Logistics Management Awareness and the Implementation of Restaurant Business: An Application of Stepwise Multiple Regression

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Abstract
As logistics are at the heart of the operation of small and medium restaurants, the logistics management implementation of restaurant entrepreneurs is a critical component for achieving their business goals. Therefore, the purpose of this research was to find the factors influencing their logistics management implementation. A self-administrative questionnaire was used as a research tool in gathering data from 400 entrepreneurs who operated small and medium restaurants in Bangkok, Thailand. The research found that the restaurant entrepreneurs were aware of the logistics management at somewhat level. Finally, a stepwise multiple regression was conducted and predicted the tendency of logistics management implementation. The analysis provided the linear combination of six independent variables (entrepreneur's gender, age, education, experience in business, size of business, and level of awareness in logistics management) which significantly related to the dependent variable (the tendency of logistics management implementation) at a statistical significance level of 0.05.
Keywords: Logistics Management, Logistics Activities, Restaurant Business

Introduction
A supply chain strategy lies at the heart of the logistic idea, working integrally to support a company's overall business objectives. A well-organized logistics supply chains provide many advantages for a business. The business will gain an efficient improvement in customer service concurrently, operating expense control, and capital investment reduction. Recently, Thailand government has extensively encouraged supply chain and logistics management among Thai businesses as a crucial strategy for boosting up competitiveness (Somboonwiwat, Kritchanchai, Wasusri, & Ruktanonchai, 2006). The restaurant sector is one of the most critical industry in Thailand. It continues to grow due to increased spending. According to the Office of National Economic and Social Development Board, Thailand's hotel and restaurant sectors expanded by 15.9 percent in the third quarter of 2016, 12.7 percent higher than in the previous quarter. As of March 31, 2016, there were 11,020 restaurants registered with the Ministry of Commerce (Sirikeratikul, 2016). However, because of the two primary reasons of unfavorable economic conditions and the government's stricter rules on migrant workers, about 2,300 small restaurants nationwide were forced to close in 2017, according to the Restaurant Business Trade Association (Jitpleecheep, 2017). This situation results in a decrease in a number of the small and medium restaurants. Whereas the arrival number of foreign tourists still increases, the demand for restaurants to operate more efficiently and provide effective services also increases to fulfill the requirements of the customers. An efficient logistics system is a solution for those small and medium restaurants as Gecowets (1979) indicated that logistics is the way to serve customers with a correct product, place, time, conditions, and cost. Eventually, this leads to the research question of this study which is what are the factors influencing on the logistics management implementation of small and

medium restaurants. The research results will be a guideline for concerned parties in supporting the entrepreneurs towards a good practice logistics management.

Literature Review

Many authors have defined logistics management in various ways. The most clearly one is by the Council of Logistics Management (2007), a leading organization for logistics professionals with a current membership of over 15,000. It defines the term of logistics management as a part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point-of-origin to the point-of-consumption to meet customers' requirements. Commonly, logistics mean activities that take place within an organization, whereas supply chain means interconnected stockholders that work systematically with the organization to carry a product to a target market (Hugos, 2011). The Council of Supply Chain Management Professionals (2007) stated that logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third-party logistics services providers. To a significant degree, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and implementation strategic, operational, and tactical. Logistics encompass five interrelated activities: customer response, inventory planning and management, supply, transportation, and warehouse (Frazelle, 2002). Moreover, logistics refer to a system of design and administration that is employed to control a changing physical location of raw materials, work-in-process and finished goods at the cost-effectiveness (Bowersox, Closs, & Cooper, 2007). Coyle, Langley, Novack, & Gibson, 2013 gave a short definition that logistics is about obtaining the right product, to the right customer, in the right quantity, in the right condition, at the right place, at the right time, and at the right cost. Finally, Schönsleben (2011) concluded that logistics management relates to the efficiency and effectiveness of the company's management. It comes with daily activity in manufacturing the company's finished goods and services. Many authors define different logistics activities under the perspective of the restaurant industry. Dani (2015) mentioned that the food supply chain is the sequences of processes and operations that assist in carrying the food from its raw material to customer plates. Managing a restaurant offers great challenges. One of the essential techniques in restaurant management is how to control the restaurant's inventory. Experienced managers have learned that it is necessary to have as many policies and procedures in place as possible as something is always going to come up to demand their consideration. Restaurants that operate with a less margin always keep an eye on cost control. After labor, food costs are normally the largest expense for restaurants. As a result, most restaurants have comparatively strict inventory-control policies (Browne, 2017). Finally, it is accepted that logistics is similar to dining at a restaurant. It is the flow of material, information and money between consumers and suppliers (Frazelle, 2002). After reviewing literature, the operational definition of this study is derived as "Logistic management is a system that results from a marketing orientation and operational efficiencies and effectiveness, time and place utility, and efficient movement to the customer". This is based mainly on the integrated logistic approach of Stock and Lambert (2001). It encompasses eight area of activities: customer service, order administration, transportation, warehouse operations, inventory management, demand forecasting, production planning and scheduling, and purchasing.

Research Methodology

Population and Sample

The population of this survey was the entrepreneurs who own registered small and medium restaurants in Bangkok. As of March 31, 2017, there were 5,207 entrepreneurs (Department of Business Development, 2017). Using the table for determining the sample size from a given population (Krejcie & Morgan, 1970), the sample size was not less than 358 entrepreneurs. The authors then rounded up the size of the sample to 400. There was no any organizations identified each proportion of small and medium restaurants in Bangkok, generally, they recorded in a total number of SMEs in Thailand. However, the Office of SMEs Promotion (OSMEP) surveyed in 2014 and reported that the number of SMEs in the service sector of Thailand was 1,041,818. Within this number, the small enterprises accounted for approximately 99.50 % and medium enterprises for 0.5 % (The Office of SMEs Promotion, 2015). As the population is partitioned into sub-population, therefore, it was rational to apply a stratified sampling method. This method is famous because it helps to improve a possibility of precision in sampling (Malhotra, 2007).

Table 1 Deriving Samples based on a Stratified Sampling Method

The service sector of Thailand (Number of stratum)	**Number of service businesses in each stratum**	**Proportional stratified sampling**		**Disproportional stratified sampling**	
		Percentage of total SMEs	**Number of samples**	**Equal Percentage of SMEs**	**Number of samples**
Small Enterprise (S)	1,036,598	99.50%	398	50%	200
Medium Enterprise (MEs)	5,220	0.50%	2	50%	200
Total SMEs	**1,041,818**	**100.00%**	**400**	**100.00%**	**400**

The process starts from dividing the population into groups, called stratum. As we can see in table 1, SMEs in the service sector of Thailand was classified into two strata, then the percentage of each stratum was derived as a proportion of total number of SMEs in this sector. Normally, a random sample is selected from each stratum based on the percentage that each subgroup represents in the population (Lammers & Badia, 2005). It is called proportional stratified sampling. However, as proportional stratified sampling, in this case, did not yield a sample size large enough for meaningful comparison between each stratum, disproportional stratified sampling is more suitable for use. One way of choosing sample sizes by this method is to have equal group sizes in the sample (Aaker, Kumar, & Day, 2007). Therefore, the random samples of each stratum were obtained at 200 equally. Details were shown in table 1. Further, from stratified sampling, simple random sampling was employed by randomly picking the desired number of units from the population (Parasuraman, Grewal, & Krishnan, 2009).

Research tool

A research tool, self-administered questionnaire, was used to collect data because it advantages of low cost and allowing contact with respondents who are inaccessible (Cooper & Schindler, 2006). The questionnaires were distributed to the sample restaurants. Then the respondents who were entrepreneurs of those restaurants could complete the questionnaires whenever they had enough time available for participation. The collecting data period was from June to August 2015.

Details of research tools: The questionnaire consisted of three parts. Part one was about entrepreneurs' demographic data and company information such as gender, age, education, number of years' experience in business, and size of business. These data were statistically socio-economic in nature and represented specific characteristics of the respondents. Some of the questions in this part were nominal scale and some were ordinal one. All the questions were structured as a closed ended questions in form of multiple choices. The multiple-choice questions are usually used to gather demographic data. This type of question, respondents are asked to select one or more of the alternatives given (Malhotra, 2007). Part two concerned with entrepreneurs' awareness of logistics management. Eight activities of logistics management were studied: customer service, order administration, transportation, warehouse, inventory management, forecasting, production planning & scheduling, and purchasing. These activities were adapted from logistics audit guides (Stock & Lambert, 2001). Customer service represents a function in creating time and place utility, with focus on the customers. Order administration serves as an effort in integrating order information system to serve the customers. Transportation defines as a performance in creating place and time utility for moving products across distance. Warehouse refers to an efficient movement in warehousing, storing, and providing accurate information about the products being stored. Inventory management represents an achievement in controlling the optimum number of inventory items including generating inventory formal report. Forecasting refers to as an ability to predicting a future demand of products by using a statistical forecasting system. Production planning & scheduling describes an effectiveness in planning production scheduling and control. Purchasing embodies an activities to serve the needs of internal units, such as production, marketing, operation, and others who wanted to procure somethings from suppliers. In this part, the questionnaire used rating scales which is the most common practice in business research that enables respondents to report the intensity of their attitudes (Zikmund, Babin, Carr, & Griffin, 2010). The questionnaire contained five rating scale of various questions related to eight areas of major logistics management activities. The entrepreneurs were asked to indicate their opinion about the awareness of listed sub-activities. The intervals were scaled ranging from 1 to 5, whereas 1 = not at all aware, 2 = slightly aware, 3 = somewhat aware, 4 = very aware and 5 = extremely aware. Finally, part three was about the tendency of implementing logistics management by entrepreneurs. This part of questionnaire was a ratio scale and was structured as an open-ended question which provides respondents a freedom to answer in their own words rather than being limited to choosing from among a set of alternatives (Churchill & Brown, 2004). Respondents were asked to answer a percentage of the logistics management activities that they plan to adopt in their enterprises.

Validity and Reliability: The eight activities in part two of the questionnaire were measured a content validity, which is a degree of being appropriated constructs (Polit & Beck, 2004), by the average congruency percentage (ACP) (Popham, 1978). Three academic experts in logistic field evaluated each item of those activities in relevant to the construct. They rated percentage of congruency with the construct as 100, 99, and 99, which averaged out in 99.33%. It indicated that this part of the questionnaire was valid because an ACP of 90 percent or higher would be considered acceptable (Waltz, Strickland, & Lenz, 2005). Furthermore, to measure the reliability of the questionnaire, the Cronbach's Alpha which is a conservative estimate of reliability (Carmines & Zeller, 1979) was used to test the internal consistency. Internal consistency refers to the extent to which there is cohesiveness or inter-relatedness among the responses to the multiple items comprising the scale. (Cronbach, 1951). The results were shown in table 2.

Table 2 Cronbach's Alpha Assessment

Activities of Logistics Management	No. of Item	Cronbach's Alpha
1. Customer Service	6	.873
2. Order Administration	10	.901
3. Transportation	9	.886
4. Warehouse	10	.834
5. Inventory Management	8	.841
6. Forecasting	7	.826
7. Production Planning & Scheduling	8	.852
8. Purchasing	7	.833
Total	**65**	

The eight activities had the reliability range between.826 to.901 on Cronbach's Alpha assessment. From several literature reviews, Cronbach's Alpha of more than 0.70 is acceptable, and 0.80 or above is favored (Cortina, 1993). Therefore the reliability analysis of this study which exceeded.80 suggesting outstanding internal consistency reliability and suitable for further statistical analysis.

Data Analysis: Descriptive statistics by frequency and percentage was applied to analyze all parts of the structured questionnaire. However, part two was also analyzed by mean and standard deviation. Inferential statistics by stepwise multiple regression was used in testing hypotheses. Preliminary analysis was conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity.

Research Results

Section 1: Demographic and Company Data

The research found that 60% of the respondents were male. 55% were between 30-50 years old. 56% held a bachelor degree. 58% had 10-20 years' experience in business, and 50% was a small business which had asset less than 50 million baht.

Section 2: Respondents' Awareness on the Logistics Management

As this part of the questionnaire used five rating scales, therefore the means for all activities were demonstrated and ranked from the highest to lowest: purchasing was 3.58, warehouse was 3.53, production planning and scheduling was 3.49, customer service was 3.41, inventory management was 3.39, transportation was 3.29, order administration was 3.23, and forecasting was 3.21. The research results were shown in table 3. It was apparently seen that most of the respondents rated all areas of logistics management at the degree of somewhat aware.

Table 3 Respondents' Awareness on the Sub-activities of Logistics Management

Activities of Logistics Management	$\bar{X}$	S.D.
1. Customer Service	3.41	0.655
2. Order Administration	3.23	0.506
3. Transportation	3.29	0.516
4. Warehouse	3.53	0.421
5. Inventory Management	3.39	0.610
6. Forecasting	3.21	0.546
7. Production Planning & Scheduling	3.49	0.404
8. Purchasing	3.58	0.494

Section 3: Tendency of Logistics Management Implementation

The research found that 59% of the respondents specified that they would implement the logistics management activities in their enterprises at an 80% possibility.

Section 4: Stepwise Multiple Regression

Stepwise multiple regression was employed to evaluate how well the six independent variables; entrepreneur's gender, age, education, number of years' experience in business, size of business, and level of awareness in logistics management predicted the tendency of logistics management implementation. As gender and education were measured in nominal scale, thus dummy variables were used as devices to sort these data into mutually exclusive categories. At step 1, age was entered, explaining 84% of the variance in logistics management implementation. Then, gender was entered at step 2, explaining 88.30 % of the variance. Education was entered at step 3, explaining 88.50% of the variance. Level of awareness was entered at step 4, explaining 88.80% of the variance. The experience was entered at step 5, explaining 89% of the variance. Finally, after entry size of business at step 6 (last step), the total variance explained by the model as a whole was 90.3%. Table 4 and 5 below shows the analysis result.

Table 4 Analysis of Variance

Model 6	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Regression	67628.982	6	11271.497	606.571	.000
Residual	7302.858	393	18.582		
Total	74931.840	399			

Table 5 The Relationship of six Independent Variables with the Tendency of Logistics Management Implementation

Variable	**B**	**t**	**Sig**
Constant	110.539	31.591	
Gender1	7.550	10.371	.000
Age	-.910	-19.171	.000
Education1	-.624	-2.819	.005
Experience	1.057	7.565	.000
Size of business	-.151	-7.243	.000
Level of awareness	-1.426	-2.122	.034
R	.950		
R^2	.903		
SIG F CHANGE	.000		

The above table illustrated the analysis result was statistically significant, by the standards of the study, when $p < \alpha$ of 0.05 (Cumming, 2012). The linear combination of the six independent variables was significantly related to the tendency of logistics management implementation at a statistical significance level of 0.05, $F(6,393) = 606.571$, $p < 0.05$. At the last step, the multiple correlation coefficient was 0.95, indicating that 90.3% of the variance of logistics management implementation could be accounted for by gender1, age, education1, experience in enterprise, amount of asset, and level of awareness. Thus the regression equation for predicting logistics management implementation was:

Logistics management implementation = 110.539 + 7.55(gender1) - 0.910(age) - 0.624(education1) + 1.057(number of years' experience) - 0.151(size of business) - 1.426(level of awareness)

Conclusion

As logistics management is the means to enhance quality and safety while reducing costs, therefore it is no surprise that logistics solutions that drive down costs are unique to individual restaurants. That is why restaurant which is a part of food service companies have been fast logistics adopters, compared to other industries (O'Reilly, 2012). As in the research results of this paper, Thai restaurant entrepreneurs tend to adopt logistics management in the future with a high possibility. Also, Partridge (2011) proposed that a logistics management practice depends on the size of the restaurant in vastly different ways. It is consistent with the results of the regression analysis which found that size of the restaurant also affects the logistics management implementation. Finally, as The Federation of Thailand Industry (2005) mentioned that Thailand government, academia, and consulting firms had developed some training courses and seminars in logistics management for small and medium enterprises (SMEs), however, the ways entrepreneurs adopted it are not naturally seen. The research results confirm that restaurant entrepreneurs are aware of logistics management at only somewhat level. Whereas their level of awareness shows a negative coefficient. It indicates that an increase in the level of awareness causes a decrease in the tendency of logistics management implementation. Therefore, the relevant parties, the especially Thai government, would take more effort in motivating and training practice courses for SMEs restaurant entrepreneurs to adopt logistics management activities. Consequently, when the restaurant logistics management works well, the result is a satisfied consumer who will bring both repeat business and profits to the restaurant and its myriad trading partners (Partridge. 2011).

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