ADI Journal on Recent Innovation (AJRI)
Vol 1 No. 1 September 2019

p-ISSN : 2685-9106
e-ISSN : 2686-0384

Strategies of Food Safety Program Improvement to Prevent Food Poisioning Outbreak At Oil & Gas Industrial City

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Author Notification
02 September 2019
Final Revised
03 September 2019
Published
03 September 2019

To cite this document:
Kholil, K., Sulistyadi, K., & Arlan, S. (2019). STRATEGIES OF FOOD SAFETY PROGRAM IMPROVEMENT TO PREVENT FOOD POISIONING OUTBREAK AT OIL & GAS INDUSTRIAL CITY. *ADI Journal on Recent Innovation (AJRI)*, *1*(1), 46-53.

DOI:
https://doi.org/10.34306/ajri.v1i1.99

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Abstract

Nowadays, The food safety issue is a major problem which is related to the people's health, livelihood, and the national economy. However, food safety incidents occur frequently in recent years. These incidents bring the blow for the consumer's confidence and it leads to the crisis of trust. These incidents not only affect the health and the safety of the consumers, but also affect seriously the health development of the food industry. Consumers require the higher requirement for the safety degree of the food. In order to reduce the occurrence of the food safety issue and ensure the quality of life, it is necessary to evaluate the food safety program implementation. Food safety program is an important barrier to prevent any food poisoning outbreak and issue in oil & gas industrial city. The purpose of this study is to determine the most priority and most important of food safety program in oil & gas industrial .Data analysis method used is descriptive analysis based on expert justification and assessed using SAST (Strategic Assumption Surfacing & Testing) and AHP (Analytic Hierarchy Process). The result of SAST analysis shows that program inspection and monitoring to food service facilities (food producer) is most certain and most important. Based on assessed by AHP analysis, the first priority of food safety program is also inspection & monitoring with a value 0.275, followed by food safety training (0.207), campaign & awareness (0.184), HACCP system (0.136), public involvement (0.108) and the last is law enforcement (0.090). The consistency value ratio (CR) is 0.01 less than 0.1.

Key word : Food Safety, SAST, AHP, Food Poisoning outbreak.

I. INTRODUCTION

In the last few decades, the problem of food poisoning outbreak and the issue of food safety in the world has increased due to the increasing incident of food poisoning. According to the report published by the World Health Organization in 2015, An estimated 600 million – almost 1 in 10 people in the world – fall ill after eating contaminated food and 420 000 die every year, resulting in the loss of 33 million healthy life years. The report includes estimates of the burden of foodborne diseases caused by 31 bacteria, viruses, parasites, toxins and chemicals.

Most of this food poisoning outbreak is because food is contaminated by microorganisms, chemical and other food material during production. In order to prevent any food contamination, the food service company must comply with food safety standards and regulations starting from selecting raw material, proper storage & segregation, hygienic processing and safe food services. According to WHO (2016) the main cause of food poisoning is food contaminated by microorganisms in food due to improper food safety programs in production. Moreover according to Makhunga *et al,* 2018 studies show that outbreaks of food-borne diseases result from failure to observe general hygiene requirements in one or more of the following activities, namely: food handling; storage; preparation; processing; cooking; and distribution. Factors such as lack of basic infrastructure, poor hygienic practices, inadequate sanitary facilities, improper handling and storage of food and food utensils, poor personal hygiene, improper waste storage, and disposal can contribute to poor quality of foods.

The oil and gas industrial city in this research is an industrial complex area for oil and gas producer companies, specifically for natural gas based industries that produce gas products and their derivatives from the natural gas produced. The Oil & gas industrial city provided infrastructure including common service corridors for gas pipelines, utility pipelines, power & telecom; commercial complex, camp accommodation, conservation-green belt areas; and also support services such as Fire Services, building security, emergency response Services. The total population in the industrial city is around 35 000 workers who stay in camp accommodation. All food supply by catering companies which have approval from HSSE industrial city and there are 3 catering service companies. Every year there are always reports of suspected cases of food poisoning in the industrial area. Symptoms of food poisoning can begin sometime after eating up to three days after consuming contaminated food. Symptoms that generally occur such as feeling nausea and vomiting, diarrhea, pain or stomach cramps. According to the annual HSE report 2019 in oil & gas industrial city there were reported cases of suspected food poisoning illness around 100 workers out of a total of 40 000 workers each year from 2015 to 2018.

The consequences of food poisoning outbreak in the oil & gas industry are an outbreak and massive illness that can disturb the project or operation in the company; the illness can lead patients to die and can make a bad reputation for the food service company. The barrier factor to prevent the threat of food contamination is implementation of food safety programs and standards. Sporadic and distracted implementation of food safety programs in oil & gas industrial causes is effective to prevent any food poisoning outbreak. Prevention of food poisoning outbreak involves many partners and parties including food safety regulator, food business and customer.

Research by Cortese, Veiros, Feldman and Cavalli (2015) in Brazil, regarding Food safety and hygiene practices during the chain of street food production indicated a need for improvement of the environment conditions at these sites to prevent foodborne diseases due

to the food producer not following food safety standards. Specific local and national laws for street food need to be created to protect the consumer and continuous training of vendors could help address the lack of food quality and safety.

The prevention program of food poisoning outbreak in the oil & gas industry is one of key factors and importance as a business continuity aspect. This research would describe and determine food safety programs which can prevent food poisoning outbreak effectively and at low cost. An appropriate food safety program strategy and focusing on targets according to priorities in the prevention of food poisoning will help oil and gas companies in the region to keep workers healthy and safe.

The purpose of research is to determine the most priority and most important of food safety program in oil & gas industrial city and to select the most effective strategy to prevent any food poisoning outbreak.

II. LITERATURE REVIEW

Food poisoning is an acute illness with recent consumption of contaminated food or water. It can be infectious or noninfectious. Infectious food poisoning is caused by eating food or water contaminated by bacteria, viruses, parasites or their toxins. It is also called a foodborne disease. The most common symptoms of food poisoning are nausea, vomiting, abdominal cramps and diarrhea. Other symptoms that may occur are fever and abdominal pain. The case an outbreak of foodborne disease is defined as the occurrence of two or more cases of a similar illness resulting from ingestion of a common food (CDC, 2016)

Studies by WHO 2015 in all the world have shown that approximately 90% of foodborne diseases are caused by microorganisms. 6% of food diseases are caused by chemicals and the remaining 4% are caused by physical factors. According to Sprenger. RA (2011) the main reasons for food poisoning are negligence, ignorance, poor management and a failure to implement food safety & hygiene programs. Food poisoning can be prevented by developing good food safety programs in all food businesses. This involves effective supervision and the instruction and training of food safety.

Food safety means assurance that food is acceptable for human consumption according to its intended use and Food Safety Management System means the adoption of Good Manufacturing Practices, Good Hygienic Practices, Hazard Analysis and Critical Control Point (HACCP) and such other practices as may be specified by regulation, for the food business. Food safety is a global issue affecting billions of people who suffer from diseases caused by contaminated food. This is one of the most widespread health problems and an important cause of reduced economic productivity. Food safety can be described as the voluntary approach by some socially conscious and responsible companies that encourage the development, implementation and maintenance of HACCP based programs in all food related establishments and grading stations for which external monitoring and verification programs are to be properly established (Ansari et al., 2013)

According to Hajnalka (2014) food safety is quite complex, made up by many components, only an integrated authority being responsible for the whole food chain – would be able to control it properly. However, the requirement of proper functioning could be only reached within a framework of a well-defined and specified statute basis. It means for controlling and guaranteeing the monitoring process by the authorities.

Food safety fact that foodborne diseases delay socio economic development by straining health care systems, and harming national economies, tourism and trade. Good collaboration between governments, producers and consumers helps ensure food safety. The Second International Conference on Nutrition (ICN2), held in Rome in November 2014, reiterated the

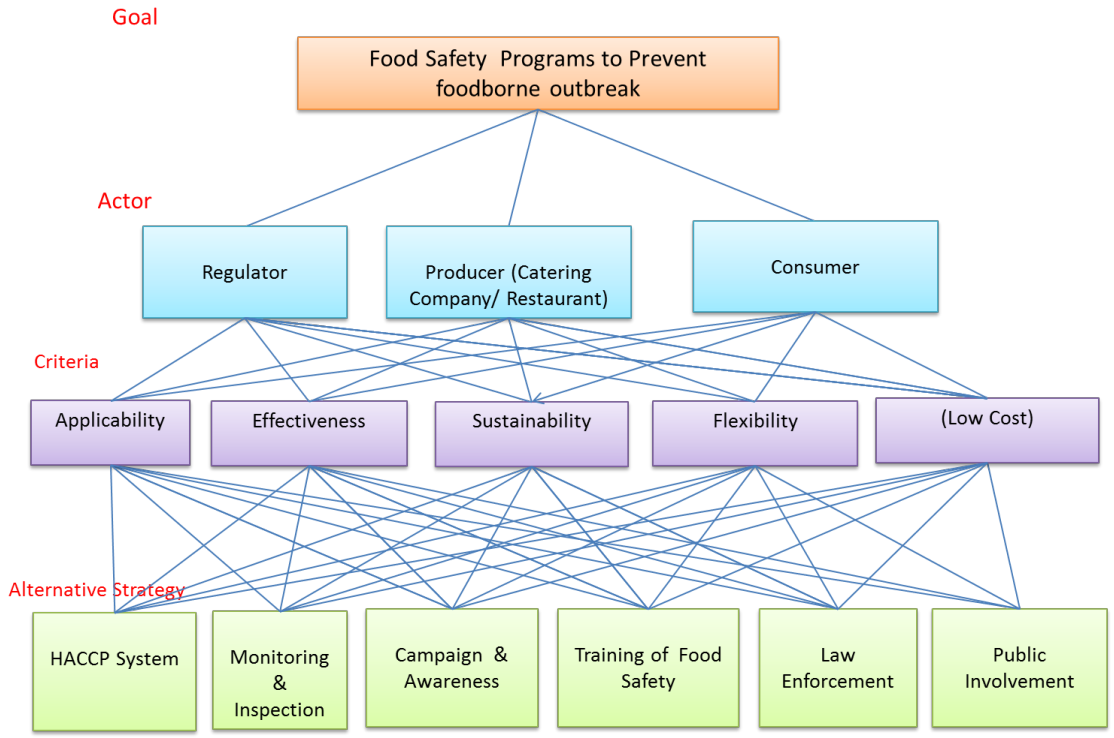
importance of food safety in achieving better human nutrition through healthy nutritious diets. Improving food safety is thus a key in achieving Sustainable Development Goals. Governments should make food safety a public health priority, as they play a pivotal role in developing policies and regulatory frameworks, establishing and implementing effective food safety systems that ensure that food producers and suppliers along the whole food chain operate responsibly and supply safe food to consumers. In this regard, governments, the food industry and consumers have a shared responsible to adopt the best practices for the control of food safety hazard (WHO, 2016)

Food safety is a critical component for sustainable development. Safer food contributes to less illness, and hence increased productivity and improved livelihood. Safe food, conforming to international food safety standards, contributes to increased export, hence, increased income. Consistent food safety and high food quality are essential ingredients for the success of any food business. The Food Safety Program is vital for a successful food business. If your customer service provides your customers' first taste of your business, food safety and food quality are the aftertaste and what will linger as a memory. When used as a proactive strategy to add value to your food business' service and reputation, a Food Safety Program can bolster your business' efficiency, streamline its waste, and prevent food safety hazards that could harm your business. (WHO, 2016)

III. METHOD

The type of research are non-experimental research and descriptive qualitative uses expert justification (expert base). The opinion from five experts through questionnaire regarding level of certainty and importance of food safety program, and also to make priority as well through using SAST and AHP analysis. Kholil (2018) stated that SAST can be used to identify the most important and certain aspects. The data consists of primary and secondary data. Primary data obtained through observation, questionnaire and interview, while secondary data obtained through literature study. Data was collected by experts discussion and question are which involved five expert in food safety (Health & Hygiene Advisor, Food Hygiene Officer, Restaurant Supervisor, Health & Hygiene Inspector and Industrial Hygienist). Data analysis through SAST (Strategic Assumption Surfacing and Testing) method which was developed by Mason and Mitroff (1981), and AHP (Analytical Hierarchy Process) developed by Saaty (1983). SAST was selected to determine basic assumptions which must be considered in food safety program. This analysis is based on response to question are from experts, while AHP to determine the appropriate strategy based multicriteria, by using AHP the best strategy can be selected Kholil, Sri Lisa Susanti, & Soecahyadi. (2016); and Kholil, Kohar Sulistyadi and Diny Agustiny (2017) . Prioritizing the strategy is carried out using the Analytic Hierarchy Process (AHP) method. According on experts discussion generally AHP structure as follow:

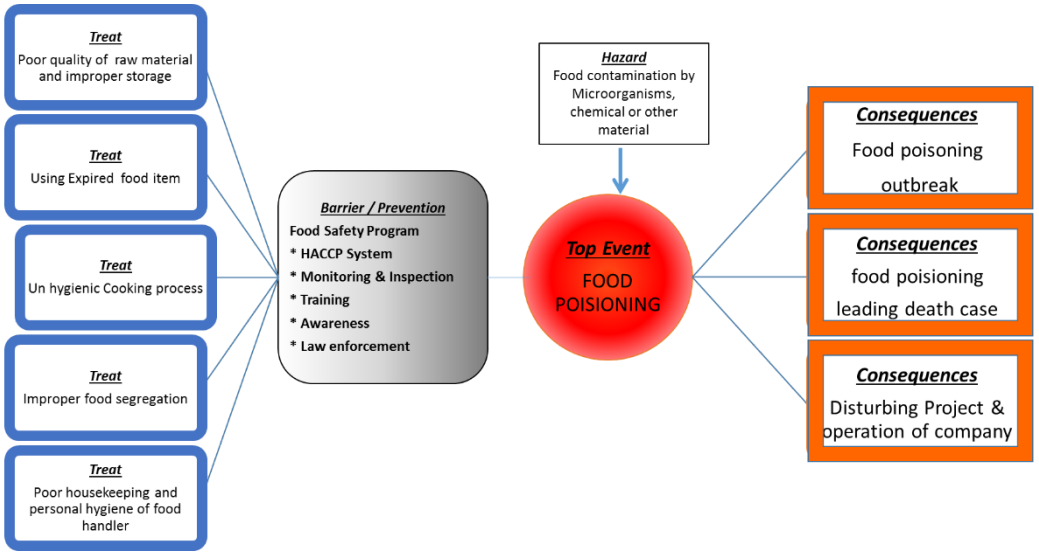
p-ISSN : 2685-9106
e-ISSN : 2686-0384



Picture 1.AHP structure of Food Safety Program

IV. RESULT AND DISCUSSION

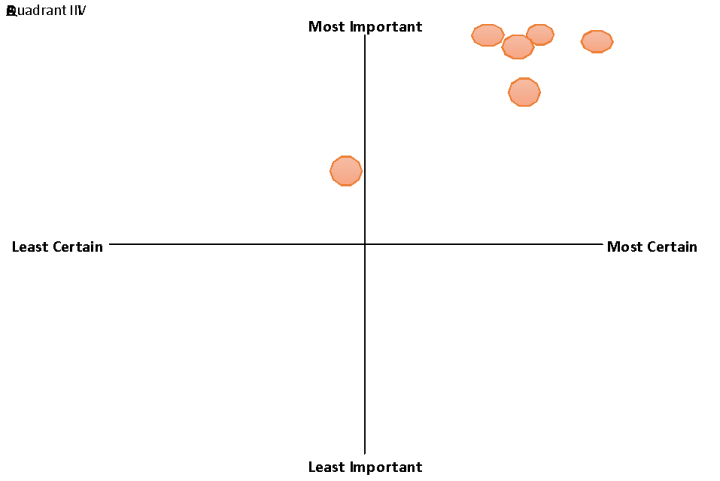
Based on observation, interviews and expert discussion find the model of Food poisoning qualitative risk assessment at Oil & Gas industrial city area as shown in picture 2. :



Picture 2. Model of Food poisoning risk assessment at Oil & Gas industrial city area

In this risk assessment qualitatively mode shows the hazard is food contaminant; Top event is food poisoning; The consequences are massif food poisoning outbreak, death, disturbing operation/business; The Threats are poor quality of raw material, using expired items, improper storage & segregation, unhygienic & unsafe cooking process, poor housekeeping of facility and poor personal hygiene of food handler; And Barrier as a prevention of the hazard are implementations of food safety program include HACCP system, monitoring & inspection, training, campaign & awareness, and law enforcement.

The result of expert justification regarding certain and importance level of food safety program using SAST analysis displayed as below:



A	Implementation & Audit of HACCP system at Food Producer
B	Inspection & monitoring to Food producer by regulator
C	Campaign & Awareness of Food Safety
D	Education & Training
E	Law Enforcement
F	Public involvement (suggestion & complaint)

Picture 3. SAST Analysis of Food Safety Programs

As per picture above and based on the SAST analysis plot on the assumption of a food safety program are almost all in quadrant II which mean importance and certainty for shows the programs are important and certain for prevention any food poisoning outbreak in the gas and oil industry area. Except public involvement program in quadrant I which mean the program is important but not certain for preventing any food poisoning. Outbreak to prevent any food poisoning outbreak in the gas and oil industry area. The SAST analysis plot shows that the inspection and monitoring program of all food establishment by the HSE Department as a regulator is the highest assumption of certainty value (5.7) and its importance (5.7), then followed by HACCP implementation & audit; Training on food handling; Campaign & Awareness program; and a law enforcement. All programs that are in quadrant II are proposed and ensure the food production facilities always during the preparation and process of food production in safe and healthy condition in order to minimize the food contamination that can lead to food poisoning outbreak.

The reason chosen AHP to select strategic priorities of food safety programs is that AHP has high flexibility, the ability to accommodate the complexity of the existing problems and accommodate differences of opinion from experts. Based on the results of expert discussions then analyzed using Expert Choice 11 software will show the highest value given for actor and criteria is mean highest influence and weight. The highest value for strategy alternative is considered the most the priority of a food safety program, the strategy with respect to actor and criteria. The result AHP analysis for weighing and influence actor for succeeding food safety program shown below:

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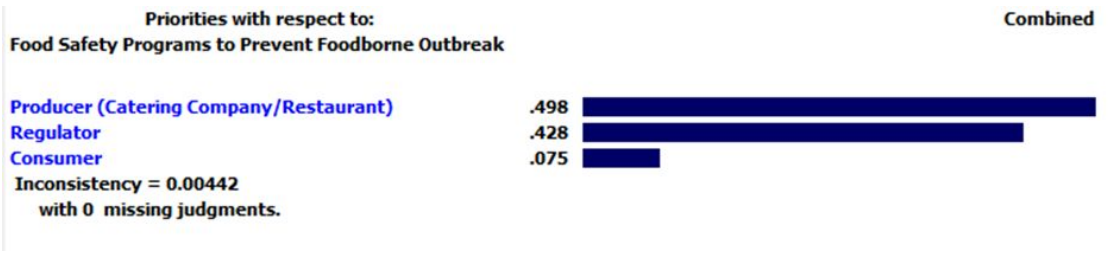
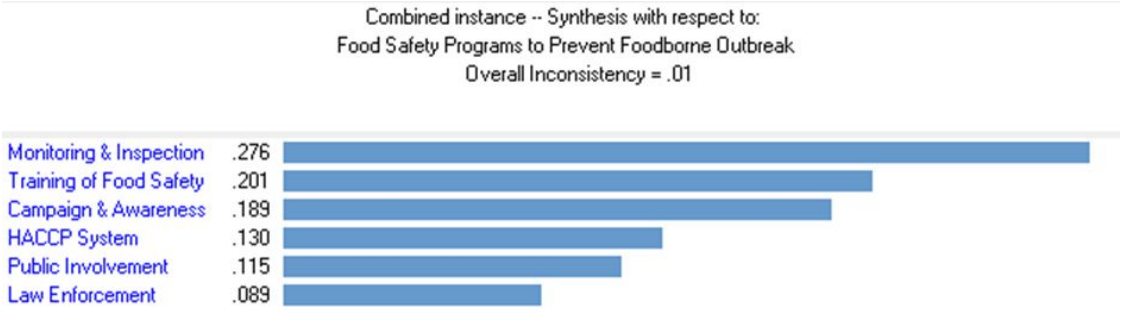


Picture 4. AHP result with respect to Actor

As per the picture above, the food producer is the most influential and weighs actors with a value of 0.498, followed by regulator (0.428) and consumers (0.075). Also shown in the picture above the consistency value ratio (CR) is 0.004 (0.4%) less than 10% and this means the data is considered consistent and logical. In other words, the food producer is the most influential actor in implementing a food safety program to prevent any food poisoning outbreak in the oil & gas industrial city area.

The strategy alternative to improve the safety program as prevention of food poisoning outbreak at oil & gas industrial city area as per expert justification and result AHP analysis respect to global/combined priorities, actors and criteria can be seen below picture:



Picture 5. Alternatives Strategy based on AHP analysis for Food Safety Program

Based on picture above shown Food safety program monitoring & inspection to food producer (0.276) is the highest priority program, then followed by food safety training (0.207), campaign & awareness (0.184), HACCP system (0.136), public involvement (0.108) and the last is law enforcement (0.090). Also seen in the picture above, the consistency value ratio is 0.01 (1%) less than 10% means the experts' justification/opinion are considered logic and consistent.

Food safety program monitoring and inspection as the first priority are considered respect to criteria effective and low cost program to prevent food poisoning outbreak in oil & gas industrial city area. Moreover, the monitoring & inspection program is activity to ensure that food producers comply with food safety standards and regulations. According to WHO (2017), Food safety regulatory authorities are tasked with safeguarding consumers interests by ensuring food they eat meets relevant food standards. Sound food safety policies and program are required to ensure food safety issues of highest concern are identified, and the appropriate control measures are implemented

However law enforcement programs are the last priority, might be the program is less effective and not sustain prevent cases of food poisoning outbreak. Besides that the food safety program at oil & gas industrial city area as safety culture for all activity at food producer

IV. CONCLUSION

Food safety programs are important activities to prevent any case of food poisoning outbreak at oil & gas industrial city areas caused by food contamination. Implementation of food safety programs such as HACCP system; Inspection & Monitoring; Food Safety Training; Campaigns & Awareness, Law Enforcement and public involvement should be applied consistently by regulator and food producers.

The result from the SAST analysis plot shows that program inspection and monitoring to food service facilities (food producers) is most certain and most important. Based on assessed by AHP analysis, the first priority of food safety program is also inspection & monitoring with a value 0.275, followed by food safety training (0.207), campaign & awareness (0.184), HACCP system (0.136), public involvement (0.108) and the last is law enforcement (0.090). The consistency value ratio (CR) is 0.01 less than 0.1. This meant the justification and opinion of experts are considered logic and consistent.

IV. SUGESSTION

To improve the monitoring & inspection food safety as first priority program more effective & sustain to prevent food poisoning outbreak is recommended to implement comprehensive monitoring & inspection based on risk (risk based inspection) for all food establishments. Moreover, the results of the inspection and monitoring program also can be assessed compliance level and can be used to give reward programs for food establishments which consistently apply food safety standards & practices.

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