

Child Health Improvement through Implementation of Food Safety Model

Upaya Peningkatan Kesehatan Anak melalui Penerapan Model Keamanan Pangan

Arief Safari, Machfud, Eriyatno, Heny Kuswanti Daryanto

Graduate Program School of Business, Bogor Agricultural University, Bogor, Indonesia

DOI: <http://dx.doi.org/10.21109/kesmas.v10i4.690>

Abstract

Food is the most important basic human need, in which its fulfillment becomes major component of human right to embody qualified human resources in Indonesia. However, there have been some problems to embody it, such as food safety problem with percentage of foodborne illness case that remains high. This study aimed to analyze the situation of Street Food for School Children (SFSC) safety practice nowadays and select the most effective and efficient food safety model alternative implemented on Micro and Small Enterprises (MSE) in order to improve food safety performance, so child health improvement may occur. This study was conducted in the second quarter until the early third quarter of 2015 through field survey and expert survey by taking case study in elementary school environment. Field survey involved 102 respondents was conducted to enable situational analysis and expert survey was conducted to select the most effective and efficient food safety model implemented in SFSC MSE with Analytical Hierarchy Process. Field survey results showed 91% school child respondents ever suffered from health disorders after consuming SFSC. Moreover, 100% SFSC MSE respondents did not wear masks nor gloves before producing food/beverage, 62% still used nearby well water as water source for SFSC production and 86% used Food Additives. Expert survey results showed Five Keys to Safer Food model selected as the most effective and efficient food safety model implemented in SFSC MSE.

Keywords: Food safety model, street food for school children, micro and small enterprises, street food

Abstrak

Pemenuhan akan pangan merupakan komponen dasar untuk mewujudkan sumber daya manusia yang berkualitas. Namun, masih terdapat permasalahan dalam mewujudkannya, di antaranya masalah keamanan pangan dengan persentase kasus keracunan makanan masih tinggi. Penelitian

ini bertujuan untuk menganalisis situasi pelaksanaan keamanan Pangan Jajanan Anak Sekolah (PJAS) yang ada saat ini dan memilih alternatif model keamanan pangan yang paling efektif dan efisien diterapkan di usaha mikro kecil (UMK) guna meningkatkan keamanan pangan yang dihasilkan sehingga terjadi peningkatan kesehatan anak. Penelitian dilakukan pada kuartal II tahun 2015 sampai dengan awal kuartal III tahun 2015 melalui survei lapangan dan survei pakar dengan mengambil studi kasus di lingkungan sekolah dasar. Survei lapangan melibatkan 102 responden untuk memungkinkan dilakukannya analisis situasional dan juga survei pakar untuk memilih model keamanan pangan yang paling efektif dan efisien untuk diterapkan pada UMK PJAS dengan *Analytical Hierarchy Process*. Hasil survei lapangan menunjukkan 91% responden anak sekolah pernah mengalami gangguan kesehatan setelah mengonsumsi PJAS. Selain itu, 100% responden UMK PJAS tidak menggunakan masker dan sarung tangan sebelum mengolah makanan/minuman, 62% masih menggunakan air sumur sebagai sumber air untuk produksi PJAS dan 86% menggunakan Bahan Tambahan Pangan. Hasil survei pakar menunjukkan model Lima Kunci Pangan Aman terpilih sebagai model keamanan pangan yang paling efektif dan efisien diterapkan pada UMK PJAS.

Kata kunci: Model keamanan pangan, pangan jajanan anak sekolah, usaha mikro kecil, jajanan

Introduction

In consideration on the Act No. 18 of 2012 concerning food, food is defined as the main basic need of human. Food compliance is part of human rights guaran-

Correspondence: Arief Safari, School of Business Bogor Agricultural University, Raya Padjajaran Street Bogor Indonesia 16151, Phone: +62251-8515815, e-mail: safari2606@gmail.com

teed in The 1945 Constitution of the Republic of Indonesia as a basic component to embody qualified human resources. Indonesia's food system should be continuously developed following human population development and its various demands. The country's food system is not only demanded to provide food product supplies with adequate amount and nutrition, but also safe. By the more increasing social status and education of people, there will be an increasing awareness of people toward the importance of quality, nutrition and food safety in order to maintain fitness and health of people.¹

Food safety problem because of foodborne illness continuously becomes a global issue in which there are about 76 million cases in the United States and 70,000 cases in the United Kingdom every year.² Beside due to still many foodborne illness cases found, this food safety problem is also due to the low level of producers' food knowledge and responsibilities as well as the low level of consumers' awareness concerning food quality and safety. Moreover, it is because of many food products that do not meet any requirements of food quality and safety, such as the use of excessive Food Additives, dangerous chemical impurities, pathogenic impurities and no expired date listed.

In Indonesia, strategic value of quality, food nutrition and safety has formally become the government's concern since the issuance of the Act No. 7 of 1996 as amended by the Act No. 18 of 2012 concerning Food. Although there has already been the Act regulating this food safety issue, the best practice of food safety is not yet effectively performed, especially on small and medium food industries because of less monitoring action from the related authority. This affects many small and medium food industries disobey the rules. For instance, there were many street food for school children that did not meet the requirements of food safety in Batu City because of the use of prohibited harmful substances, such as formaline (71.4%), borax (25.5%) and rhodamine B (18.5%).³ Meanwhile, based on Street Food for School Children (SFSC) monitoring regularly conducted by The National Agency of Drug and Food Control or *Badan Pengawas Obat dan Makanan* (BPOM), the level of unqualified SFSC products was around between 40 – 44% within 2008 – 2010.⁴

Efforts to decrease number of unqualified SFSC can be performed by implementing food safety management in Micro and Small Enterprises (MSE) of SFSC. Results of survey on food Small and Medium Enterprises (SME) in Europe showed that although implementation of food quality management, such as Hazard Analysis and Critical Control Point (HACCP), International Food Standard (IFS) and ISO 9001 were not completely performed, it provided benefits.⁵ Such benefits obtained were in the forms of cost reduction, costumers' com-

plaints, increase of productivity and profit.

Based on the Act No. 18 of 2012 concerning Food, food industries including MSE of SFSC shall guarantee food safety produced. Therefore, MSE of SFSC need to implement food safety that may provide benefits in order to guarantee safety for SFSC produced. Common weaknesses of small industries are limited capital, not having certain management and business planning, using simple equipments, lack of commitment and business ethics, high dependency and lack of information access.⁶ Therefore, it needs alternative of effective and efficient food safety management model that can be implemented on SFSC MSE.

Until now, study conducted in relation to food safety is still limited, even study related to food safety model on SFSC MSE is not yet conducted. Several studies have been conducted, for example, Wibawa conducted study concerning bacteriological contamination on elementary school's street food and its influencing factors in Tangerang District.⁷ Kristianto examined assessment of school children's street food quality and identified factors which determined food product choices in Batu City.³ Another study was conducted by Syah *et al*,⁸ related to root of SFSC safety problem in meatballs, snacks and noodles. However, the existing studies do not lead to find the way to solve foodborne illness case.

On the other hand, the urgency is already at very high level because based on BPOM data, there was a tendency of increasing extraordinary incidence of foodborne illness in Indonesia from 26 cases with 1,187 sufferers and 19 died in 2001 to 184 cases with 18,949 sufferers and 49 died in 2005.^{7,9} Therefore, this study aimed to analyze situation of SFSC safety practice by the existing MSE nowadays and to select the most effective and efficient food safety management model implemented in SFSC MSE within such situation. Situational mapping and selection of the most effective and efficient food security model alternative implemented on SFSC MSE will be helpful for any following study related to designing MSE development system in assuring SFSC safety.

Method

This study is the first stage of a study set to design Micro and Small Enterprises Empowerment System for Ensuring Street Food for School Children Safety by using Soft System Methodology approach.¹⁰ Design of this study was conducted through stage of need analysis, situational analysis and food safety management model selection. Stage of need analysis was conducted through literature study and interview. Based on results of the need analysis, situation of SFSC safety practice was identified through field survey at situational analysis stage. Based on the results of situational analysis, the stage of alternative selection of the most effective and efficient food safe-

ty management model implemented in SFSC MSE was conducted.

Objects of this study were street food vendors that produced and sold SFSC to elementary school environment with definition of SFSC as instant food traded in school environment. Location of the study objects was elementary school considering that elementary school children were not yet mature in selecting safe SFSC to be consumed, so they were at risk of suffering from foodborne illness. Stakeholders limited to the ones that directly interact with the interest of SFSC safety. They were street food vendors, teachers, students' parents and students.

Situational analysis was conducted by taking case study in six elementary schools in Bekasi City, both state elementary school, private elementary school and *Ibtidaiyah*/Islamic elementary school environment, each with rural and urban typology. The selected elementary schools were the result of consultancy and recommendation from Bekasi City Educational Agency. This study involved respondents as actors directly related to SFSC, such as MSE as producers and hawkers of SFSC, school children as SFSC consumers, teachers and parents. This study was conducted in the second quarter of 2015 until the early third quarter of 2015 through field survey and expert survey.

Descriptive statistic was used as analytical tool to describe the situation and condition of SFSC safety practice nowadays. Frame of sampling used in selecting both elementary school and respondent objects was purposive sampling because the role of field survey in system approach was only to capture factors or elements of the existing food safety system holistically in order to examine its system behavior and not to make a conclusion.¹¹

Analytical Hierarchy Process (AHP) is used in selecting food safety management system model alternative through expert survey.¹² AHP technique was developed by Dr. Thomas L. Saaty to organize information and experts' perspectives in selecting the most favorite alternative.¹³ AHP work principle is simplification of a complex problem which is not structured strategically and dynamically to become such organized parts in a hierarchy. The interest level of every variable is given numerical score subjectively about the important meaning of the variable and relatively compared to other variables with score 1 for which has the "equal" score, maximum at score 9 for the "absolutely more" and minimum at score 1/9 for the "absolutely not more" or another numerical score in between. Based on many considerations, synthesis was then conducted to determine variable that had high priority and role to influence results on such system.¹³

The presented data processing results included facts of SFSC safety practice at Bekasi City elementary schools and results of food safety management model alternative determination obtained from AHP analysis through expert survey based on the available food safety management model alternatives.

Results

Field Survey

Field survey was conducted by purposive sampling at six elementary schools and 102 respondents with distribution as Table 1. Respondents' education background was presented in the following Table 2.

Results of SFSC MSE respondent group showed that the type of food sold was various and the classifications consisted of beverage products (ice *cendol*, instant pack-

Table 1. Distribution of Respondents

| Respondents | Urban | | | Rural | | | Total |
|-------------|--|--|--------------------------------------|------------------------------------|---|--------------------------------------|-------|
| | Jati Waringin II State Elementary School | At Taqwa 24 Islamic/Ibtidaiyah Elementary School | Al Azhar 9 Islamic Elementary School | Cikiwul II State Elementary School | Nurul Amal 9 Islamic/Ibtidaiyah Elementary School | Dinamika Indonesia Elementary School | |
| SFSC MSE | 5 | 5 | 5 | 6 | 3 | 5 | 29 |
| Students | 4 | 4 | 4 | 4 | 3 | 4 | 23 |
| Teachers | 4 | 3 | 3 | 6 | 3 | 4 | 23 |
| Parents | 5 | 6 | 3 | 5 | 3 | 5 | 27 |
| Total | 18 | 18 | 15 | 21 | 12 | 18 | 102 |

Table 2. Respondents' Education Background

| Respondents | Elementary School | Junior High School | Senior High School | Diploma | ≥ Bachelor Degree |
|-----------------|-------------------|--------------------|--------------------|---------|-------------------|
| SFSC MSE | 52% | 31% | 17% | 0 | 0 |
| School children | 100% *) | 0 | 0 | 0 | 0 |
| Teachers | 0 | 0 | 14% | 18% | 68% |
| Parents | 15% | 22% | 33% | 15% | 15% |

Note: *)The 2nd, 3rd, 5th, 6th grade were 23%, 36%, 23% and 18% respectively

aged ice, iced tea, *es lilin*/ice cut, Indonesian iced fruit cocktail dessert, iced chocolate) by 21%, egg food products (Indonesian sweet thick pancake or *martabak*, omelette/egg rolls, noodles with eggs) by 21%, main course (Indonesian yellow rice, *rames* rice, fried vermicelli, boiled noodles, burger, meatballs) by 17%, Indonesian fried food (Sundanese deep-fried fish dumpling served with peanut sauce or *batagor*, spicy tofu) by 14%, sago food products (sago rolls, fried sago, steamed sago balls or *cilok*, sago balls fried with fresh eggs or *sagu telur basah*) by 14%, cakes (*pancong* cake, *arum manis* cake, macaroni) by 10%, snacks by 3%.

The average net profit gained in a day, 38% of SFSC MSE stated they gained net profit under 50,000 rupiah, 55% stated they gained profit between 50,000 rupiah to under 100,000 rupiah, meanwhile the remaining stated they gained profit over 100,000 rupiah per day. Worth 97% of SFSC MSE worked by themselves, meanwhile the remaining that was *cilok* hawker still worked in a group.

Results of survey on school child respondents showed the reasons those school children bought SFSC that were delicious (65%), nutritious (26%), cheap (22%), the interesting food colors (4%), meanwhile 22% said other reasons. Moreover, 65% of children bought SFSC in the food hawkers around their school and the remaining bought SFSC in their school's canteen.

Study on school child respondents showed that 83% of them ever received counseling concerning SFSC safety, meanwhile 17% of respondents said they never received. This counseling was received from the school party or the teachers (52%) and other parties. Worth 91% of school children respondents said they ever suffered from health disorders after consuming SFSC. However, it was only 41% of parents who got complained by children about such health disorders after consuming SFSC. The study showed that not all parents nor children reported to the teachers about any health disorders as teacher respondents only received 13% complaints regarding health disorders after consuming SFSC.

Worth 62% respondents of SFSC MSE used nearby well water as water source for their production. All respondents of SFSC MSE never wore masks and/or gloves within the process of their food/beverage, but 93% of SFSC MSE admitted that they washed their hands before producing food/beverage. Moreover, 86% SFSC MSE admitted they used Food Additives in which the majority (52%) used it as flavor enhancer. SFSC MSE respondents (93%) produced food/beverage by themselves.

Based on results of study, perceptions of teacher, school child and parent respondents on food safety and hygiene of SFSC MSE were 65%, 44% and 30% respectively saying that SFSC were unsafe. Meanwhile, for the hygiene of SFSC MSE, the respondents were 43%, 26%

and 41% respectively saying that the hygiene of SFSC MSE was bad maintained.

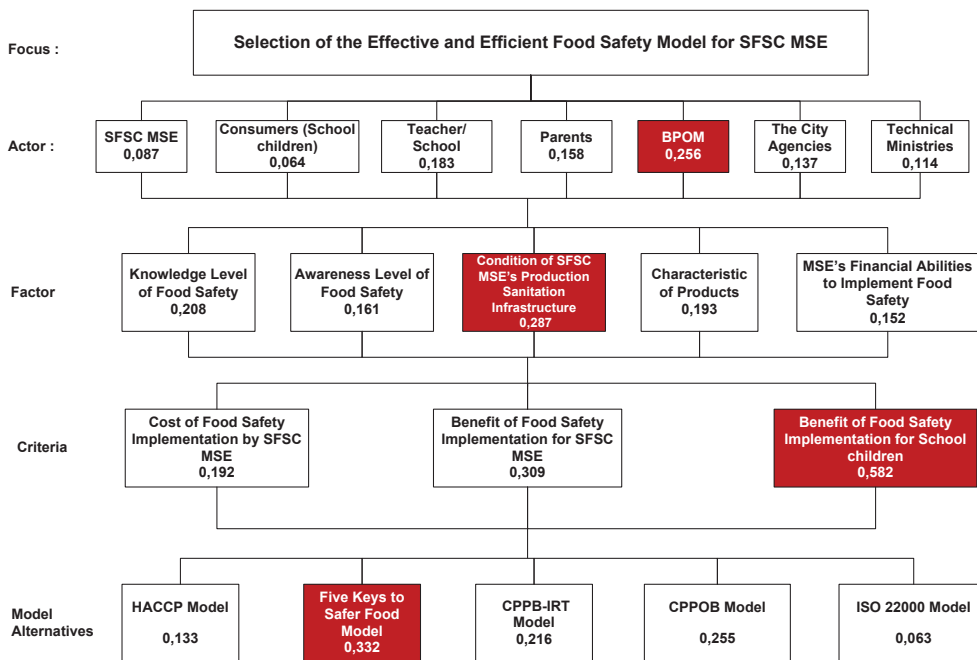
Expert Survey

To select food safety management model as the most effective and efficient model alternative implemented for MSE, survey to eight experts (MSE empowerment expert, management system expert, food expert, auditor of food safety management) was conducted using AHP method. Several food safety model alternatives available in Indonesia including the most basic model of food sanitation hygiene conception as represented in Five Keys to Safer Food model issued by World Health Organization (WHO), Good Food Manufacturing Practices Model for Home Industry (*Cara Pembuatan Pangan yang Baik untuk Industri Rumah Tangga/CPPB-IRT*) regulated by National Agency for Drug and Food Control (BPOM), Good Processed Food Manufacturing Practices (*Cara Pembuatan Pangan Olahan yang Baik/CPPOB*) as regulated by Ministry of Industry, Model of Hazard Analysis & Critical Control Point (HACCP) issued by Codex Alimentarius and ISO 22000 Model issued by ISO. Results of experts' assessments could be seen in Figure 1. Based on results of AHP analysis, Five Keys to Safer Food model was selected as the most effective and efficient food safety management implemented on SFSC MSE based on actors, factors, criteria and model alternative priorities.

Discussion

The important thing found in the results of the study was that 91% of school child respondents ever suffered from health disorders after consuming SFSC. However, mechanism of complaining health disorders after consuming SFSC was less effective in which some children did not report this case to their parents because for parent respondents, it was only 41% of parents who got complaints about health disorders after consuming SFSC. As well as to teachers, not all parents nor children reported to teachers about any health disorders as teacher respondents only received 13% complaints about health disorders after consuming SFSC. This condition showed that counseling of food safety performed by teachers to 83% child respondents was not yet effective to provide information about SFSC safety. This could be acceptable because the increase of knowledge concerning food safety possessed did not necessarily change behavior toward food safety. This was due to any attitude, subjective norms and the feeling of any perceived control behavioral influencing the intention of a behavior further it would influence behavior.¹⁴

Experience of suffering from health disorders above could be caused by any factors including the use of inadequate production facilities, such as the use of well wa-



Notes:
 SFSC: Street Food for School Children (*Pangan Jajanan Anak Sekolah/PJAS*)
 BPOM: National Agency for Drug and Food Control
 LKPA: *Lima Kunci Pangan Aman* (Five Keys to Safer Food)
 CPPB-IRT: *Cara Pembuatan Pangan yang Baik untuk Industri Rumah Tangga* (Good Food Manufacturing Practices for Household Industries)
 CPPOB: *Cara Pembuatan Pangan Olahan yang Baik* (Good Processed Food Manufacturing Practices)

Figure 1. Structure and AHP Results

ter that probably had been contaminated, which potentially caused diarrhea due to the fact that 62% of SFSC MSE respondents used well water as the water source for their food production.¹⁵ Moreover, production process was less hygienic in which all SFSC MSE respondents never wore masks and/or gloves within the process of their food/beverage production although 93% of SFSC MSE admitted they washed their hands before producing food/beverage. Also, it may happen due to the use of Food Additives inappropriate with the standard requirements as 93% of SFSC MSE said that they never received counseling/assistance programs concerning best practices to produce health and safe food/beverage. SFSC MSE (86%) admitted they used Food Additives in which the majority (52%) used it as flavor enhancer. This was in line with most child respondents (65%) bought SFSC because of ‘delicious taste’ reason, so there was a tendency of SFSC MSE, which had low commitment and business ethics, to use excessive Food Additives as flavour enhancer in purpose to make their products sold out.⁶ Counseling/development programs concerning the awareness of food safety and practices to produce safe SFSC needed to be conducted directly to SFSC MSE in order to make them understand and able to produce safe SFSC. This was necessary to be performed because the education level of SFSC MSE was mostly (52%) gradu-

ated from elementary school, therefore their food safety knowledge and practices were still limited as shown by results of study on food hawkers in Malaysia that those having primary school education background/not formally educated had lower food safety knowledge and practices than those attaining diploma or higher education levels.¹⁶

Based on results, such health disorder incidence was also in line with trust level to SFSC that was still low. Perception to food safety and SFSC MSE hygiene was quite low in which teacher, school child and parent respondents (65%, 44% and 30% respectively) said that food products for school children were unsafe, meanwhile worth 43%, 26% and 41% respectively said that SFSC MSE hygiene was bad maintained. This trust level to SFSC MSE security was important because people, both children, parents and teachers could make an appeal not to buy food products for school children at schools or children bring lunch box from home. This definitely would give disadvantage to SFSC MSE.

To solve this problem, it needed to be approached systematically through implementation of food safety management on SFSC MSE in order to make the products safe.⁵ However, with any limitation SFSC MSE had, especially the number of workers (97%) were only self-employed with education levels of SFSC producers/

hawkers who were mostly graduated from elementary school (52%) and the small economic scale in which 93% gained daily net profit under 100,000 rupiah, the most effective and efficient food safety model alternative implemented on SFSC MSE needed to be selected.

Based on results of AHP analysis for the selection of effective and efficient food safety model for SFSC MSE, inconsistency ratio value was under 10%. Thus, the result of this preference comparison was consistent.¹⁷ In the results of AHP analysis as Figure 1, results of expert survey showed that for the aspect consideration of actor, BPOM obtained the biggest value (0.256). Therefore, BPOM was considered playing a role more than teachers/schools, parents, the city government's agencies, technical ministry and consumers in selecting food safety model. BPOM selected as the leading actor in the selection of food safety model implementation on SFSC MSE could be caused by the agency's role within monitoring SFSC in the field was very dominant. Moreover, the consideration probably taken was due to functions of BPOM in accordance with the Act No. 18 of 2012 and Government's Regulation (*Peraturan Pemerintah/PP*) No. 28 of 2004 as the authority responsible to food safety monitoring may influence food safety implementation on SFSC MSE. This was in line with perspectives that organization may take adoption to other organizations because of both formal and informal pressures that could be considered as strength, persuasion or recommendation to follow other organizations including country, organizations or wider community.¹⁸

Consideration of factors influencing in AHP structure is based on proxy of three groups of factors influencing the succeed of implementation of food safety management system including characteristics of employees, production system and characteristics of organization.¹⁹ The factor knowledge and awareness levels of food safety become the proxy of characteristics of employees, condition of SFSC MSE's production sanitation facilities and infrastructure and characteristics of products become the proxy of production system, meanwhile the factor MSE financial abilities to implement food safety becomes the proxy of characteristics of organization.

Condition of SFSC MSE's production sanitation facilities and infrastructure was the more important factor (0.287) in the selection of food safety model than the factors knowledge level of food safety, characteristics of products, awareness level of food safety and MSE financial abilities to implement food safety management. The factor condition of SFSC MSE's production sanitation facilities and infrastructure became the major factor in the selection of food safety model implementation on SFSC MSE due to the very bad condition of SFSC MSE sanitation facilities and infrastructure in Indonesia. This was supported by the results of field survey showing the use

of well water as the main water source for SFSC production and the disuse of gloves and/or masks while producing food products for school children. Moreover, survey conducted by BPOM in 2009 in 18 provinces also showed parameter of hygiene and sanitation facilities and activities became problems for Household Food Industry.²⁰

Level of food safety knowledge became the second factor considered by experts, in line with the study that found three central obstacles related including the lack of knowledge and understanding, the less trust to regulation concerning food safety and the less motivation. SME had the least knowledge and understanding of regulation concerning food safety.²¹ This would affect on opinion that any regulation concerning food safety became irrelevant to its food safety business, so it emerged distrust to such regulation. This distrust would make SME less motivated in obeying regulation concerning food safety.

Considerations of criteria used in AHP structure were in accord with study conducted to measure economic efficiency to food safety in the United States by using estimation of benefits and costs ratio.²² On criteria aspect, benefits of food safety implementation for school children obtained the highest value (0.582), so considered more important than the criterion benefits of food safety implementation for SFSC MSE and the criterion costs of food safety implementation by SFSC MSE in the selection of food safety model. This showed that the aspect child health became the priority compared to the aspect of economic benefits for SFSC MSE and costs expanded in order to implement food safety model.

Results of AHP analysis through expert survey determined Five Keys to Safer Food as the most effective and efficient food safety model implemented on SFSC MSE than CPOB, CPPB-IRT, HACCP and ISO 22000. Five Keys to Safer Food model is a simple food safety model developed by WHO.²³ Both Five Keys to Safer Food and CPOB, CPPB-IRT, HACCP and ISO 22000 seemed less complex than the reality of food safety management itself, however, the five keys could be considered as a model because it had certain description of a representation or abstraction of actual situation, in this case situation of food safety management.¹¹

Priority sequence of model alternative respectively was Five Keys to Safer Food, CPOB, CPPB-IRT, HACCP and ISO 22000 with the model alternative selected was Five Keys to Safer Food model by the value 0.332. Five Keys to Safer Food model was selected as the most effective and efficient food safety model implemented in SFSC MSE by considering the existing actor, factors and criteria. This could be acceptable considering SFSC MSE had any obstacles, such as the number of workers that was very limited both in terms of quantity and quality, the small economic scale and the limited resources owned, so that would be hard for SFSC MSE to implement the more

complex food safety models, such as CPPB-IRT and CP-POB even HACCP and ISO 22000. Implementation of HACCP on food service companies that had adequate resources was still inhibited.⁹ Moreover, monitoring of production facilities as conducted by BPOM within 2011 showed there was just 54.1% of Household Food Industries already well implementing CPPB, meanwhile the rest was not yet to implement.²⁰

Five Keys to Safer Food model is the most basic model in conception of food sanitation hygiene that is health act by maintaining and protecting the hygiene of the subjects and the hygiene of the subjects' environment. Description of such Five Keys to Safer Food model were keep clean, such as washing hands before cooking or contact with food materials; separate raw and cooked, such as separating raw meat from other food materials; cook thoroughly, for instance cooking food in form of soup until the temperature at 700°C; keep food at safe temperature, such as not leaving cooked food in the bedroom temperature more than two hours; and use safe water and raw materials, such as using hygienic and safe drinking water for cooking.²³

It is necessary to deeply observe development system that needs to be executed by the government in order to make SFSC MSE able to implement Five Keys to Safer Food model based on the role of actor consideration, necessity of factors and its criteria because the increase of knowledge of food safety does not necessarily guarantee the succeed of its implementation. The increase of knowledge and understanding of food safety may be boosted through training with supporting training materials in the forms of training booklet, presentation slides, video and demonstration practically. However, the increase of possessed knowledge concerning food safety does not necessarily change behavior to food safety management because of any factors including behavior, subjective norms and the feeling of any perceived behavioral control influencing the intention of a behavior, further it will influence the behavior.¹⁴ Behavior of food manager is important because it is proven contributing to bacteriological contamination.⁷ Therefore, it is necessary to deeply observe MSE empowerment system in assuring of SFSC safety by using Five Keys to Safer Food model as reference of the implementation of food safety management model.

Conclusion

In order to meet safe SFSC, there are still some problems regarding health disorder complaints suffered by school children after consuming SFSC, which may be due to less adequate hygiene of food sanitation both at the time of production and SFSC selling as well as the use of unqualified use of Food Additives. This is also reflected by the low trust level of children, parents and teach-

ers to SFSC safety. Health disorders suffered by children show that implementation of food safety management in SFSC MSE is needed as one of ways to solve it. The result of AHP analysis through expert survey shows that Five Keys to Safer Food model is selected as the most effective and efficient food safety management model of SFSC to be implemented in order to improve SFSC safety.

Recommendation

To reduce health disorders, the implementation of food safety management model on SFSC MSE is needed as one of practices to ensure safe SFSC, so it may overcome or at least reduce the incidence of child health disorder cases after consuming SFSC. However, it is necessary to deeply observe MSE empowerment system that should be conducted by the government in ensuring safe SFSC by using Five Keys to Safer Food model consisting of maintaining hygiene activities, separating raw materials and cooked food, cooking thoroughly, maintaining food at safe temperature as well as using safe water and raw materials as reference of implementation of food safety model on SFSC MSE.

Acknowledgement

We are grateful to Mr. Rudi Sabarudin as the Head of Bekasi City Education Agency, heads of elementary schools/islamic elementary schools (*Madrasah Ibtidaiyah*) over Bekasi City region, also Mrs. Nunung Nurhayati, STP, MP and Mr. Bagus Rudiono, SP for supports and assistance. We hope this article can contribute in the improvement of SFSC safety, so school children, especially elementary school children who become the consumers of SFSC may grow and develop to be the next healthy and strong generation.

References

1. Hariyadi P. Pangan dan daya saing bangsa, upaya peningkatan keamanan, mutu dan gizi pangan melalui ilmu dan teknologi. Bogor: Southeast Asian Food Science & Technology (SEAFST) Center, IPB; 2007.
2. Fielding L, Ellis L, Clayton D, Peters A. An evaluation of process specific information resources, aimed at hazard analysis, in small and medium enterprises in food manufacturing. *Food Control*. 2011; 22: 1171-7.
3. Kristianto Y, Riyadi BD, Mustafa A. Faktor determinan pemilihan makanan jajanan pada siswa sekolah dasar. *Kesmas: Jurnal Kesehatan Masyarakat Nasional*. 2013; 7(11): 489-94.
4. Badan Pengawas Obat dan Makanan Republik Indonesia. Rencana Aksi Nasional: Gerakan menuju pangan jajanan anak sekolah yang aman, bermutu, dan bergizi. Jakarta: Badan Pengawasan Obat dan Makanan Republik Indonesia; 2011.
5. Dora M, Kumar M, Van Goubergen D, Molnar A, Gellynck X. Food quality management system: reviewing assessment strategies and a fea-

- sibility study for European food small and medium-sized enterprises. *Food Control*. 2013; 31: 607-16.
6. Ainuri M. Nilai ekonomi modal sosial sebagai media rekayasa difusi teknologi pada sentra industri pangan skala kecil. *Agritech*. 2009; 29 (4): 209-2.
 7. Wibawa A. Faktor penentu kontaminasi bakteriologi pada makanan jajanan di sekolah dasar. *Kesmas: Jurnal Kesehatan Masyarakat Nasional*. 2008; 3 (1): 3-8.
 8. Syah D, Ghaisani M, Suratmono, Sparringa RA, Palupi NS. Akar masalah keamanan pangan jajanan anak sekolah: sudi kasus pada bakso, makanan ringan, dan mi. *Jurnal Mutu Pangan*. 2015; 2 (1): 18-25.
 9. Rina A. Sistem manajemen mutu dan keamanan pangan pada perusahaan jasa boga. *Kesmas: Jurnal Kesehatan Masyarakat Nasional*. 2008; 2 (6): 263-72.
 10. Checkland P. Soft system methodology: a thirty year retrospective. *System Research and Behavioral Science*. 2000; 17: S1-58.
 11. Eriyatno, Larasati L. Ilmu sistem: meningkatkan integrasi dan koordinasi manajemen. Edisi ke-4. Surabaya: Guna Widya; 2012.
 12. Saaty TL. Priority setting in complex problems. *IEEE Transactions on Engineering Management*. 1983; EM 30 (3): 140-55.
 13. Marimin, Maghfiroh N. Aplikasi teknik pengambilan keputusan dalam manajemen rantai pasok. Bogor: IPB Press; 2010.
 14. Soon JM, Baines RN. Food safety training and evaluation of handwashing intention among fresh produce farm workers. *Food Control*. 2012; 23: 437-8.
 15. Sujaya IN, Aryantini NPD, Nursini NW, Purnama SG, Dwipayanti NMU, Artawan IG. Identifikasi penyebab diare di Kabupaten Karangasem, Bali. *Kesmas: Jurnal Kesehatan Masyarakat Nasional*. 2010; 4(4): 186-92.
 16. Pang F, Toh PS. Hawker food industry: food safety/public health strategies in Malaysia. *Nutrition and Food Science*. 2008; 38 (1): 41-51.
 17. Singh RK. Prioritizing the factors for coordinated supply chain using analytic hierarchy process (AHP). *Measuring Business Excellence*. 2013; 17(1): 80-98.
 18. DiMaggio PJ, Powel WW. The iron cage revisited: institutional isomorphism and collectivity rationality in organizational field. *American Sociological Review*. 1983; 48: 147-60.
 19. Ball B, Wilcock A, Aung M. Factors influencing workers to follow food safety management systems in meat plants in Ontario, Canada. *International Journal of Environmental Health Research*. 2009; 19 (3): 201-18.
 20. Rahayu WP, Nababan H, Hariyadi P, Novinar. Keamanan pangan dalam rangka peningkatan daya saing usaha mikro, kecil dan menengah untuk penguatan ekonomi nasional. Conference Paper. Jakarta: Widyakarya Nasional Pangan dan Gizi X; 2012.
 21. Yapp C, Fairman R. Factors affecting food safety compliance within small and medium-sized enterprises: implications for regulatory and enforcement strategies. *Food Control*. 2006; 17: 42-51.
 22. Yasuda T. Food safety regulation in the United States: an empirical and theoretical examination. *The Independent Review*. 2010; 15 (2): 201-26.
 23. World Health Organization. Five keys to safer food manual [online]. Department of Food Safety, Zoonoses and Foodborne Disease. Geneva: WHO Press; 2006. Available from: http://www.who.int/foodsafety/publications/consumer/manual_keys.pdf.