

# Food Safety and Halal Food Risks in Indonesian Chicken Meat Products: An Exploratory Study

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*Abstract* - Food safety and halal food is an important for quality of food. Food safety affects human health, while halal affects in Islam regions. This study aims to: explore issues in food safety and halal risk in Indonesian chicken meat products. Two cases of chicken meat companies that have implemented food safety and halal food are observed and compared. The data were collected through observation and interviews. Through this data collection, critical factors and importance issues of food safety and halal food risks in Indonesian chicken meat products can be exposed. The expectation of this study is results of this study to understand the extent to food safety and halal food risks, the critical point, critical processes, and integration between food safety and halal food issues in chicken meat products.

*Keywords* - food safety, halal, risks, and integration.

## I. INTRODUCTION

Food safety and halal is an aspect of the main concern of consumers in choosing food for consumption. Many diseases are caused by food contaminated with salmonellosis, Escherichia coli infections, listeriosis, and others [1]. In the supply chain context, food can be contaminated from various aspects, such as raw materials, raw material to industrial process, heating process, food storage and distribution [2]. The, food safety is regarded as a problem in the supply chain because partners will face problems over actions that are not done [3].

Halal is also a major aspect for humans to choose food. In food, halal is a form of food legality based on Islamic law. Halal, defined as anything or actions that are permissible under Islamic law, contained in the Qur'an and Hadith [4,5]. Halal-labeled foods reflect that the ingredients used in their production contain no forbidden, unclean and toxic substances [6]. However, in reality, there is still a violation of the concept of halal. Some phenomena of nonconformity to halal practices are seen with the presence of halal logo forgery by non-halal certified companies that threaten the reputation, integrity and authenticity of the industry and will lead consumers to find it difficult to distinguish the authenticity of the goods [7,8].

In the context of the supply chain, corporate participation is needed to recognize risks in order to produce better food products by providing supervision through the food safety system and halal guarantee in its logistic processes [9]. It is important to reduce risk factors from the early stages (raw materials or livestock) as it can reduce the burden of contamination at the food processing stage [10].

In the previous study, risk management was initiated by measuring the risk that was done separately between food safety and halal. Several studies of food safety risk assessment have been conducted through FMEA [e.g.,11], Monte carlo [12] and Bayesian [13,14]. Whereas risk studies on halal leads to models of management and identification of critical factors in order to provide halal assurance on these food products [15].

The increasing risks in food safety and halal food, practitioners need a new approach to integrate managing risks between food safety and halal food simultaneously. the managing risks for food safety and halal risks perhaps could be done more efficiencies and effectives. Integration in the business process will have implications for achieving high performance in the company and company targets can be achieved using minimal labor and time to produce high quality products than previously produced products [16,17]. However, there has been a few study to investigate the extent and importance issues of food safety and halal food risks in Indonesian chicken meat products. The expectation of this study is to understand the extent to food safety and halal food risks, the critical point, critical processes, and integration between food safety and halal food issues in chicken meat products.

## II. METHODOLOGY

Food safety and halal is an important factor for consumers. In this study, the risk for food safety based on food safety management system ISO 22000-2009, i.e. physics risk, chemical risk and biological risk. As for halal risk, it is based on seven attributes that provide halal guarantee on food, i.e. location, facilities and equipment, labor, supplementary food, slaughtered animal species, packaging materials, storage warehouse [18]. The foodstuff process business refers to the SCOR (Supply Chain Operations Reference). In a supply chain perspective, SCOR organizes a strategic process that connects companies to consumers, i.e. plan, source, make, deliver and return [19]. However, in this study, SCOR concept used only three processes, i.e. source, make, deliver. The process plans and return are not used because the risk on both processes is smaller than the other three SCOR processes.

An Indonesian chicken slaughtering industries was selected as a case study because Indonesian food industries area experiencing several problems and need solution approach to reduce food safety risk [20,21 22] and halal food [23]. This research is qualitative, so the

data collection is done based on a series of interviews and focus group [24]. This research is done through 2 stages, namely interview (first stage) and measurement of risk opportunity (second stage).

**Stages 1**

The first company interview was conducted during October 2017, and at the second company during November 2017. The interviews was conducted through structured questions for interviews. This study uses two companies as a source of data. The question consists of two parts: identities of respondents (part I) and questions about food safety and halal risk management systems in the company.

Interviews were conducted with the aim of supplementing data not obtained through the questionnaire or to clarify information obtained from the questionnaire. Interviews were conducted based on 15 questions, consisting of eight questions about food safety risks, five questions about halal food risk and two

questions about integration of food safety and halal risk (Table 1).

Interviews were conducted individually and face-to-face. Interview conducted on two people (respondent). Each company is represented by one respondent. Respondents are those responsible for the management of food safety and halal, have extensive knowledge and experience with this subject.

**Stages 2**

Furthermore, this study also conducted an analysis of the impact of risks that occurred. The risk impact analysis refers to the concept of risk exposure value of risk factor [25].

Risk exposure value of risk factor:  
 =Risk consequence index x risk probability index  
 Cosequence severity level consists of: catastrophic (4), critical (3), marginal (2), negligible (1). for the risk probabilities are grouped at 4 levels: often (4), infrequent (3), rare (2) extremely (1) .

TABLE 1  
 INTERVIEW GUIDELINES

Aspect	Questions
Food safety	What is the food safety system used by the company? (Q1)
	Which part / process is the source of food safety risk? (Q2)
	Which is the biggest risk from the food safety aspect that needs to be the main concern of the company? (Q3)
	How to control physical risk? (Q4)
	How to control chemical risk? (Q5)
	How to control biology risk? (Q6)
	How to control food safety on transportation and distribution system? (Q7)
	How is the company's strategy to minimize risk occurrence from food safety aspect? (Q8)
Halal	What is the halal certification system used by the company? (Q9)
	Which parts / processes are the source of unlawful risk? (Q10)
	Which is the biggest risk of halal aspects that need to be the main concern of the company? (Q11)
	How to control food safety on transportation and distribution system? (Q12)
	How can companies minimize the risk of halal aspects? (Q13)
Integration food safety and halal risk	Is it possible to conduct integrated food safety risk management and halal in the company? (Q14)
	Which part / process can be integrated risk management for food safety and halal/ (Q15)

TABLE 2  
 COMPANY PROFILE AND INDENTITY OF RESPONDENT

Company Profile		
	Case 1	Case 2
Product	fresh chicken meat	Processed chicken products, such as nugget and sausage
Number of employees	403	1500
The establishment of the company	2008	2013
Marketing area	National	National
Food safety certification	-	ISO 22000
Halal certification	MUI	MUI
Identity of respondent		
Gender	Male	Male
Age (year)	30	30
Position	QC-QC inspector	QC inspector
Education	Bachelor	Bachelor
length of work (year)	5	5

### III. RESULT

#### Case Study

This study used two companies as a case study (see Table 2). Both companies use chicken as the main raw material.

#### Case 1

The company was founded in 2008 with 403 workers. The main products produced are frozen chicken and fresh chicken marketed in all parts of Indonesia, especially eastern Indonesia. The marketing of fresh chicken is done through retail and fast food restaurants. While frozen chicken is used as a raw material for food seasonings.

Commitment to food safety and halal is demonstrated through the implementation of food safety systems based on the concept of HACCP and halal through the Halal Assurance System (HAS) since 2014. HACCP implementation is done by the company to avoid the contamination of physics, biological chemistry on its products. While HAS is done to keep food halal until the hands of consumers.

#### Case 2

The second case study was conducted on companies that produce processed chicken, such as nuggets, sausages, meatballs of various sizes. The products are marketed throughout Indonesia through traditional markets, shops, minimarkets and supermarkets throughout Indonesia.

To provide food safety and halal for consumers, the company has been certified FSSC 22000 and halal food safety system since 2014. The certification is a company's step to avoid the risk of contamination on the product. Moreover, certification is a testament to the company's commitment to keeping food safe and halal when received by consumers.

#### Identity of the respondent

Interviews were conducted with persons responsible for managing food safety and halal systems in each company (see Table 2).

#### Food safety risk

To control the food safety system, the two companies identify the critical points in the supply chain, from raw material procurement to distribution to consumers.

##### Q1: The food safety system used

Case 1: *our company uses the application and application of HACCP system*

Case 2: *we do by identifying a critical point.*

##### Q2: The part / process that is the source of food safety risk

Case 1: *from our identification result determines 3 critical points (CCP): temperature decrease, product temperature when loading (shipping).*

Case 2: *There are two kinds in the process of sausage production that can be categorized as a source of risk i.e. cooking and detection of foreign bodies.*

##### Q3: The greatest risk of food safety aspects that need to be the main concern of the company

Case 1: *product temperature, and physical/ contaminant hazards.*

Case 2: *The product may endanger consumers due to non-achievement of food safety.*

##### Q4: Control methods for physics risk

Case 1: *The company seeks to maximize the implementation of HACCP & GMP system, from employees, processes and equipment.*

Case 2: *We do by Assigning the Metal detector process as CCP so that the product contaminated by metal or foreign body must be separated and special handling is done.*

##### Q5: Control methods for chemical risks

Case 1: *Using food grade materials for all supporting materials in the process area (eg Oil, handsoap, primary plastic).*

Case 2: *Set standard raw materials, with reference to the standards of the United States (FDA), by separating the handling for allergen and non-allergenic materials.*

##### Q6: Control methods for biological risks

Case 1: *Maximize the implementation of GMP system in production process area and quality checking of raw materials.*

Case 2: *By setting the cooking process as CCP so that the product through the cooking process is carefully monitored, in order to achieve standard central temperature of the product so as to kill harmful microorganisms and / or harm.*

##### Q7: Food safety control process in transportation and distribution system

Case 1: *The presence of car condition checks include: box condition, scrup condition, bolt and pallet in car, car cooling machine.*

Case 2: *Always maintain good hygiene and temperature in the car or container transporting the product. The temperature that must be charged during the shipping process is -18<sup>0</sup> C.*

##### Q8: Steps that have been taken company to minimize the occurrence of risk from the aspect of food safety

Case 1: *Maximize the implementation of HACCP system, and conducting training and training to all employees about food safety.*

Case 2: *Training routine once for 3 months to the employees about the importance of Good Manufacturing Practice, HACCP and Sanitasion, as well as product halal assurance.*

##### Halal risk

##### Q9: The halal system is done by the company

Case 1: *Apply all the requirements of halal according to the rules and regulations of the MUI*

Case 2: *By applying the Halal Assurance System*

##### Q10: The parts / processes that are sources of risk are not halal

Case 1: *Live chicken raw materials, stuning process, slaughter process, raw material supporting process or product*

Case 2: Procurement process of raw materials, production process, storage process and delivery process.

**Q11: The biggest risk of halal aspects that need to be the main concern of the company**

Case 1: Stunning and slaughter

Case 2: Consumer confidence will halal product

**Q12: Halal control process in transportation and distribution system**

Case 1: ensure that the means of transportation used are clean, non-mixed or used for Haram's product charge (Pork or any blood left).

Case 2: By using special vehicles to transport halal products, which are separate with non-halal products

**Q 13: Enterprises pursued by the company to minimize the risk of halal aspects**

Case 1: Implementation of SJH (halal assurance system), halal slaughterer certification, checking production support materials

Case 2: Always communicate with BPOM MUI if there is any change and / addition of supplier, with the purpose of raw material guaranteed halal

**Integration of risk management between food safety and halal**

**Q14: Possibility of integrated risk management between food safety and halal**

Case 1: The possibility of integration can be done because food safety factors are related to halal.

Case 2: Integrated food safety and halal integrated risk management can be done in the whole process, because the factors in food safety are related to halal

**Q15: The types of activities whose risks can be managed are integrated**

Case 1: Slaughter, roses of advanced production, Decrease of product temperature

Case 2: In the process of preparation, production, storage, and delivery.

Next, calculations will be performed to identify food safety and halal risk scales on food processing. The risk identification scale is based on the value of consequence severity indexes and probability indexes.

TABLE 3  
RISK EXSPOSURE VALUE

	Case 1			Case 2		
	RCI	PI	REV	RCI	PI	REV
Physical risk	4	2	8	2	2	4
Biology risk	4	1	4	2	2	4
Chemical risk	4	2	8	2	2	4
Facilitas and equipment	3	2	6	1	2	2
Labor	2	3	6	1	3	3
Supplementary food	2	1	2	2	2	4
slaughtered	4	3	12	3	1	3
Animal species	2	1	2	3	1	3
Packaging materials	2	2	4	2	1	2
Storage and warehouse	3	2	6	2	2	4

#### IV. DISCUSSION

The results of pre-exploration studies show that the company has been aware of the risks in food safety and halal. Therefore, the company implements food safety and halal system to avoid the occurrence of these risks. The critical points identified as the source of risk are the delivery process (case 1) and the cooking process (case 2). The results of the measurement of the impact of risk indicate that the slaughter process has the highest risk to food safety and halal for case 1. Whereas, in case 2, 5 out of 10 items is a high risk to food safety and halal. In terms of integration, both companies state that the concept of integrated risk management between food safety and halal in the supply chain is possible to do.

#### V. CONCLUSION

The company needs to identify critical points in its supply chain to avoid contaminated risks from food safety and halal aspects. In addition, risks can be avoided by applying food safety certification and halal certification.

This is to ensure that the resulting product is safe and lawful for consumption. The results showed that the company can manage the risk integrated in food safety and halal aspects. This is driven by activities that have food safety risks and halal risks. Further research can be developed to develop an integrated food safety and halal risk model in food supply chains with Bayesian, Monter Carlo and others.

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