



Institute of Technology Management and Entrepreneurship



**IOT BASED MODEL TO ENHANCE THE POTENTIAL OF
INDONESIAN BATIK ENTREPRENEUR**

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**IOT BASED MODEL TO ENHANCE THE POTENTIAL OF
INDONESIAN BATIK ENTREPRENEUR**

SOLICHUL HADI ACHMAD BAKRI

**A thesis submitted
in fulfilment of the requirements for the degree of Doctor of Philosophy**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

DECLARATION

I declare that this thesis entitled “IoT based Model to enhance the potential of Indonesian Batik Entrepreneur” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.


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APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy.



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اونيورسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEDICATION

I dedicate this thesis to my wife, my children, Yayasan Pendidikan Batik (YPB), and batik craftsmen.



ABSTRACT

The development of batik industry depends on its industrial developments and is strongly related to entrepreneurship. With the development of batik businessmen becomes a priority, there is a need to keep reinventing itself while keeping this priority in mind. Therefore, failure in continuous development of batik businessmen may cause a trickledown effect of struggles in adapting to market changes and may in turn cause a hindrance in production of batik along with its distribution. However, few problems are found in developing batik entrepreneur. Firstly, most Batik Entrepreneur are identified to have less knowledge and understanding of batik production, leading to the failure of implementing the batik entrepreneur requirements. Secondly, most of the batik development failed to utilize the information and digital technology. Lastly, there is a lack of studies discussing on IoT based model in Batik Entrepreneur environment. Thus, it is important to change the underlying behaviors to ensure the transformation of mere batik craftsmen into batik entrepreneurs in this age of digitalization. This research has three objectives, which are: 1) To analyze the factors of developing batik entrepreneurs; 2) To propose a new IoT-based model for developing batik entrepreneurs; and 3) To evaluate the effectiveness of the performance as well as the usability of the proposed model. Conducted in Sragen, Indonesia, this research adopted a process-based research design, involving three stages of research. In the first phase, findings from the systematic literature review and a survey drawn from 13 respondents were used to develop the conceptual IoT- model. The model was further validated by conducting a survey, participated by 101 respondents. Data were analysed statistically using regression analysis to test the related hypothesis. Based on the analysis, it was found that attitudes, technology usage and IoT usage have significant effects on entrepreneur, while knowledge and skills were not significant. Next, the second phase focuses on developing an automated prototype of the IoT-based model. The prototype, named Batik Solo Apps was designed by mapping the four constructs of the validated model to the batik business process: marketing, designing, crafting and sales. Finally, the evaluation of the prototype model was conducted in the third phase, in which two usability tests, namely a survey with 80 entrepreneurs and interviews with 11 experts in batik industry were carried out. Data were collected based on the usefulness, easy to use, easy to learn and satisfaction of using the tool, and descriptive statistics were used to analyse the data. The finding of this study comprises in three results: 1) the results show that the majority of the respondents indicated their strong agreement on satisfaction, easy to use and usefulness respectively. 2) all respondents claimed that the automated tool has the ability to facilitate batik entrepreneurs. 3) Feedback from the second evaluation, the interviews with 11 experts in the batik industry also reported that the automated tool is helpful and useful for transforming the craftsmen to batik entrepreneurs. Therefore, it can be concluded that the automated IoT-based model has the ability to facilitate the transformation of batik craftsmen into batik entrepreneurs. This research contributes to the development of batik entrepreneurs through the utilization of IoT, which is becoming prevalent in the world of entrepreneurship. Specifically, the adoption of the model and realization of the Batik Solo Apps is expected to

be able to improve the production growth, the effectiveness and market potential of batik industries.



MODEL BERDASARKAN IOT UNTUK MEMBANGUNKAN USAHAWAN BATIK

ABSTRAK

Perkembangan batik industri dalam pembangunan industri mempunyai hubungan yang sangat kuat kepada keusahawanan. Dengan perkembangan perniagaan batik menjadi keutamaan, terdapat keperluan untuk menjaga hasil cipta semula itu sendiri bagi menjaga kepentingan batik tersebut. Oleh itu, kegagalan kesinambungan perkembangan dalam perniagaan batik boleh menyebabkan kesan yang berpanjangan kepada permasalahan berpaksikan penukaran pasaran dan juga boleh menyebabkan kelewatan dalam produksi batik sepanjang tempoh pengeluarannya. Walaubagaimanapun, beberapa masalah yang dikenalpasti dalam membangunkan usahawan batik. Pertama, kebanyakan usahawan batik dikenalpasti mempunyai kurang pengetahuan dan pemahaman pada produksi batik iaitu kegagalan untuk terjemah keperluan yang ada pada usahawan batik. Keduanya, kebanyakan pembangunan batik adalah gagal bagi memuatkan teknologi maklumat dan digital. Ketiga, kekurangannya pendekatan pada templat pada Internet Benda (IoT) dalam persekitaran usahawan batik. Maka, mengubah sifat bagi memastikan transformasi pada pertukangan batik kepada usahawan batik yang berjaya dalam peringkat digital adalah penting. Kajian ini mempunyai tiga objektif yang terdiri daripada 1) untuk analisis faktor bagi mengembangkan usahawan batik; 2) untuk mencadangkan sebuah model berdasarkan IoT yang baharu bagi membangunkan usahawan batik; dan 3) untuk menilai keberkesanan pada prestasi seperti kebolegunaan model yang dicadangkan. Bagi menjalankan kajian di Sragen, Indonesia, kajian ini dipaksikan kepada rekabentuk kajian berdasarkan proses yang melibatkan tiga tahap kajian. Dalam fasa pertama, dapatan daripada tinjauan literatur sistematik dan soal selidik yang dibuat daripada 13 responden digunakan untuk membangunkan kerangka konsep. Model ini seterusnya divalidasi dengan mengendalik soal selidik yang dilaksanakan oleh 101 responden. Data statistik dianalisis menggunakan regresi analisis untuk menguji andaian yang berkaitan. Berdasarkan analisis, faktor seperti sikap, penggunaan teknologi dan penggunaan IoT adalah signifikan yang memberi kesan kepada usahawan manakala pengetahuan dan kemahiran adalah tidak signifikan. Seterusnya, fasa kedua memfokuskan kepada pembangunan prototaip automatik pada model berdasarkan IoT. Prototaip yang dinamakan aplikasi Batik Solo direkabentuk untuk memadankan empat pembinaan pada pengesahan model kepada proses perniagaan batik iaitu pemasaran, rekabentuk, pertukangan dan jualan. Akhir sekali, penilaian pada model prototaip dijalankan melalui dua ujian kebolegunaan yang dinamakan soal selidik bersama 80 usahawan dan temuduga bersama 11 pakar dalam industri batik. Data dikumpulkan berdasarkan kepada kebolegunaan, senang untuk digunakan, senang untuk dipelajari dan kepuasan kepada penggunaan alatan, manakala statistik deskriptif digunakan untuk analisis data. Keputusan memaparkan majoriti responden telah memberikan sangat bersetuju kepada kepuasan, senang untuk digunakan dan kebolegunaan. Seterusnya, kesemua responden mengenalpasti alatan automatik mempunyai kebolehan memudahkan usahawan batik. Maklumbalas daripada penilaian kedua, temuduga bersama 11 pakar dalam batik industri juga melaporkan alatan automatik adalah sangat membantu dan berguna bagi transformasikan pertukangan kepada usahawan batik. Oleh itu, ianya boleh dirumuskan model automatik berdasarkan IoT ini mempunyai kebolehan untuk memudahkan transformasi pertukangan batik kepada

usahawan batik. Kajian ini menyumbang kepada pembangunan usahawan batik melalui penggunaan IoT yang menjadi lazim dalam dunia usahawan. Secara khusus, berpaksikan model dan merealisasikan aplikasi Batik Solo dijangkakan boleh meningkatkan pertumbuhan produksi dan sasaran pasaran pada industri batik terutama di Indonesia.



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LIST OF ABBREVIATIONS

IoT	-	Internet of Things
A	-	Attitude
E	-	Entrepreneur
KS	-	Knowledge and Skills
T	-	Technology
IU	-	IoT Usage
UTeM	-	Universiti Teknikal Malaysia Melaka
SD	-	Sekolah Dasar
SR	-	Sekolah Rakyat
SMP	-	Sekolah Menengah Pertama
SMA	-	Sekolah Menengah Atas
SMU	-	Sekolah Menengah Umum
SLTA	-	Sekolah Lanjut Tingkat Atas
SMEA	-	Sekolah Menengah Ekonomi Atas
STM	-	Sekolah Teknik Menengah
SMK	-	Sekolah Menengah Kejuruan
D2	-	Diploma 2
D3	-	Diploma 3
PICOC	-	Population, Intervention, Comparison, Outcomes and Context
RC	-	Research Contribution

Rp	-	Rupiah
Mil	-	Million
USD	-	United States Dollar
App	-	Application



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2. Solichul Hadi Achmad Bakri, Massila Kamalrudin, Noorrezam Yusop, Safiah Sidek; 2018. The Usage of IOT Technology and Its Potential In Batik Business. *Opcion*, vol.34, issue 85, pp. 1285-1295. ISSN 1012-1587.



CHAPTER 1

INTRODUCTION

1.1 Introduction

The significance of batik industry as one of the main contributors to the economic prosperity of Indonesia is a common knowledge. Besides contributing as a national industrial wealth (Susanty et al., 2019), it has been recognized as a cultural richness and national identity (Gatut and Aryanto, 2010). Hence, there is a necessity to find ways to ensure the sustainable growth of this industry so that it can continuously contribute to the prosperity as well as the national heritage of Indonesia. This study is an initiative to contribute to the sustainable growth of batik industry in Indonesia by utilizing the advanced development of Information Technology, namely the Internet of Things (IoT). Specifically, it aims to propose a model that would enable transformation of batik craftsmen, who are mainly employees in this industry into batik entrepreneurs, facilitated by IoT. We could safely assume that the transformation of the batik craftsmen into batik entrepreneurs would be able to revitalize and sustain Indonesian batik industry.

This chapter presents an overview of this thesis. First, it presents the background of the research and introduces the motivation of the research. The following section outlines the research questions as well as the objectives of the research. The next section describes the contribution of the study, and the chapter concludes with the outline of the thesis structure.

1.2 Research background

The growth of Batik industry depends on its industrial developments and is strongly related to the entrepreneurial ability of the industry players. Kirzner (1973, 1997) highlighted entrepreneurship as a concept with specific emphasis on innovation, identification of opportunities, wealth creation, its consequences for the economy, and the entrepreneur himself as the main actor in the entrepreneurship. With the development of batik businessmen becomes a priority, there is a need for the industry to keep reinventing itself without losing focus on this priority. Therefore, failure in the development of batik entrepreneurs may cause a trickledown effect that is signified by their struggles in adapting to rapid changes in the market that will cause a hindrance in the making and distributing batik.

Additionally, the rapid development of information and digital technologies has resulted in the adoption of these technology in almost every aspect of business process. In this context, most of the digital technologies have been adopted to facilitate innovative and efficient production of Batik products (Kurniawardhani, Minarno and Bimantoro, 2016; Yuan, Xu and Jian, 2018), focusing mainly on the batik design. Drawn from these two trends, it is important to transform the underlying conventional practices of batik entrepreneurs to survive in this age of digitalization. As such, this research aims to propose an IoT based model in the batik business process to facilitate the development of batik entrepreneurs. Specifically, this model will allow a process structured IoT-based model that is designed to empower the batik craftsmen to become batik entrepreneurs.

This research is motivated by the changes in the ways in which batik entrepreneurs need to respond due to the advanced development of information and digital technologies. Specifically, it aims to propose a systematic approach to transform batik craftsmen into batik entrepreneurs. Instead of having its focus on issues related to the lack of access to education