Chapter 5
An Integrated Rough Model for Third Party Logistics Service Provider Selection

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ABSTRACT

Logistics is a key factor for companies to sustain their businesses, to gain the competitive advantage in the market, and to speed up the transportation process. Companies can perform their own logistic activities using their own core competencies; however, they can face huge logistics costs. To avoid these logistics operating costs, companies need to cooperate with third party logistics service providers (3PL) to perform logistics activities. This chapter proposes an integrated rough MCDM model including Rough SWARA and Rough COPRAS methods to identify the best 3PL for a Turkish textile company. These two rough methods were not previously utilized in solving any decision-making problems in the extant literature. Thus, the contribution of this study is to develop a new rough integrated model to solve the 3PL service provider selection problem.

INTRODUCTION

Today, as a result of rapid changes in technology, companies are forced to manufacture better quality products at a lower price to be able to sustain their businesses and to gain competitive advantage in the marketplace as well as to speed up the transportation process. In order to achieve all these objectives and to adapt to the quick changes in the market, it can be said the most effective tool to be used is "logistics" as competition between businesses depends on the realization of successful logistics activities.

Logistics can be briefly defined as delivering the right product in accurate quantity from the source point to the accurate final consumption point at the right time. Logistics plays a key role in unifying the supply chain of an industry and there is a strong impact of logistics on the productivity and whole supply chain's cost (Li et al., 2012; Govindan et al., 2016). If companies perform their logistics activities

with their own core competencies, this can bring high costs to the companies. Therefore, firms fulfil their logistics activities through working with an outsourcing company; namely, third party logistics (3PL) service providers.

The use of 3PL service providers in logistics has become a conventional activity because of the experience and expertise of 3PL service providers in supporting customers (Govindan et al., 2016).

The main benefits of working with logistics providers allows more focus on the company's core competencies, increased company productivity and performance, reduced transportation costs, and restructured supply chain (Li et al., 2012). The 3PL service provider presents the following services; consolidation of freight and distribution, stock management, storage, transportation, and cross-docking (Govindan et al., 2016). As a result, 3PL service providers have become an indispensable and important part of logistics activities for companies which choose to outsource.

Aguezzoul (2014) identified and listed 11 main criteria commonly used in selecting 3PL service providers in the extant literature. These criteria are as follows: relationship, cost, quality, flexibility, information and equipment systems, location, delivery, services, financial position, professionalism, and reputation. Therefore, it can be said that the choice of 3PL service provider is a complicated process as many qualitative and quantitative criteria, which generally conflict each other, influence this process. Hence, the choice of 3PL service provider can be classified as a multi-criteria decision making (MCDM) problem comprising various types of uncertainty.

There are many methods and models in literature to choose the right 3PL service provider. Most of the models used fuzzy set theory and small number of models used grey set theory to solve 3PL service provider selection problem. However, any rough integrated model has not been proposed before to solve this problem. In addition to the fuzzy theory, rough set theory is an appropriate tool to treat uncertainty without any effect of subjectivism (Vasiljević et al., 2018). Additionally, using rough set theory can bring some benefits such as easy collection of data and simple and quick calculation.

In this study, a new rough integrated model including rough SWARA (Step-wise Weight Assessment Ratio Analysis) method and rough COPRAS (Complex Proportional Assessment) method is used to handle uncertainty in selecting a 3PL service provider. The benefits of using rough SWARA are the reduction of the uncertainty, the decreasing of decision maker's subjectivity, consisting of small number of steps, the collection of data easily and simplicity in access creation (Zavadskas et al., 2018). The benefits of rough COPRAS can be small number of steps to go through and quick computation. Rough SWARA was introduced by Zavadskas et al. (2018) and rough COPRAS was developed by Stević et al. (2017a).

These two rough methods were not utilised together before in solving any decision making problem in the existing literature. Thus, the contribution of this study is to develop a new rough integrated model to solve the 3PL service provider selection problem. This rough integrated model is applied into a Turkish textile company, which would like to work with a 3PL service provider to deliver its products to local shops.

THE IMPORTANCE OF THIRD PARTY LOGISTICS SERVICE PROVIDER SELECTION

Logistics has generally played a supporting role for business functions such as marketing and production and transportation. In recent years, the role of logistics has begun to change in a significant way and its importance level has started to be seen as a critical factor that has become more prominent in competi-

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