

Alternative Approaches in Leftover Food Management to Increase the Effectiveness of Service Business Organizations

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Abstract

The objectives of this research were 1) to study the influence of marketing focus, supply chain mobility, employee response, and disposal of leftover food affecting the effectiveness of service business organizations and 2) to propose the approaches for leftover food management to increase the effectiveness of service business organizations. The research results revealed that 1) the responses of employees and the disposal of leftover food has a direct influence on the effectiveness of service business organizations and has the indirect influence on marketing focus and supply chain mobility and 2) the leftover food management approaches are (2.1) systematic inventory management, (2.2) training and instilling good conscience among employees to be proud as part of the organization and help taking care of the interests of the organization as well as monitoring the amount of food waste by customers, (2.3) use of technology to order food for reducing the mistakes, and (2.4) benefit from the leftover food.

Keywords: Leftover food, organizational effectiveness, service business

Background and Significance of Problem

The problem of leftover food has received attention from many international organizations. The United Nation (UN) has identified the problem of “leftover food” as one of the sustainable development goals (SDGs) aiming to reduce leftover food by 50% globally by 2030. Since 2013, the cooperation was joined by the Forum, World Business Council for Sustainable Development (WBCSD), and Waste and Resources Action Program (WRAP) to announce the Food Loss and Waste Protocol to collect data used in measuring, monitoring, and solving leftover food problem. Together with the Food Loss and Waste Standard, these can be used as the tools for developing leftover food management plan. In addition, the Meeting of G20 Agricultural Chief Scientist (MACS G20), a joint organization among the G20 countries, continually hold the meetings to find solutions to the problem of leftover food. The United

Nations Food and Agriculture Organization (UNFAO) and the United Nations Environment Program (UNEP) have published a five-step guideline on food chain management alternatives to reduce leftover food ordered by the most preferable option to the least preferable option of the government (Thailand Development Research Institute, 2019) consisting of 1) prevention, 2) optimization, 3) recycle, 4) recovery, and 5) disposal.

When looking back at Thailand, it was found that there is no clear data on the amount of produced food and the amount of leftover food. Only the amount of organic solid waste is available. The Pollution Control Department stated that in 2017, the volume was up to 17.56 million tons, accounting for 64% of the total amount of solid waste or 254 kilograms per person per year. This figure is the amount of solid waste collected by the municipality only. It does not include leftover food or excess food volume from businesses that employ private companies to manage (Thailand Development Research Institute, 2019). In 2013, it was reported that the amount of waste in Bangkok was 534.8 kg/person/year which is the fourth largest amount of waste out of 22 Asian cities, behind only Osaka, Japan, Kuala Lumpur, Malaysia and Seoul, South Korea (Weerapong Sunthonchatrawat, 2015).

The service businesses such as hotels and restaurants serving buffet meals are more likely to experience leftover food problems than hotels or restaurants. This is because all over prepared food increases the cost of goods sold of the business (Makro Horeca Academy, 2020). Meanwhile, some businesses had to hire a private company to manage the excess food that occurred. This results in higher management costs. The hotel business group realizes the importance of leftover food problem and develop the process of managing excess food. When the organization can manage the problem of excess food and leftover food effectively, the organization will be able to reduce or control the production cost and get rid of the leftovers along with creating satisfaction for customers from the image of an organization that cares about the environment. The internal operating processes can be developed to be able to respond to excess food management practices and create learning for employees in the organization about the importance and the need to solve the problem of junk food, develop skills and information technology to make the leftover food problem become concrete.

The researchers were interested in studying the approached for leftover food management to increase the effectiveness of service businesses in order to understand the factors affecting the effectiveness of service business organizations as a result of the management of excess food problems and leftover food throughout the process part. The organizations are enabled to increase their competitive efficiency from solving such problems. The other part is to help reducing the environmental problems that will affect the sustainable development of society in the future.

Literature Review

Concepts and theories about leftover food management

The United Nations Food and Agriculture Organization (UNFAO) and the United Nations Environment Program (UNEP) have released the recommendations for tackling leftover food and excessive food. It is divided into five steps from the most preferable option to the least preferable option as follows:

1. Prevention is to prevent the creation of leftover food or excessive food. For the private sector, this may mean having a product ordering system that meets the needs to reduce the amount of leftovers. For government agencies, it might mean a fee for collecting leftover food based on the amount of waste, for example.

2. Allocating food that can still be consumed for optimization is such as (1) donations to the poor or employees, (2) cheaply selling in specialty stores, and (3) selling as animal feed. The government may promote it through tax incentives or support an organization that is a mediator in food distribution.
3. Recycle is the introduction of leftover food into the production process for reuse, consisting of the production of biogas through the anaerobic fermentation process and the production of fertilizers for agriculture.
4. Recovery for energy is the burning of leftover food with low humidity to produce heat. Leftover food with high humidity requires more energy to burn and causes more pollution than leftover food with low humidity. Therefore, it is necessary to dehydrate the waste before incineration with thermal energy.
5. Disposal is the disposal of leftover food that is no longer usable by incineration or landfill.

As mentioned above, the vast majority of leftover food data is household waste. Up to 57% of the leftover food comes from households amounting about 10 million tons per year. This leftover food is disposed of in landfills. Therefore, in the household sector, it is imperative to study methods to promote the reduction of excessive food and leftover food as well as the use of discarded food in the priorities shown in the pyramid.

However, although Thailand does not collect data on the amount of leftover food generated by the private sector whether from hotels, restaurants or even modern retailers, it is one of the production chains that cause a lot of leftover food. Therefore, the management to reduce the amount of leftover food according to the concept of the United Nations organization can be taken as a guideline that entrepreneurs can choose to take action in four ways known as 4R; 1. Reduce which means reducing the amount of food that must be discarded, 2. Reuse is to donate food that is still edible to be donated or used as animal feed, 3. Recycle is to be processed into other products such as fertilizer or biogas, and 4. Recovery is to burn for use in the electricity generation.

Concepts and theories on the effectiveness of service business organizations

The effectiveness of operations is the expected outcomes of the management of organization. It has been interested in academics for a long time. The effectiveness of the operation is possibly measured through a variable of organizational performance. According to the literature review, it was found that popular indicators to reflect the performance of an organization are such as revenue, sales growth, or turnover including earnings per share (EPS). They are higher than the industry average or return on equity (ROE) or return on assets (ROA). These are all financial indicators (Ling & Hung, 2010; Chang, 2012) which are easy to be measured and the changes can be clearly noticed.

Regarding the **key performance indicators**; Woraphat Phucharoen, Jeerapong Pornkul and Thanakrit Jaratrunghawalit (2007) said that the key performance indicator is an important indicator to measure how the performance is. The measure of success is a measure of both concrete and abstract results which can be used in every organization. It is used to inform executives about their competence, performance, progress, and quantity of activities that are done according to the plan or strategy varied by types of business. Strategic activities are sometimes referred to as key success indicator.

From this reason, success indicators are often a reflection that activities in the organization as planned according to the strategy laid down or not. In saying which index is an important indicator depends on the perspective, interests or policy of management focusing on

something? For example, for the fast growing business, the executives may be interested in indicators of revenue growth, market share, and cash flow. In order not to let the executives be distracted and focus on one thing too much, the executives may use a balanced scorecard to meet all four perspectives; financial perspective, customer perspective, internal process perspective, and learning and development perspective.

In summary, the effectiveness of service business organization is defined as an outcome that demonstrates the ability to manage administrative processes through both internal and external perspectives. It is defined as an observation variable to measure the effectiveness of business organization in the service sector consisting of financial perspective, customer perspective, internal process perspective, and learning and development perspective.

Research Methodology

This research uses a mixed research methodology. For quantitative research, the sample group consisted of the executives and employees involved in the food department of hotels/resorts in Bangkok that had been certified for tourism accommodation standards from the Thai Hotels Association, 2020 (Thai Hotels Association, 2020) for a total of 60 hotels, totaling 320 people. The sample size was determined using the criteria 20 times the observed variable using stratified sampling method to collect data with questionnaires. The content validity was conducted with IOC values ranging from 0.80-1.00. For the reliability of measures, it was found that the Cronbach's alpha coefficient of the observed variables used in this research was between 0.760 and 0.994. For the entire edition, it was 0.982 and could be analyzed by structural equation modeling.

For the qualitative research, the data were collected from the in-depth interviews with key informants, namely (1) hotel/resort managers in Bangkok and its vicinity that has been certified for tourism accommodation standards from the Thai Hotels Association in 2020, totaling 10 persons, (2) 3 executives from the Office of Natural Resources and Environmental Policy and Planning, and (3) 3 executives from the Department of Environmental Quality Promotion for a total of 16 persons. The content analysis was also conducted.

Research Findings

Influence of marketing focusing on supply chain mobility, employee response and disposal of leftover food on the effectiveness of service business organizations

From Table 1, it is found that all metrics in the structural model can be used to analyze structural equations. The researchers analyzed the composite reliability (ρ_c) and mean variance extracted (ρ_v).

For the result of the model adjustment, after adjusting the model, it was found that the input metrics are correspondent with the data and meet the criteria of good entry rates with the data.

Direct and indirect influences among the variables on the effectiveness of service business organizations

The results of the model analysis represents the influence of latent variables which directly and indirectly affect the effectiveness of service business organizations. The researchers therefore applied the results of the structural equation analysis to present the direct

and indirect influences and the sum of all latent variables to show the influence of various factors affecting the effectiveness of service business organizations as shown in Table 3.

From Table 3, it was found that employee responses had the greatest overall influence on the effectiveness of service business organizations, followed by market orientation, getting rid of leftover food and supply chain agility, respectively.

Table 1 Results of the convergent validity analysis of the measuring elements

Variables	λ	ρ_c	ρ_v
Market Orientation)MKTORIN)		0.815	0.597
Customer Orientation)CUSORIN)	0.69		
Competitor Orientation)COMPORIN)	0.84		
Internal Function)INTFCTN)	0.78		
Supply Chain Agility)SUPAGIL(0.771	0.530
SPEED	0.79		
Response (RESPON)	0.69		
Flexibility)FLEX)	0.70		
Employee Response)EMPRES)		0.815	0.596
Environment Concern) ENVCC)	0.72		
Environment Knowledge)ENVKN)	0.75		
Intention of Reduction (INREDUCE)	0.84		
Getting rid of leftover food)RIDFD(0.861	0.676
SELL	0.90		
Recycle) RECYC)	0.79		
Donation)DONATE)	0.77		
Organizational Effectiveness of the Service Business		0.807	0.512
)ORGEFTN(
Financial Perspective)FINAN)	0.77		
Customer Perspective (CUSTMR)	0.70		
Internal Process Perspective)INTPROC)	0.69		
Learning and Development Perspective)LERNGROW)	0.70		

Table 2 shows the Item-Objective Congruence Index

Indicators	Criteria of good entry	After the model adjustment
Chi-square/df	Less than 2.00	1.24
RMSEA	Less than or equaling to 0.05	0.027
Standardized RMR	Less than 0.05	0.040
GFI	From 0.90 and over	0.96
AGFI	From 0.90 and over	0.94
CFI	From 0.90 and over	0.99
PGFI	From 0.50 and over	0.65
CN	Not less than 200	340.12

When considering only the factors directly influencing the effectiveness of service business organization, it was found that employee responses had the most direct influence on the effectiveness of the service sector organization, followed by getting rid of leftover food. The market orientation and supply chain agility had indirect influence on the effectiveness of the service business organization.

Table 3. *Direct Influence, indirect influence and total influence of the studied factors*

Influence of variables	Causal relationship		
	Direct influence	Indirect Influence	Total
Market orientation	-	0.53	0.53
Supply chain agility	-	0.14	0.14
Employee response	0.54	-	0.54
Getting rid of the leftover food	0.32	-	0.32

Approaches in leftover food management to increase the effectiveness of service business organizations

The in-depth interviews were conducted on the key informants including (1) Hotel/resort managers in Bangkok and its vicinity that has been certified for tourism accommodation standards from the Thai Hotels Association in 2020, totaling 10 persons, (2) 3 executives from the Office of Natural Resources and Environmental Policy and Planning, and (3) 3 executives from the Department of Environmental Quality Promotion for a total of 16 people. The approaches for leftover food management can be summarized in order to increase the effectiveness of service business organizations as follows. (1) Management of raw material storage areas and warehouse management are very necessary such as recording raw materials in-out in the warehouse, using the first-in first-out system, ordering from the forecast of the food menu that will be sold in the future both the ingredients used in the menu that sell well and not well in each period. (2) The procurement of raw materials is extremely important. By choosing fresh, good quality ingredients, it can help prolonging the time of spoilage thorough inspection of raw materials in terms of quantity and quality by focusing on the freshness of raw materials. Non-fresh ingredients have a shorter shelf life and risk of wasting leading to the inability to use raw ingredients in time. (3) For the employees in the restaurants of the hotels/resorts, regular training is required coupled with an efficient management system. This can help reducing the error rate and reducing the employee turnover rates greatly contributing to the reduction of errors that occur during operation. (4) Using technology to prevent mistakes from employees, such as using the food ordering system from tablet to allow customers to order food by themselves. Orders are delivered straight to the chef in the kitchen and waiters without any errors from the staffs. (5) Many hotels/resorts often throw away too much raw materials. On the other hand, if the hotels/resorts want to reduce costs, they should use excessive raw materials for maximum benefits. (6) The hotel/resort operators should set the remaining food intake acceptable criteria which can be calculated from the menu that has the exact sales of the restaurants first. If any day there is more food left than the limit specified by the hotels/resorts, it can indicate that any system of the hotel / resort must be improved and fixed. It is an incentive for hotel/resort operators and the staffs very well. (7) The hotels/resorts can create benefits from the leftover food that cannot be eaten such as using leftover food to make organic fertilizer, fruit vinegar, fruit fermented juice, etc. (8) The hotels/resorts have to create new food items from raw materials that consumers often leave behind to be able to eat deliciously and safely by considering how to dispose of leftover food that occurs both before and after reaching the consumers. They must keep creating knowledge and understanding for consumers at the same time. (9) The standard recipes in the cooking process must be set. Apart from making food taste, the appearance and quantity are now of the same standard. It can also help reducing the amount of leftover food effectively. (10) The hotels/resorts' standard operating procedures should be established to ensure strict compliance for employees in all positions. (11) The employee training is essential for hotels/resorts. This will help employees feel loved and loyal to the organizations and to feel the ownership. They will be proud to be a part of the

hotels/resorts and help the restaurants save money to take care of the benefits of the hotels/resorts. In addition, the employees should observe the amount of food left by customers. If food is left over in large quantities, they can check to see how the food quality is. If the food quality is good, then it means the quantity of food at the hotels/resorts is excessive and the amount of food being given may be reduced appropriately.

Conclusion and Discussion

The employee response is the most important variable that directly affects the effectiveness of business organizations in the service sector. Cultivating entrepreneurial consciousness among employees through sharing and transferring information amongst themselves within the organization includes providing knowledge about the environment to create awareness and intent to reduce the amount of leftover food. This leads to the environmental problems including leftover food crisis and contamination of water sources. It is a breeding ground for disease-carrying animals and global warming from methane generated from solid waste. Meanwhile, organizations such as restaurants and hotels have to deal with the cost of leftover food. Getting rid of the leftover food is quite a bit each year. Employee's response to leftover food problems reflects the values and beliefs that individuals have about environmental issues that are expressed through employee behavior towards managing the leftover food. It also encourages employees to understand the roles and importance of duties to the organizations. The results of the study found that employee's response is part of the employee's involvement in the organization that affects productivity. The employees' sense of involvement stems from the feeling of commitment and demand to see their work accomplishment (Schaufeli, & Bakker, 2004). The study of Kahn (1990) found that employee engagement influences employee performance (i.e. work quality or work experience) while influencing performance of the organization (e.g. increased productivity or reduced costs, etc.) due to the high level of employee involvement. A high level of corporate support is also required as a result of the cooperation between the organization and its employees at a high level. It will affect the efficiency of the organization's operations to increase accordingly (Saks, 2006). Therefore, it can be said that employees has the high level of response to leftover food issues. There will be efforts to reduce costs or add value to leftover food which is an important element in maximizing the effectiveness of service business organizations in various fields.

Getting rid of the leftover food has the second most direct influence on the effectiveness of the service business organizations. This agrees with the concept of lean manufacturing which is a manufacturing approach that focuses on reducing waste or improving the efficiency of production processes using different tools (Pearce, Pons, & Neitzert, 2018). This is to increase the efficiency of the organizations in terms of cost reduction and increase productivity for the organization (Veres, Marian, Moica, & Al-Akel, 2018). This is correspondent with the organization's leftover food elimination guidelines with the key objective in reducing the costs that may arise from daily leftover food disposal, for example: cost of time, money and labor. The value is added to leftover food by forwarding it to farmers, professional groups or organizations for processing into animal feed, compost or EM compost, or delivering daily excessive food to organizations for further distribution. It is consistent with the results of the study of Thailand Development Research Institute (2019).

The marketing orientation indirectly influences the effectiveness of the service business organizations through the employee response and the getting rid of leftover food. The marketing orientation is described as a strategy or action plan of an organization that will determine the direction how organizations and their internal personnel should act in response

to the plans they have been put in place. The study of Rustamadji & Zulkifli (2019) found that organizational strategy has strong influence on employee behaviors and persistence. This is consistent with the study of Khairiah (2017) that found a significant correlation between organizational strategy and employee engagement. In the same way, leadership strategy is another strategy that has positive relationship with employees' organizational engagement as well as increasing organizational efficiency (Colakoglu, Culha, & Atay, 2010; Lee, 2018; Vithessonthi & Thoumrunroje, 2011). The organizational strategies are therefore often initiated by senior executives who understand the organization's direction and goals before being passed on to employees and stakeholders (Burney & Widener, 2013; Homburg, Artz, & Wieseke, et al). 2012). A well-structured organization helps employees understand the importance of assignments (Hall, 2008) and understand the work processes and goals the organization has set. In particular, the understanding of the roles and responsibilities affect the efficiency of the organization's operations. Establishing a clear organizational strategy is thus a great tool for determining employee behaviors and responses (Hall, 2008; Stringer, 2007).

The supply chain agility indirectly influences the effectiveness of the service business organizations through getting rid of leftover food. The supply chain agility can already be described as having an impact on the efficiency of an organization's operations. It also affects the practice guidelines of relevant organizations. This means the supply chain agility is essential for improving competitive advantage in volatile market conditions. Agility is therefore a key factor in enhancing competitiveness and improving operational efficiency for organizations (Sherehiy, Karwowski, & Layer 2007) and the uncertainty of the industry (Silvestre, 2015; Tallon & Pinsonneault, 2011) including the environmental concerns and social resistances. Many businesses combine lean with environmental protection in order to reduce the impact on the environment and reduce production costs. The amount of waste is reduced according to the lean concept at the same time (Garza-Reyes, 2015). A study by Wiengarten, et al. (2013) shows that investment efforts in environmental conservation and the concept of lean production help the organizations reduce waste during the manufacturing process to prevent pollution problems and reuse the remaining raw ingredients.

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