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Challenges of Developing Countries in Complying Quality and Enhancing Standards in Food Industries

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Abstract

Food safety has been fervently discussed throughout the world. Priority for food safety addresses issues in enhancing food safety systems in terms of exporting countries, contribution to consumers' health and protection and advancement on food regulations and standards. Not all food industrial companies are able to follow demands highlighted by international bodies. Many developing countries lack the resources to participate in international trade because of the difficulties in complying with the requirements of the food safety standards. The underlying reasons for this are outdated laws, lack of knowledge in terms of limited coordination between organizations handling food safety issues, under-funding of national research institutes and lack of awareness for standards and quality. In moving towards the development of standards, consumer participation to demonstrate their concern over the quality and safety of food is correspondingly on the rise. In every aspect of food production, the company is required at each step in the food production chain to ensure food safety standards are not compromised and to show compliance with regulatory and customers' requirement. In an attempt to address the issue of compliance with international standards, this paper will set to discuss international food chain perspective including food quality assurance in production processes, hazard characteristics in the production and distribution of food and generic food quality and safety standards. The aim of this paper is to identify public and private food safety and quality standard internationally and implementation of food quality standards in three different regions. At the end of this paper, the researchers seek to highlight some significant findings on quality assurance in the food industry and its benefits to consumers globally.

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1. Introduction

Food quality assurance critically had been imposed for food manufacturing to comply the standard in their production. Dietary changes in the global society, restriction on importing several foods from other countries, lack of consumer food knowledge are part of the contribution which affected the food consumption and food industries. These include getting varieties of food throughout the countries. Some of the food manufacturing, especially exporting countries is not alert in producing healthy and safe food. A food production firm may try to reduce production costs by mixing in low-quality materials, which may damage people's health. Due to the lack of knowledge and awareness, it is very difficult for consumers to distinguish between healthy food and unhealthy food.

Overloaded of information and exposure on other countries' food culture is one of the major causes in consumers' demand for healthy food. Blended ingredients between different cultures by not knowing the suitability to the people who consume it may contribute to unhealthy food.

As overloaded information and exposure on other countries' food culture, demand of healthy food from the consumers has increased. However, the increasing globalization of the food industry has become a cooperative concern and responsibility, because the food we eat have been grown and processed in several other countries (HDC Vibe, 2008). As for example, in Malaysia, cases of food borne disease are commonly cholera, typhoid fever, hepatitis A, and dysentery and food poisoning as a result from food contamination. Sharifa, Netty and Segaran (2013) reported that food poisoning cases in 2008 was 62.47 cases per 100,000 population and 36.17 in 2009. Due to the disease factor, EU countries are very concern in controlling high level protection of food safety standards to their consumers, especially the one which involves exporting fresh production (Lamuka, 2014). Besides, it will impact the company's sales, consumers' confidence and brand value and even national image (HDC Vibe).

In order to preserve processing food from being contaminated, standard has become powerful in controlling any food accessing to other countries. As the food may harm in any circumstances, Trienekens and Zuurbier (2008) has listed characteristics of some specific hazards that exist in the food production and distribution. Food production may harm in cross-contamination process as the food industries are mixed and cases may exist in the same resources for the production of different (inter-mediate) products. Recent evidence shown that food industrial activities resulted in exposure to toxic metals such as mercury and arsenic, which now present in entire food chain (Borchers et.al, 2010). Second, food quality assurance may be hard to achieve because of internationalization of food chains and networks, sourcing becomes more and more international as most food industries have many sources of raw materials and as there a recycling products and semi-finished products in food processing industries, it contributes to not meet food quality standards.

Besides strengthening the consumers judgments towards the products, Prema (2003) agreed with other scholars in terms of economics view, which is efficiency of production would be increased through standardization as it reduces imbalance information between buyers and sellers, and promotes product commutability and allowing for increased economies of scale and scope.

This paper will review the importance of implementing food safety standard, and dilemma on applying food safety standard among developing countries. It is important to discuss in this paper to harmonize the use of the implementation of food standard based on data from three regions comprises industrialized countries, emerging economy countries and least developed countries.

1.1. Importance of implementing food safety standard

The growth of the population worldwide and awareness of cleanliness of food production has risen and are forcing public and private sector to practice hygienic food production. This is where the food safety standard plays their roles in order for the food industrial to obey the rules. Consumers concern on the quality and safety of food occurs from the illness increment reported every year. World Health Organization (WHO, 2014) reported that more than 90% of human exposure is through food, mainly meat and dairy products, fish and shellfish. Moreover, studies conducted by Hartman (2005) showed that consumers concern for the safety food; especially in animal proteins are high. This study is in response towards the mad cow diseases, followed closely by seafood, poultry and other meat concerns.

Besides the diseases and illness, consumers' perceptions on food safety have decreased due to many quality control programs (Trienekens and Zuurbier, 2008). Trienekens and Zuurbier, 2008 claimed that the USA quality assurance systems had many approached programs. For example, safe production methods and physical health of animals on the farm has been emphasized besides traceability and animal welfare, while in European Union (EU) has many food safety legislation differences between countries and making trade complicated.

1.2. Dilemma of developing countries

Henson and Loader (2001) has revealed that outdated laws, lack of knowledge in sharing-limited coordination between organizations handling food safety issues; includes funding of national research institutes and the lack of awareness for standards and quality may affect developing countries lack the resources to effectively participate in international trade. World Health Organization (2007) reported that food safety legislation in many developing countries is not in line with international requirement. As developing countries contributes 50 percent agricultural exporters (Spenser and Steven, 2006), the challenges that has been identified is commodity markets are governed by price and quality grades. To support the author findings, Nugroho (2014) reported that challenges faces by Indonesia's coffees to export globally is to meet quality standard which caused several cases of export rejection. And one the contribution rejection is lack of support from Indonesia government to defend the trade agreement. Several studies agreed that market for high-value agricultural and food products are driven by quality-based. Issue addresses on food quality and sanitary and phytosanitary (SPS), which developing countries are unable to follow is lack of proactivity in food safety criteria. Lamuka (2014) stressed that the reason given by international standard are not in scientifically based but more to prohibit the developing countries to compete internationally. The situation has been illustrated in the case of Kenya and India back in nineties from entering EU market, involving fish products.

A study conducted by Prema and Sisira (2003) reached a different approach, which is standards typically much higher than those existing in developing countries, and often difficult and costly to meet, but they are also subject to frequent changes. Changes are caused by scientific knowledge about health hazards, improvements in food processing technology and highly income-elastic consumer preferences for higher safety standards. Examples of the food borne' diseases, where scientific technologies capable to overcome in detecting the new hazard, are added to stringent food safety requirement (Henson and Jeffee, 2006). Further evidence on showing cost matter is private good agricultural practices certification, known as Global GAP is charged with high costs for necessary investments and certification, and it is difficult for low income producers especially in global south (Amekawa, 2013).

Further evidence on Jacques and Zuurbier (2008) reported that as marginal costs in certification and accreditation increase, it gives impact on company's profit.

Dilemma of developing countries becomes crucial when firms use food safety standard as business-to-business strategy to shelter their brand reputation (Henson and Jaffee, 2006). Even this can increase their product value, but it may kill other food firm that has the potential to export internationally but has obstruction on applying food safety standard. Mensah and Julien (2011) agreed that most developed and developing countries are removing tariffs and quotas as trade barriers and implementing more stringent measures to ensure the safety of food.

Developing countries are usually in difficulties of their limited capacity to access and absorb best practice technology and information and constrained by inadequate resources from challenging perceived inequities. In terms of facilities, Lamuka (2014) highlighted laboratories of food control does not cover for the whole aspect and countries including limited scope in testing, understaffed constrain, involving of a few number of staff and lack of suitability trained staff. From the research, Lamuka (2014) discovered that management system's incapability to detect potential risks and gaps, share information, plan together and identify appropriate strategies for collaborative management of food safety in the supply chain and protect the consumers. Furthermore, Lamuka (2014) pointed out that the core responsibility of ensuring food safety in the food supply chain is government dependability.

According to Chandra (2003), there is evidence that export diversification into this commodity category can bring significant terms of trade gains. Whether export diversification will lead to terms of trade gains depends on the degree of income and price elasticity of demand for the commodities concerned. The available estimates of income and price elasticities of demand in food trade further confirm this view.

2. Public and private food safety and quality standard approach

Somehow the dilemma of developing countries in applying food safety standard may affect the food production exports, but the changes happen in the international trading environment may become an opportunity to the developing countries. Lamuka (2014) has listed emphasizing on food safety regulations in trade, introduction of stringent food safety standard, reorientation of food quality techniques toward preventive management and a shift by regulatory agencies toward process-based standards may become an opportunity to the developing countries, mainly in agricultural commodity export markets and domestic food sector. Furthermore, Unnevehr (2014) stated that developing countries are in efforts to improve food safety, particularly in market access requirement and aim to export high value products.

As public and private food safety and quality standard has been written and presented in different approach, still the importance to implement in food industrial is a high requirement. The importance of food safety standard may stand in the definition. According to Giovannucci and Reardon (2001), standards have been defined as parameters that segregate similar products into categories and describe them with consistent terminology that can be commonly understood by market participants. As standards improve the efficiency of markets, standards which concern any of the processes in the food chain. Gibbon and Ponte (2005) describe standards as “chain membership, imply rules and conditions for participation, and lead to processes of redistribution of chain”.

Much of the current literature agreed that worldwide food industries applied Good Agricultural Practices (GAPs), Hazard Analysis of Critical Control Points (HACCPs) and International Organization for Standardization (ISO) as benchmark of food quality assurance. Those practices are in core triangle revolution of food quality system in food safety management (Lamuka, 2014). From the previous research, developing countries have been identified as lack of good agricultural, manufacturing and hygiene practices. Thus, the importance of total food safety management may boost their product for export market.

Good Agricultural Practices (GAPs) is a well-known public safety standard. Trienekens and Zuurbier (2008) discuss that GAP systems include a set of guideline for agricultural practices aiming at assuring minimum standards for production and storage. GAP systems underline pest management (optimal use of pesticides), manure handling at animal farms, maintenance of water quality, worker and field sanitation, guidelines for post-harvest handling and transportation, among others. GlobalGAP is a private safety standard that arisen from the GAPs. The existence of the private standard has been said to harmonize the public and private safety standard (Unnevehr, 2014).

Several recent studies have begun to examine the importance of private standards in food production. One study by Fagotto (2013) examined the trend of applying private food standard is a must or de facto mandatory as ignoring the standard is equal to losing a significant share of the market. Vellema and Boselie, 2003, points that major aims of private food safety standards are:

- Improve supplier standards and consistency, and avoid product failure
- Eliminate multiple audit of food suppliers-manufacturers through certification of their processes
- Support consumer and retailer objectives by transferring their demands to parties upstream the chain
- Be able to provide concise information about production processes in case of food incidents

Others worldwide recognition of private certification is Best Aquaculture Practice (BAP); a certified aquaculture facilities, environmental and social responsibility, animal welfare, food safety and traceability. British Retail Consortium (BRC) is established to define common criteria for the inspection of suppliers of food products. BRC are more to documented quality management system, factory environment and facilities, product and process control and personnel. Furthermore, it demonstrates and strengthens the commitment between consumer safety and stakeholder relations. IFS Food Standard certification improves operational efficiency and product quality. SQF (Safe Quality Food) aims at quality assurance from a total supply chain perspective. The SQF program is based on the principles of HACCP, ISO-9000 series norms and Quality Management System. Designed as a food safety programme, SQF also covers product quality (at level 3) a feature that is unique to this type of certification programme:

- Level 1: food safety Fundamentals
- Level 2: certified HACCP Food Safety Plans
- Level 3: comprehensive Food safety and Quality management Systems

Hazard Analysis Critical Control Points (HACCP) become a legislative requirement in many developing countries, as it is a systematic approach to the identification, evaluation and control of those steps in food manufacturing, that is critical to product safety (Luning, 2002). Currently, HACCP principles are the basis of most food quality and safety assurance systems. HACCP mandatory comprises some agricultural sectors that are beneficial to developing countries, which contains fresh fruit and vegetable, meat and fishery products. With the presence of HACCP in the food quality management, it may defeat power of small-scale producers, middlemen and retailers in the food system which may disrupt the export market.

International Organization for Standardization (ISO) standard is an international standard in order to achieve uniformity and to prevent technical barriers to trade throughout the world (Luning, 2002). The essence of an ISO 9000-based quality system is that all activities and handling must be established in procedures, which must be followed by ensuring clear assignment of responsibilities and authorities.

2.1. Reasons the food safety implementation differ between countries

Table 1 below discusses the differences applying food safety standard based on three regions. Data collections involves European Union (6 countries), Mercosur (3 countries) and African Caribbean Pacific -ACP (3 countries). The importance of the data in this paper is to address the reasons of differences in applying food safety standard, which the author can use to harmonize the standard use in developing countries.

Table 1. Food quality standards in three different regions and categories.

Regions	Category
European Union (EU)	Industrialized countries
Mercosur	Emerging economy countries
African Caribbean Pacific (ACP)	Least developed countries

The data collected is in three meetings, which ended in 2005. The meeting between countries focus on the quality and safety of food information (Trienekens and Zuurbier, 2008). From the data findings, EU countries generally practice GAPs and Good Health Practices (GHP) in primary production; Mercosur, food industrial are complied with GAP or GHP for international quality and safety demands as export-oriented producers. A number of large export-oriented vegetables and fruit producers follow Eurep-GAP or Eurep-GAP-like standard. In ACP countries, GAP/GHP is only applied by very few export oriented farms. Only a few large food productions that deliver directly to Western supermarkets applied Eurep-GAP or Eurep-GAP-like standards.

Table 2 shows the limitation and opportunity on applying food quality and safety standards in these three regions.

Table 2. Limitation and opportunities regarding application of food quality and safety standards in these region.

Region	Limitation	Opportunities
European Union (EU)	Lacking consumer knowledge	Provision of product information
	Insufficient risk communication	Monitoring safety and quality of food
	Low dissemination R&D knowledge	Innovative products and packaging and niche markets
Mercosur	Uneven income distribution	Design of coordinated subsystems
	Harmonization of standards	Standards harmonization (PP) within and between Mercosur countries
	Lack of coordination (horizontal and vertical)	Improvement of inspections and enforcements
	No or too few laboratories	Investments in infrastructures
African Caribbean Pacific (ACP)	Low investments in transportation and storage	Improvements in feed and feeding system
	Lack of legal framework	PP development of standards

The outcome in table 2 supports the dilemma faces by developing countries. Limitations in EU region focus on consumer-related topics; which emphasized on traceability and labelling systems, on where consumer perspective is important. To fulfil the consumers' desire, the researcher suggested that the food industries to get involved in developing innovative products, such as organic products and packaging materials. Researcher also suggested improving communication on safety and quality in the chain in order to fulfil the gap on R&D knowledge.

Limitations of Mercosur focus on developing new markets, both national and internationally. Due to unequal income division requirements in different market segments, Mercosur countries have extensively depend on home markets. The researcher commented the region is in the process of awareness and adoption of quality and safety regulations both for government as well as for the business. In this regard, the food safety requirement is influenced by international trade.

ACP countries limitations are in the stage of discovering the importance of food quality and safety food. The researcher alleged that the building of facilities to improve quality regulations and the building of government structures to ensure quality and safety of products are key points of attention. Investments in (cooled) transportation and storage are necessary to effectively participate in international trade. The governments must encourage financial institutions to reward credit to farmers and play a facilitating role by providing market information, education and establishment of standards.

Based on the table above, limitation occurs in developing countries are close to emerging countries and least develop countries. EU countries with regard to food safety and quality have well-established industry standards and are now focusing on communication of quality and safety aspects to consumers. Mercosur (emerging economy) countries are in the phase of implementation and harmonization of food quality and safety standards, while ACP (developing) countries are still struggling with the establishment of the right (infrastructural) conditions to enforce food quality and safety of their products. Developing countries need more support from Food Agriculture Organization (FAO) and World Health Organization (WHO) in terms of technical assistance, which may boost the development of food safety systems.

3. Conclusion

In the development process of the food safety standard in industry, private safety and quality standards are beneficial to the food industries. The management of food industry in developing countries may decide which food safety standard may suit their production and path should the company export their products. As we knew that food safety standards vary across countries due to changes in diets, income levels, different tastes and consumers' perceptions, developing countries need to overcome these barriers and develop capability to guarantee the safety of the food products. By doing that, consumers' confidence will be increased.

A well-coordinated food safety management may generate international competitiveness and awareness in the global arena. In terms of the cost matter, improvements in food safety will not occur without significant market incentives. In addition, it will engender more confidence among consumers' perceptions towards food product. This is evident, considering the efforts to analyze the company's processes, to develop alternatives and implement the changes.

Further research need to be done in order to place developing countries in one stage with develop and industrialized countries. To harmonized, the safety standard need an extra effort and collaboration among food industrial and government sectors. Besides, the benefits will come back to consumers and the nation in general.

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References

- Athukorala, P., & Jayasuriya, S. (2003). Food safety issues, trade and WTO rules: A developing country perspective. *World Economy*(pp1395-1416). UK: Blackwell Publishing Limited.
- Chemnitz, C. (2011). The compliance process of food quality standards on primary producer level: A case study of the EUREGAP standard in the Moroccan tomato sector. *Food Policy*.
- Escriche, I., Domenech, E., Baert, K., (2006). Design and implementation of an HACCP system. Safety in the agri-food chain. Wageningen Academic Publishers, Wageningen.
- Fagotto, E. (2013). Private roles in food safety provision: the law and economics of private food safety. *European Journal of Law and Economics*, 37, 83-109
- Gibbon, P., & Ponte, S. (2005). Trading down Africa, value Chains and the Global economy. Temple University Press, Philadelphia.
- Giovanucci, D., & Reardon, T. (2001). Understanding grades and standards and how to apply them. A guide to developing agricultural markets and agroenterprises. The World Bank, Washington
- Hartman, H., H. (2005). Food safety from a consumer perspective: The Hartman group pulse report
- Henson, S., & Loader, R. (2001). Barriers to agricultural exports from developing countries : The role of sanitary and phytosanitary Requirements. *World Development*, 29(1), 85–102.
- Henson, S., & Jaffee, S., (2006). Food safety standards and trade: Enhancing competitiveness and avoiding exclusion of developing countries. *The European Journal of Development Research*, 18:4,593-621
- Lamuka, P.O., (2014). Challenges of developing countries in management of food safety. *Encyclopedia of food safety*, (4), 20-26
- Luning, P.A., Marcelis, W.J., & Jongen, W.M.F., (2002). Food quality management: A techno-managerial approach. Wageningen Academic Publishers.
- Mensah, L.D., & Julien, D., (2011). Implementation of food safety management systems in the UK. *Food Control* 22, 1216-1225.
- Nugroho, A., (2014). The impact of food safety standard on Indonesia's coffee exports. *Procedia Environmental Sciences* 20, 425-433.
- Sharifa Ezat, W.P., Netty, D., & Sagarin, D. (2013). Paper review of factors, surveillance and burden of food borne disease outbreak in Malaysia. *Malaysian Journal of Public Health Medicine*, 13(2), 98
- Trienekens, J., & Zuurbier, P. (2008). Quality and safety standards in the food industry, developments and challenges. *International Journal of Production Economics*, 113, 107–122.
- Unnevehr, L. (2014). Food safety in developing countries: Moving beyond exports. *Global food security*.
- Vellema, S., Boselie, D. (2003). Cooperation and competence in global food chains. Perspectives on food quality and safety. Shaker publishing, Maastricht.
- WHO (2007). Countries urged to be more vigilant about food safety <http://www.who.int/mediacentre/news/releases/2007/pr39/en/>
- WHO (2014). Dioxins and their effects on human health. <http://www.who.int/mediacentre/factsheets/fs225/en/>