xxi
<b>CHAPTER ONE: INTRODUCTION TO RESEARCH .....</b>	<b>1</b>
1.1 Introduction.....	1
1.2 Research Background .....	1
1.3 Problem Statements And Issues .....	3
1.4 Research Goal .....	6
1.5 Research Questions.....	7
1.6 Research Objectives.....	7
1.7 Significance Of Research .....	8
1.8 Research Scope .....	10
1.9 Research Methodology .....	10
1.10 Reasearch Design.....	9
1.11 Organization (Outline) Of Thesis .....	10
1.12 Summary.....	11
<b>CHAPTER TWO: LITERATURE REVIEW; SONGKET HISTORY AND     EVALUATION .....</b>	<b>13</b>
2.1 Introduction.....	13
2.2 History Of Songket .....	13
2.2.1 Songket Origins.....	15
2.2.2 Songket Uses .....	17
2.2.3 Significance of Songket Textile.....	19
2.3 Songket Characteristics .....	20
2.4 Different kind of Songket .....	20
2.4.1 The Sarong .....	21
2.4.2 Shawl.....	22
2.5 Structure of Songket .....	24
2.5.1 Structure of Sarong .....	24
2.5.2 Structure of Shawl.....	25
2.6 Materials and Tools .....	26
2.7 Weaving Technique .....	27
2.7.1 Weaving Process .....	29
2.8 Dyeing.....	32
2.8.1 Traditional Dyeing .....	33
2.9 Pattern Design (The Design Structure Of Songket) .....	33



2.9.1 Traditional Pattern Decorating the Main Body, Head and Border of Songket.....	35
2.10 Songket Motifs .....	36
2.10.1 Flora (flowers).....	39
2.10.2 Plant .....	41
2.10.3 Earth .....	42
2.10.4 Fauna.....	43
2.10.5 Fruit.....	44
2.11 Metal Thread.....	47
2.12 Comparative Study On Songket Textiles (Malaysia, Indonesia And India) .....	48
2.13 Summary .....	53

### **CHAPTER THREE: MATERIALS TECHNOLOGY AND SURVEY**

<b>METHODOLOGY .....</b>	<b>51</b>
3.1 Introduction.....	51
3.2 Methodology.....	51
3.2.1 Primary Visual Observation.....	52
3.2.2 Description of Samples under Research .....	52
3.3 Visual Analysis and Physical Properties .....	55
3.3.1 Classification of Fibers .....	55
3.3.2 Technical Studies on Weaving Technique.....	57
3.4 Scientific Examination and Analysis.....	64
3.4.1 Identification and Analysis of Fibers .....	65
3.4.2 Identification of Dye and Pigments.....	70
3.5 Summary.....	70

### **CHAPTER FOUR: FINDINGS AND RESULTS..... 72**

4.1 Introduction.....	72
4.2 Identification of Natural And Metal Threads .....	72
4.2.1 Laboratory Research and Microscopic Observation .....	72
4.2.2 Morphological Examinations.....	73
4.3 Finding And Result of Dye And Pigments Identification .....	81
4.3.1 Identification Test of Blue Pigment with Chemical Analysis... 81	
4.3.2 Ftir Result For Dye And Pigments.....	82
4.4 Summary of Results And Findings.....	84

### **CHAPTER FIVE: PATHOLOGY STUDIES .....**

<b>89</b>	
5.1 Introduction.....	89
5.2 Deterioration Factors Of Textiles .....	89
5.2.1 Internal Agents .....	90
5.2.2 External Factors .....	91
5.3 Pathology Methods .....	99
5.4 Problems Faced By Songket Textiles.....	99
5.5 Fabrics Damage Assessment .....	100
5.5.1 Sample No. 1 Assessment.....	101
5.5.2 Sample No. 2 assessment .....	110
5.5.3 Sample No. 3 Assessment.....	120
5.6 Summary.....	125

<b>CHAPTER SIX: CONSERVATION AND RESTORATION OF SAMPLES UNDER RESEARCH.....</b>	<b>126</b>
6.1 Introduction.....	126
6.2 Conservation Treatment.....	127
6.3 Stages Prior To Conservation Treatment.....	127
6.3.1 Taking Samples.....	129
6.3.2 Surface Cleaning (Vacuuming).....	129
6.3.3 pH Measurement.....	130
6.3.4 Testing the stability of dyes.....	132
6.4 Steps Of Conservation And Restoration.....	133
6.4.1 Cleaning.....	134
6.4.2 Dry cleaning.....	136
6.4.3 Wet cleaning and De-acidification.....	140
6.4.4 Cleaning decorative metal threads.....	145
6.4.5 Restoration.....	147
6.4.6 Restoration progress of samples under study.....	150
6.5 Summary.....	157
<b>CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION, GUIDELINE ON PREVENTIVE MEASURE.....</b>	<b>158</b>
7.1 Introduction.....	158
7.2 Conclusion And Recommendation.....	158
7.3 Guideline On Preventive Measure.....	159
7.3.1 Preventive Measures.....	160
7.4 Principles Of Care Of Historical Textiles.....	160
7.4.1 Furniture and Maintenance Principles.....	161
7.5 The Environment.....	162
7.5.1 Temperature and Relative Humidity.....	162
7.5.1.1 Songket Textiles in Tropical Weather.....	163
7.5.2 Light.....	164
7.5.3 Dirt and pollutants.....	164
7.6 Handling.....	165
7.6.1 Lifting and moving songket textiles.....	166
7.7 Labeling.....	166
7.8 Storage.....	167
7.8.1 Flat Storage.....	169
7.8.2 Rolled Storage.....	170
7.8.2.1 Songket Storage Traditionally.....	185
7.8.3 Flat-rolled Storage.....	172
7.8.4 Songket Sarong Storage.....	174
7.8.5 Acid-free Paper for Storage.....	175
7.9 Display.....	176
7.9.1 Display of Songket Textiles.....	176
7.9.1.1 Display Songket in Malaysia Museums.....	178
7.9.1.2 Display Songket Shawl.....	179
7.9.1.3 Display Songket Sarong.....	179
7.9.2 Ideal condition for storing and displaying songket textiles.....	180
7.10 Museum Condition Management.....	181
7.11 Summary.....	183

<b>BIBLIOGRAPHY .....</b>	<b>185</b>
<b>APPENDIX 1 .....</b>	<b>189</b>

## LIST OF TABLES

Table 1.1	Literature review gap	4
Table 2.1	<i>Selvanayagam</i> classified patterns	37
Table 2.2	Original sources of motifs in songket textile	39
Table 2.3	Illustration of different songket (Malaysia, Indonesia & India)	53
Table 4.1	Technical and laboratory studies for identification of fibers	73
Table 4.2	Summary of technical study and scientific analysis of sample1	86
Table 4.3	Summary of technical study and scientific analysis of sample2	87
Table 4.4	Summary of technical study and scientific analysis of sample3	88
Table 5.1	Categories of destructive factors of historical textiles	90
Table 5.2	Identification of <i>Aspergillus</i> fungi	120

## LIST OF FIGURES

Figure 1.1	Research methodology chart	9
Figure 1.2	Thesis design flowchart	9
Figure 2.1	Nineteenth century songket gold thread silk textile	15
Figure 2.2	Royal princes using songket textiles	18
Figure 2.3	Nineteenth century gold threads Sarong, Natural dye	22
Figure 2.4	1920s-1940s Selendang songket, ceremonial shawl, red silk	23
Figure 2.5	Structure of sarong songket	25
Figure 2.6	Structure of songket shawl	25
Figure 2.7	Type of loom used by Malay weavers, apart from songket	27
Figure 2.8	Square set of ground cloth, circa 1930	31
Figure 2.9	Examples of traditional songket motifs	39
Figure 2.10	Diagram of a flower motif	43
Figure 2.11	Lotus ( <i>teratai pecah lapan</i> )	43
Figure 2.12	Bamboo shoot and earth motif in songket sarong	42
Figure 2.13	Ombak-ombak (Waves)	43
Figure 2.14	Mountains ( <i>Pergunungan</i> )	43
Figure 2.15	Sea horse ( <i>unduk-unduk laut</i> )	44
Figure 2.16	Mangosteen reins ( <i>Tampuk manggis</i> )	45
Figure 2.17	Star fruit ( <i>Buah cermai</i> )	45
Figure 2.18	Cloves ( <i>Cengkih</i> )	46
Figure 2.19	Anise ( <i>bunga lawang</i> )	46

Figure 3.1	Sample No. 1 songket shawl	53
Figure 3.2	View of the one side of sample No. 2 songket sarong	54
Figure 3.3	View of sample No. 3, fully pattern embroidered sarong	55
Figure 3.4	Microscopic photography of background texture of samples	59
Figure 3.5	Visual and microscopic view of sample one density	59
Figure 3.6	Microscopic view of sample two warp and weft density	60
Figure 3.7	Microscopic view of sample three warp and weft density	60
Figure 3.8	Both warp and weft in cotton part of songket sarong was Z	61
Figure 3.9	Metal threads S torsion around the core fiber	61
Figure 3.10	Motif analysis in sample one	63
Figure 3.11	Sample two pattern and motifs analysis	63
Figure 3.12	Sample three motif analysis	64
Figure 3.13	Microscopic image of the object's natural and metal threads	66
Figure 3.14	Preparing of sample and FESEM/EDS	68
Figure 3.15	ZEISS AURIGA using for FESEM-EDS	69
Figure 4.1	FTIR result of background warp fiber of sample 1 (Purple)	74
Figure 4.2	FTIR result of background warp fiber of sample 1 (Red)	74
Figure 4.3	FTIR result of songket warp fiber of sample 2 (Green: Silk)	74
Figure 4.4	FTIR result of attached red fabric, sample 2 (Red: cotton)	74
Figure 4.5	FTIR result of warp fiber of sample 3 (Maroon: cotton)	75
Figure 4.6	FESEM analysis of metallic strips in sample one	75
Figure 4.7	FESEM image of border decorative metal thread, sample one	76
Figure 4.8	FESEM image of metal thread, sample 2 (100x and 500x)	76
Figure 4.9	Sample 3 FESEM images of metal thread (mag. 100x)	76
Figure 4.10	Metal thread material analysis (EDS) sample 1	77

Figure 4.11	Sample one, EDS analysis of cotton yarn inside metal thread	78
Figure 4.12	Sample one border decorative metal thread (EDS analysis)	78
Figure 4.13	Sample one border decorative cotton yarn inside metal EDS	79
Figure 4.14	Sample 2 metal threads EDS analysis	79
Figure 4.15	Sample 2 cotton yarns inside metal thread (EDS analysis)	80
Figure 4.16	Sample 3 metal threads EDS analysis	80
Figure 4.17	Sample 3 EDS analysis of cotton yarns inside metal thread	81
Figure 4.18	Two phases solution of indigo pigment	82
Figure 4.19	IR spectral interpretation result for purple thread, compound	82
Figure 4.20	IR spectral interpretation result for red thread sample one	83
Figure 4.21	IR spectral interpretation result for green thread sample two	83
Figure 4.22	IR spectral interpretation result for red thread sample two	84
Figure 4.23	IR spectral interpretation result for maroon thread sample 3	84
Figure 5.1	Linear designs of degradations in songket shawl	102
Figure 5.2	Abrasion and thinning the fabric	103
Figure 5.3	Previous improper restorations	104
Figure 5.4	Incongruity thread and method for sewing	104
Figure 5.5	Disruption and loosing fabric in border	105
Figure 5.6	Colored stains (microscopic view in circle)	105
Figure 5.7	Pigment stain (microscopic view in circle)	106
Figure 5.8	Stretching of metal fibers	106
Figure 5.9	Opening of metal threads on surface and in border	107
Figure 5.10	Tearing of metal threads and natural yarn in core	107
Figure 5.11	Corrosion on margin metallic decoration	108
Figure 5.12	Delamination of metal thread	108

Figure 5.13	Corrosion and scratching of metal thread and natural yarn	109
Figure 5.14	Cracking of metal thread and natural yarn in core (1000x)	109
Figure 5.15	Damage illustration of first side of sample 2	110
Figure 5.16	Damage illustration of second side of sample 2	111
Figure 5.17	Opening metal threads in the body of songket	111
Figure 5.18	Loosing fibers and tearing in the border	112
Figure 5.19	Tearing metal threads	113
Figure 5.20	Sticker damage on songket	114
Figure 5.21	Wrong repair	114
Figure 5.22	Corrosion Stain (Blurring of metal fibers on fabric in circle)	115
Figure 5.23	Tearing and missing part in cotton fabric	116
Figure 5.24	Dark ink stains	116
Figure 5.25	Pollutant particles cause dark stain on fabric	117
Figure 5.26	Using paper sticker on fabric directly	117
Figure 5.27	Fungi pollution and dark stains caused by paper sticker	118
Figure 5.28	Microscopic photography of <i>Aspergillus</i>	119
Figure 5.29	<i>Aspergillus</i> in petri dish	119
Figure 5.30	Damage drawing sample three first side	121
Figure 5.31	Damage drawing sample three, second side	121
Figure 5.32	Fibers stretching	122
Figure 5.33	loosing of metal thread and opening of natural fibers	122
Figure 5.34	Tearing and loosing warp and weft	123
Figure 5.35	Tearing and loosing of natural and metal thread	123
Figure 5.36	Breakdown metal thread and fading inside core fiber	124
Figure 5.37	Tearing fibers and loosing a part of body in border	124



Figure 5.38	Fading caused by chemical oxidation and ageing	125
Figure 6.1	Take separated threads from back of fabric for analysis	129
Figure 6.2	pH measurement of sample No.1 (songket shawl, pH:5)	131
Figure 6.3	pH measurement of sample No.3 (songket shawl, pH:4-5)	131
Figure 6.4	pH measurement of sample No.2 (embroidered sarong, pH:5)	131
Figure 6.5	Testing the stability of dyes in songket shawl (dye stable)	132
Figure 6.6	Testing the stability of dyes in songket sarong (dye stable)	133
Figure 6.7	Testing the stability of dyes in sample 3 (dye was not stable)	133
Figure 6.8	Surfaced cleaned low power vacuum suction and soft brush	136
Figure 6.9	Using scalpel and acetone to remove stain	138
Figure 6.10	Solubility tests allowed the removal of the adhesive stamps	138
Figure 6.11	Remove sticker and adhesive with using solvent	139
Figure 6.12	Wet cleaning of samples under study by using soft brush	141
Figure 6.13	Deep washing using detergent and ethanol	141
Figure 6.14	Rinsing with distilled water	142
Figure 6.15	Using cold wind of dryer to quick dry of songket sarong	143
Figure 6.16	Drying sample with blotted paper and wind of fan and dryer	143
Figure 6.17	Iron the back side of fabric to complete drying process	144
Figure 6.18	Using acid-free paper to make indirect iron heat on object	144
Figure 6.19	Metal threads cleaning and removing the corrosion	146
Figure 6.20	Metallic decoration before and after cleaning reinforcement	147
Figure 6.21	Alkaline adhesive HV498	149
Figure 6.22	Summary the whole steps of restoration in songket shawl	151
Figure 6.23	Details of stabilizing the lost cotton parts of sample 2	152
Figure 6.24	Summary of the whole steps of restoration of songket sarong	153

Figure 6.25	Summary of the whole steps of restoration of sample No.3	154
Figure 6.26	Appearance of the songket shawl in missing part	155
Figure 6.27	Support of the weak and missing of cotton part songket	155
Figure 6.28	Fixing of the separated metal thread with fine cotton yarn	155
Figure 6.29	Fixing of the threads and support the weak parts of sample 3	156
Figure 6.30	Objects prepared for rolled storage	156
Figure 7.1	Handling fragile fabrics on a support using tissue paper	165
Figure 7.2	An accession number on cotton tape on embroidered sarong	167
Figure 7.3	Window mounts with a fabric-covered backboard	170
Figure 7.4	Practice for rolled textile	171
Figure 7.5	Rolled onto a padded roller for storage	172
Figure 7.6	Flat-rolled storage for songket shawl by using box	174
Figure 7.7	Rolled storage of songket sarong with cotton pad inside	175
Figure 7.8	Methods of displaying textiles vertically	177
Figure 7.9	Display stands for songket shawl	179
Figure 7.10	Display songket sarong	180
Figure 7.12	Thermo-hygrometer to spot check of temperature	182
Figure 7.13	Handheld Lux and UV meter to spot check of natural light	183

## SYMBOLS AND ABBREVIATIONS

°C	Degree Celsius
°F	Degree Fahrenheit
%	Percent
μm	Micrometer
ml	milliliter
pH	Potential of hydrogen
cm	Centimeter
UV	Ultraviolet
NaOH	Sodium hydroxide
HNO <sub>3</sub>	Nitric Acid
NaCl	Sodium chloride

# **CHAPTER ONE**

## **INTRODUCTION TO RESEARCH**

### **1.1 INTRODUCTION**

This thesis is focusing on the preservation of songket textiles. The research investigates several problems faced by historical songket textiles to reduce the impacts of deterioration factors with the proper method of conservation and restoration. The plan includes historical and artistic studies, technology, pathology, and prepares guideline for preservation, display and storage of historical songket textiles. Furthermore, it provides premium technique of refinement and cleansing according to the fiber materials under scientific analysis. The goal of this research, significance of thesis, research questions and different methods of research that will be engaged in this study are describe in detail in this chapter. The research findings will include case studies, experiments and analysis and will be designed with primary and secondary sources. The organization of thesis as well as research limitation and scope are explained in this study. This research highlights the findings congruency with other literature available currently in the field of textile conservation.

### **1.2 RESEARCH BACKGROUND**

The word “songket” is derived from the Malay verb *menyongket* or *menyungkit* that there have been many interpretations containing “to embroider”, “to lever” or “to lift” (Noor Azlina, 2008). Since the sixteenth century, songket has played a major role in the ruling courts of this region (Azah, 2006). Songket hailed as “the cloth of gold” and “the Queen of fabrics” songket remains one of the most popular Malay textiles (Ghani

and Zakaria, 2013). Songket is a glorious fabric which is woven in colorful cotton and silk yarns and metallic threads used beautifully to make traditional pattern and motifs.

The art of songket weaving is believed to have come to the Malay Peninsula through trade, migration and political marriage since the fifteenth century (Kheng, 2011). Songket belongs to the brocade family of textiles and patterns are created beautifully by metallic gold and silver threads by using the supplementary weft method. Till sixteenth century, songket was used for royal family and worn during official and traditional functions by the nobles. It was also used for wedding and sent as a gift by the groom to the bride (Ismail, 1997). Songket is the richest and most complex of all Malaysian art crafts, but unfortunately very little research has been carried out on the origin of this fabulous brocade cloth, its role in the cultural life of the Malays, and its development and decline and in recent years, revival.

Since the sixteenth century, at least trade in textiles was active, both on the east coast and west coast of the peninsula. Evidence is weighted to a Sumatra origin since many fine pieces of songket were, and still are produced in Sumatra. Another factor pointing to a Sumatra origin is many songket weavers in Terengganu and Kelantan also believe that the origin place of songket is Sumatra. In early centuries, commoners were not allowed to wear the royal gold and silver songket and it was only much later that they were allowed to wear it, and then only on one day, their wedding day. There are however, surviving examples of songket sarong's woven in the early nineteenth century by commoners for their own use on ceremonial occasions (Kheng, 2007). Traditionally, songket was woven using silk; metal thread was gold and silver gilt (Salleh, 2000). The songket hand-weaving is a very time consuming process. A piece of songket normally needs about two weeks to complete from warping to weaving. A more complicated one needs as much as three months to complete. Over 300 pieces of

traditional songket, along with some modern examples, were photographed and kept during 1977 till 1978 in the collection of the National Museum in Kuala Lumpur, the Museum Seni Asia in the University of Malaya, the Museum Di Raja Abu Bakar, Istana Besar in Johor Bahru, the Muzium Negeri Terengganu, as well as in private collections (Kheng, 2007).

### **1.3 PROBLEM STATEMENTS AND ISSUES**

In museum, songket textiles are one of the most delicate collections. They are sensitive to light and humidity and affected by temperature, pollutant and dirt. Moreover, they are at risk of abrasion and susceptible to biological damages. There is a shortage of studies about the problem faced by songket textiles. There is also lack of awareness among Malaysians on the preserving of songket; many scholars mainly emphasized on the background history and characteristics of songket. However, there is a big gap in research towards identifying deterioration factors, and preventive measures for conservation and restoration of historical songket textiles as detailed in Table 1.

Problems associated with the restoration of historic textile with metallic and natural fibers, are:

- i. There are unclear and inconsistent methods of restoration treatment on Songket textile with organic and inorganic materials.
- ii. Very little investigated information by the Malay themselves is available on the conservation and restoration of songket textile.
- iii. The major factor that causes the deterioration of fibers and metals are not alike. The detailed study of both organic and inorganic materials can lead

to the selection of materials to apply in moderate approach for simultaneous refinement of organic and inorganic fibers in songket textile.

The problems identified above can be further developed into some research questions in order to facilitate the research conduct. Some questions can be raised upon discussion of these problems.

Table 1.1 Literature review gap

Literature	Finding				
	Background history	Characteristic and Technology	Motif	Analysis and Deterioration factors	Conservation and Restoration
Songket; A Malaysian Touch (Malaysian Handicraft Development Corporation, Sh. M. Nor, 1999)	√	√	√	×	×
Cultural Treasures: Textile of the Malay world (A. Pathak, New Delhi National Museum, 2003)	√	√	√	×	×
Hand-woven textiles of South-East Asia (Sylvia Fraser- Lu, Oxford University Press, 1988)	√	√	√	×	×
Herencia Textile De Malaysia, Malaysian Textile heritage (National Art Gallery Malaysia, 2003)	√	√	√	×	×
Malay Woven Textile (Sri Zainon Ismail, 1997)	√	√	√	×	×
Malaysian Songket (Norwani Mohd Nawawi, 1989)	√	√	√	×	×
Nature Motifs in Malay Batik & Songket (H. Hussin, 2010)	×	×	√	×	×
Songket, Malaysia's Woven Treasure (Grace I. Selvanayagam, Oxford University Press, 1990).	√	√	√	×	×

Table 1.1 continue

Songket Malaysia (Norwani Mohd Nawawi, 2007)	×	×	√	×	×
Songket, Satu Warisan Malaysia (University of Malaya & Puan A. Aziz, 1999)	√	√	√	×	×
The Changing Face of Malaysian Crafts (B. Leigh, 2003)	√	×	×	×	×
Tradition and Continuity (Ghani and Zakaria, 2013)	√	×	×	×	×
Sustaining the Magnificent craft of Songket weaving (Kheng, 2010)	√	√	×	×	×
Revitalising the craft of songket weaving through innovation (Kheng, 2011)	×	√	×	×	×
Contemporary Malaysian art; an exploration of songket motif (A. Bahauddin 2002)	√	√	√	×	×
The Songket Motifs between Reality & Belief(A. Bahauddin 2003)	×	×	√	×	×
Geometric shapes generation in Songket design using shape Grammar (N.F. Ismail, 2013)	×	×	√	×	×
Classification of frieze pattern in songket textile (N.M. Nawawi, 2014)	√	√	√	×	×
Textile Praxis, Malaysian hand-woven Songket (S. Stankard 2010)	√	√	√	×	×
Glimmering Songket aims at spotlight (D. Indrasafitri, 2010)	√	√	√	×	×
Symmetrical pattern; analysing songket in wallpaper pattern (Nawawi, 2014 )	√	×	√	×	×