Analysis of Human Error in the Halal Supply Chain of Kemplang Crackers

Sari Wahyuni
Undergraduate Student at Department of Industrial Engineering
Faculty of Engineering
University of Sumatera Utara
Medan, Sumatera Utara, Indonesia
sariwhyn.29@gmail.com

Mohammad Azmi Fadli
Undergraduate Student at Department of Industrial Engineering
Faculty of Engineering
University of Sumatera Utara
Medan, Sumatera Utara, Indonesia
azmiefadli@gmail.com

Novia Maharani
Undergraduate Student at Department of Industrial Engineering
Faculty of Engineering
University of Sumatera Utara
Medan, Sumatera Utara, Indonesia
noviamaharani30@gmail.com

Putri Amiroh Lubis
Undergraduate Student at Department of Industrial Engineering
Faculty of Engineering
University of Sumatera Utara
Medan, Sumatera Utara, Indonesia
putriamirahlubis@gmail.com

Dini Wahyuni
Department of Industrial Engineering
Faculty of Engineering
University of Sumatera Utara
Medan, Sumatera Utara, Indonesia
diniwahyuni2015@gmail.com

Abstract

There is the potential for human error in the supply chain which can cause losses and affect the halal status of a product. Halal products must be maintained from upstream to downstream and the chance of human error must be minimized. In the context of halal products in Indonesia, there is a stipulation, criteria, and procedures for processing halal products from upstream to downstream that have been arranged in halal certification. However, there is a problem in the current system where no system can be 100% guaranteed because of the dependence on business actors. The purpose is to ensure the provisions in halal certification are carried out properly by business

actors to secure the halal status of a product. However, as an individual, mistakes are certainly inseparable, in this context there is the possibility of fraud or errors (human error) during the production process. This research was conducted at one of the kemplang crackers producers located in southern Sumatera. The results of identifying human errors using the adoption of the SCOR model produced 26 types of errors. There are 3 types of errors in the planning process, 4 types of errors in the sourcing process, 16 types of errors in the making process, 2 errors in the delivery process, and 2 errors in the returning process. Based on the results of research using the SHERPA method, it is discovered that the highest probability of error with a critical level is found in the process of ordering raw materials, receiving raw materials, storing raw materials, washing fish, drying products, examinations when drying so as not to be exposed to dirt, an inspection of order notes and payment transactions. While the results using the HEART method are the highest Human Error Probability (HEP) was obtained in the process of receiving raw materials from suppliers, storing raw materials, washing fish, and examinations when drying with a value of 5.03.

Keywords

1. Introduction
The role of humans is quite dominant in the industry and greatly affects the quality of the products. This is because humans in a work system have the opportunity to make mistakes or also called human error. Love and Josephson define human error as the failure of humans to perform tasks that have been designed within certain limits, sequences, or time. Meanwhile, Peters stated that human error is a deviation from predetermined performance standards, causing delays due to difficulties, problems, incidents, and failures. (Ridho Anwar, 2015)

Research related to human error was previously conducted by Lamria Theresa in 2017 on the supply chain of batik cloth. The research stated that there were 48 types of errors that occurred along the supply chain of batik cloth. The highest probability of error with a critical level is found in the process of production planning, fabric cutting and sagging (boiling colored cloth to remove the wax coating). Based on these errors, the solution given is to use a measuring tool for measurements in the cutting process and check repeatedly in the sloughing process. (Lamria Theresa, 2019)

In the context of halal products in Indonesia, in halal certification, stipulations, criteria and procedures for processing halal products from upstream to downstream have been stated. However, the problem is that the system currently implemented has a large dependence on business actors. The product can be guaranteed to be halal if all provisions in halal certification are carried out properly by business actors. However, as an individual, mistakes are certainly inseparable, in this context there is the possibility of fraud or errors (human error) during the production process. If the business actor carries out the existing procedures properly, the product produced will also have good quality and its halal is guaranteed, but on the contrary if the business actor only carries out halal certification on paper, or an error occurs during the production process, this will have an impact on quality. product. (Ardan Zaki, 2021)

All activities in the supply chain have the potential of human error. Research related to human error in the halal supply chain was carried out by Rinaldi et al in 2020 on the halal chicken meat supply chain. The research states that there are human errors that occur along the supply chain of halal chicken meat, totaling 38 types of errors and the highest error probability with a critical level is found in errors in checking blood and errors in ensuring the condition of the chicken is dead before it is put into hot water. Based on this, improvements are made to each job description so that the potential for human error that occurs can be reduced. (Rinaldi Apriza M, 2021)

To prevent the potential for human error, it is necessary to analyze the causes of human error using the SHERPA (Systematic Human Error Reduction and Prediction) method and the HEART (Human error Assessment and Reduction Technique) method. The SHERPA method is a qualitative method for analyzing human error using a basic task level as input. Besides SHERPA, another method used is HEART (Human error Assessment and Reduction Technique). HEART is a method that can be used to see what major factors can lead to failure at work. The HEART method is used to see what factors are dominant to cause an error by setting aside smaller causes. (Dwiyanti, et al, 2022).

Kemplang is one of the processed fishery products, which is made from a mixture of fish and sago flour. Kemplang can be used as a light meal or as a substitute for side dishes. In addition, kemplang is one of the thematic regional innovation systems (SIDa) of Palembang city in the food sector. The majority of kemplang businesses in South Sumatra are still on a household scale and are hereditary family businesses. However, this kemplang business is growing rapidly because the market is still available. (Lia Perwita, et al, 2021). The main ingredients in making kemplang are sago flour and snakehead fish/mackerel fish. To meet the need for raw materials in the form of fish, usually kemplang entrepreneurs do not only collaborate with one fish supplier but with several suppliers so that raw materials will be easier to obtain and avoid a lack of raw materials. Meanwhile, the raw material in the form of sago flour is not a problem in terms of supply, it's just that the price has increased slightly. (Syahrizal, 2018)

This research was conducted at one of the Kemplang producen located in southern Sumatera. Based on the explanation from the SME owner, the products use halal materials and all the equipment used is guaranteed cleanliness. However, during the research, it was found that there were several processes that could interfere with the halal product. The halal status of a food is not only determined by ingredients and its processing, but also by the entire supply chain the food.

Identification of human error is carried out in the supply chain of kemplang crackers by using the SCOR model and human error analysis using the SHERPA method and the HEART method so that potential human errors that may occur can be identified and prevention suggestions are given according to the identification results.

2. Literature Review

Human error is defined as failure to complete a specific task or job (or perform an unauthorized action) that may disrupt operational schedules or result in property and equipment damage (Dhilon, 1986). Human error can be classified into several categories (Meister, 1976), namely:

1.   Error in the operation

Errors that occur in this process are related to the deadline for work that must be completed by the operator. Almost all errors that occur are caused by time limits that cannot be met in the operation process. The situations that cause errors in the operation process, namely:

- Lack of clear procedures.
- Excessive complexity of work and conditions.
- Poor selection process and training for operators.
- Operator carelessness and lack of interest in work.
- Bad working conditions.
- The operating procedure was not correct

2.   Error in the assembly

This type of error is caused by humans and occurs during the assembly process. The existence of this error occurs as a result of a lack of expertise the operator.

3.   Error in the design

This type of error is caused by design that are not in accordance with the work system. This is a failure to implement human requirements in the design, lack of precise designed functions and failure to take into account the effectiveness of the interaction between humans and machines.

4.   Error in inspection

The purpose of inspection activities is to find defects or errors. However, errors can also occur because the inspections carried out are not 100% accurate.

5.   Error in instalation

One of the main causes of errors during the installation process is the operator's failure to install the equipment according to the instructions or blueprints that have been given.

6.   Error in maintenance

Errors that occur in the maintenance process are caused by incorrect repair or maintenance actions carried out by the operator.

The Systematic Human Error Reduction and Prediction Approach (SHERPA) was developed by Embrey as a technique for predicting human error analyzes tasks and identifies potential solutions to errors in a structured way. This technique is on the taxonomy of human error by determined the psychological mechanisms. SHERPA was originally designed to assist people in industrial processes. (Neville Stanton, 2005). The HEART method is a

method that can be used to see what major factors can lead to failure at work. The HEART method is used to see what factors are dominant to cause an error by setting aside smaller causes. (Dwiyanti, et al, 2022).

Supply chain is a series of relationships between companies or activities that carry out the distribution of goods or services from the place of origin to the place of the buyer or customer. Viewed horizontally, there are five main components or actors in the supply chain, namely suppliers, manufacturers, distributors, retailers, customers. Vertically, there are five main components of the supply chain, namely buyers, transporters, warehouses, sellers and so on. (Stefvani Flauren Kambey, et al, 2016). The goal to be achieved from each supply chain is to maximize the value generated as a whole. An integrated supply chain will increase the overall value generated by the supply chain.

The halal supply chain is a series of processes starting from the source of raw materials to the receiving consumer that must be guaranteed halal. The supply chain for halal chicken meat will start from farms and slaughterhouses, and then the chicken meat will be transported and stored before reaching the customer. This is to ensure that halal is not only applied to products or food but also to all activities in the supply chain which includes product handling and management (inventory management and material handling). According to Zulfakar et. al (2014) all components in the supply chain, from upstream to downstream, must have individual and integrated responsibility to protect halal food products from being cross-contaminated, either intentionally or unintentionally. (Tian Nur Ma'rifat, et al, 2017).

In Indonesia, guidelines for the application of halal principles to the food industry have been prepared by LPPOM MUI (Institute for the Assessment of Food, Drugs and Cosmetics of the Indonesian Ulema Council). Before the of halal product assessment, LPPOM MUI was an institution that had the authority to issue halal certificates in Indonesia. In carrying out its duties and responsibilities, LPPOM MUI issues a set of written rules regarding the Halal Assurance System (SJH) which must be implemented by companies wishing to obtain halal certificates (Tian Nur Ma'rifat, et al, 2017).

The Supply-Chain Operations Reference (SCOR) model is a model developed by the Supply Chain Council (SCC). The SCOR model is used to measure and improve the performance of a company's total supply chain. This model includes the assessment of delivery and demand fulfillment performance, inventory and asset management, production flexibility, warranties, process costs, and other factors that affect the overall performance assessment in a supply chain . SCOR divides supply chain processes into 5 core processes, namely plan, source, make, deliver, and return (SCC, 2012).

3. Methods
The method of collecting data in this study performed with observation and interview. Observation is the process of collecting data through direct observation of the object of research. In the case of this research, observations were made in the production process of making kemplang crackers from start to finish to observe the possibility of human error occurring. Then, interview with the SME owner to confirm the things observed throughout the production process.

The stages of data processing in this research are uses the adoption of the SCOR model and human error analysis using the SHERPA method and the HEART method.
a.   The steps that must be taken in determining human error using the SHERPA method are as follows:
Step I : Hierarchical Task Analysis (HTA)
Step II : Work classification
Step III : Human error identification
Step IV : Consequence analysis
Step V : Recovery analysis
Step VI : Ordinal error probability assessment
Step VII : Critical Level analysis
Step VIII   : Error correction strategy
In determining the potential for human error, research was conducted for 1 month at SME kemplang crackers. In this study, observations and confirmations were made regarding human error in the supply chain with workers in the SME.

b.   The HEART method is a method used to obtain human error probability (HEP) values for each activity in the UKM kemplang crackers supply chain. The steps taken to determine the HEP value using the HEART method are as follows:

1. Identify all types of work that must be carried out by workers.
2. Categorized each work item into one of the 8 categories in the Generic Task Type (GTT) table.
3. Identified Error Producing Conditions (EPCs) according to the conditions in the HEART EPCs table.
4. Determine the Assessed Proportion of Effect (APOE) and calculate the Assessed Effect (AE) value of each EPC that has been identified.
5. Calculated the total value of AE.
6. Calculation of the value of Human Error Probability (HEP).

4. Results

4.1. Supply Chain Identification by Adoption of the SCOR Model

The human error identification model resulting from the adoption of the SCOR model provides convenience in identifying types of errors based on the classification of sub-processes in the supply chain. This classification will help producen of kemplang crackers in determining policies related to how to manage human error more specifically, systematically, and effectively. After the classification process has been successfully carried out, the next step is to carry out an analysis to carry out management so that the potential for human error can be minimized. The identification framework with the adoption of the SCOR model can be seen in Table 1.

Table 1. Identification of the SME Kemplang Supply Chain

No	Process	Sub-Process
1	*Plan*	Selection of Raw Material Suppliers
		Production Planning
2	*Source*	Raw materials orders from suppliers
		Receipt of raw materials from suppliers
		Storage of raw materials
3	*Make*	Fish washing
		Fish grinding
		Fish batter with other ingredients
		Dough Printing
		Laying the dough on the bamboo mat
		Dough Steaming
		Arrangement of the dough on the bamboo mat after steaming
		Product drying
		Examination when drying so as not to be exposed to dirt
		Product frying
		Product packaging
4	*Deliver*	Inspection of order notes
		Payment transactions
5	*Return*	Return agreement check
		Determination of return time

4.2.   Data processing using the SHERPA method (systematic human error reduction and prediction)

The SHERPA tabulation in SME kemplang crackers can be seen in Table 2

Table 2. Tabulation of SME Kemplang Crackers Supply Chain SHERPA (Adoption of SCOR Model)

Model SCOR	Job Description	Error Category	Error Description	Improvement Strategy	Critical Level	Error Probability
Plan	Selection of Raw Material Suppliers	S2	Error in choosing suppliers who own halal certification	Ask the supplier to show the halal certificate	!	Medium
		S5	Error in selecting suppliers who are unable to meet demand	Monitor supplier track record in an effort to meet demand	!	Medium
	Production Planning	A5	Error in calculating consumer demand	Evident communication with consumers	!	Medium
Source	Raw materials orders from suppliers	A5	Error in calculating the number of raw materials ordered	Recalculating and re-checking the number of consumer requests	!	*High*
	Receipt of raw materials from suppliers	A5	Error in checking the condition of raw materials	Regular examinations of raw materials are carried out	!	*High*
	Storage of raw materials	A6	Errors in the placement of raw materials in storage	Raw materials are placed in the appropriate place and routinely checked	!	*High*
		C4	Errors in checking raw materials in storage	Regular examinations of raw materials are carried out	!	*Medium*
Make	Fish washing	A5	Error in washing fish	Repeated examinations	!	*Medium*
		C2	Error in checking the cleanliness of fish	Repeated examinations	!	*High*
	Fish grinding	A1	Error in determining the time of grinding fish	Repeated examinations	-	*Low*
		C2	Error in examinations of fish grinding texture	Repeated examinations	-	*Low*
	Fish batter with other ingredients	A5	Error in the input of ingredients	Record input measure for each ingredient	-	Medium
	Dough Printing	A7	Error in determining product size	Using molds in the product printing process	-	*Low*
	Laying the dough on the bamboo mat	A5	Error in the arrangement	The arrangement is done carefully and does not overlap	-	Medium
	Dough Steaming	A7	Error in checking steam water	Periodic checks are carried out	-	Medium
		C4	Error in checking the maturity level of the dough	Periodic checks are carried out	-	Medium
	Arrangement of the dough on the bamboo mat after steaming	A5	Error in the arrangement order	The arrangement is done in reverse and does not overlap	-	Medium
	Product drying	A7	Error in preparing the product for drying bamboo mat	Arrangement is done regularly and not overlapping	-	Medium
		C2	Error in checking product cleanliness	Regular examinations are carried out	!	*High*
	Examination when drying so as not to be exposed to dirt	C5	There are no workers assigned specifically to this process	Assign workers specifically tasked to carry out the inspections	!	*High*
	Product frying	C4	Error in checking product maturity	Regular examinations are carried out	-	Medium
	Product packaging	C2	Error in checking the condition of the product packaging	Product packaging using hand sealer	!	Medium
Deliver	Inspection of order notes	A5	Error in checking the order receipt	Repeated examinations are carried out	!	*High*
	Payment transactions	A5	Error in the transaction	Repeat examinations are carried	!	*High*

				out		
Return	Return agreement check	A5	Error in determination of product return criteria	Repeat examinations are carried out	-	Medium
	Determination of return time	12	Error in notification during product return process	Confirm with related parties	-	Medium

Based on the table above, the ordinal error probabilities consist of 3 types, which are low, medium, and high. Medium ordinal error probabilities indicate that the error on the analyzed job occurred some time ago but with a small frequency, while high ordinal error probabilities indicate that the error on the analyzed job occurred some time ago with a high frequency. The critical level in the table above is (!) which means that if an error occurs in this activity, it will cause a loss for kemplang crackers producer.

4.3. Data processing using the HEART method (human error assessment and reduction technique)

The HEP value in the SME kemplang crackers supply chain can be seen in Table 3.

Table 3. Calculation of the Human Error Probability (HEP) Value

Model SCOR	Code	Job Description	GTT	*Nominal Human Unreliability*	Total AE	*Human Error Probability* (HEP)
Plan	1.1.	Selection of Raw Material Suppliers	C	0,16	30,69	4,91
	1.2.	Production Planning	C	0,16	30,69	4,91
Source	2.1.	Raw materials orders from suppliers	C	0,16	31,46	0,63
	2.2.	Receipt of raw materials from suppliers	C	0,16	31,46	5,03
	2.3.	Storage of raw materials	C	0,16	31,46	5,03
Make	3.1.	Fish washing	C	0,16	49,73	5,03
	3.2.	Fish grinding	D	0,09	49,73	4,47
	3.3.	Fish batter with other ingredients	E	0,02	49,73	0,99
	3.4.	Dough Printing	E	0,02	49,73	0,99
	3.5.	Laying the dough on the bamboo mat	E	0,02	49,73	0,99
	3.6.	Dough Steaming	E	0,02	49,73	0,99
	3.7.	Arrangement of the dough on the bamboo mat after steaming	E	0,02	49,73	0,99
	3.8.	Product drying	D	0,09	49,73	4,47
	3.9.	Examination when drying so as not to be exposed to dirt	C	0,16	49,73	5,03
	3.10.	Product frying	E	0,02	49,73	0,99
	3.11.	Product packaging	D	0,09	49,73	4,47
Deliver	4.1.	Inspection of order notes	C	0,16	6,91	1,11
	4.2.	Payment transactions	C	0,16	6,91	1,11
Return	5.1.	Return agreement check	C	0,16	5,76	0,92
	5.2.	Determination of return time	C	0,16	5,76	0,92

Based on the table above, the result of calculating the probability using the HEART method it is found that the biggest errors are in the process of receiving raw materials from suppliers, storing raw materials, washing fish, and examining when drying so as not to be exposed to dirt. Improvement strategies for each of these job descriptions can be adapted to the results of the SHERPA method.

4.4.   Conclusions

The conclusions obtained from the results of this study are:

1.   The results of identifying human errors in the supply chain of kemplang crackers using the adoption of the SCOR model produce 26 types of errors, where in the plan process there are 3 types of errors, in the source process there are 4 types of errors, in make there are 16 types of errors, in deliver there are 2 error and on return there are 2 errors.

2.   Based on the results of research using the SHERPA method, it is found that the highest probability of error with a critical level is found in the process of ordering raw materials, receiving raw materials, storing raw materials, washing fish, drying products, checking when drying so that they are not exposed to dirt, checking order notes and payment transactions.

3.   Based on the results of research using the HEART method, the highest Human Error Probability (HEP) was obtained in the process of receiving raw materials from suppliers, storing raw materials, washing fish and checking when drying them so they are not exposed to dirt with a value of 5.03.

References

Anwar, Ridho. Pengaruh Penyembelihan Halal terhadap Perilaku Konsumen : *Jurnal Institusi Agama Islam Negeri (IAIN)* Metro. 2015

Ali, Mukhtar. Konsep Makanan Halal dalam Tinjauan Syariah dan Tanggung Jawab Produk atas Produsen Industri Halal Ahkam. Vol. 16, No.2. 2016

Chotimah, Rizqi Rahmawati et al. Pengukuran Kinerja Rantai Pasok menggunakan Metode SCOR dan AHP pada Unit Pengantongan Pupuk Urea PT. Dwitama Multikarsa Semarang.. 2021.

Dwiyanti, Dinda Okta et al. Identifikasi Human Error pada Proyek Konstruksi dan Perancangan Layout menggunakan Sign System Visual, *Jurnal Hasil Penelitian dan Kaya Ilmiah*, Vol. 8, No. 1. 2022.

Dhillon, Balbir S. *Human Reliability : With Human Factors*. Pergamon Press, Exeter, UK, 1987

Kambey, Stefvani Flauren et al. Analisis Rantai Pasokan (Supply Chain) Kubis di Kelurahan Rurukan Kota Tomohon, *Jurnal Emba*, Vol. 4, No. 5. 2016.

Kusrini, E et al. Supply Chain Performance Measurement Using Supply Chain Operation Reference (SCOR) 12.0 Model : a Case Study in a Leather SME in Indonesia. *Journal of Materials Science and Engineering*. 2019.

LPPOM-MUI. 2019

Ma'rifat, Tian Nur dan Arief Rahmawan. Penerapan Rantai Pasok Halal pada Komoditas Daging Ayam di Kabupaten Ponorogo, Vol. 14, No. 1. 2017.

Marpaung, Rinaldi Apriza. Analysis of Halal Supply Chain in Chicken Meat Products using Human Error Perspective. *International Conference on Industrial Engineering and Operations Management*. 2021.

Omar, Emi Normalina dan Harlina Suzana Jaafar, Halal Supply Chain in the Food Industry : A Conceptual Model, *IEEI Symposium on Business Engineering and Industrial Application*, Langkawi, Malaysia

Rohaeni, Y dan Sutawidjaya, A. H. Pengembangan Model Konseptual Manajemen Rantai Pasok Halal Studi Kasus Indonesia. *Jurnal Teknik Industri*. Vol. 15, No.3. 2020.

Sandom, Carl dan Roger S. Harvey. *Human Factors for Engineers*. The Institution of Engineering and Technology, London, 2009

Sari, Lia Perwita dan Santi Mayasari. Evaluasi Usaha Kemplang Ikan di Kabupaten Ogan Ilir (Studi Kasus : Usaha Kemplang Ibu Marisah), *Jurnal Ilmu-Ilmu Perikanan dan Budidaya Perairan*, Vol. 16, No. 2. 2021.

Septia, Avin, dkk. Karakteristik Sifat Organoleptik Kerupuk Kemplang dari Limbah Tulang Ikan Tenggiri (Scomberomorus Commersoni) dengan Perbandingan yang Berbeda. *Jurnal ilmiah Pangan Halal*. Vol. 2, No. 2. 2020.

Sinaga, Lamria Theresa, et al. Human Error Assessment in Batik Enterprises Located in Nort Sumatera using HEART Method. *IOP Conference Series : Materials Science and Engineering*. doi 10. 1088/1757-899X/801/1/012103. 2019.

Sinulingga, Sukaria. *Metode Penelitian*, USU Press, Medan , 2021.

Stanton, Neville. *Handbook of Human Factors and Ergonomic* Method, CRC, London, 2005

Syahrizal. Supply Chain Management Pengusaha Pempek Dadakan dalam Menghadapi Permintaan Menjelang Idul

Fitri. 2018.

Zaki, Ardan. Perancangan Sistem Penjaminan Produk Halal Berbasis Blockchain pada Supply Chain Produk Daging Sapi (Studi Kasus : Oricow Yogyakarta). 2021

Zulkarnaen, W et al.. Pengembangan Supply Chain Management dalam Pengelolaan Distribusi Logistik Pemilu yang Lebih Tepat Jenis, Tepat Jumlah dan Tepat Waktu Berbasis Human Resources Competency Development di KPU Jawa Barat. *JIMEA : Jurnal Ilmiah MEA (Manajemen, Ekonomi dan Akuntansi)*Vol. 4, No. 2. 2020.

Acknowledgments

Biographies
Sari Wahyuni is a final year student at the Department of Industrial Engineering, Universitas Sumatera Utara. She currently working on her thesis with which topic is about human error in halal supply chain management. Born on June 29, 2001 in Ajamu as the first child of 2 siblings. Graduate form SMAN 3 Rantau Utara.

Mohammad Azmi Fadli is a final year student at the Department of Industrial Engineering, Universitas Sumatera Utara. He currently working on his thesis with which topic is about Inventory performance measurement at CV Royal Insan Mandiri. Born on October 9, 2001 in Medan as the first child of 2 siblings. Graduate form SMAN 2 Binjai.

Novia Maharani is a final year student at the Department of Industrial Engineering, Universitas Sumatera Utara. She currently working on her thesis with which topic is about designing a measuring system of halal supply chain in the SME manufacuring industry based on SCOR-Model. Born on November 12, 2001 in Medan as the last child of 4 siblings. Graduate form SMAN 1 Medan.

Putri Amiroh Lubis is a final year student at the Department of Industrial Engineering, Universitas Sumatera Utara. She currently working on her thesis with which topic is about business process improvement analysis using business process reenginering (BPR). Born on November 05, 2001 in Medan as the middle child of 3 siblings. Graduate form SMAN 3 Medan

Dini Wahyuni is a lecturer at the Department of Industrial Engineering, Universitas Sumatera Utara. Undergraduate education is pursued at Industrial Engineering at the Universitas Sumatera Utara and master programme in the Industrial Engineering at the Institut Teknologi Bandung. Currently, she is a doctoral student in the industrial engineering at the Universitas Sumatera Utara. Research interests include halal supply chain, halal certification, production management and ergonomics. Dini Wahyuni has attended workshops on the Halal Assurance System and workshops on Best Practice of Halal Logistics in Malaysia, as well as workshops on Supply Chain teaching materials. She is also active in LPPOM MUI as a Halal auditor in the Province of North Sumatera.