

Key Success Factors in Catering Enterprises Practicing Food Traceability System

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ABSTRACT The outbreak of food events in the past years has induced the unease and panic of food manufacturers, distributors, and consumers as well as serious strike for food export of catering enterprises. To ensure the diet and consumption safety in Taiwan, food traceability system is practiced, aiming to completely publicize the production and sales processes, guarantee the food safety for consumers, and promote the international image of domestic food. Sanli food, as the research subject, is distributed 200 copies of questionnaires. Total 134 valid copies were retrieved, with the retrieval rate 67. The investigation results show raw material production as the mostly emphasized key success factor in catering enterprises practicing Food Traceability System in Taiwan. In terms of the global weight, disease and agents control, weighted 0.097, is the mostly emphasized factor, followed by processing manufacturer (weighted 0.085), raw material source (weighted 0.084), sampling frequency (weighted 0.081), and distributor (weighted 0.075).

INTRODUCTION

With the rapid advance of Internet, IT (Information Technology) has promoted the reconsideration of global supply chain. Information technology allows the information in the supply chain being simply and fast acquired and shared as well as the buyers, sellers, and logistics receiving contact and information through the network so as to real-time master all dynamic information related to logistics (Yuasa Kazuo 2001). The outbreak of food events in the past years has catering enterprises perceive the necessity of food safety management. In order to ensure the diet and consumption safety, Food traceability system is therefore practiced to integrate e-data into the database for the users instantaneously acquiring the relative data through the network. It aims to establish a responsible production and sales system, reinforce the food safety management procedure in catering enterprises, and guarantee the information openness from food raw material source to dining table. Food safety problems have seriously struck the trade among countries in the world that advanced countries of European Union and Japan have covered food safety as the key issue in the agriculture. After being a member of World Trade Organization (WTO) in 2002, Council of Agriculture, Executive Yuan in Taiwan, has actively promoted Taiwan Good Agriculture Practice (TGAP) and established food traceability system to cope with the impact

from joining in WTO, enhance industrial competitiveness, and remain the domestic market. The establishment of food traceability aims to completely publicize the information in production and sales processes, guarantee the food safety for consumers, and enhance the international image of domestic food. Nevertheless, current food traceability system merely provides consumers (mid-stream or downstream businesses) for inquiring the product information based on the identification numbers; the low-level consumers could not acquire the relevant information about the purchased products that the consumers' rights are damaged and the purchase confidence cannot be enhanced. Having food traceability system recorded information from the production locations to the dining tables could have the consumers thoroughly master the relevant information and purchase securely.

Literature Review

Research on Food Traceability System

Food Traceability, whose safety accreditation ensures the products through the production traceability to enhance the industrial value added, is commonly applied to the products in agriculture, forest, fishery, and livestock, mainly because the accreditation of food safety is largely stressed by consumers. Production Traceability System is established based on Global Common

Code Standards, with which the commodity circulation process could be precisely recorded and traced. Production Traceability System refers to the production, processing, and delivery of commodities; aiming at the raw material sources or the transactional and kept records of manufacturers and sales locations, the commodities and the information could be traced. After establishing Production Traceability System, the management of an enterprise could conform to the quality assurance systems and precisely trace the commodity sources and the batch identification. Regarding the logistics, an enterprise could control more logistics and distribution information, the distribution problems could be promptly responded, and the stock could be optimized (Chou 2009; Wang 2014).

Based on the traceability system of bluefin tuna, Chiou (2010) explored the applications of traceability to fishery. By studying a Japanese restaurant, a handheld RFID Reader was used as the hardware device to trace the bluefin tuna Kuai in the restaurant. The traceability data, including the catch data (types and parts of fish), catch location, manufacturer (catch boat, captain, and catch method), stock information, and nutrition, were established. An RFID Tag was attached under the Kuai dish so that the server could read the Tag with the handheld Reader, which connected to the database through wireless network, for the consumers when the dish was served. Lu (2009) discussed the applications of an e-pedigree information system, which, based on the process and data format proposed by EPC, covered the establishment of traceability, the delivery of traceability, the verification of traceability, the security mechanism of data delivery, and the storage and enquiry of data. Aiming at the information flowing in the supply chain, the system was designed and developed from the delivery between different systems, the transfer of data formats, the correspondence and information verification, to the information system and was service-oriented. Wang (2010) explored the applications and management of RFID for layer farms so as to establish the traceability system. Based on Taiwan Good Agricultural Practice (TGAP), the information management system for layer farms was developed for collecting the traceable data. The operators could record the daily temperature, humidity, water intake, and feed volume by reading the Tags on the hen-coops with handheld Readers to record the phys-

iological conditions of hens, which were then uploaded to the information management system after completing the work. In the study on the RFID application to cold-food logistics, Wu (2009) constructed a system to trace the meat temperature with RFID, as the strict temperature control of cold-food could ensure the freshness and safety of food for the consumers. An automatic temperature sensing Tag was utilized for recording the temperature data in the production and logistics processes; and, the temperature traceability data were established to control the delivery quality of cold-food and ensure the food sanitation and safety.

Cheng (2009) studied the RFID applications to the electronic pedigree system for the traceability in pork food chain, a supply chain system suitable for pork was derived based on EPC Network. Aiming at the upstream (pig raisers) and the mid-stream (meat markets and slaughter houses) in the pork supply chain, the e-traceability system for the pork supply chain was established for the consumers tracing the production process through RFID Tag so as to enhance the purchase confidence.

Key Success Factors in Food Traceability System

Introduction of Delphi Method

Delphi Method is utilized in this study for finding out the key factors. Delphi Method, also named expert judgment, is a kind of group decision-making method, which is mostly applied to qualitative research. Aiming at a problem or specific issue, anonymous adjustment is applied to integrating the rich experiences, knowledge, and opinions of experts, when the questions are repeated asked and answered for several rounds, so that the experts are able to practice the opinions of other experts. All expert opinions are finally integrated, with the least differences, for the consistent conclusion (Murry and Hammons 1995). Delphi Method presents the following characteristics (Linston and Turoff 1975; Lin 1982; Li 2009): (1) Anonymity. Without exchanging opinions in the process, the experts could freely express the opinions in order to avoid the pressure from Authorities; (2) Controlled feedback. The experts are informed the statistical data (mean and median) of Personal and other experts' opinions in the previous questionnaire for fur-

ther deliberate evaluation; (3) Iteration. The experts could repeatedly consider and revise the opinions in the several rounds of questionnaire survey till the responses approach the consistency; (4) Statistical group response. The retrieved questionnaires are calculated the group opinions as the concentration criteria (Chang 2010). In spite of the above characteristics, Delphi Method is inevitably restricted by some factors. Sung (2011) proposed that (1) Delphi Method relied on the experts' instinctive knowledge that the research results were likely interfered by the subjective judgment, (2) the practice of Delphi Method was organized by the researcher, who could interfere the process, (3) the practice of Delphi Method was time-consuming and hard to control the schedule that contradiction was likely to appear, and (4) the final conclusion with Delphi Method was rather general, without knowing the detailed planning and specific details, that it could merely be the direction and reference of strategies.

Questionnaire Dimension

The following key success factors were acquired with Delphi Method in this study.

Raw material production includes manufacturer, raw material source, disease and agents control, and raw material harvest and delivery. inspection and analysis contains inspection result, sampling time, sampling location, and sampling frequency. Transportation and wholesale covers transportation method, transportation destination, and transportation process record. processing includes processing manufacturer, processing condition, and production type. Distribution and consumption contains distributor, distributive channel, sales volume, and sales period.

RESEARCH DESIGN AND METHOD

Research Framework

Figure 1 shows the research framework revised with Delphi Method in this study.

Research Subjects

Sanli Food, established in 2000, is a jelly manufacturer. Stressing on food safety and sanitation, it researches and develops high-quality and

unique-flavor healthy foods with the verification of ISO22000, HACCP, and HALAL. Having actively promoted export affairs and participated in food fairs in the past years, Sanli Food expects to look for an excellent agent, through fairs, to promote the products globally. In addition to the original markets, it focuses on the promotion in China market, expecting to promote MIT products. Sanli Food therefore is selected as the research subject, and 200 copies of questionnaires are distributed to the managers and employees. Total 134 valid copies are retrieved, with the retrieval rate 67.

OBSERVATIONS AND DISCUSSION

Having completed all hierarchical weights, the relative importance of the criteria in each hierarchy was distributed to show the importance in the evaluation system for the global weight of the key success factors in the catering enterprise practicing food traceability system in Taiwan (Table 1).

Table 1 shows that raw material production, weighted 0.276, about 27.6% of the global weight, was mostly emphasized in hierarchy 2, followed by processing (weighted 0.231), Inspection and Analysis (weighted 0.184), distribution and consumption (weighted 0.163), and transportation and wholesale (weighted 0.146). The results showed the mostly emphasized key success factor in the catering enterprise practicing food traceability system as raw material production. in regard to the global weight, disease and agents control, weighted 0.097, was mostly emphasized, followed by processing manufacturer (weighted 0.085), raw material source (weighted 0.084), sampling frequency (weighted 0.081), and distributor (weighted 0.075). The importance of tracing the raw material sources is obvious. Taiwan food scandal and recent adulterated foods have resulted in popular anxiety and seriously struck the economic system in catering industry.

CONCLUSION

The following conclusions are proposed from the empirical analyses, expecting to provide a definite guidance and direction for Food Traceability System in catering industry. Within the 18 evaluation criteria, the top five emphases reveal (1) disease and agents control, the global weight 0.097, (2) processing manufacturer, the

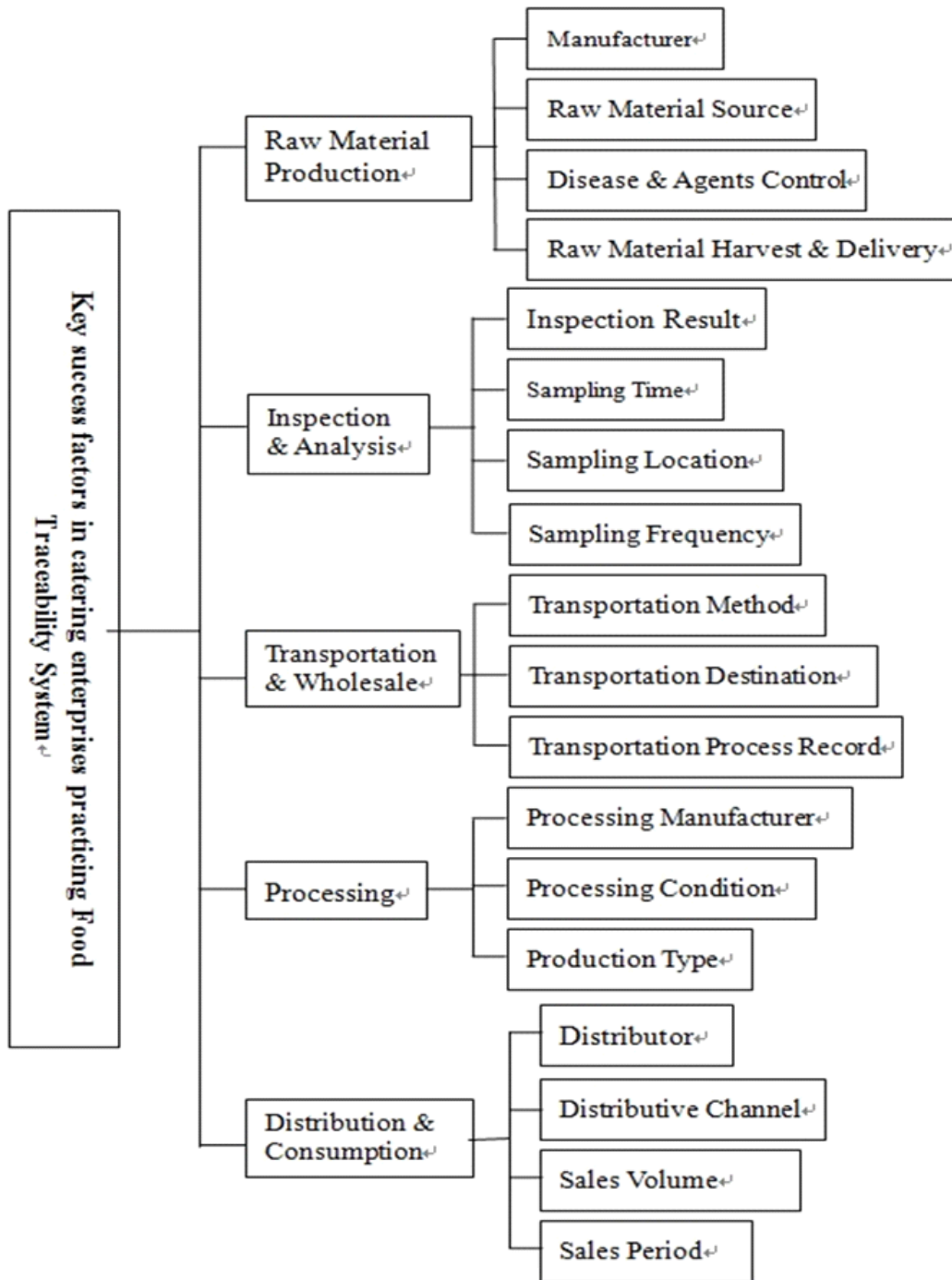


Fig. 1. Research framework

Table 1: Global weight of the catering enterprise practicing Food Traceability System in Taiwan

<i>Key success factors in catering enterprises practicing Food Traceability System</i>	<i>Evaluation criteria in hierarchy 2 (hierarchical weight)</i>	<i>Evaluation criteria in hierarchy 3 (hierarchical weight)</i>	<i>Global priority</i>	<i>Global sequence</i>
Raw material production (0.276)	Raw material	Manufacturer	0.071	6
		Raw material source	0.084	3
		Disease and agents control	0.097	1
		Raw material harvest and delivery	0.055	10
Inspection and analysis (0.184)	Inspection and analysis	Inspection result	0.039	13
		Sampling time	0.060	8
		Sampling location	0.047	12
		Sampling frequency	0.081	4
		Transportation method	0.019	18
Transportation and wholesale (0.146)	Transportation and wholesale	Transportation destination	0.028	15
		Transportation process record	0.051	11
		Processing manufacturer	0.085	2
Processing (0.231)	Processing	Processing condition	0.066	7
		Production type	0.023	17
		Distributor	0.075	5
Distribution and consumption (0.163)	Distribution and consumption	Distributive channel	0.058	9
		Sales volume	0.037	14
		Sales period	0.024	16

global weight 0.085, (3) raw material source, the global weight 0.084, (4) sampling frequency, the global weight 0.081, and (5) distributor, the global weight 0.075. For the safer food supply chain for the manufacturers, wholesalers, dealers, and consumers, safety and traceability are applied in this study to analyzing the key success factors in catering enterprises practicing food traceability system. It is expected to publicize the production and sales information in catering enterprises, instantaneously confirm the problematic catering foods or breeding ground, and rapidly control and solve problems so as to reduce the damage and doubt of the public.

RECOMMENDATIONS

According to the above research results, the following suggestions are further proposed in this study.

1. Web-based Enquiry Integrated Program

When tracking and tracing become popular, the web-based enquiry program, which combined web-based tracking and tracing systems, will be more efficient. By the combination with web pages, an inquirer could inquire the products through a browser by directly keying in the information code of a product.

2. Grading of Data Intensity

For the purpose of preventing the products from being substituted internally, reading the product data with a device would not guarantee the product not being stolen. For this reason, the data reliability could be analyzed for discriminating the data being acquired by association or actual reading so as to grade the data intensity. Such a grading could be used for discussing the various applications.

3. Reducing the Risk of Food Safety Hazard

A lot of food safety hazards in catering industry come from the raw material sources, such as heavy metal, pesticide, and drug residue. Since Inspection and Analysis, such as the openness of inspection results, is covered in Food Traceability System, it could enhance the reliability of product information and ensure the food safety in catering industry.

4. Establishment of Brand Marketing

A lot of food brands and origins would affect a consumer's purchase intention. Food Traceability System therefore could be the proof of brands and origins to promote the positive brand marketing.

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