A Conceptual Framework for Understanding the Potential Economic Impact of Halal Food Testing in Halal Supply Chain

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Abstract

A globalized food trade, extensive production and complex supply chains are contributing toward an increased number of non-Halal substance in food cases. Halal laboratory testing or Halal testing is an approach to identify contaminants and ensure the integrity of raw materials and food products. The adoption of an integrative approach of Halal management system and Halal testing was investigated to identify and discuss several related economic issues in this field. From an extensive analysis of academic literatures using 'Halal Food Fraud', 'Halal Food Testing' and 'Halal Food' specifically at food manufacturer, the issues involving economic impact of Halal testing was highlighted. Several Halal Testing Points were proposed for the evaluation of Halal ingredients and products, followed by a conceptual framework on the potential economic impact of Halal food testing. The high demand for transparency in the food industry among consumers has therefore may need food manufacturers to consider Halal food testing as part of their production process.

Keywords: Food Production, Food Manufacturer, Halal Food Testing, Economic Impact, Conceptual Framework.

1. Introduction

The global Halal market has gained a foothold to be a key driver or the engine of growth contributing to the Gross Domestic Product (GDP) of not only a Muslim country but also a non-Muslim nation. The Halal food items have evolved from being branded as a mark of religious observation to become an assurance of food safety, hygiene and reliability. As a matter of fact, the non-Muslim consumers would associate Halal with that of ethical consumerism (Shash, 2019). The non-Muslim consumers' ethical consumption arises because of several reasons of

which some may start to consume: i) vegan or plant-based food; ii) organic or natural food; iii) no animal by- products; iv) no Genetic Modified Organism (GMO) ingredients (Yusuf, 2018). On one part, economically the global Halal food market value is estimated to grow from USD1.4 trillion in 2017 to USD2.6 trillion in 2023 whereas the global share of Halal food revenue is expected to reach USD2.04 trillion by 2027 (Statista, 2021).

On that aspect, it is not surprising that several Asian countries such as Indonesia, Pakistan, United Arab Emirates, Bahrain including Malaysia have aspired or eyeing to be a global 'Halal hub'(Dinar Standard, 2020). Though in early years of its commencement, Halal industry focused more on food sector, now it has even expanded to include pharmaceuticals, cosmetics, health products, toiletries and medical devices (Dinar Standard, 2019). This is based on the belief that Muslims should eat food and use goods that are "Halalan toyibban" meaning permissible and wholesome according to the teaching of Islam. Consequently, Malaysia does not only venture to the stated goods, it goes further to include services sector such as Islamic Finance and Muslim-Friendly Travel. According to the Global Islamic Economy Report 2020/2021 based on the Global Islamic Economic Indicator (GIEI) rankings, Malaysia has been leading and retains its top position in the overall rankings for eight consecutive years. GIEI measures the overall development of the Islamic economic sectors by evaluating a nation's performance using a composite weighted index in line with its broader social obligations.

Table 1 presents the GIEI score of top ten ranking nations according to six sectors of the Islamic economy i.e. Islamic finance, Halal food, Muslim-friendly travel, modest fashion, media/recreation and Halal pharmaceuticals/cosmetics (Global Islamic Economy Indicator Report, 2020/21). As a whole an impressive achievement for Malaysia in five of the sectors except for modest fashion holds by the UAE. Majority of Malaysia's exports goes with its strong trade partnership with the Organization of Islamic Cooperation (OIC) countries.

Table 1: Breakdown of the Indicator Score for the Top Ten Ranking Countries

Country	Ranking	GIEI	Halal Food	Islamic Finance	Muslim-Friendly Travel	Modest Fashion	Pharma & Cosmetics	Media & Recreation
Malaysia	1	**290.2**	**209.8**	**389.0**	**98.3**	43.7	**80.2**	**59.9**
Saudi Arabia	2	155.1	51.1	234.2	36.8	22.1	33.4	34.7
UAE	3	133.0	104.4	142.5	78.3	235.6	72.1	125.3
Indonesia	4	91.2	71.5	111.6	45.3	57.9	47.5	43.6
Jordon	5	88.1	39.6	124.6	43.3	18.5	39.1	31.6
Bahrain	6	86.9	42.2	121.9	31.9	16.7	33.5	42.3
Kuwait	7	73.3	42.2	99.2	27.1	17.5	33.3	40.8
Pakistan	8	70.9	54.7	91.1	23.6	30.6	32.5	12.9
Iran	9	64.0	60.5	74.0	28.8	33.5	55.9	26.6
Qatar	10	63.0	44.3	80.1	36.7	20.3	32.1	40.2

Source: The Global Islamic Economy Indicator (Report, 2020/21)

It is undeniable that Malaysia is recognized as a modern Muslim nation with well-positioned in the branding, processing and marketing of Halal foods. This was further strengthened by its own well-known Halal standard (MS 1500:2019), which meets both the requirements of the Muslim community and international health and safety standards. Unfortunately, there are some issues pertaining to Halal food caused by irresponsible parties who adulterated and make Halal food a medium of crime (Fadzlillah *et al*, 2012, Md Ariffin *et al*, 2021). Some of these Halal food crimes are in the form of slaughtering methods, sources of Halal ingredients, food industry practices, food fraud and adulteration. An issue that create anxiety among Muslims as reported

by (Johari, 2016), consumers are no longer satisfied to accept food products that are certified Halal at face value knowing the potential for false advertising or food fraud. The recurrent mass media reports of Halal food fraud scandal cases along the food supply chain should be mitigated. This is critical for Malaysia in particular to ensure its ability to sustain and reaffirm the number one position of the key exporter of Halal food among OIC countries. The problem could be one of the challenges for Halal food business in Malaysia to remain competitive beside facing the issue on food industry practices. In addition, (Johari, 2016) even highlighted the need to discover new strategies that can improve access to raw materials, ensure Halal food safety, quality and integrity, and grow the necessary talent to build trust in this thriving global industry.

Food adulteration frequently refers to non-compliance to health or safety standards according to the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA). It is a legal term of which in practice additives may be deliberately added to more expensive substances to increase visible quantities, reduce manufacturing costs and other deceptive or malicious purpose. Adulterants may also be accidentally or unknowingly introduced into the substances. It is the act of intentionally debasing the quality of food offered for sale either by admixture or substitution of inferior substances or by the removal of some valuable ingredient (Fadzlillah et al., 2011).

Thus, this study aims to focus on examining and determining the initial framework to consider the potential economic impact of embedding Halal food testing as part of food producers' production process. Certainly, it would not be an easy task to do so due to the low-level awareness among these producers regarding the importance of Halal food testing. Also, a hindrance could be that many of those established analytical tests are costly and may need to implement monitoring program to detect the fraud (Butler *et al*, 2021). But, if food producers grasped the essentialness of Halal food testing in the context of food traceability, then the term 'Halal Food from Farm to Fork' would be genuinely materialized. In this research, the data collection technique will utilize the rapid review and meta-analysis approach of which the keywords such as 'Halal Food Fraud', 'Halal Food Testing' and 'Halal Food' were searched to capture the content of any forms of publications. Moreover, references and cases on the economic impacts of foodborne illness will be taken into consideration as well.

2. Background of Halal Food Testing

Determining Halal status of a food product is an important aspect of the Muslim life both spiritually and physically, as it contribute to the purity of Ibadah (Riaz & Chaudry, 2018). In this globalization era, Muslims faced a great challenge in finding Halal and toyyiban product where a single processed food product can contain ingredients sourced from dozen nations and its origin not questioned or neglected due to ignorance or lack of technology (Brook et al., 2021; Visciano & Schirone, 2021). The additions of undeclared substances or materials were commonly practised by the manufacturer worldwide with the intention of increasing the weight of product or make the product appears better in value than it was. Such action will subsequently lead to better financial gain. Adulteration usually change appearance, taste, composition, or other characteristics, which resulted in decrease of quality. Yet, it is marketed and advertised to the consumer as the ordinary food under common name or by other false name (Brook et al., 2021). Sadly, not all Muslims are aware of the raw materials that go into products. For example, collagen may come from pork, while vinegar can be a by-product of wine.

As in Malaysia, the recent meat cartel scandal is a wake up call to urge for thorough enforcement and Halal testing (Basyir, 2020; Md Ariffin *et al*, 2021). Previously, few reports had been made by the consumers in 2012, whereby seven frozen meat products imported from Thailand has been proved to contain pig DNA. Further investigation by religion authority and collaboration with Department of Chemistry Malaysia, showed that the products contain certain amount of undeclared meat species and did not comply with Malaysian Halal Standard (Berita Harian, 2012). These unethical practises clearly violate the consumer rights in getting Halal food. However, it is still unclear in any cases above whether the said adulterant was incorporated intentionally or unintentionally. The cases mentioned above are not a direct food safety issue, the scandal revealed a major breakdown in the traceability of the food supply chain, and therefore some risk that harmful ingredients were included has become the major concern (Premanandh, 2013).

Realizing the importance of Halal testing, Department of Islamic Development Malaysia (JAKIM) has added Halal testing in the latest Malaysia Halal Management System 2020 (MHMS 2020) guideline, whereby laboratory analysis was introduced as part of Halal assurance system particularly for medium and big industry. The document highlighted the requirement to create a standard operating procedure on implementation of Halal testing in the company. The specific analysis such as species authentication, determination of alcohol content, protein profiling, physical test for leather and bristles, fats and oil profiling as weel as other scope deemed necessary, shall be implemented and planned by the Halal certified company or Halal certificate applicant as a support procedure. Moreover, the analysis can only be performed by Malaysia Halal Analysis Centre (MyHAC), Department of Chemistry Malaysia or any Halal panel laboratories appointed by JAKIM. The record shall be kept for audit purpose (JAKIM, 2020).

Similarly, Manual Procedure for Malaysia Halal Certification (MPPHM) emphasise the importance of Halal testing during audit or enforcement activity. The document stated that any raw materials or ingredient or other products with doubtful Halal status should be sampled for laboratory analysis and the auditor can authorise the process. The sampling must be conducted according to the standard operating procedure. It is also been specified in clause '9.3 Sampling, iv. The laboratory analysis shall be carried out at government laboratories which are accredited based on ISO/ IEC 17025 for the related analytical scope. Currently, the laboratory under the Department of Chemistry Malaysia is the official laboratory for Malaysia Halal Certification' (JAKIM, 2014).

The value of Halal certified food are high, not only as a marketing tool to sell a product and in business, it is also valueable aspect is gaining customers' trust (Nur Shahrulliza et al., 2019). The tendency to choose Halal-certified products will be higher (Rahman & Rahman, 2021). Statistics shows that 60 per cent of Halal certificate applicants are non-Muslim entrepreneurs (Bernama, 2019) as these segments values Halal as high quality, wholesome food and profitable market. Such value will be much more higher when supported by Halal testing. The benefits of Halal testing includes reduction in contamination risk associated with non-Halal components such as alcohol, porcine and unslaughtered animal, as well as microbial pathogens and other hazards. It also lowers the incidence of food recall and food borne illness and indirectly protects the company from revocation of Halal certification (Nasa, 2015).

3. Methodology

This study gathered information through online databases mainly from journals, economic reports, websites and newspapers articles by exploring keywords of Halal food fraud, Halal food testing, Halal food and conceptual framework for Halal food fraud which are relevant to the research. Several examples of databases are provided by Elsevier, Emerald, ResearchGate including tool such as Google Scholar to search for the related articles. In addition, the paper also reviews available documents for example reference to authoritative sources of standards and guidelines such as Malaysian Halal Certification Procedure Manual (MPPHM) and Malaysian Halal Management System (MHMS) that are much related to the study.

4. Discussion of Findings

The implementation of Halal authentication technology in testing Halal food products is able to aid legal experts in determining the status of the products with great accuracy. Figure 1 portrays the potential testing points that could conducted which is essential to detect the presence of illegal substances accurately by using laboratory testing analysis. In food safety perspectives, laboratory testing is an important process, which relies on scientific analysis to identify problems in food products. It provides analytical data on the quality of a product or production process to support quality control in the HACCP system. The objective of quality control is to identify contaminants in raw material, or contamination after a product is produced and before it is placed on the market (Adinolfi, Di Pasquale & Capitanio, 2016). In Malaysia, compliance to food safety regulation i.e. Food Safety is Responsibility of the Industry or popularly known in Malay language as '*Makanan Selamat Tanggungjawab Industri*' (MeSTI) certification scheme, Good Manufacturing Practice (GMP), Hazard Analysis and Critical Control Point (HACCP) (depends on the size of company), has been enforced to food producer. Thus, it is suggested that compliance to MHMS and MS1500:2019 should be practised concurrently. At the moment, most of the manufacturers rely on supplier's Halal logo and trust when purchasing raw ingredients. Though certificate of analysis will be requested upon receiving the raw materials, however, most of the parameter included in the analysis only covers food safety aspect such microbial testing, pH and moisture content and rarely include porcine detection or alcohol testing.

Therefore, Halal Testing Point 1 (HTP1) is proposed as a step to be conducted by manufacturer before purchasing from new supplier in order to verify the new raw ingredients are Halal and evaluate the potential supplier's integrity. Same goes with HTP2, which should be conducted by manufacturer on regular supplier but on yearly basis. This point will serve as part of internal audit initiative with the purpose is to assess existing supplier integrity and possible contamination during transportation. On the other hand, HTP3 and HTP4 are proposed as part of monitoring or enforcement activity to assess food manufacturer's integrity or sample test sent to laboratory by consumer upon any doubtful ingredients in the product.

Mahama et al. (2020) emphasise the important role of forensic laboratory testing for supporting Halal supervision and certification. The study revealed that among the 4,829 food samples collected in Thailand, 62 (1.3%) suspicious or unacceptable samples were found. Although laboratory tests can verify the absence of materials contaminated with illegal substances, the results of these tests should be supported with seamless documentation and record keeping to ensure tracking and tracebility is achievable. Additionally, implementation of

Halalan-Toyyiban supply chain practices (HTSCP) in the context of service management is encouraged to ensure integrity of products throughout the Halal supply chain (Zainuddin, Ridzwan, & Ridzwan, 2020).

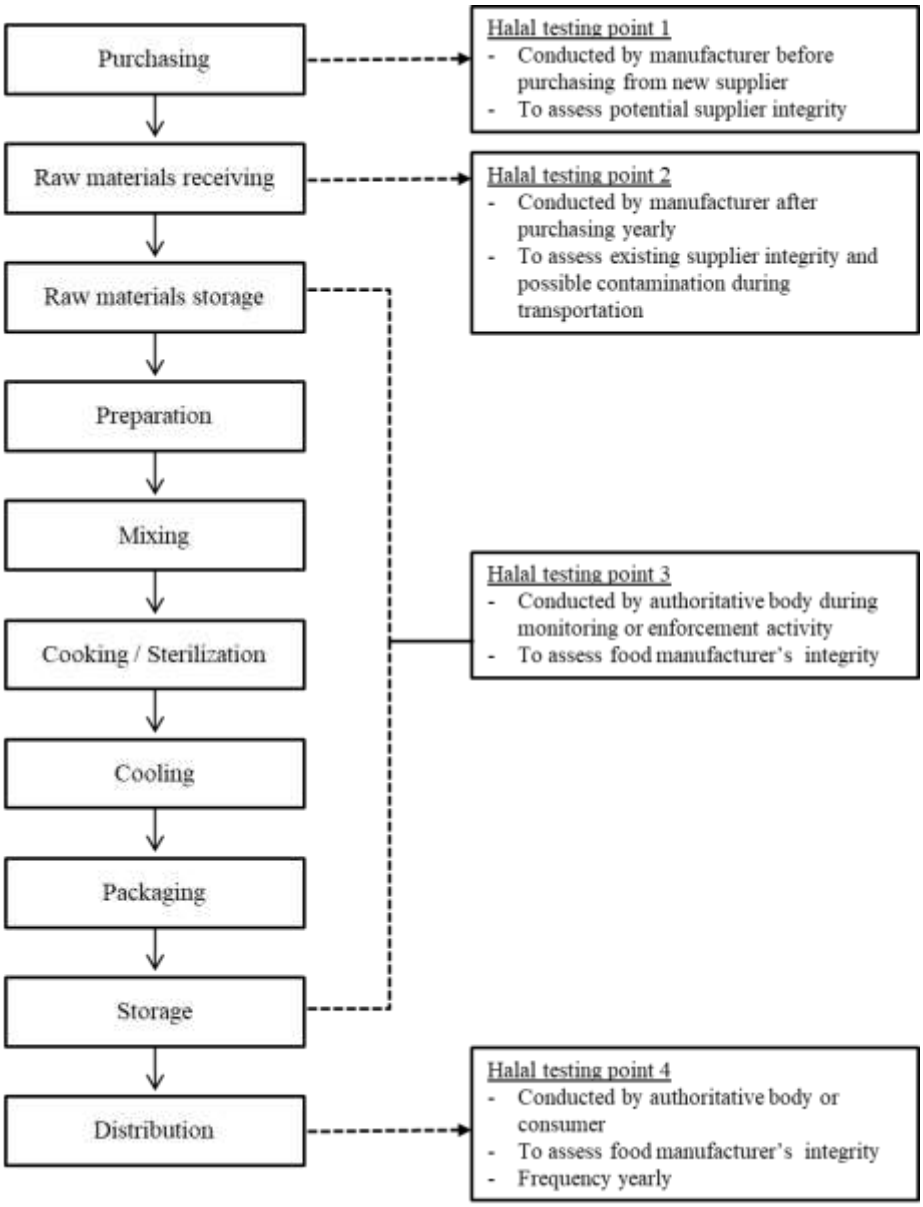

Figure 1: Flowchart of Critical Points Required for Halal Testing

In response to the issue of food adulteration and fraud, the management or decision maker of a firm should think about effective strategy or strategies to curb the problem and its implication in terms of monetizing them as a critical component in their risk management strategy (Caswell, 2000). Hence, it is better to begin comprehend and thoroughly discuss the potential economic impact of embedding the Halal food testing in a firms' food production (Randeree, 2019, Azam

& Abdullah, 2020). Figure 2 showcases a simple conceptual framework that provides overall scenario of the potential economic impact of the Halal food testing.

Economic Impact	***Direct/Tangible***	***Indirect/Intangible***
Positive	Ease of certification process Ease to market product domestically & internationally Enhance market share/size Reap economies of scale (EOS) Increase competitiveness Increase profits	Brand enhancement Create customers' trust/loyalty Ease to franchise Potential of Joint Venture Potential of R & D Sharing of knowledge Sharing risks
Negative	Production Shutdown Loss of jobs Legal Fees Penalties And Fines Health costs Loss of lives Compensation cost	Brand damage Loss of trust in business Loss of trust in customers Loss of trust in authorities Increase social cost

Figure 2: Conceptual Framework on the Potential Economic Impact of Halal Food Testing Regarding Halal Food Fraud of Food Production

Assessing the economic impact involves a combination of both the direct (tangible) and indirect (intangible) effects within the scenario of both positive and negative perspectives of implementing the Halal food testing in the process of Halal food production. In Figure 2, the economic impacts are classified into 4 quadrants i.e. whether the impacts are positive or negative, the effects could be categorized further to be either direct/tangible or indirect/intangible. A positive impact means by having the Halal food testing, firms' ensure their foods are free from fraud or adulteration. In contrast, the negative impact means without the testing, firms' food could be contaminated and thus harmful for consumption. The direct or tangible effects from a positive perspective are those quantifiable aspects of which firms provide a value for them for example their products' market share increases or higher profits. However, the indirect or intangible effects focus on the firms' non-physical aspects such as products branding or customers' trust or loyalty to the product. Similarly, looking at the negative economic impact, the direct or tangible effects would be firms' production to be halt or workers might lose their jobs.

It is customary for any firms to traditionally aiming for profits in their operations, consequently the focus on the first quadrant (i.e. direct or tangible) is essential to gain foothold and expand their businesses. Halal certification is one of the key factors to cater the ever growing Halal market and for a firm's business to grow. More importantly it is able to differentiate from one business to another and in fact can be the deciding factors for survival of a business (Yusuf, Abdul Shukor & Ahmad Bustamam, 2016). By embedding the Halal food testing in a firm's food production could ease its certification process since it is setting or following certain standards as a way to monitor and control its food safety. Among the standards are Hazard Analysis and Critical Control Point (HACCP - MS1480), Good Manufacturing Practice (GMP) and the Food Safety is the Responsibility of the Industry (MeSTI). When these standards are met, it would indirectly imply the firm's product is of high quality or branded and consequently easy to market the product domestically and internationally. Gaining export market means market size will be

larger and eventually more demand for the firm's products. Theoretically, when this occurs firm is said to be able to reap internal economies of scale (EOS).

A firm may enjoy internal EOS when an increase in the overall size of operation for instance more staff, more facilities, more equipment and larger purchasing orders can lead to lower per-unit production costs. Investing in the facilities, equipment or outsourcing services of Halal food testing proving firm's compliance of Halal requirements, may gain consumers' confidence in consuming the goods. Studies by Shaari and Ariffin (2010) and, Mohayidin and Kamarulzaman (2014) showed that the significant factor influencing the actual purchasing intention of Halal products is mostly driven by the consumer confidence towards the Halal brand. Intangibly, creating confidence implies consumers' trust and loyalty towards the firm's Halal brand. Firm could even benefit further by taking advantage to distribute its products by franchising them for marketing purpose which is also a cost-effective tactic for expanding its business. Another approach to business is searching the potential established firm for Joint Venture (JV), an indirect opportunity to gain new capacity, access to latest technology, access to larger resources, initiate research and development (R & D) of new products or process, new geographic market, sharing expertise staff and even sharing risks.

In contrast, larger purchasing orders specifically buying raw materials in bulk will enable firm to negotiate prices or paying at a discounted price. Besides, firm can command cheaper transportation rates, it could even significantly able to assess supplier integrity in delivering the materials beginning from its sources and origin. A lower per-unit production cost would provide firm's ability to sell its goods at lower price and this would increase firm's market competitiveness. When a good's price is competitive and its Halalness is visible, demand for the product would increase locally and internationally meaning profits will rise too. Bear in mind that obtaining these advantages may not only be in the shorter period but more noticeable in the longer period. Therefore, the economic benefits of Halal food testing are more apparent for firm's future business expansion for growth. If firms key focused are more tangible on the first quadrant whereas rather intangible at the second quadrant, they should also be aware of other two quadrants as these quadrants have direct external impacts and ultimate concerned with them and the welfare of the society too.

On the other hand, reluctance in incorporating Halal food testing activity during the food production possesses several negative impacts to the manufacturers. Fail-to-proof the absence of non-Halal-components in the products could lead to the revocation of the Halal certification and subsequently lead to unexpected expenses on recalls, disposal, and penalties. As a result, company could suffer from production loss, loss of jobs, legal fees penalties and fine. Much severe when the breach of the Halal certification procedure manual involving serious offences on cleanliness and good manufacturing practices and cause health costs and lost of lives. Company also might need to compensate the victims upon the damages.

On the bigger scale, the potential impact of Halal testing on a food business or a company can be devastating. Once a news is reported, it will diminish consumer's confidence and loyalty (Hussain & Dawson, 2013). For instance, recent meat scandal case put the whole supply chain of meat producer company at the centre of a global Halal scare. The meat company management and government authorities are trying their best to protect the overall reputation of their global business although 19 distributors companies involved in imported meat cartel activities has been brought to justice (Bernama, 2021; Meat Cartel.., 2021). On another case, Modelez International, a company responsible for marketing of Cadbury in Malaysia, suffers brand damage and consumer's confidence when their Dairy Milk hazelnut and Dairy Milk roasted almond bars

were reported to contain pork DNA (Cadbury, 2014a; Yu & Tak, 2020). Initial news reports estimated that the company lost about $37 million in global sales upon the announcement of the contamination in its products (Jaques, 2015).

Company also has to increase social cost and work out on public relation campaign in order to regain trust in business, customers and authorities. During the crisis, Cadbury Malaysia maximizes its use of the media and maintains accessibility, it issued statements on official website and Facebook (Cadbury, 2014b), also conducted advertising campaigns on official website, Facebook and YouTube. Continually evaluate and repair image Cadbury Malaysia has resumed sales in less than two weeks, but its public relations campaign has not ended there. More than a month after the controversy, Cadbury Malaysia is still in the process of assessing its image repair. Several campaign such as celebrity endorsement was done to show the public that their production process is strictly in accordance with Halal standards, which strengthened its image restoration (Jaques, 2015; Ghazali et al., 2019).

Another case study concerned on hygiene issue was reported in 2015 regarding the revocation of Secret Recipe's Halal certificate. Though it is only the matter of hygiene issue and no doubtful ingredients used in the products, such news rocked the public and obviously gave negative implication to their reputation (Nasa, 2015). Evidently, Halal testing are essential tools to allow government agencies to confiscate non-Halal products from the market rapidly and efficiently in order to protect consumers and general public health. Therefore it is suggestive that companies conducted their own internal halal testing as part of internal control and proactive measures against contamination of haram substances.

4. Conclusions

Halal food sector's investments are forecasted to continue particularly in delivery, health-based and functional food, and Ready-to-Eat or Ready-to-Cook segments (Global Islamic Economy Report, 2020/2021). Since the Halal industry is growing progressively, competition among ASEAN members like Thailand, Indonesia, Brunei and other Asian countries would become stiff and challenging as they too are aiming to be the global Halal players focusing on small and medium enterprise (SME). Thus, these nations see a good opportunity to expand their Halal food industry among local SMEs have intensified numerous incentives to encourage them to invest in this industry.

For Malaysia to maintain its premier position as key Halal Food exporter, ensuring the quality of its Halal food is so much strictly vital. Thus, the strategy of investing in Halal food testing and considering it to be one of the compulsory production process should be thought-out seriously. This is because as mentioned by Fadzlillah et al. (2011) Halal authentication cannot rely solely on physical inspection and documentation anymore, but require the use of the latest highly sophisticated technology and analytical instrumentation to detect various issues of food adulteration.

Furthermore, the high demand for transparency in the food industry has enhanced, therefore food manufacturers should now realize focusing on methods for Halal certification is no more sufficient. They should ensure their products are free from contamination and should not contain any haram ingredients during its preparation, production and storage (Talib et al., 2013). Then, the quality assurance and the wholesomeness of the Halal product could indeed be attained which eventually meant the firm does practice total quality management (Shah Shahar et

al., 2020). In conclusion, the effort to ensure Halal integrity for Halal food products requires full commitment from each layer of the supply chain not only the producers.

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