

KNOWLEDGE DISCOVERY FOR HALAL HUMAN CAPITAL AND HALAL
TRAINING PROGRAMS IN MALAYSIA

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DEDICATION

*All praises to Allah the Almighty for
the strengths and His blessing in completing this thesis.*

*Specially dedicated to
my beloved parents Fazarudin Mahamudin and Zarinah Awang
my precious siblings Zahirul Firdaus, Farah Zulaiha and Farhah Zubaidah*

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ABSTRACT

The halal industry is one of the fastest growing markets with an annual value of USD 2.3 trillion. Correspondingly, personnel knowledgeable in the halal concept is currently in demand. Previous study on human capital growth in the halal industry has shown a shortage of competent employees with adequate knowledge of the halal concept. In fact, little is known about the current human capital needs and requirement of the halal industry. Hence, the main aim of this research is to identify the relationship between human capital requirements and training needs in the halal industry. Human capital dataset used in this research was provided by Jobstreet.com. To better understand the Jobstreet.com data, the dataset was classified into a more exact label with 70% of the data reclassified as training data and 30% as testing data. In order to transform the dataset into informative data, Knowledge Discovery in Databases (KDD) framework was applied while neural network was utilised during the data mining phase. Several keywords were identified from the National Occupational Skills Standard (NOSS), Malaysian Halal Standard (MS1500:2009), and Manual Procedure for Malaysia Halal Certification (MPPHM). These keywords were then reclassified into three scenarios; (i) halal and Syariah, (ii) Jakim halal standard and halal certification, and (iii) halal internal auditing and professional halal executive. The classification of the dataset into “Yes” or “No” class label in scenario one and three recorded more than 80% accuracy rate. However, the neural network learning process was sluggish and model construction was time consuming due to the large data size. The final phase in the KDD framework is to produce visualisation graphs on human capital and training needs in the halal industry from year 2013 until 2015. The data shows that jobs from the manufacturing group which is in high demand are quality assurance and quality control executives, while the most sought-after trainings are on halal standard requirements and certification. The findings of this study contribute to employees and training providers’ understanding of the overall landscape of human capital development and training needs for the Malaysian halal industry.

ABSTRAK

Industri halal adalah salah satu pasaran yang pesat berkembang dengan anggaran nilai tahunan bernilai USD 2.3 trilion. Sehubungan itu, kakitangan yang berpengetahuan dalam konsep halal amat diperlukan. Kajian terdahulu mengenai pertumbuhan modal insan dalam industri halal menunjukkan kekurangan tenaga kerja yang berwibawa dalam industri ini adalah kerana kurangnya pendedahan dan pengetahuan tentang konsep halal. Sebenarnya, hanya sedikit pengetahuan yang diketahui tentang keperluan modal insan semasa dalam industri halal. Oleh itu, matlamat utama kajian ini adalah untuk mengenal pasti hubungan antara modal insan dan keperluan latihan dalam industri halal. Dataset modal insan yang digunakan dalam kajian ini disediakan oleh Jobstreet.com. Untuk lebih memahami data Jobstreet.com, dataset diklasifikasikan ke dalam label yang lebih tepat dengan 70% daripada data diklasifikasikan sebagai data latihan dan 30% sebagai data ujian. Untuk mengubah dataset menjadi data informatif, *Knowledge Discovery in Databases* (KDD) digunakan manakala *Neural Network* digunakan dalam fasa perlombongan data. Beberapa kata kunci telah dikenal pasti dari *National Occupational Skills Standard* (NOSS), *Halal Malaysian Standard* (MS1500:2009), and *Manual Procedure for Malaysia Halal Certification* (MPPHM). Kata kunci ini kemudian diklasifikasikan semula kepada tiga senario; (i) halal dan syariah, (ii) piawaian halal Jakim dan pensijilan halal, dan (iii) audit dalaman halal dan profesional halal eksekutif. Klasifikasi data kepada label "Ya" atau "Tidak" dalam senario satu dan tiga mencatat lebih daripada 80% ketepatan kadar. Walau bagaimanapun, proses pembelajaran *neural network* adalah perlahan dan mengambil masa yang lama untuk membina model kerana saiz data yang besar. Fasa terakhir dalam kerangka KDD adalah untuk menghasilkan graf visualisasi mengenai modal insan dan keperluan latihan dalam industri halal dari tahun 2013 hingga 2015. Data menunjukkan bahawa pekerjaan dari kumpulan profesional pembuatan yang mempunyai permintaan tinggi adalah jawatan Jaminan Kualiti dan Eksekutif Kawalan Kualiti, manakala latihan yang diperlukan untuk pekerjaan ialah piawaian halal dan pensijilan halal. Dapatan kajian ini menyumbang kepada pemahaman pekerja dan penyedia latihan tentang landskap keseluruhan pembangunan modal insan dan keperluan latihan industri halal di Malaysia.

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LIST OF ABBREVIATIONS

FFNN	-	Feedforward Neural Network
FP Rate	-	False Positive Rate
HDC	-	Halal Industry Development Corporation
HE	-	Halal Executive
HE	-	Halal Ecosystem
HIA	-	Halal Internal Audit
HPB	-	Halal Professional Board
JAKIM	-	Jabatan Kemajuan Islam Malaysia
KDD	-	Knowledge Discovery in Databases
MASCO	-	Malaysia Standard Classification of Occupation
MIHAS	-	Malaysia International Halal Showcase
MITI	-	Ministry of International Trade and Industry
MLPNN	-	Multilayer Perceptron Neural Network
MNC	-	Multi-Nasional Company
MPPHM	-	Manual Procedure of Halal Certification Malaysia
MS	-	Malaysian Standard
NN	-	Neural Network
NOSS	-	National Occupational Skills Standard
SME	-	Small and Medium Enterprise
TP Rate	-	True Positive Rate
WHF	-	World Halal Forum

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CHAPTER 1

INTRODUCTION

1.1 Overview

Halal certification schemes are broad, which can be classified into many categories such as food, premises, finance, logistics, tourism, pharmaceuticals and others. Halal industry is among the fastest growing global markets in the world due to the increasing number of global Muslim population. In order to support this growing industry, various types of personnel are needed such as Halal Executive, Internal Auditor, Quality Assurance, Production Supervisor, Food Technologist, Chemist, and others. Each of these personnel requires knowledge and experience in various kinds of areas for instance Syariah, Food Technology, Good Manufacturing Practice (GMP), Hazard Analysis and Critical Control Points (HACCP), etc. This is very crucial for the Malaysian government to establish a well structured human capital development because of the interest and demand of halal product from consumers. Hence, training and development to support these personnel need to be personalized according to the needs of industry and certification bodies. This thesis depicts the needs of halal training in each of the jobs offered by the companies in Malaysia. The current situation of halal human capital and halal training will be explained in this thesis. This chapter introduces the thesis background by outlining the problem background, problem statement, research objectives and scope, research significance followed by a description of the overall structure of the thesis.

1.2 Problem Background

Halal is among the fastest growing global markets in the world. The global halal market is estimated at USD 2.3 trillion annually (Khalek *et al.*, 2015; Mohammadian & Hajipour, 2016). The demand for halal products and services are

growing significantly due to the increasing number of Muslim population around the world which is approximately 1.8 billion and thus increasing in their purchasing power (Elias *et al.*, 2016; Halim *et al.*, 2014). Due to the growing market in the halal industry and the rise of Muslim consumers around the world, Asian countries are competing to become the leader of halal industry. Based on the statement, Malaysia is seen as a potential country to become a global halal hub. Malaysia is the world leader of the halal industry and the only country that issues, controls, rules, and also handles halal certificates worldwide (Post, 2014).

As mentioned by Pahim *et al.*, (2009), the rising level of awareness and interest for the halal products and services in Malaysia began in early of 2000. However, in year 2005, the word halal started to get attention from industry players due to many forums, seminars, conferences, and showcase for instance World Halal Forum (WHF), Malaysia International Halal Showcase (MIHAS), Penang International Halal Expo and Conference (PIHEC), World Halal Research Summit, and International Halal Food Conference (IHFC) being organized during that year. In order for Malaysia to achieve a status as a global halal hub, this creates a high demand for halal human capital in the industry. According to Hashim and Shariff (2016), the human capital who works with halal related companies must have knowledge and skills in Syariah and 'Halalan Thoyyiban' concept. The expanding of the halal markets is substantial, thus it requires competent human capital to carry out halal concept and Syariah law for each of the products and services in the industry. As long as there is demand for halal products and services in the market, the demand for halal competent workers should be in place.

In addition, halal industry is one of the biggest contributors to the Malaysia's economy due to the high demand of the halal products and services in the market. Based on the statement, it shows that an organized halal human capital development is required to increase the economics of halal industry in Malaysia. Therefore, Malaysian government has proposed a Halal Ecosystem framework with a specific end goal to boost up the economics of the halal industry. This framework consists of five key areas and one of the important areas focus on the "Human Capital" (HDC, 2016b). Through these human capital development areas, the government hopes to provide more job

opportunities in halal industry particularly for fresh graduates. For the coming 2020, defined by Ministry of International Trade and Industry (MITI) there will be a huge number of employment opportunities which will accelerate the growth of the halal industry (MITI, 2016). The needs of personnel that have knowledge and expertise in the halal procedure and guidelines is very significant.

However, there are problems in halal industry that need to be addressed before Malaysia can achieve the human capital target for the year 2020. One of the biggest problems is the lack of manpower and skill workers that can ensure the products are halal compliance in manufacturing, marketing, and distribution (Alina *et al.*, 2013; Hashim *et al.*, 2016). The shortage of manpower is due to the lack of awareness and inadequate education for halal and Syariah knowledge. Current employees still lack the understanding in terms of halal procedure, guidelines, and requirements that must be fulfilled for products or services to be halal compliance among manufacturers of products, service providers, and consumers (Dzulkifly, 2012). In 2013, almost 31% of more than 4000 halal certificate application run into problems during application process and have to be rejected. Among others the reason for this is lack of halal competent personnel during the application process for halal certification (Zainol, 2013). According to the interview conducted by Borzooei and Asgari (2013), there are company managers who had still do not have basic knowledge on halal. This is based on his inspection of one company where company managers did not know exactly which types of meat were considered as halal based on the halal concept and Syariah law. All these issues related to human capital development can cause problems that might hinder the growth of the halal industries in Malaysia.

Therefore, we identified that training is important for human capital development in halal industry. The comprehensive training should be given to the employees and job seekers to ensure the halal requirements are fully understood and implemented. The halal training is the backbone of the human capital development with the purpose of providing the knowledge and skills to the employees. The benefits of appropriate training in the halal industry are able to increase employee motivation, satisfaction and morale, increased competitiveness, consistency message, increased efficiency, reduction in employee turnover and increased innovation in strategies and

product (Amanda & Lucy, 2004). In today's trend of halal marketplace, employees require specialized training regarding halal in order to work with different kind of halal sectors such as manufacturing, slaughtering house, food premise, pharmaceutical, and cosmetic to increase their level of knowledge and skills (Shariff & Lah, 2014). In Malaysia, there are numerous training providers and consultants who provide halal training programs to cater the halal human capital as needed by the industry.

However, in this era of technology, employees or job seekers are still having difficulties to recognize the appropriate training as required by the companies. Currently, most of the employees or job seekers are looking for jobs through an online job portal such as Jobstreet, Monster, and Indeed. If the information given by the companies is not complete especially regarding halal training courses, this situation will lead to the problems as mentioned above. Companies will hire people that are not capable enough to do the halal related jobs. In order to cope with this kind of problems, technology is needed to make the relationships between halal human capital and halal training more transparent. Unfortunately, there was insufficient research done in the past related halal human capital and halal training with the technology. According to this study by Bakar *et al.*, 2013, the valuable information that are kept in the database is not widely studied. The authors used classification techniques to classify the halal status of the food product by using a data mining approach. Even though the data for that study is completely different from the area of human capital development, but the concept of using technology which is the classification in data mining can be used to identify the relationships between halal human capital and halal training. Based on the previous study, several data mining process models have been used for the study in education area, medical area, and banking area. Knowledge Discovery of Databases (KDD) is one of the frameworks that was frequently used in the previous research. Data mining is one of the phases in the KDD. The definition of KDD refers to the process of extracting previously unknown, valid, and actionable information from large information sources or databases (Helma et al.,2000). This framework used in this research will help employees and job seekers identifying types of halal training as required by the companies.

The above arguments show that with the help of technology, people can easily identify the appropriate halal training based on the hidden knowledge in the database. At the end, employee must have the appropriate specialized knowledge to perform their job excellently in the various sectors of halal. The training is aimed at enhancing knowledge and skills in halal concept and Syariah knowledge so that the employees can help companies to handle the halal issues. The halal training will overcome the shortage of employees by developing training that link with the scope of the job as stated by the industry.

1.3 Problem Statement

The Malaysian government has really put a tremendous effort to increase the halal industry sector. One of the efforts is by implementing the Halal Ecosystem framework that creates a well-structured human capital together with other sectors such as production and services, infrastructure, government support, and reference centre. This indicates that Malaysia have started to realize the significance of the human capital in this halal industry. The effort shown by the Malaysian government has projected that there will be an enormous number of job opportunities in this industry; to fulfill the operation of halal in the business.

However, research has consistently show that the problem in expanding the Halal industry was due to the shortage of suitable halal workforce, where their skills and competencies are questionable due to inadequate standard criteria for halal personnel (Shariff *et al.*, 2016). Employees are still lacking of awareness of halal concepts as well Syariah knowledge. Therefore, some employees face difficulties to understand and handle the whole process of getting a halal certification for each of the products. There are a lot of things that employees must inspect besides haram ingredients inside the products in order to get the halal certificate. For example, employees competency, tools or equipments used during the production, place taken to produce the products, and the safety factors during the production process. Besides halal concept, employees must also have the knowledge on what is the meaning of ‘Halalan Thoyyiban’. The concept of ‘Halalan Thoyyiban’ is not just refer to the

ingredients, whether the products using halal or haram ingredients but also refer to the hygiene and safety of the products. Hence, the employees must have a comprehensive knowledge of halal compliance in order to handle halal matters.

Moreover, the employees need to understand and aware of all the standards and procedure related to halal. In order to solve these problems, the companies, employees, and job seekers must know exactly the type of trainings needed to increase the level of understanding of the halal concept and Syariah. It is necessary to provide halal training to improve the employees' capability and knowledge in the halal concept and Syariah so that employees can work more diligently and efficiently. Employees and job seekers should attend the halal training required by the companies in order to ensure the operation of halal running smoothly. The halal training providers must ensure that training programs must meet the needs of the companies in order to be meaningful and beneficial for the companies.

This research explored the relationship between job requirements offered by the companies and the types of training related with halal concept. This was in order to attain Malaysian government target regarding human capital development for the year 2020. Through this research, job seekers and halal training providers had the ability in identifying the appropriate halal training needed to comply with the job scope given by the companies. For this purpose, the researcher used KDD framework to extract the hidden knowledge from human capital dataset. The KDD framework consisted of five phases which were selection, pre-processing, transformation, data mining and interpretation or evaluation. Each of the phases ensured that at the end of the process, it produced valuable information. In the data mining phase, this research proposed a Neural Network classification technique and validates the performance in three different types of scenario based on the keywords describe in the National Occupational Skills Standard (NOSS), Halal Malaysian Standard (MS 1500:2009), and Manual Procedure for Malaysia Halal Certification (MPPHM). The keywords used in those scenarios were halal, syariah, halal certification, halal internal auditor, halal executive, halal committee and Jakim halal standard. The final phase which was the interpretation or evaluation, the human capital dataset had been applied in the data visualization by using Tableau software. This data visualization had turned the raw

data and complex data from that dataset into a valuable data that was more meaningful for the job seekers and halal training providers. The visualize graphs produced by Tableau had shown the trend on how halal human capital and halal trainings in three consecutive years from year 2013 until 2015. In addition, the graphs had also shown the appropriate halal training for the job seekers based on the companies demand.

1.4 Research Questions

The research questions of this research outline the solution to the problems as stated above. The following research questions have been defined:

- i. What are the gap between halal human capital and halal training in the halal industry?
- ii. What is the design of Neural Network for halal human capital dataset?
- iii. What are the current trends and patterns of halal human capital and halal training?

1.5 Research Objectives

Based on the raised problems mentioned above, the objectives of this research can be stated as:

- i. To identify the gap between halal human capital and halal training in the halal industry.
- ii. To design a Neural Network model for halal human capital dataset.
- iii. To create a data visualization for halal human capital and halal training in the halal industry.

1.6 Research Scope

The scope of this research defines the limits of the study. Scope normally covers the following elements:

i. Time

The research was conducted from September 2015 until August 2017. A lot of information needed was extracted by the researcher in order to accomplish this study. Researcher had limited time in extracting the data for this research as the related information did not have centralized portal or database.

ii. Study area

The research was conducted in Malaysia. Researcher focused only on the human capital development and halal training in the halal industry. Researcher decided to narrow down the area of study and choose education sector in the halal industry as the topic to do a research.

iii. Data

Data that was collected in this research were based on primary and secondary data. The primary data were the data collected by using a qualitative approach by interviewing an expert in the field of halal human capital and halal training. While the secondary data were obtained from sources such as articles, journals, magazines, books, thesis sample, seminar, slide presentation, and authority websites.

iv. Dataset

Halal human capital dataset was used in this study. The data was extracted from Jobstreet online job portal from year 2013 until 2015 only. Unfortunately, the dataset used in this research was not from the recent year due to the limited access to extract

halal human capital information. Moreover, the privilege granted by Jobstreet organization to the researcher was only to have data from year 2013 until 2015. The dataset consists of 2711 records and under Private and Confidential (P&C) status.

v. Neural Network for halal human capital dataset

This research had validated the performance of the Neural Network classifier towards halal human capital dataset by using RapidMiner software. Based on the keywords such as halal, syariah, halal certification, halal internal auditor, halal executive, halal committee and Jakim halal standard, this research had created three types of scenarios (Scenario 1: halal/syariah, Scenario 2: Jakim standard/halal certification, scenario 3: halal executive) to identify the highest accuracy.

vi. Data visualization for halal human capital and halal trainings in Malaysia

This research had identified the trends and patterns of halal human capital dataset from three consecutive years 2013, 2014, and 2015 by producing several visualize graphs using Tableau software.

1.7 Research Significance

The research would be able to demonstrate ways and methods to improve or enhance the human capital in the halal industry that can help employees, job seekers and halal training providers to make a better decision. This research will be significant to the following groups:

- i. Industry: The companies that are looking for halal competent employees. The employees must have skill and experience in halal guidelines and Syariah law in order to help companies to solve the issues regarding halal. The companies also need to understand the concept of halal to guide the employees in terms of halal matters. This research would help the

companies to identify the appropriate halal training needed for the employees.

- ii. Job seekers: This research will help the job seekers to identify the types of halal training needed before applying the jobs that related to halal concept and Syariah.
- iii. Halal training providers: This research will help halal training providers to identify the types of halal training requires by the job seekers and employees according to the company's requirements.
- iv. The academicians and researchers: This research can be used to many other studies in the same area. It helps people who are focusing on learning and understanding the data visualization by using a Tableau and classification techniques in the data mining by using a RapidMiner.

1.8 Organization of the Thesis

This thesis consists of six chapters. Each of the chapters was organized as follows:

- i. Chapter 1: This chapter explains about the halal industry. In addition, it also covers the problems in halal human capital and the needs of halal training. It contains major subtopics such as problem background, problem statement, research questions, research objectives, research scope, and research significance.
- ii. Chapter 2: Literature review is a foundation of research understanding. It provides the literature review of the most recent and relevant studies in this field. Finally, the gaps in the existing body of knowledge are highlighted and summarized.
- iii. Chapter 3: Outlines the research methodology used in this research by describing the appropriate method been used in conducting the data collection process. Finally, the instruments and strategies for data analysis are also presented.

- iv. Chapter 4: The classification technique used in this research is Neural Network. Validate the implementation of Neural Network to the human capital dataset in order to accomplish objective number 2.
- v. Chapter 5: Describe halal human capital and halal training graphs produce based on the data visualization concept to solve objective number 3.
- vi. Chapter 6: Describes the conclusion of the research, research contribution, research challenge, and future work.

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