



INTEGRATION MODEL OF HALAL PRINCIPLE, LEAN SIX SIGMA, AND SUSTAINABILITY FOR BETTER OPERATIONAL PERFORMANCE AT POULTRY INDUSTRY IN INDONESIA



DOCTOR OF PHILOSOPHY

2024



**Faculty of Industrial and Manufacturing Technology and
Engineering**



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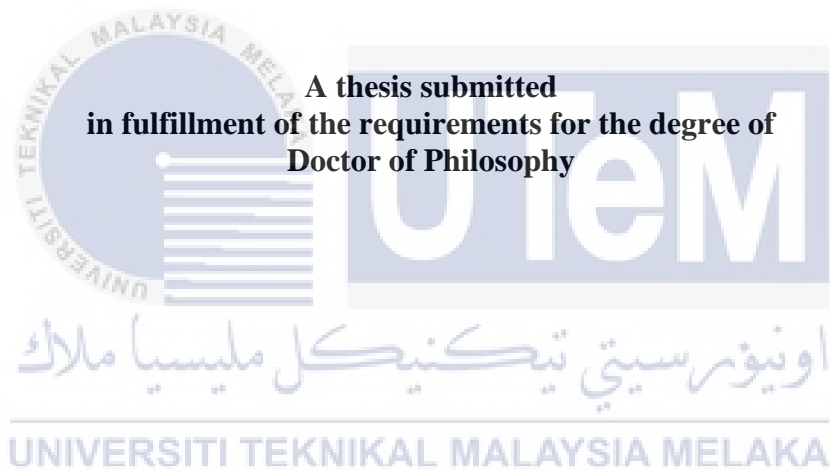
Muhammad Faishal

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**INTEGRATION MODEL OF HALAL PRINCIPLE, LEAN SIX SIGMA, AND
SUSTAINABILITY FOR BETTER OPERATIONAL PERFORMANCE AT
POULTRY INDUSTRY IN INDONESIA**

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2024

DEDICATION

To my beloved mother and father.

Nunik and Muhtadi, Aini and Kartubi

Specially to my wife and my boys.

Hayati Mukti Asih

Hafizh and Yusuf

“Thank you for your patience and support”



اونيورسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ABSTRACT

The operational performance of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia's poultry industry is critical, given the industry's substantial contribution to the national economy. Despite significant annual investments aimed at stimulating related economic activities, the sector continues to face challenges such as adherence to Halal Principles (HP), inefficient processes, quality issues, limited product innovation, and negative environmental and social impacts, which hinder sustainable economic growth. Consequently, many MSMEs within this sector have struggled, with some ceasing operations. Therefore, this study aims to explore the impact of Halal Principles on the operational performance of MSMEs in the poultry industry, with Lean Six Sigma (LSS) and Sustainability (S) considered as mediating factors. A survey research design incorporated a quantitative method and cross-sectional study of MSMEs poultry industries' owners or head managers to test the hypothesized relationship among various constructs. The sampling frame of the target population was not available. Hence, this study had to develop a sampling frame and distribute structured questionnaires face-to-face to collect quantitative data. From the total collected questionnaires, 249 responses were selected through random sampling. Data were analyzed using Structural Equation Modelling (SEM) technique through IBM-SPSS-AMOS version 24.0 software. The results revealed that Halal Principles significantly influence Operational Performance but not supported to Sustainability. LSS not only has a direct positive effect on Operational Performance but also partially mediates the relationship between Halal Principles and Operational Performance. Similarly, Sustainability significantly enhances Operational Performance and partially mediates the impact of Halal Principles and LSS on Operational Performance. The novelty of the research was constructing an inductive model called the Halal LSS Model (HLSSM), which theoretically implied relationships among LSS, Halal Principle, Sustainability, And Operational Performance. The research introduces a novel theoretical framework is HLSSM, which integrates Halal Principles, LSS, and Sustainability to provide a comprehensive understanding of their combination effects on Operational Performance. The other influencers were Sustainability and LSS, which partially mediate the relationship between Halal Principle and Operational Performance. This model offers valuable insights for practitioners and policymakers, suggesting that a strategic focus on these interconnected elements can lead to substantial improvements in the operational performance of MSMEs in the poultry industry. The research outcomes are particularly relevant for industry leaders and government agencies aiming to spur sustainable economic development within this vital sector.

MODEL INTEGRASI PRINSIP HALAL, LEAN SIX SIGMA, DAN KEMAMAPAN UNTUK PRESTASI OPERASI YANG LEBIH BAIK DI INDUSTRI AYAM DI INDONESIA

ABSTRAK

Prestasi operasi Perusahaan Mikro, Kecil dan Sederhana (PKS) dalam industri ternakan ayam Indonesia adalah kritikal, memandangkan sumbangan besar industri itu kepada ekonomi negara. Walaupun pelaburan tahunan yang besar bertujuan untuk merangsang aktiviti ekonomi berkaitan, sektor ini terus menghadapi cabaran seperti pematuhan kepada Prinsip Halal (HP), proses yang tidak cekap, isu kualiti, inovasi produk yang terhad, dan kesan negatif terhadap alam sekitar dan sosial, yang menghalang pertumbuhan ekonomi yang mampan. Akibatnya, banyak PKS dalam sektor ini telah bergelut, dengan beberapa operasi terhenti. Oleh itu, kajian ini bertujuan untuk meneroka kesan Prinsip Halal terhadap prestasi operasi PKS dalam industri ayam itik, dengan Lean Six Sigma (LSS) dan Kelestarian (S) dianggap sebagai faktor pengantara. Reka bentuk kajian tinjauan menggabungkan kaedah kuantitatif dan kajian keratan rentas pemilik atau ketua pengurus industri ayam PKS untuk menguji hubungan hipotesis antara pelbagai konstruk. Rangka persampelan populasi sasaran tidak tersedia. Oleh itu, pengkaji perlu membangunkan kerangka persampelan dan mengedarkan soal selidik berstruktur secara bersemuka untuk mengumpul data kuantitatif. Daripada jumlah soal selidik yang dikumpul, 249 jawapan telah dipilih melalui persampelan rawak. Data dianalisis menggunakan teknik Structural Equation Modeling (SEM) melalui perisian IBM-SPSS-AMOS versi 24.0. Keputusan menunjukkan bahawa Prinsip Halal mempunyai pengaruh yang ketara kepada Prestasi Operasi tetapi tidak disokong kepada Kemampanan. LSS bukan sahaja mempunyai kesan positif langsung ke atas Prestasi Operasi tetapi juga sebahagiannya menjadi pengantara hubungan antara Prinsip Halal dan Prestasi Operasi. Begitu juga, Kemampanan meningkatkan Prestasi Operasi dengan ketara dan sebahagiannya menjadi pengantara kesan Prinsip Halal dan LSS terhadap Prestasi Operasi. Kebaharuan penyelidikan adalah membina model induktif yang dipanggil Model Halal LSS (HLSSM), yang secara teorinya menyiratkan hubungan antara LSS, Prinsip Halal, Kelestarian dan Prestasi Operasi. Penyelidikan ini memperkenalkan rangka kerja teori baru yaitu HLSSM, yang menyepadukan Prinsip Halal, LSS, dan Kemampanan untuk memberikan pemahaman menyeluruh tentang kesan gabungannya terhadap Prestasi Operasi. Pengaruh lain ialah Kelestarian dan LSS, yang sebahagiannya menjadi pengantara hubungan antara Prinsip Halal dan Prestasi Operasi. Model ini menawarkan pandangan yang berharga untuk pengamal dan penggubal dasar, menunjukkan bahawa tumpuan strategik pada elemen yang saling berkaitan ini boleh membawa kepada peningkatan yang ketara dalam prestasi operasi PKS dalam industri ayam itik. Hasil penyelidikan amat relevan untuk pemimpin industri dan agensi kerajaan yang bertujuan untuk memacu pembangunan ekonomi yang mampan dalam sektor penting ini.

ACKNOWLEDGEMENTS

In the Name of Allah, the Most Gracious, the Most Merciful

First and foremost, I would like to thank and praise Allah the Almighty, my Creator, my Sustainer, for everything I received since the beginning of my life. I would like to extend my appreciation to the Universiti Teknikal Malaysia Melaka (UTeM) for providing the research platform. Thank you also to Universitas Ahmad Dahlan (UAD) for the financial supports.

My utmost appreciation goes to my main supervisor, Profesor Ts. Dr. Effendi Mohamad, Universiti Teknikal Malaysia Melaka (UTeM) for all his support, advice and inspiration. His constant patience for guiding and providing priceless insights will forever be remembered. Also, to my co-supervisor, Ir. Dr.-Ing. Azrul Azwan Abdul Rahman, Universiti Teknikal Malaysia Melaka (UTeM) who constantly supported my journey. My special thanks go to Associate Professor Dr. Zaenal Muttaqin, Mr. Okka, Mr. Wawan and All my Ph.D friends in BBI 6 no.13 for all the help and support I received from them.

Last but not least, from the bottom of my heart a gratitude to my beloved wife, Dr. Hayati Mukti Asih, for her encouragements and who have been the pillar of strength in all my endeavors. My eternal love also to my childrens, Hafizh Musthafa Faishal, and Muhammad Yusuf Faishal, for their patience and understanding. I would also like to thank my beloved parents for their endless support, love and prayers. Finally, thank you to all the individual(s) who had provided me the assistance, support and inspiration to embark on my study.

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LIST OF SYMBOLS AND ABBREVIATIONS

AAPOR	-	American Association for Public Opinion Research
AMOS	-	Analysis of a Moment Structures
AVE	-	Average Variance Extracted
BPS	-	<i>Badan Pusat Statistik</i>
CB-SEM	-	Covariance- Based SEM
CFA	-	Confirmatory Factor Analysis
CFI	-	Comparative Fit Index
CMIN	-	Minimum Capacitance
CR	-	Composite Reliability
CRISP-DM	-	Cross Industry Standard Process for Data Mining
CSR	-	Corporate Social Responsibility
Df	-	Degree of Freedom
DMAIC	-	Define Measure Analysis Improve Control
GDP	-	Gross Domestic Product
GFI	-	Goodness of Fit Index
HFC	-	Halal Food Certification
HLSSM	-	Halal Lean Six Sigma Model
HP	-	Halal Principle
HSS	-	Halal Six Sigma
LSS	-	Lean Six Sigma
MSMEs	-	Micro, Small, and Medium Enterprises
MUI	-	<i>Majelis Ulama Indonesia</i>
OP	-	Operational Performance
PLS-SEM	-	Partial Least Square SEM
RMSEA	-	Root Mean Square Error of Approximation
RPA	-	<i>Rumah Potong Ayam</i>
S	-	Sustainability
SD	-	Standard Deviation
SDGs	-	Sustainable Development Goals

SEM	-	Structural Equation Modeling
SME	-	Small Medium Enterprise
TAM	-	Technology Acceptance Model
TLI	-	Tucker Lewis Index
VSM	-	Value Stream Mapping



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CHAPTER 1

INTRODUCTION

1.1 Research Background

In the halal industry, halal food is the most important section of halal products. The reasons are part of Islamic law and its emphasis on cleanliness and health (Manzouri et al., 2014). The global market for halal products is growing so fast. According to Hasan et al. (2018), the halal market was predicted to be about US\$1.3 trillion or more than 17% of all global expenditures on food and beverages in 2017 and is forecasted to reach US\$1.9 trillion by 2023. Various public and private institutions have successfully developed the halal standard and certification (Kurth and Glasbergen, 2017). Many studies have been concerned about halal in not only Muslim-majority countries, such as Indonesia (Suryawan et al., 2019), Malaysia (FiCSHer, 2015) or Turkey (Atalan-Helicke, 2015), but also in those where Muslims are the minority, such as the United States (Regenstein et al., 2003), the Netherlands (Havinga, 2010), France (Wright and Annes, 2013), the United Kingdom (FiCSHer, 2011) and the European Union (Lever et al., 2010; Lever and Miele, 2012; Miele, 2016).

The rapid growth of halal food products has garnered increased attention from scientists. Comprehensive studies on halal have been conducted not only in Muslim-majority nations but also in non-Muslim-majority countries, for instance, in the Netherlands. According to Kurth and Glasbergen (2017) the halal governance system in the Netherlands is weakly institutionalized and inadequately responsive to the diverse needs of a heterogeneous Muslim community. Factors such as varied ethnic backgrounds, levels of

religiosity, and demographics, including age, gender, and education, contribute to diverse perspectives on the worthiness of halal. In Turkey, Atalan-Helicke (2015) presented that the global growth of halal food markets, particularly in the meat sector, has grown worldwide. This research showed the expanding halal markets and various certification mechanisms designed to address Muslim consumers' quality and other concerns. Notably, discussions on genetically engineered foods in the Muslim world are relatively new. In France, halal food has become a distinct point of discussion, particularly following a burger restaurant's introduction of a halal menu in 2009, leading to increased food sales. However, some researchers debates link the issue of the halal food menu to national identity, as studied by Wright and Annes (2013). In Europe, as reviewed by Lever and Miele (2012), the market for halal meat is experiencing high growth, leading to the emergence of new certification bodies. However, there are still concerns about the reliability of these certification bodies, mainly due to regulations that allow stunning procedures before the slaughter process.

Miele (2016) identified multiple European factors that have contributed to the mislabelling of Halal products. These factors comprise various issues, such as the omission of the Tasmiyah recitation by slaughterhouse workers, the use of pre-recorded Tasmiyah recitations, and the controversial use of mechanical slaughter with rotating blades, often resulting in incomplete cuts. Furthermore, the stunning of animals raises concerns about the vitality of the animal at the point of slaughter. Another challenge is mixing meats, including pork, in Halal products or unintentional contamination with non-Halal meats. Incorrect cuts and insufficient vessel cuts, necessary for meeting Halal criteria outlined by the Halal Monitoring Committee, also contribute to the problem (Halal Monitoring Committee, 2012).

In the United States, as highlighted by Regenstein et al. (2003), the vast majority of the 6 to 8 million people Muslims in North America adhere to Halal dietary laws, yet the

food industry has generally overlooked this consumer group. Poultry products, constituting a significant portion of the kosher market, raise concerns regarding unconventional sources of ingredients, synthetic materials, and improvements in slaughter and processing methods, posing challenges for Muslim scholars. Turning to Malaysia, Fischer (2015) illustrates how the promotion of Halal is framed as a bridge between the religious and the secular, exemplifying the compatibility of the ethnicized state, modern Islam, business, and proper Islamic consumption.

Moreover, the global Halal market has witnessed significant growth in the past 15 years, prompting the Malaysian state to assert its position in the global Halal market through the efforts of Malaysia Muslim entrepreneurs in the diaspora (Fischer, 2015). In Indonesia, the world's largest Muslim-majority country, the Halal industry has experienced significant growth due to government initiatives and regulations, such as the establishment of the Halal Product Assurance Agency (BPJPH) under Law No. 33 of 2014, which mandates Halal certification for all consumer goods (Fischer, 2011). Indonesia has become a key player in the global Halal market by engaging in international trade fairs and bilateral agreements, while local businesses are encouraged to obtain Halal certification to boost competitiveness. The Halal logistics sector is evolving with specialized supply chains ensuring product integrity, and efforts to align Halal standards with international benchmarks further enhance consumer trust, positioning Indonesia as a major contributor to the global Halal economy (Tieman and Ghazali, 2014; Fischer, 2016).

It is essential to consider various aspects of the sustainability of Chicken Slaughtering Houses (CSH), such as animal welfare, environmental impact, food safety, and economic viability. Sustainable practices in chicken slaughtering houses encompass a range of factors, including the welfare of broiler chickens, genetic studies, sustainable poultry production

processes, feed efficiency, good manufacturing practices, and environmental sustainability. These factors are crucial for ensuring sustainable and responsible poultry farming practices. The welfare of broiler chickens is a critical aspect of sustainable poultry production (Meluzzi and Sirri, 2009). The European Union (EU) directive emphasizes the importance of management practices, stocking density, and air quality in ensuring the welfare of chickens. Additionally, genetic studies play a significant role in understanding the traits associated with slaughter in chicken populations (Liu et al. 2021). Establishing sustainable breeding programs can benefit from identifying candidate genes linked to features related to slaughter.

Furthermore, sustainable poultry production processes are essential for mitigating socio-economic challenges (Shamsuddoha et al., 2015). Implementing sustainable models in the poultry industry can help address existing socio-economic problems. Good manufacturing practices and sanitation procedures are also crucial for ensuring the sustainability of traditional CSH (Afrila et al. 2023). Adhering to these practices can lead to the production of chicken meat that meets microbiological requirements.

In addition, sustainable intensification of chicken meat production requires a focus on feed efficiency and the role of amino acids, feed enzymes, and organic trace minerals (Zampiga et al. 2021). Studies conducted in different countries have highlighted the importance of feed efficiency for the sustainable intensification of chicken meat production. Moreover, the impact of COVID-19 on poultry production and the environment is a critical consideration for sustainability (Hafez et al. 2021). Understanding the effects of global events on poultry production is essential for developing safe and sustainable practices. Additionally, transmitting pathogens such as *Campylobacter* and *Salmonella* during slaughtering is a significant concern for food safety and sustainability.