

Chapter 47

Performance Estimation of Firms by G–L–A Supply Chain under Imperfect Data

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ABSTRACT

Amongst various proposed SC philosophies, Lean, Green and Agile strategies of SC worked seminal to solve many problems of firms. Performance measurement acts as a tool to quantify overall efficiency via G-L-A SC activities of firm, where Green SC agenda is to control and diminish pollution and Lean SC helps to reduce waste of firm, while Agile SC target to manage SC more cum quick responding to clients. This chapter proposed a MCDM performance appraisal module (module constituted by mixing the segregated chain of green-lean-agile logistic activities and corresponding their interrelated metrics) conjunctive with Fuzzy Performance Index model in purpose to estimation the overall performance of individual firm. Furthermore, a centroid method coupled with fuzzy number set is proposed for classifying ill and strong G-L-A metrics of firm, so that managers could escalate their firms performance in case of non desirable performance. A hypothetical case research of two firms i.e. gear and shaft manufacturing firms are shown to measure their performance under G-LA supply chain.

HISTORICAL BACKGROUND AND SCM

The philosophy of Supply Chain (SC) was articulated by Tom Peter in front of Ford firm. He elaborated that SC network, is counted as an incomplete network as long as links aren't established amongst:

- The vendor,
- Manufacturing firm,
- Warehouse,
- Wholesaler,
- Retailer and end users,

Each element of said network is known as agent of SC. In SC, entire agents are allied with each other through an inter relationship, communication and collaboration for its own mutual profit. As a practical example, he also considered the convention centre of ford firm as a particle application, and explained that the convention centre of ford firm is built and not into use. Ford firm must use this convention centre for sheep to supply wool for its own automobile upholstery. Moreover, he also discussed that the degradation in efficiency and effectiveness of any agent of SC not solely leverages the performances of SC agents survive at upstream and downstream level of SC, but also disgrace the reputation of each agent.

During the half spanning of 19th century, the philosophy of supply chain is impounded by several industries, as it worked for a great success, growth and excellence in business of firms. In the mid of 19th century, proposed concept is accepted as a heart of each firm. Many definitions are proposed in regards to supply chain, expressed here.

Definitions of Supply Chain

SC is a network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities, which produce value in the forms of products and services in the hands of the ultimate customer (Christopher, 1998). SC is considered as a network that performs the procurement of raw material, transformation of materials into intermediate and end-products, distribution and selling of the end-products to end customers (Petrovic, Roy, & Petrovic, 1999). SC is an integrated process, which involves the processing of raw materials into finished goods and making them available to the end user (Beamon, 1999). SC is the upstream fraction of the value chain activities aiming to ensure that the right materials, services and technology are purchased from the right sources, at right time, at right quantity. SC is a continuous process, from raw materials to finished goods, via each traditional distinct function such as forecasting, purchasing, manufacturing, distribution, and sales and marketing (Chan, Qi, Chan, & Lau, 2003).

SC comprises a worldwide network of suppliers, factories, warehouses, distribution centre's and retailers through which raw materials are acquired, transformed and delivered to the end user (Lin, Chiu, & Tseng, 2006). SC is considered as a value-adding relationship between partially discrete, yet interdependent entities that cooperatively procure and transform raw materials into finished products through sequential network structures (Hult, Ketchen, & Arreli, 2007). SC is a combined system which comprises planning, sourcing, making and development of processes with its constituent parts to include:

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