# Chapter 4
# Agile Supplier Assessment Using Generalized Interval-Valued Trapezoidal Fuzzy Numbers

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## ABSTRACT

*The supplier assessment has always been a key area to be developed for necessary advancement and evaluation by the researchers. In this chapter, the authors react upon the agile characteristics and furnish an agile supplier assessment decision support system to be utilized by the managers of the distinguish firm for assessing the agile characteristics of the partner supplier firm. The authors presented a modeling based on generalized interval-valued trapezoidal fuzzy numbers (GIVTFNs) to assess the status of partner supplier concerning agile characteristics. A multi-criterion decision-making (MCDM) appraisement module is built by the authors and a decision support system is developed by them to judge the scale of agile characteristics in the supply chain (SC) network of the supplier firm. A second-level hierarchy appraisement module is discussed by the authors to illustrate the procedural implementation of the proposed work. Here, the authors proposed a decision support model, which can grab the subjective views of the decision makers. The authors utilized GIVTFNs to clutch the uncertainty and vagueness of the measures and their metrics (sub-measures) of the discussed agile platform. In this study, a fuzzy performance important index model is presented to recognize the weak and strong agile measures and metrics of the supplier firm. The major intention of the authors in this study is to deliver a knowledge-based technical model for the sake of determining the quality of agile strategies by the supplier firm in their SC network.*

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## INTRODUCTION

The value of any industrial and manufacturing firms can be increased by emphasizing on the elementary decision relating the different zones of the system. The decision accompanying the different corners and elements of the supply chain management (SCM) of the industrial and manufacturing firms is nowadays considered by the researchers to make it more effective and useful. Nowadays, Agile Supply Chain (ASC) is also drawing the attention of the researcher, which is responding towards managing flexibility, quickness, responsiveness and competency in SC network. ASC should be highly flexible and should be competent to be reconfigured quickly in responding to the changes, which occurs in an unpredictable business environment. ASC responds the thought of a dynamic network of firm, whose constituents can be structure and change frequently. ASC is the link between suppliers and customers, which impacts the planning, manufacturing and controlling of raw materials and products (Markland et al., 1995; Sahu et al., 2017b).

SC activities incorporates numerous activities i.e. product development, warehousing, production and logistics activities, information systems and medium etc. The coordination amongst these activities is must for developing and expanding SC network. SCM incorporates the business activities dealing with the flow of goods, services etc of a business firm. Successful SCM demands the effective movement & storage of raw materials, in-process and finished inventory from origin to source and vice versa. It stresses on maximizing the customer values and relations, cost, inventory etc by optimizing the associated distinguish activities, links and relations. Robust decision concerning the SCM can be taken by capturing numerous SC elements into decision arena. It is also required to develop numerous decision models, which can evaluate the incorporated elements. In this study, the authors consider agility as one of the element and presented an evaluation index to evaluate the agile status of the concerning firm for maximizing the customer relations amongst firms, which is one of the objective of SCM. Firms wants to run their SC in the most effectual and competent way. Birhanu et al. (2014) stated that the SC strategies show the companies competitiveness and their position in the market against their competitors. Hence, right SC strategy is compulsory for the companies to compete in the market. They disclosed different types of SC strategies, which are identified from literatures. Sukati et al. (2012) explored the relationship between SCM strategies and SCM practices and examined their effects on SC performance.

In recent times, business companies have started adopting the concept of ASC or agile networks; in order to react efficiently and effectively towards the increasingly dynamic and volatile markets demands (Christopher, 2000; Chong and David, 2012). ASCM can be considered as one of the most important aspects of production planning and control (Yigin et al., 2007). The successful implementation of an ASC largely depends on the firm ability to select the most significant potential partner in any given situation (Chong and David, 2010). Yang and Li (2002) emphasized that the foundation of the ASC lies in the integration of customer sensitivity, organization processes, networks and information systems. Some predictive analysis is essential to disclose the system behavior and for analyzing data and to get meaningful information (Acharjya and Anitha, 2017) and this can be done by structuring decision support systems. Sharma and Virmani (2017) proposed an efficient decision support system for detection of medical renal disease utilizing statistical features, which are computed from raw renal ultrasound images. Agility is the ability of an enterprise to meet the demands of customers in ever-shorter delivery times (Stalk and Thomas, 1990; Sharp eta l., 1999). Agility is defined as the ability of an enterprise to rapidly respond towards market changes and customers demands (Markland et al., 1995). It is sometimes