

Designing evaluation indicators for school lunches provided by primary schools

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Abstract

In recent years, the economic development and an increasing number of dual-income families have resulted in working parents unable to prepare lunches for their children. Therefore, arranging for school lunches not only provides students with safe and hygienic lunch meals, allow students to concentrate on their academic study. It enables parents to focus on their work without worrying about the children's meals. The school lunch teaches students about the knowledge on foods' nutrition facts, cultivates students' good dining etiquette and hygienic habits, and rears good nationals with a sound mind in a sound body.

This study adopted document analysis and the modified Delphi method as the main research methods. Document analysis was first conducted to establish preliminary evaluation indicators. Then, the modified Delphi method was adopted to consult opinions of experts who have rich practical and supervisory experiences in school lunches, and explored the difficulties involved in implementing the preliminary system of the evaluation indicators as well as the relative importance of the evaluation indicators.

Based on the document analysis and two rounds of modified Delphi method questionnaires, this study developed the appropriate evaluation system for primary school lunches, which includes 4 dimensions, 13 criteria, and 52 indicators. In terms of the 52 indicators, the top five indicators are "lunch drinks meeting the school food safety regulations", "unblocked drains", "hand washing facilities at food premises", "good ventilation and lighting", and "cleaning out fridges and freezers regularly". A system for the evaluation indicators is put forward following the summarized results of analysis to

provide a reference for designing future evaluation indicators for primary school lunches.

Keywords: *school lunch, evaluation indicator, the modified Delphi method*

1. Introduction

School education is an industry, and managing an industry requires the utilization of various resources. Given various resources' distinct properties, appropriate management methods are required in order to maximize resources' functions. Although arranging for school lunches is only one of a school's numerous tasks, a large number of rules and regulations may be involved. The tasks involved in providing school lunches can also be very complex and difficult to follow through [1]. It is also a rather hefty responsibility for school teachers at schools which provide school lunches yet have limited human resources as school teachers would be demanded to assist with matters required for the provision of school lunches in addition to their busy teaching work. For that reason, it is imperative that we come up with a set of autonomous management and a system of the evaluation indicators to provide guidance for staff in charge of the provision of school lunches [2]. One of this study's motives is to develop a management system with optimal economic efficiency so as to maximize school lunches' functions and better the implementation of a school lunch program.

2. Literature Review

With the provision of school lunches as a starting point, this study primarily examines key points of school lunches stressed by the government and local education agencies as the guidance for the direction of exploration. The first part involves performing

document analysis as well as organizing and consolidating evaluation items outlined in “a mentoring visit to inspect school lunches and campus foods at junior high and primary schools” [3], proposed by the K-12 Education Administration under the Ministry of Education, school lunch regulations [4] [5] [6], and the “Key Points on the Provision of School Lunches by Junior High and Elementary Schools” [7]. The second part involves using the modified Delphi method to collect and organize expert opinions in order to find appropriate school lunch evaluation indicators. More details of relevant documents are given below:

2.1 Document analysis

Using on the evaluation items outlined in “a mentoring visit to inspect school lunches and campus food at junior high schools and primary schools” proposed by the K-12 Education Administration under the Ministry of Education as the underpinning framework as well as referring to school lunch regulations and the content of the “Key Points on the Provision of School Lunches by Junior High and Elementary Schools”, we consolidate and summarize relevant aspects of evaluation, details of evaluation indicators, and regulations before designing a preliminary hierarchical structure which consists of 4 dimensions: “hygiene management at the food preparation premises”, “control and management of food preparation and delivery procedures”, “administrative tasks in relation to school lunches” and “nutrition and hygiene education”, 15 criteria, and 61 indicators. Details of the hierarchical structure are as follows:

1. Hygiene management at food preparation premises

- (1) Hygiene at food preparation premises
 - 1) Good ventilation and lighting
 - 2) Sufficient lighting
 - 3) Hand washing facilities at food premises
 - 4) Unblocked drainage
 - 5) Cleaning out fridges and freezers regularly
 - 6) Putting restrictions on non-related workers' unauthorized entry to food premises
- (2) Management of food preparation equipment
 - 1) Knives and chopping boards must be properly cleaned with food-safe sanitizers.
 - 2) Containers and cutleries must be kept clean to prevent recontamination.
 - 3) Ventilators must be kept clean.

- 4) Cookware must be kept clean.
 - 5) Kitchen appliances must be separated to handle cooked and raw food separately.
 - 6) Water used for food preparation must meet “drinking water quality standards”.
- ### (3) Kitchen staff management
- 1) Kitchen workers must undergo health checks.
 - 2) Kitchen workers must be licensed and attend an eight-hour workshop.
 - 3) Kitchen workers must wear clean attires.
 - 4) Kitchen workers must clean both hands thoroughly.
 - 5) The changing room should be separated from food preparation areas.
- ### (4) Kitchen stuff management
- 1) Checking ingredient and kitchen stuff inventory must comply with the principle that what are received first must be used first.
 - 2) Kitchen stuff must be categorized for storage.
 - 3) Equipment to prevent invasions to the warehouse must be installed.
 - 4) The classification of items must be clearly labeled and recorded.
 - 5) Meal delivery carts must be kept clean.
- ### (5) Kitchen waste disposal
- 1) Kitchen waste must be properly handled and placed in outdoor kitchen waste buckets with a tight covering lid.
 - 2) Piling up waste at food preparation premises is prohibited.
- ## 2. Control and management of food preparation and delivery procedures
- (1) Recipe and menu designs
 - 1) A great variety of recipe designs
 - 2) Menus showing balanced nutrition
 - 3) Main and subsidiary dishes should be prepared or cooked by workers at the school kitchen.
 - 4) Lunch drinks meeting the school food safety regulations
 - 5) “School lunch satisfaction surveys” should be conducted each semester.
 - (2) Selecting and purchasing of food ingredients
 - 1) Taking heed of food sources and expiry dates
 - 2) Providing evidences to prove food ingredient and spices' legitimate sources
 - 3) Provide qualified suppliers' business registration certificates
 - 4) Food ingredient suppliers should be covered by product liability insurance.

- 5) Purchasing school lunch ingredients by following the government procurement act.
- (3) Lunch nutrition facts
 - 1) Meeting the “school lunch ingredient combination and nutrition benchmarks” (for primary school students) promulgated by the Executive Yuan
 - 2) The portion of lunches must comply with the recommended food portion in the “daily dietary guidelines”.
- (4) Management of the provision of lunches
 - 1) Lunches must be provided from the first day of the school.
 - 2) After being processed, food should not have direct contact with the ground.
 - 3) Soup ladles should be used to distribute the same portion of meals from a bucket.
 - 4) Food samples must be kept for future reference.
 - 5) Procedures for handling food poisoning incidents must be followed.
3. Administrative tasks in relation to school lunches
 - (1) The organization of the school lunch work team
 - 1) Keeping meeting records for school lunches for future reference
 - 2) The executive secretary for school lunches is appointed by the school president.
 - 3) Summoning special meetings
 - 4) Filling out the report form on time
 - (2) Work personnel for school lunches
 - 1) Hygiene supervisory personnel have to attend a 32-hour food hygiene lecture.
 - 2) Complying with the “key points for primary and secondary school temporary staff management”
 - 3) The number of dietitians employed by a school should meet the requirements specified in Article 23 of the School Health Act.
 - (3) Handling account matters and managing school lunch funds
 - 1) Handling school lunch funds by following principles of income and expenditure
 - 2) Preparing a school lunch-related income and expenditure statement
 - 3) School lunch funds must be deposited in an exclusive account for further appropriation.
 - 4) An application for school lunch subsidies for students in need must be made in compliance with relevant regulations.
4. Nutrition and hygiene education
 - (1) Nutrition lesson plans

- 1) Decorating the dietary and nutrition teaching environment
 - 2) Publicizing recipes and menus
 - 3) Organizing nutrition teaching observation and debriefing sessions
- (2) Food hygiene education
 - 1) Teachers accompany students to have meals.
 - 2) Washing hands before meals and brushing teeth and rinsing mouth after meals
 - 3) Dining service personnel keep their attires clean and tidy.
 - (3) Hygiene at dining areas
 - 1) Consistent and well-organized distribution of meals
 - 2) Meal delivery carts and dining tables are kept clean.
 - 3) Good ventilation and lighting

2. 2 The modified Delphi method

The Delphi method is a method which utilizes experts' forecasts and group decision making. This method is to invite a group of experts to discuss about a chosen issue or an uncertain and controversial issue. Each member in the expert panel could fully express their ideas and utilize their professional knowledge, abilities, experiences, and opinions. The same procedures are repeated to induce experts' opinions, aim to reach a consensus, and give solutions to a complex issue [8]. After referring to a large number of documents and making amendments to steps in the traditional Delphi method, a structured questionnaire is designed and used as the questionnaire for the first-round survey. The modified method is named the modified Delphi method [9].

In compliance with the Delphi method's requirements for the expert panel [10], this study invites evaluators, subjects of evaluation, and experts with relevant expertise or experiences to participate in developing evaluation indicators. After collecting and analyzing relevant research documents, school lunch regulations, and the “Key Points on the Provision of School Lunches by Junior High and Elementary Schools”, we come up with the preliminary evaluation items for school lunches. Subsequently, we carry out the modified Delphi method expert questionnaire survey to produce

appropriate and practicable indicators to evaluate school lunches.

3. Research Design and Implementation

3.1 Questionnaire design and survey

After consulting relevant documents, this study summarizes the work in relation to the provision of school lunches into four dimensions: “hygiene management at food preparation premises”, “control and management of food preparation and delivery procedures”, “administrative tasks in relation to school lunches”, and “nutrition and hygiene education”. Dietitians who represent the Department of Education to supervise school lunch nutrition and hygiene and executive secretaries that coordinate school lunch tasks are invited form an expert panel and participate in the modified Delphi method questionnaire survey. Further, expert validity is established by scrutinizing and making amendments according to the importance and practicability of the content of the questionnaire.

Instructions for completing the first Delphi survey questionnaire require experts to evaluate the importance and level of difficulty in implementing question items outlined in the questionnaire. Participatory experts have to tick one answer from an array of answer options based on their perceived importance and difficulty in implementing the question item. In addition, there is a blank column for experts to give their opinions and suggestions and reasons for amendments.

With a design similar to that of the first Delphi survey questionnaire, the second Delphi survey questionnaire’s difference is having no open-ended questions. Evaluation indicators at the second Delphi survey questionnaire are also modified by taking advice from experts at the first Delphi survey questionnaire. At the second Delphi survey questionnaire, the mean derived from statistical calculations on results of the first Delphi survey questionnaire is placed next to each evaluation indicator’s importance and level of difficulty in implementation for the reference of the experts.

3.2 Survey data analysis

In terms of the analysis of data from the Delphi survey questionnaire, the coefficient of variation (C.V.) is used to measure divergence of participatory experts’ opinions to determine whether a consensus has been reached. The coefficient of variation is the ratio of the standard deviation to the mean. A smaller coefficient of variation means a greater level of participatory experts’ consensus [11].

In terms of reliability, open-ended questions are added to the first Delphi survey questionnaire to clarify research questions. Further, amendments are made to written descriptions and content of ability indicators by taking experts’ suggestions. It is estimated that most participatory experts would have reached a consensus at the second Delphi survey questionnaire. Therefore, the survey questionnaire may stop when participatory experts reach a consensus on all evaluation criteria.

3.3 Developing a hierarchical structure

Beginning with collecting and examining documents relevant to school lunches, we subsequently design a research hierarchical structure, use the modified Delphi method to conduct several rounds of questionnaire surveys, collect and organize experts’ opinions, and confirm the research hierarchical structure when participatory experts have convergent opinions.

With a semi-structured questionnaire, the first modified Delphi survey questionnaire allows participatory experts to freely express their opinions. Further, the second Delphi survey questionnaire is designed after collecting and organizing the revised content of evaluation indicators.

In terms of the second Delphi survey questionnaire’s results on each evaluation indicator’s importance and the level of difficulty in implementation, having a mean bigger than 4.0 and a coefficient of variation smaller than 0.3 is the requirement for an eligible evaluation indicator. As revealed by the second Delphi survey questionnaire’s results on each evaluation indicator’s importance and the level of difficulty in implementation, 52 evaluation indicators

have a mean bigger than 4.0 and a coefficient of variation smaller than 0.3, indicating participatory experts' highly convergent opinions. The analysis of the second modified Delphi survey questionnaire is illustrated in Table 1.

Table 1: Analysis of the second modified Delphi survey questionnaire
 Dimension: Hygiene management at food preparation premises

| Criteria : Hygiene at food preparation premises | | | | | | | |
|--|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Good ventilation and lighting | 4.89 | 0.33 | 0.07 | 4.22 | 0.83 | 0.20 | Retain |
| Sufficient lighting | 4.89 | 0.33 | 0.07 | 4.44 | 0.88 | 0.20 | Retain |
| Hand washing facilities at food premises | 4.89 | 0.33 | 0.07 | 4.56 | 1.01 | 0.22 | Retain |
| Unobstructed drainage | 5.00 | 0.00 | 0.00 | 4.78 | 0.44 | 0.09 | Retain |
| Cleaning out fridges and freezers regularly | 4.67 | 0.50 | 0.11 | 4.56 | 0.53 | 0.12 | Retain |
| Putting restrictions on non-related workers' unauthorized entry to food premises | 4.89 | 0.33 | 0.07 | 4.11 | 0.78 | 0.19 | Retain |

| Criteria : Management of food preparation equipment | | | | | | | |
|---|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Ventilators must be kept clean | 4.89 | 0.33 | 0.07 | 4.44 | 0.73 | 0.16 | Retain |
| Cookware must be kept clean | 4.89 | 0.33 | 0.07 | 4.07 | 0.50 | 0.11 | Retain |
| Kitchen appliances must be separated to handle cooked and raw food separately | 4.89 | 0.33 | 0.07 | 4.56 | 0.53 | 0.12 | Retain |
| Water used for food preparation must meet "drinking water quality standards" | 4.89 | 0.33 | 0.07 | 4.07 | 0.50 | 0.11 | Retain |

| Criteria : Kitchen staff management | | | | | | | |
|--|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Kitchen workers must undergo health checks | 5.00 | 0.00 | 0.00 | 4.89 | 0.33 | 0.07 | Retain |
| Kitchen workers must be licensed and attend an eight-hour workshop | 4.89 | 0.33 | 0.07 | 4.67 | 0.50 | 0.11 | Retain |
| Kitchen workers must wear clean aprons | 4.89 | 0.33 | 0.07 | 4.56 | 0.53 | 0.12 | Retain |
| Kitchen workers must clean both hands thoroughly | 4.89 | 0.33 | 0.07 | 4.56 | 0.53 | 0.12 | Retain |
| The changing room should be separated from food preparation areas | 4.56 | 0.73 | 0.16 | 4.33 | 0.71 | 0.16 | Retain |

| Criteria : Kitchen staff management | | | | | | | |
|--|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Checking ingredient and kitchen staff inventory must comply with the principle that what see received first must be used first | 4.67 | 0.71 | 0.15 | 4.07 | 0.50 | 0.11 | Retain |
| Kitchen staff must be categorized for storage | 4.89 | 0.33 | 0.07 | 4.56 | 0.53 | 0.12 | Retain |
| Equipment to prevent infestations in the warehouse must be installed | 4.78 | 0.44 | 0.09 | 4.33 | 0.50 | 0.12 | Retain |
| The classification of items must be clearly labeled and recorded | 4.78 | 0.44 | 0.09 | 4.56 | 0.53 | 0.12 | Retain |
| Meal delivery carts must be kept clean | 4.78 | 0.44 | 0.09 | 4.44 | 0.73 | 0.16 | Retain |
| Kitchen waste must be properly handled | 4.78 | 0.44 | 0.09 | 4.44 | 0.53 | 0.12 | Retain |

Dimension: Control and management of food preparation and delivery procedures

| Criteria : Recipe and menu designs | | | | | | | |
|---|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| A great variety of recipe designs | 4.67 | 0.50 | 0.11 | 4.11 | 0.78 | 0.19 | Retain |
| Menus showing balanced nutrition | 4.67 | 0.50 | 0.11 | 4.11 | 0.78 | 0.19 | Retain |
| Lunch drinks meeting the school food safety regulations | 4.89 | 0.33 | 0.07 | 4.67 | 0.50 | 0.11 | Retain |
| "School lunch satisfaction surveys" should be conducted each semester | 4.56 | 0.53 | 0.12 | 4.33 | 0.71 | 0.16 | Retain |

| Criteria : Selecting and purchasing of food ingredients | | | | | | | |
|---|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Taking heed of food sources and expiry dates | 4.67 | 1.00 | 0.21 | 4.44 | 0.53 | 0.12 | Retain |
| Providing evidences to prove food ingredients and spices' legitimate sources | 4.67 | 1.00 | 0.21 | 4.44 | 0.53 | 0.12 | Retain |
| Provide qualified suppliers' business registration certificates | 4.44 | 1.01 | 0.23 | 4.56 | 0.53 | 0.12 | Retain |
| Food ingredients suppliers should be covered by product liability insurance | 4.67 | 1.00 | 0.21 | 4.89 | 0.33 | 0.07 | Retain |
| Purchasing school lunch ingredients by following the government procurement act | 4.67 | 1.00 | 0.21 | 4.56 | 0.53 | 0.12 | Retain |

| Criteria : Management of the provision of lunches | | | | | | | |
|--|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Lunches must be provided from the first day of the school | 4.67 | 0.71 | 0.15 | 4.56 | 0.53 | 0.12 | Retain |
| After being processed, food should not have direct contact with the ground | 4.89 | 0.33 | 0.07 | 4.33 | 0.71 | 0.16 | Retain |
| Food samples must be kept for future reference | 4.78 | 0.67 | 0.14 | 4.67 | 0.50 | 0.11 | Retain |
| Procedures for handling food poisoning incidents must be followed | 5.00 | 0.00 | 0.00 | 4.44 | 0.53 | 0.12 | Retain |

Dimension: Administrative tasks in relation to school lunches

| Criteria : The organization of the school lunch work team | | | | | | | |
|---|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Keeping meeting records for school lunches for future reference | 4.56 | 0.73 | 0.16 | 4.56 | 0.53 | 0.12 | Retain |
| Summoning special meetings | 4.56 | 0.73 | 0.16 | 4.56 | 0.53 | 0.12 | Retain |
| Killing cut the report form on time | 4.56 | 0.73 | 0.16 | 4.56 | 0.53 | 0.12 | Retain |

| Criteria : Work personnel for school lunches | | | | | | | |
|---|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Hygiene supervisory personnel have to attend a 32-hour food hygiene lecture | 4.56 | 0.73 | 0.16 | 4.44 | 0.73 | 0.16 | Retain |
| Complying with the "key points for primary and secondary school temporary staff management" | 4.78 | 0.44 | 0.09 | 4.22 | 0.67 | 0.16 | Retain |
| The number of dietitians employed by a school should meet the requirements specified in Article 23 of the School Health Act | 4.78 | 0.44 | 0.09 | 4.22 | 0.67 | 0.16 | Retain |

| Criteria : Handling account matters and managing school lunch funds | | | | | | | |
|--|------------|------|------|------------------------------|------|------|----------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete /Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Handling school lunch funds by following principles of income and expenditure | 4.67 | 0.71 | 0.15 | 4.56 | 0.53 | 0.12 | Retain |
| Preparing a school lunch-related income and expenditure statement | 4.67 | 0.71 | 0.15 | 4.44 | 0.53 | 0.12 | Retain |
| School lunch funds must be deposited in an exclusive account for further appropriation | 4.89 | 0.33 | 0.07 | 4.67 | 0.53 | 0.11 | Retain |

Dimension : Nutrition and hygiene education

| Criteria : Nutrition lesson plans | | | | | | | |
|---|------------|------|------|------------------------------|------|------|---------------|
| Indicator | Importance | | | Difficulty in implementation | | | Delete/Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Decorating the dietary and nutrition teaching environment | 4.78 | 0.44 | 0.09 | 4.67 | 0.50 | 0.11 | Retain |
| Publicizing recipes and menus | 4.89 | 0.33 | 0.07 | 4.67 | 0.50 | 0.11 | Retain |
| Organizing nutrition teaching observation and debriefing sessions | 4.67 | 0.71 | 0.15 | 4.44 | 0.73 | 0.16 | Retain |
| Criteria : Food hygiene education | | | | | | | |
| Indicator | Importance | | | Difficulty in implementation | | | Delete/Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Teachers accompany students to have meals | 4.89 | 0.33 | 0.07 | 4.22 | 0.67 | 0.16 | Retain |
| Washing hands before meals and brushing teeth and rinsing mouth after meals | 4.89 | 0.33 | 0.07 | 4.44 | 0.53 | 0.12 | Retain |
| Dining service personnel keep their attire clean and tidy | 4.89 | 0.33 | 0.07 | 4.44 | 0.53 | 0.12 | Retain |
| Criteria : Hygiene at dining areas | | | | | | | |
| Indicator | Importance | | | Difficulty in implementation | | | Delete/Retain |
| | Mean | SD | C.V. | Mean | SD | C.V. | |
| Consistent and well-organized distribution of meals | 4.78 | 0.44 | 0.09 | 4.67 | 0.50 | 0.11 | Retain |
| Meal delivery carts and dining tables are kept clean | 4.89 | 0.33 | 0.07 | 4.67 | 0.50 | 0.11 | Retain |
| Good ventilation and lighting | 4.67 | 0.71 | 0.15 | 4.44 | 0.73 | 0.16 | Retain |

3.4 Data Analysis

Upon the confirmation of the 4 dimensions, 13 criteria, and 52 indicators of the research hierarchical structure, the completed survey questionnaire is collected for data analysis, and results of the questionnaire are used to produce each evaluation indicator.

Dietitians who represent the Department of Education to supervise school lunch nutrition and hygiene conditions and executive secretaries who coordinate tasks of school lunches are invited to form an expert panel and participate in the modified Delphi method survey questionnaire.

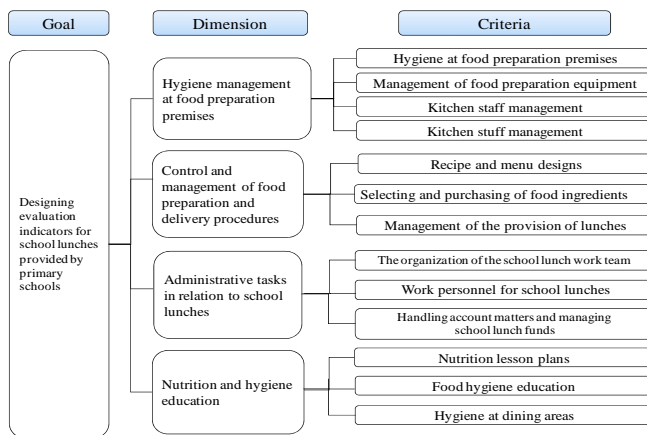


Fig. 1 Hierarchical Structure of this Study

4. Research Results and Discussion

As indicated by research results, four out of the top five evaluation indicators belong to the “hygiene at food preparation premises” evaluation criteria. It indicates that experts believe that priority should be given to hygienic conditions at school lunch preparation premises. This result coincides with a statement in a work booklet for school lunches organized by primary and junior high schools. The statement is that “the purpose of school lunches provided by primary and junior high schools is not only to let students’ parents concentrate on their jobs and not distress themselves with any worry or mess resulting from preparing lunches for their school children. School lunches also hope to provide all students with hygienic lunch meals packed with balanced nutrition.”

5. Conclusions

The results of the analysis of evaluation indicators for primary school lunches, the two evaluation dimensions “hygiene management at food preparation premises” and “control and management of food preparation and delivery procedures” have higher key points for providing school lunches. According to the “Key Points on the Provision of School Lunches by Junior High and Elementary Schools”, the two dimension have to be managed and evaluated on a long-term basis in order to produce noticeable results. As such, a hasty and aggressive approach does not suit the provision of school lunches. However, indicators with a larger proportion may not be necessarily easy to implement in practice. In contrast, in the course of evaluating school lunches, experts are inclined to choose to observe and score evaluation dimensions which are more feasible or easier to be implemented. These evaluation dimensions involve generic tasks, a clear division of workers in line with the organization at the workplace, specific work procedures and requirements, and therefore make performance evaluation possible within a short period of time.

References

- [1]. S.F.Tu, "A study of key factors for successful school lunches provided by primary schools", Master's Thesis, Master's Program for In-service Teachers, Department of Business Education, National Changhua University of Education, Changhua, Taiwan, 2003.
- [2]. H.H. Lin, "Designing evaluation indicators for school lunch programs of primary schools in Taiwan", Master's thesis, Graduate Institute of Educational Management. National Taipei University of Education, Taipei, Taiwan, 2006.
- [3]. K-12 Education Administration, Ministry of Education, Taiwan, announced in 2014.
- [4]. Matters of Attention Concerning the Provision of School Lunches by Junior High and Elementary Schools, Taiwan, 2012.
- [5]. Act Governing Food Safety and Sanitation, Taiwan, amended and announced on 2014.
- [6]. School Health Act, Taiwan, announced on 2013.
- [7]. Key Points on the Provision of School Lunches by Junior High and Elementary Schools., Taiwan, 2013 version.
- [8]. Linstone, H. A., & Turoff, M., "The Delphi Study: Technique and Applications." London, England: Addison-Wesley Publishing Co., 1975.
- [9]. Murry J.W., and J.O. Hammons, "Delphi: A versatile methodology for conducting qualitative research", *The Review of Higher Education*, 1995, vol. 18, no. 4, p. 423-436.
- [10]. Delbecq, A. L., Van de Ven, A. H. & Gustafson, D. H., "Group Techniques for Program Planning: A Guide to Nominal Group and Delphi Processes", Chicago: Scott, Foresman and Company, 1975.
- [11]. S.Y. Feng, "Using the Delphi technique and the analytic hierarchy process method to examine the appropriateness of bed-and-breakfasts management regulations", Master's thesis, Graduate School of Business and Management, China University of Science & Technology, Hsinchu, Taiwan, 2006.