The Asian Journal of Shipping and Logistics 33(1) (2017) 001-010

HOSTED BY

ELSEVIER

Contents lists available at ScienceDirect

The Asian Journal of Shipping and Logistics

Journal homepage: www.elsevier.com/locate/ajsl

Simulating Fleet Procurement in an Indonesian Logistics Company

Harry Dharma RAFKE[a] , Yuliani Dwi LESTARI[b]

[a] *MBA Student, School of Business and Management, Institut Teknologi Bandung, Indonesia, E-mail: harry.dharma@sbm-itb.ac.id (Corresponding Author)*
[b] *Senior Lecturer, School of Business and Management, Institut Teknologi Bandung, Indonesia, E-mail:yuliani.dwi@sbm-itb.ac.id*

ARTICLE INFO

Article history:
Received 16 October 2016
Received in revised form 28 February 2017
Accepted 10 March 2017

Keywords:
Capacity Management
Decision Making
Logistic
Fleet Procurement
Simulation

ABSTRACT

Capacity Management – such as fleeting becomes one of the critical decisions for the logistic company. Despite its role to ensure the availability of fleet as needed with an effective and efficient process, a good capacity management can improve service level and lead to competitive advantage. However, due to its capital-intensive characteristic, the decision between buying and renting a fleet becomes an important consideration. Therefore, this study presents a comprehensive decision-making methodology in capacity management, particularly on fleet procurement by incorporating several techniques (i.e., Demand forecasting, Demand-capacity analysis, Analytic Hierarchy Process with BOCR model, Urgent-Important Eisenhower Matrix, and Simulation). A numerical example is performed to an Indonesian logistic company. It reveals that a combination of owned-fleet and rented-fleet becomes the most appropriate strategy. In general, this study has contributed to strengthening existing literature and providing a comprehensive methodology in capacity management.

1. Introduction

With rapid environment changes and fierce competition, logistic companies are encouraged to optimize its resource and capacity position to maintain the achievement of service level (Pettus, 2001). As service companies, balancing demand and capacity has always been challenging due to the difficulty in predicting demand patterns (Klassen and Rohlender, 2002). In addition, other decisions that should be concerned for the success of managing Logistics Company are strategic planning, inventory management, transportation, and information technology (Gunasekaran and Ngai, 2003). Good management of these decisions can minimize cost and maximize fleet utilization, improve service flexibility, and reduce business risk.

Logistic company – particularly fleeting, has a capital intensive characteristic. High investment cost in fleeting has caused companies to analyze the necessity of fleet procurement under uncertain demand. One of the alternatives to overcome this issue is to rent fleets from vendors. Thus, it requires a trade-off between the cost of owned-fleet (investment outlay), the potential penalties of associated with unfulfilled demands as a result of the use of limited fleets, and the dependence on the vendor.

http://dx.doi.org/10.1016/j.ajsl.2017.03.001
2092-5212/
Peer review under responsibility of The Korean Association of Shipping and Logistics, Inc.

Regarding to this, it implies the need for an appropriate methodology as decision making guidance for companies to deal with this matter.

Existing studies (Utami & Rahmiati, 2015; Momani et al., 2016) have contributed to propose a flow of analysis in which respectively discuss the aggregate planning for fleeting operation and evaluation of capacity expansion decision. However, considering the aspects influencing this issue are combinations of both qualitative and quantitative, thus it is necessary to propose a comprehensive methodology by incorporating both aspects. Thus, this study presents a more comprehensive decision making methodology in capacity management, particularly on fleet procurement by integrating several techniques (i.e., Demand forecasting, Demand-capacity analysis, Analytic Hierarchy Process with BOCR model, Urgent-Important Matrix, and Simulation).

2. Proposed Methodology

The following figure presents the methodology proposed (figure 1). An initial analysis is performed to predict the demand (demand forecasting). Depending on the type of contract and the conditions of competition causes companies need to update the market forecast. Secondly, analyze the capacity availability (owned-fleet) with the demand forecast. Thirdly, the alternatives derived from the previous step are being further analyzed using AHP technique with BCOR model. From this step, Eisenhower Matrix / Urgent-Important matrix is performed to cluster short-term, middle-term, and long-term foresight strategies. The final step will be a simulation to simulate the financial requirement following the decision was chosen. With such analysis, we expect that the decision of fleet procurement can be analyzed from many perspectives (qualitative and quantitative) and resulting in comprehensive findings.

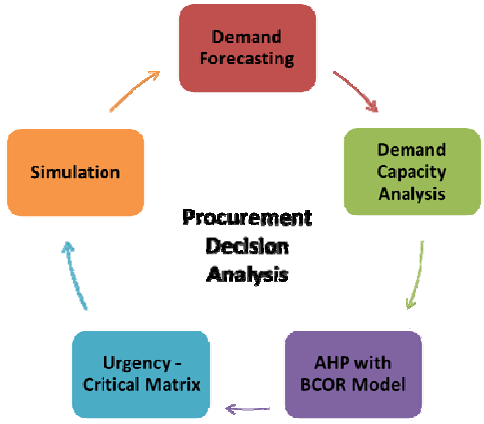

Fig. 1. Proposed Methodology for Procurement Decision Analysis

2.1. *Demand Forecasting*

In this step, two kinds of demand will be analyzed: (i) firstly, is the overall demand forecast, (ii) and second is the local demand (e.g. certain routings, destinations, fleets, etc.). These forecasting aimed to obtain the overview of future demand projection either in global and local perspective, so that the appropriate strategy accommodating the projected demand can be prepared. Forecasting methods can be varied from qualitative and quantitative technique, such as Delphi technique, time series, causal method (Chase, 2013).

2.2. *Demand Capacity Analysis*

To sustain their customer base and to seize revenue opportunities, logistics companies must be able to manage their capacity resources efficiently (e.g. fleets, fleets). Capacity is a measure of processing abilities and limitations and is represented as a factor of stocks of various processing resources, while investment is the change of capacity and includes expansion and contraction (Mieghem, 2009). To do so, firms must structure capacities in their supply chain so that over time it is possible to respond to demand surge from new opportunities and market upside, and to absorb short-time decline due to technological migration and market downside (Wu et al., 2005). Further, when demand is uncertain, capacity is costly, or capacity adjustments are not instantaneous, there will be instances of insufficient capacity to meet demand (Mieghem, 2009). Demand uncertainty can discourage firms from capacity expansion when there is perfect competition, while in imperfect competition the higher uncertainty may increase firm's incentive to invest (Wu et al., 2005).

Moreover, the role of capacity management is even more important in industries in which the capital equipment cost is high. In capacity planning, there are three key issues; in strategic, tactical, and operational; they consecutively are strategic interactions between two or more players, capacity expansion tactics and capacity planning typically refers to decision-support models developed for a specific operational environment (Wu et al., 2005). Capacity planning capabilities give the ability to quickly understand capacity gaps when new demand is planned. There are two circumstances where the capacity adjustment is considered necessary. The first condition is when the demand is exceeding the capacity. It means that the capacity needs to expand if the demand still wants to be coped. The second condition that might appear to be necessary for capacity adjustment is when the capacity is exceeding the demand (Utami and Rahmiati, 2015). For this purpose, capacity measurement analysis is required. One of common tools for a capacity measurement is demand-capacity ratio. It is used as the basis for decision making in capacity management. It enables management to identify underused capacity and opportunities for consolidation; the capacity can relocate as necessary and monitor the impact. This tool has been applied in airport's facility requirements (Brinckerhoff, 2013), semiconductor manufacturing (Chen-fu and Jia-nian, 2012), and planning for fleeting operation (Utami and Rahmiati, 2015). The purpose of this analysis is to compare the existing as well as forecast levels of fleet demand with the capacity of the existing fleets. In the purposes of this evaluation, capacity refers to the fleet ability to accommodate the demand with expected cost. In other words, this analysis aims as the internal environment analysis. In this demand-capacity analysis, the cut-off as an expected demand-capacity ratio by management is calculated; where the value is adjusted to the management decision.

2.3. *AHP with BOCR Model*

The Analytic Hierarchy Process (AHP) is designed to cope with the intuitive and rational decision to select the best alternative. It is a quantitative procedure for selecting a preferred alternative by performing the process of pairwise comparisons of the alternative's relative performance. It is a systematic process for representing the parts of a