Barrier and motivations implementation of safety and halal assurance for apple processed products: A review

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Abstract. Consumers are increasingly critical and require transparency of information related to food quality. As such, the warranties of safety and halal processed apple products are increasing. Therefore, the apple processing industry should implement various systems to obtain product safety and halal certificates. This certification is not only based on the final products, but starts from the procurement of raw materials, production processes, to the distribution with evidence of consistency of implementation. Safety and halal implementation have various obstacles and challenges, especially for micro and small businesses. This article reviews the barrier factors and motivations for the implementation of safety and halal assurances for processed apple products, especially in micro and small businesses. The study results show that the main motivations for apple processing businesses include improving product safety and quality, creating satisfaction and fulfilling consumer demands, improving company image. In addition, the micro and small-scale food industries also face various obstacles, namely human resources, finance and infrastructure. These barriers can be overcome by a commitment to management, effective communication, cost management, education and training, operating procedures, supplier management, and external supports. Research regarding strategies to implement halal and safety guarantees for small-scale apple processing businesses is needed.

1. Introduction
The food industries, such as the apple processing industry have an important role in national economic growth [1]. Apple industries process fresh apples into processed products such as apple juice, cider, chips, vinegar, jam, apple sauce and canned apples [2]. However, consumers and food inspectors are increasingly critical of the quality and transparency of information on the production of processed apple products. This condition makes industrial demands on quality assurance and minimizes the risk of harm [3]. Consumers are increasingly concerned about the halal status and safety of processed apple products because there may be physical, chemical and biological contamination in raw materials and additives that affect health. One of the efforts of processed apple producers is to obtain safe, halal and quality products by following safety and halal standards and certifications. Certification is a written warranty that the industry has complied with the required standards. The benefits of safe and halal certification for the industry increase sales and profits [4][5]. Implementing safe and halal assurance in the food industry, especially on a small scale, faces various obstacles due to limited resources, time, and finance [6].
An internationally recognized food quality, safety, and halal assurance system [7] aim to protect general health and food trading. The safety and halal status of food production such as processed apples are very important in the global food supply chain [8]. Food chain stakeholders must meet standards to reduce potential hazards to consumer health. Several food safety assurance systems include GMP (Good Manufacturing Process), GHP (Good Handling Practices), HACCP (Hazard Analysis and Critical Control Point), BRC (British Retail Consortium), SQF (Safe Quality Food) and ISO 22000 (The International Organization). for Standardization) [9]. The most common food safety assurance system applied in the apple processing industry is HACCP based on ISO 22000 [8]. Halal, including *tayyib* (qualified), is used as a benchmark for product quality and safety. Halal assurance of processed apple products is marked by a halal logo on the product packaging. Halal certification is obtained if the food is hygiene and is produced from high quality materials [10] following and consistent implementation of the Halal Assurance System (HAS). Halal certification is a type of certification to check and ensure products comply with halal standards [11,12]. The Halal Product Assurance Agency (BPJPH) is a halal certification body in Indonesia. Each country has a different halal certification body and status [13]. Implementation of quality assurance has not only many benefits for the industry, but also faces various obstacles, challenges and constraints [14]. This article discusses the inhibiting factors and motivations for implementing safety and halal assurance in the production of processed apples. This model is built based on the results of a literature review from several studies related to factors of obstacles and support for the implementation of safety and halal assurance.

2. Method
This article uses a systematic review through an analysis of the previous literature. A systematic review is a structured and comprehensive approach to selecting relevant theoretical perspectives and practices in the recent literature [15]. The literature survey was conducted from quantitative and qualitative empirical studies from several international journals such as Elsevier, Springer, Emerald Insight, Proceedings. The keywords used include “barriers to food certification”, “food safety”, “food halalness”, “advantages of food certification”, “processed apple products”. Researchers analyzed the publications for the period 2009 to 2020 as many as 40 articles.

3. Discussion
3.1. Food safety assurance
Food safety assurance often applied in the food industry is GMP, HACCP, SSOP, BRC, SQF and ISO 22000 [7]. Various food safety assurance such as HACCP are implemented for certification. The food industry combines GMP, SSOP, and HACCP [6]. GMP and SSOP are prerequisite programs for HACCP. Quality assurance regulations include equipment, procedures, programs, tools, organizational actions and workforce to carry out control and assurance tasks [16].

The micro and small-scale food industry generally apply the ISO 22000 system to ensure food safety, but not properly certified [6]. Food safety in ISO 22000 is a requirement that allows the industry to plan, implement, operate, and update a food safety management system. ISO 22000 provides a mechanism for building the HACCP concept along the food chain from producers, distributors to consumers. The certification of processed apple products is not only based on the final product but also the procurement of materials, production processes, and distribution, with evidence of consistency in implementation. Fresh apples are a critical control point (CCP) as the raw materials for processing apple products sometimes grown by farmers contain pesticide residues as a chemical hazard. The production of processed apples has a physical hazard is foreign objects that can be harmful. The HACCP team should evaluate the prerequisite programs during inspections and determine whether these programs continue to support HACCP implementation decisions [17]. The effective implementation of HACCP is evidenced by a HACCP certificate from an independent certification body.
3.2. Food halal assurance

It is important for halal certification and labeling to be applied to food industries, whether on micro or small and medium scale, such as apple-processed producers. Halal certified products are symbolized in the halal logo on the packaging to increase the competitiveness and trust of consumers, especially Muslims [18]. A halal logo can ensure high quality products and guaranteed safety because the materials and production meet sharia law [19]. Each country has a different halal product guarantee agency, such as BPJPH (Halal Product Guarantee Agency of Indonesia) is the halal product guarantee agency in Indonesia [13]. The success key for implementing halal assurance for processed apples is because there is an integration of the roles of the health department, BPJPH, researchers, and producers. Halal certification is valid for four years since the issuance of BPJPH.

The halal aspect of processed apples can be identified from the cleanliness of the facilities, production equipment, origin and formulation of additives such as preservatives and cooking oil. For example, processing apple chips requires additional cooking oil. The cooking oil is a halal control point (HCP) because it may be made from vegetable fat or animal fat. The manufacture of cooking oil could add ingredients that may not be halal. Cooking oil is sourced from plants or synthetic chemicals but is unstable, so it is often added a stabilizer. The oil stabilizer can be made from pork gelatin, while the active carbohydrates are sourced from coal, coconut shells, sawdust, and bones of haram animals or halal animals but not halal slaughtered [20]. Halal certification is written evidence of a product from raw materials, processing, packaging, and distribution, including the industry's internal system ensuring the product's halal status [1]. Halal and GMP certification are requirements for the food industry to enter the modern market [21, 22].

3.3. Motivation for implementing product safety and halal assurance

Food safety certification is a legal requirement that must be applied and becomes a global market trend [23]. The implementation of safe and halal certification for processed apple products is a consumer or government demand. Manufacturers realize the benefits of food certification are numerous [14], such as increasing product safety and quality. The motivation for implementing safety and halal assurance is shown in the related research presented in Table 1.

| Table 1. Motivation for implementing product halal and safety assurance. |
|-----------------------------------------------|
| **Factor** | **Description** | **Source** |
| Production safety and quality | Improving product safety and quality, improving production conditions, reducing the risk of endangering food safety and halalness, increasing productivity and production efficiency | [4] [5] [24] [25] [26] [27] [28] |
| Consumer demand and pressure | Meet consumer needs and expectations, attract new customers, reduce consumer complaints, ensure customer satisfaction, protect consumers from potential food contamination and foodborne diseases | [4] [29] [30] [26] [31] |
| Government regulations and policies | Fulfill government requirements and policies, comply with food safety and halal laws, comply with applicable legal requirements | [24] [25] |
| Company image and reputation Marketing | Improve and maintain the image and reputation of the company Increase marketing profits, promotion tools for sales, improve product selling ability, enhance product branding, build strong brands | [28] [4] [5] [2] [32] |
| Competitive advantage | Strengthen the company's competitive advantage, maintain competitiveness, improve competence | [24] [25] [29] |
The motivation for implementing the safety and halal assurance of processed apple products can be divided into internal and external factors. The main motivation for the internal factors of implementing food certification is to increase the safety and quality of production. The creation of safe and halal products can affect the image and reputation of the industry to consumers. For example, implementing the ISO 22000 standard is one of the prerequisites for the global market to follow trends and possibly become a trendsetter [23]. External benefits can increase sales, implement food certification as part of a marketing strategy, and meet consumer expectations that are increasingly demanding for the safe and halal status of processed apple products. An important motivation for food certification is the opportunity to confirm industry competence in food safety and halal, which may be a prerequisite for cooperation with key customers and markets. This motivation is beneficial for producers of processed apples as well as benefits for consumers. Consumers increasingly believe that the processed apples produced are guaranteed quality, safety and halal.

3.4. Barriers implement product safety and halal assurance

Applying the system and achieving safe and halal certification in the apple processing industry faces various obstacles [25]. Barriers to implementing safe and halal assurance arise based on internal and external factors (33). Based on several studies, large industries have more resources, expertise, and management skills [34], while small enterprises have limited resources, time, and finances, so certification implementation is more difficult to accept, implement, and maintain [6]. Barriers to the implementation of product safety and halal assurance in research are in Table 2.

| Table 2. Barriers to the implementation of product safety and halal assurance. |
|---------------------------------------------------------------|
| Factor                        | Description                                                                 | Sources |
|-------------------------------|-----------------------------------------------------------------------------|---------|
| Implementation cost           | High development and implementation costs, increased training costs, high   | [5]     |
|                               | costs of hiring consultants, high certification costs                        | [4]     |
| Human Resources               | Lack of technical knowledge and skills, lack of knowledge about certification, | [4]     |
|                               | lack of knowledge of certification standards, lack of management skills, lack| [31]    |
|                               | of education and training, low employee motivation                          | [36]    |
| Implementation time           | Limited implementation time, it takes time to get used to employee activities| [39]    |
|                               | according to certification standards                                         | [25]    |
| Facilities and infrastructure | Inadequate infrastructure, lack of equipment and infrastructure, lack of    | [40]    |
|                               | facilities and the need to make structural changes to the existing industry  | [31]    |
| Resistance to internal changes| Employee resistance to change, lack of commitment between staff and         | [24]    |
|                               | managers, employees have difficulty accepting and adapting to the system     | [5]     |
| Government support            | Lack of support from government agencies, inadequate financial support from  | [40]    |
|                               | the government, lack of commitment from government authorities               | [35]    |

The barrier for implementing safety and halal assurance in the apple processing industry is the limited knowledge of human resources, finance and infrastructure. The main obstacle due to limited knowledge of human resources is due to the low level of education and training of employees related to safe and halal certification. Little knowledge of human resources to develop and implement food certification can lead to competency gaps. This gap, if ignored, can lead to resistance to internal change. Financial-related barriers arise from costs in developing, implementing and maintaining halal and safety certifications for processed apple products sustainably. Some of these costs are used as training and development costs for all staff members. Employee training will cost a lot of it involves retraining [37]. Other costs arise from regular audits at planned times to determine whether the safety and halal
certification conform to the scheduled and implemented standards effectively and regularly updated. Implementation time is a common obstacle because it takes time to familiarize employees’ activities according to certification standards. For food safety coordinators, implementation time affects work commitment so that managers shorten training time [8]. In addition, another obstacle arises from obtaining the suitable infrastructure capacity to plan and implement the processes required for validation of control measures and verification of the effectiveness of safe and halal certification. As a result, external agencies are contracted for validation and verification, which can also incur costs.

3.5. The key to the successful implementation of product safety and halal assurance

Apple processing producers make various efforts to face multiple obstacles to the implementation of food safety. In general, the success factors for implementing food certification in micro, small and medium scale industries are based on managerial, organizational and technical barriers [35]. Several factors to overcome the barriers to certification implementation from related research are presented in Table 3.

| Factor                  | Description                                                                 | Sources |
|-------------------------|-----------------------------------------------------------------------------|---------|
| Management commitment   | Top management needs to be aware of safe and halal requirements to ensure employees understand the program and allocate resources to support the safe and halal certification process [39] [8] [28] |
| Effective communication | Effective communication between departments aims to clarify the role of each part of the task [39] [8] [28] [18] |
| Adequate infrastructure | Adequate infrastructure such as facilities, equipment, human resources and prerequisite programs are required for efficient, safe and halal food production [18] |
| Supplier management     | Choose certified suppliers to guarantee the quality of raw materials and additives [18] |
| External support        | Support from government and certification bodies [16] |
| Cost management         | Improved cost tracking for expense reporting purposes [16] |
| Education and training  | Training and education to improve the skills and knowledge of safe and halal certification for employees [39] [28] [18] |

The food industry, especially the micro and small scale, effectively implements various obstacles to implementing food safety and halal assurance. Integration of producers, suppliers and the government to realize safe and halal products is the key to successful food assurance certification. The main obstacles to implementing food safety are employees’ lack of knowledge and skills, costs, and infrastructure. Industry efforts to overcome these obstacles carry out training and education consistently by attending workshops and seminars. The knowledge and skills of employees can create effective communication between departments to realize a strong commitment between staff and top management in consistently implementing food safety and halal assurance. The existence of training needs to be done because it can increase employee awareness of the importance of implementing food certification [31]. The factors to overcome other barriers to cost management are based on clear cost reporting. Apple processed producers need to have adequate infrastructure to overcome obstacles to food safety implementation. Good infrastructure such as facilities, equipment, labor, and prerequisite programs is required for efficient, safe and halal food production [18]. Integration of halal and safety assurance is urgent to make efficient quality product assurance [41].
4. Conclusions
Consumer demands on the quality and information transparency of processed apple production make safety and halal assurance necessary. The primary motivation for the apple processing industry is to improve product safety and quality to create satisfaction and fulfill consumer demand for safe and halal products and improve the company’s image. The small and medium scale food industry faces various obstacles to implementing safety and halal assurance, namely the limited knowledge of human resources, finance and infrastructure. Some obstacles can be overcome with the successful key to implementing product safety and halal assurance, including management commitment, effective communication, cost management, education and training, operating procedures, supplier management, and external support. Therefore, a more in-depth research is needed regarding strategies to implement halal and safe guarantees for small-scale apple processing businesses.

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