DEVELOPMENT OF BATIK SURFACE DESIGN LAYOUT USING PATTERN GRADING ARRANGEMENT FOR CONTEMPORARY WOMEN'S BAJU KURUNG

By

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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The Malaysian batik and fashion industry plays a crucial role in the country's economy. To ensure its continued growth, it's essential for batik fabric manufacturing to adopt modern methods and technology. However, a lack of research on batik fabric, particularly regarding pattern grading arrangement for contemporary women's baju kurung and motif design placement layout, poses challenges for tailors, leading to fabric wastage. This research examines a new batik surface design layout by investigating suitable pattern grading arrangement for contemporary women's baju kurung. In order to collect data for this research study, a comprehensive approach was adopted, consisting of interviews, observations, experiments, and validation through the utilisation of focus group interviews and Likert scale questionnaires. 10 expertise were interviewed for the research where 3 batik experts, 2 batik tailors and 5 batik sellers. Besides, 4 batik markets and craft festivals were chosen for observations and 23 samples were produced in experiments. Meanwhile, 6 batik experts and textile or batik lecturers were involved in validation (focus group interview) and 13 expertise

were involved in validation (questionnaire) where 9 batik experts and 4 fashion experts. The findings indicate that experts in batik and fashion strongly endorse the innovative batik surface design fabric arrangement layout, which showcases innovation and sustainability by reducing fabric consumption compared to existing batik fabric and its pattern grading arrangement meets aesthetic and functional standards. Furthermore, the research recommended a new batik surface design layout based on pattern grading arrangement for use by manufacturers or designers during the development and production of contemporary women's baju kurungs.

Keyword: Batik surface design layout, Pattern grading arrangement, Contemporary women's baju kurung.

SDG: GOAL 9: Industry, Innovation and Infrastructure.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PEMBANGUNAN SUSUN ATUR REKA BENTUK PERMUKAAN BATIK MENGGUNAKAN SUSUNAN PENGGREDAN POLA BAGI BAJU KURUNG KONTEMPORARI WANITA

Oleh

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Industri pembuatan batik dan fesyen Malaysia memainkan peranan penting dalam ekonomi negara. Bagi memastikan pertumbuhannya berterusan, adalah penting bagi pengusaha kain batik perlu bergerak seiring dari segi kaedah dan teknologi moden semasa. Walau bagaimanapun, kekurangan penyelidikan dan pembangunan mengenai kain batik, terutamanya berkaitan dengan susunan penggredan pola pakaian untuk baju kurung kontemporari dan susunan perletakan motif yang sesuai, menyebabkan cabaran bagi para tukang jahit, yang mengakibatkan pembaziran kain. Penyelidikan ini mengkaji susun atur reka bentuk permukaan batik dengan menyiasat susunan penggredan pola pakaian yang sesuai untuk baju kurung kontemporari wanita. Bagi mengumpul data penyelidikan ini, pendekatan menyeluruh telah digunakan, terdiri daripada temu bual, pemerhatian, eksperimen, dan validasi melalui temubual kumpulan berfokus dan soal selidik (skala likert). 10 pakar telah ditemu bual di mana 3 pakar batik, 2 tukang jahit dan 5 penjual batik. Selain itu, 4 pasar batik dan festival kraf dipilih untuk pemerhatian dan 23 sampel dihasilkan dalam eksperimen. Sementara itu, 6 pakar batik dan pensyarah tekstil atau batik terlibat dalam validasi

(temubual kumpulan berfokus) dan 13 pakar terlibat dalam validasi (soal selidik) di mana 9 pakar batik dan 4 pakar fesyen. Penemuan menunjukkan bahawa pakar dalam bidang batik dan fesyen menyokong susunan reka bentuk permukaan kain batik yang inovatif, yang memperlihatkan inovasi dan kelestarian dengan mengurangkan penggunaan kain berbanding kain batik sedia ada dan susunan penggredan pola pakaian bagi baju kurung kontemporari memenuhi standard estetik dan fungsi. Tambahan pula, kajian ini mencadangkan susunan reka bentuk kain batik baharu berdasarkan susunan penggredan pola untuk pengusaha atau pereka semasa proses pembangunan dan penghasilan baju kurung kontemporari wanita.

Kata Kunci: Susun atur reka bentuk permukaan batik, Susunan penggredan pola, Baju kurung kontemporari

SDG: MATLAMAT 9: Industri, Inovasi dan Infrastruktur

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LIST OF ABBREVIATIONS

Ai	Adobe Illustrator
CAD	Computer Aided Design
DIKN	National Creative Industry Policy
RTW	Ready-To-Wear
SDG	Sustainable Development Goals
SME	Small and Medium Enterprises
SPSS	Statistics package for Social Sciences
OECD	Origanisation for Economic Cooperation and Development

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter delves into the concerns and issues associated with the existing batik fabric, which does not follow to the pattern grading arrangements of different sizes, which has implications for the tailor when manufacturing garments for women. In current fashion trends, the Ready-To-Wear (RTW) fashion, which includes batik garments, is affected by the international fashion market. Batik garments are in demand not only in the traditional markets of batik-making regions but also in international markets. Given the importance of the RTW context, the research background will focus on the application of the pattern grading methods to the Batik Pattern Grading Arrangement layout. This method is essential in order to meet the current fashion needs of batik and to produce garments in multiple pieces in an efficient manner. The importance of the research background will be determined based on the primary purpose, objective, and scope.

1.2 Research Background

There has been a long-standing recognition of Malaysian batik as a creative industry that contributes to national revenue and the development of the country's cultural identity. According to the Malaysia Creative Industry Policy, Talent Development, government policies, funding, marketing, technology, research, and commercialization are all essential for the development of the Malaysian batik industry (Eshaq, 2019; Syed Shaharuddin et al., 2021).

The Malaysian Creative industry, particularly in the field of batik, has yet to demonstrate a commitment to innovation and the exploration of new techniques, as well as a lack of utilisation of the most up-to-date technology in the manufacture of batik items (Sinar Harian, August 30, 2020), and in order to remain competitive with imported goods, it is essential to enhance our printing proficiency (Hafiz, 2020). Director of *Perbadanan Kemajuan Kraftangan Malaysia*, Ibrahim Ismail (2019), said the research, improvement and development has been conducted to ensure that the country's product is in line with consumer preferences and meets the necessary standards. If this issue is not addressed, it is likely to have a negative impact on the country's batik textile arts industry. Furthermore, raw materials for the production of batik are imported from overseas, which are of high cost, and the production methods are manual rather than automated, resulting in limited production and a lack of capacity to meet both local and international demand (Ariffin, 2019).

The Malaysian batik industry is a major contributor to the disposal of textile waste, despite not being aware of it. This is due to the fact that the manufacture of existing batik fabrics for women's clothing does not adhere to the pattern grading size, (Juhari Azmi, 2021; Azizah Ahmad, 2021; Suraya Shaari, 2021), resulting in the waste of fabric on existing batik fabric (Juhari Azmi, 2021). For instance, 4 metres of existing batik fabric are used for a user if they are size S and M, while for users with larger sizes, the fabric is insufficient and they must purchase additional fabric. According to data from Kloth Cares, the "Fabric Recycling Movement 2020" in *Perbadanan Pengurusan Sisa Pepejal Dan Pembersihan Awam* official portal, during the 22 months of the "fabric recycling movement" conducted in four states (Selangor, Kuala Lumpur, Melaka and Negeri Sembilan) between August 2018 and May 2020, resulting

in the collection of over 600,000 kilogrammes of textile waste, equivalent to approximately 3.6 million garments.

In order to effectively manage this situation, entrepreneurs must be exposed to the initial pattern classification of batik designs on fabric (Suraya Shaari, 2021). Pattern grading is an approach employed by apparel designers to create designs for Ready-To-Wear (RTW) apparel in a range of sizing options. When an increment or decrease is applied to a particular design, resulting in each new pattern being produced in a different size, it is referred to as pattern apparel grading (Schofield, 2007). In the garment industry, pattern grading is typically conducted with a medium-sized pattern, as it facilitates the expansion of the pattern to large sizes (L) or the reduction of the pattern to small sizes (S) (Cooklin, 2003; Marniati, 2020). In the current fashion environment, the global fashion market has had a significant impact on the demand for RTW fashion, which includes batik apparel (Rosihan et al., 2022). In the realm of Ready-to-Wear (RTW) fashion, Petrova (2008) underscores the substantial importance that pattern grading methods assume in the ability to produce diverse garments with varying dimensions, all while safeguarding the complex integrity of the batik patterns. The amalgamation of conventional artistry with contemporary manufacturing methodologies effectively caters to a wider spectrum of consumers, augmenting the inclusiveness and adaptability of batik fashion within the current global fashion industry (Poon, 2017; Hamid et al., 2022). The utilisation of Computer Aided Design (CAD) plays a crucial role in the process of pattern grading development, as it enables the visualisation of garment patterns and streamlines the arrangement procedure on a specific dimension of fabric. Datta et al. (2022) highlight the predominant employment of CAD systems within the apparel industry, specifically

in the domains of garment design, pattern preparation, pattern grading, and marker creation. Moreover, Papachristou et al. (2019) demonstrated that computer-aided design (CAD) has the ability to generate clothing prototypes using a wide range of distinct clothing design patterns. In the industry, there exist a multitude of Computer-Aided Design (CAD) applications. However, the adoption rate of these applications among batik entrepreneurs remains limited, primarily attributable to perceived complexities in the utilisation process and the requisite expertise and precision in operating computer systems.

In conclusion, the insufficient integration of contemporary technology in the exploration of batik manufacturing and innovations for the advancement of Malaysia's creative industry, particularly regarding the existing batik fabric used for women's garments, manifests through the absence of size grading and the consequent generation of fabric waste attributable to not follow with user dimensions. There are several implementation requirements that need to be addressed. Consequently, an appropriate course of action to tackle this matter entails the identification of the suitable pattern grading arrangement in the realm of existing batik fabric. This would be followed by a comprehensive analysis of an apt pattern-grading design arrangement specifically tailored for a women's baju kurung batik design layout utilising Computer-Aided Design (CAD) software. Ultimately, the objective would be to develop an optimal batik design fabric layout, incorporating a well-suited pattern grading arrangement layout specifically tailored for baju kurung garments. This layout proposal aims to assist entrepreneurs in minimising fabric consumption based on user requirements and size. Furthermore, this particular arrangement of the layout ensures the preservation of the motif, thereby addressing concerns regarding the prevailing

disorganised nature of motifs in fabrics available in the current market. Simultaneously, this measure has the potential to mitigate the accumulation of batik fabric waste, consequently contributing to the reduction of environmental pollution. Additionally, the utilisation of Computer-Aided Design (CAD) applications within the realm of batik surface design styles can contribute to the realisation of the objectives set forth by the National Creative Industry Policy (DIKN), thereby facilitating the advancement and integration of technology as a catalyst for the creative industry. Furthermore, it effectively contributes towards the achievement of Sustainable Development Goals (SDG), more specifically Goal 9, which aims to build resilient infrastructure, promote sustainable industrialization, and foster innovation.

1.2.1 Problem Statement

The development of the Malaysian batik industry hinges on the presence of batik entrepreneurs who possess exemplary skills, meticulous creativity, and a penchant for innovative thinking. These qualities are crucial in order to produce batik goods that not only boast superior design elements but also exhibit a wide repertoire of product offerings, enhanced durability, and versatile utility. In incorporating these fundamental elements, the Malaysian batik industry can thrive as a prosperous and formidable sector, as noted by Ismail et al. (2019). Many batik enterprises in Malaysia persist in employing the conventional method for producing batik goods and executing the batik process. This entails that the workers possess a higher proficiency in crafting flora and fauna patterns, and their concentration tends to be geared towards the domestic market (Ismail et al., 2019; Kari et al., 2017).

In contemporary batik production, there is a departure from the conventional practice of simply adhering to pre-established pattern arrangements on existing batik fabric. The existing batik fabric has been produced in accordance with standardised design arrangements, which are offered in a free-size measurement to customers. In the production process of contemporary batik fabrics for women's garments, there appears does not follow the grading size (Juhari Azmi, 2021; Azizah Ahmad, 2021; Suraya Shaari, 2021). Additionally, there exists a deficiency in users' knowledge and comprehension regarding established batik fabrics and designs intended for women's attire, as well as the visual effect achieved by the placement of the pattern on the garment (Ehfan, 2021; Aliff, 2021). The determination of pattern placement is ultimately within the purview of the tailor (Ehfan, 2021).

Tailors faced challenges in ascertaining the positioning of individual clothing patterns on the pre-existing batik fabric, which had a length of 4 meters. The conventional arrangement of the pattern on the fabric entails utilising the borders or edges (referred to as "feet") to demarcate the layout of the pattern at the shirt's bottom, the sleeve's end, and the skirt's bottom. According to Roziana (2021) and Haslina (2021), empirical data obtained through observations and interviews with multiple tailors revealed challenges in ascertaining the optimal placement of clothing patterns on pre-existing batik fabric. Furthermore, an issue arises wherein the configuration of the motif lacks equilibrium on the fabric design, leading to the discontinuity of the batik pattern when sewn together (Roziana, 2021; Haslina, 2021). In addition to this, a substantial surplus of batik fabric is observed when it is utilised for garments of smaller sizes, particularly those in the S and M size categories. Consequently, this engenders a considerable amount of waste within the realm of batik fabric production

(Juhari Azmi, 2021; Suraya Shaari, 2021). In certain instances, it has been observed that batik fabric may not be sufficiently available in larger sizes, typically corresponding to L and XL. Consequently, the inclusion of additional fabric becomes imperative in order to complete the construction of a garment (Roziana, 2021; Haslina, 2021).

As referring to the above issue, the main problem that significantly to address in this research is the existing batik fabric lacks sufficient research and development concerning pattern grading, which pertains to the arrangement of patterns on clothing as well as a proper placement layout for motif designs. Consequently, excessive fabric is wasted, specifically for small-scale users. Consequently, the aforementioned individual is compelled to procure a standard batik fabric that adheres to free-size measurements, notwithstanding their requirement for a relatively minimal quantity of such fabric to fashion a single ensemble.

In order to tackle this matter, it is essential to undertake an in-depth investigation pertaining to the existing batik fabric, which encompasses diverse pattern grading sizes. This research should primarily concentrate on organising the arrangement of patterned garments as well as strategically arranging batik motifs on fabric layouts (Juhari Azmi, 2021). In order to prevent this issue, entrepreneurs should be familiarised with the early assessment of batik design patterns on fabric (Suraya Shaari, 2021). Additionally, the implementation of the Computer Aided Design (CAD) system is of utmost significance and predominantly utilised in various processes within the apparel sector, encompassing garment design, pattern preparation, and pattern grading arrangement (Datta et al.). Furthermore, the CAD

system can also be effectively employed in the development process of batik design layouts.

1.3 Research Aim

The aim of this research is to develop a new batik surface layout for contemporary women's baju kurung designs that is based on pattern grading arrangement. The new batik surface design layout provides a guideline for manufacturer or the designer during the development and manufacturing process of contemporary women's baju kurung.

1.3.1 Research Questions

The research questions from this research are:

i. What are the existing pattern grading arrangements manufacture for contemporary women's baju kurung?

ii. What are the suitable pattern grading arrangements that can be implemented for contemporary women's baju kurung using CAD software?

iii. How can a batik surface design layout be developed with proper pattern grading arrangement for contemporary women's baju kurung?

1.3.2 Research Objectives

The objective of this research endeavour is to create a proper pattern grading layout that effectively corresponds to women's batik design layout, in particular the pattern of the traditional Malay garment known as *baju kurung*. The intended outcome of this effort is to mitigate wasteful fabric disposal by enabling users to determine the precise quantity of fabric required for garment production, taking into consideration their

individual size. Moreover, the integration of a suitable pattern grading layout in the batik design motif ensures its safeguarding against any potential alterations, as opposed to purchasing batik fabrics currently available in the market that lack well-arranged design motifs.

The objectives of this research are:

i. To identify the existing pattern grading arrangement for contemporary women's baju kurung.

ii. To analyse a suitable pattern grading arrangement for contemporary women's baju kurung through CAD software.

iii. To develop a new batik surface design layout based on pattern grading arrangement for contemporary women's baju kurung.

1.4 The Scope and Area of Research

The purpose of this research is to develop a new batik surface layout that is specifically designed for contemporary women's baju kurung, based on pattern grading arrangement. The ultimate goal is to combine a pattern arrangement layout with an appropriate motif design placement on batik fabric to create garments especially contemporary women's baju kurung that follow current fashion trends. By developing a revolutionary batik surface design layout with a suitable pattern grading arrangement, this study aims to provide manufacturers and designers with a comprehensive guide for the development and manufacturing of batik arrangement layouts and contemporary women's baju kurungs. Furthermore, a key aspect of the research is exploring the possibility of pattern grading arrangements that have the potential to reduce fabric usage while maintaining garment quality and design integrity. By researching and adopting efficient grading arrangement procedures, the research

attempts to increase resource conservation and cost-effectiveness within the batik manufacturing process.

The research focuses on the Malaysian states of Terengganu and Kelantan. Terengganu and Kelantan are acknowledged for their rich tradition in batik craftsmanship, with an extensive population of batik entrepreneurs and craftsmen. This creates numerous potential for collaboration and knowledge sharing in the local batik industry. Meanwhile, the region has a strong demand for batik and contemporary women's baju kurung garment production, making it an ideal location for research and development of novel batik surface design layouts. The research attempts to successfully address industry gaps and satisfy customer preferences by aligning with market needs. Meanwhile, Terengganu and Kelantan have a vibrant batik sector that includes a wide range of factories, workshops, and artisanal studios. This strategic environment and territory provide access to the resources, skills, and infrastructure required to perform thorough research and experimentation. As a result, Terengganu and Kelantan have a plethora of batik-related resources, such as raw materials, trained artisans, expertise, and historical, which improves research skills and allows for in-depth investigation into batik surface design layout techniques.

1.5 Significant of Research

The purpose of this research is to gain insight into the prevalent pattern grading procedures used in Malaysia's existing batik textiles industry. Furthermore, the ability to assess and develop appropriate pattern grading and batik design placement layouts is required when making women's baju kurung following conventional grading sizes.

In addition, this proposed arrangement, which has been supported by batik and fashion understanding has potential application in the batik and fashion industries.

1.6 Thesis Outline

The present research is structured into five distinct chapters. Chapter 1 provides the fundamental context for the subsequent investigation. This research seeks to examine the current situation and problem with the existing batik fabric industry in Malaysia. This chapter additionally encompasses a concise problem statement, well-defined research objectives, and articulated research questions. The research encompassed an examination of both the scope and limits inherent to the research, along with an exploration of its significance. The initial section culminates with a succinct overview and delineation of the thesis outline.

Chapter 2 provides a comprehensive evaluation of prior research on the Malaysian batik industry, with a specific focus on the prevalent use of batik fabric for women's clothing. In addition to this, the research provides an exposition on the method of pattern grading and pattern arrangement utilised in the batik fabric industry in Malaysia, along with a concise overview of the traditional attire known as women's baju kurung. The current chapter culminates with the identification of a research gap and a comprehensive conclusion.

Chapter 3 delineates the research methodologies employed to procure data pertinent to this research. The present chapter has been organised into three distinct sections. During Phase 1, the research employed the methods of interview, observation (visual record), and questionnaire to gather data. In order to acquire primary data, it is recommended to execute a phase 2 experiment alongside a phase 3 the development

of batik design fabric layout for contemporary women's baju kurung and validation. This can be achieved by utilising research methods such as interviews, specifically via focus groups, and questionnaires that employ the Likert scale. In the interim, literature research was conducted to augment the primary data.

Chapter 4 provides a comprehensive account of the outcomes and data analysis subsequent to the procurement of a database resulting from the three phases expounded upon in Chapter 3. The initial data set comprises an examination of the interview through the application of content analysis utilising the software programme Atlas.ti9, coupled with observations facilitated by a visual record. Additionally, the data set incorporates an analysis of questionnaires conducted via the utilisation of SPSS. The second data set encompasses an analysis of experimental findings. The third data set encompasses the creation and development of a definitive batik surface design layout and prototype design, as well as a validation analysis facilitated by a focus group interview and questionnaire employing the Likert scale. This validation analysis seeks input from experts in the fields of batik and fashion. In order to conduct an analysis of the validation phase, the software tools Atlas.ti9 and SPSS were utilized. The present chapter will provide an exposition of the outcomes.

In Chapter 5, the researcher assesses the finding by considering the research objectives and addressing the research questions. The conclusion effectively provides an overview of the research's questions, objectives, novelty research, research limitation and contribution of knowledge. The research recommendations for more investigation.

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