Chapter 29
A Framework Proposal to Assess the LARG Index of a Supply Chain in a Fuzzy Context

Paulo Fazendeiro
Instituto de Telecomunicações, Portugal

Susana G. Azevedo
University of Beira Interior, Portugal

V. Cruz-Machado
Universidade Nova de Lisboa, Portugal

ABSTRACT

Bearing in mind the new Supply Chain Management (SCM) paradigms, it is important that supply chains be aware of the implementation level of the main practices associated to each SCM paradigm (Lean, Agile, Resilient, and Green, hereafter referred as LARG). The main objective of this chapter is to propose a framework, based on Enterprise 2.0 approach, for global supply chains to assess their LARG index in order to evaluate the leanness, agility, resilience, and greenness of their practices. Enterprise 2.0 technologies and Fuzzy Logic techniques are used as enablers to the proposed LARG evaluation model in the following assessment tasks: 1) determination of an adequate set of Lean, Agile, Resilient, and Green practices; 2) consensual definition of the relative weights of the considered practices; 3) adjustment of the evaluation policy to the particular supply chain; and 4) effective follow-up of the assessment results.

INTRODUCTION

A Supply Chain (SC) can be described as a chain that links various agents, from the customer to the supplier, through manufacturing and services so that the flow of materials, money and information can be effectively managed to meet the business requirements (Gunasekaran & Tirtiroglu, 2001). In present-day business there is the assumption that SCs compete instead of companies, while the success or failure of SCs is mainly determined in the marketplace. Supply Chain Management (SCM) is considered a strategic factor for in-

DOI: 10.4018/978-1-4666-4373-4.ch029

creasing organizational effectiveness and for the better attainment of organizational goals such as enhanced competitiveness, better customer service, and increased profitability.

The static connections between enterprises are typically insensitive to the changes in the business environment. Instead, flexible, agile, short, and dynamic connections that facilitate seamless information flow across different value chains are needed for dynamic business partnership formation to take place (Camarinha-Matos, 2002).

The research developed by the Association for Information and Image Management (AIIM) shows that most organizations look at Enterprise 2.0 as the application of Web 2.0 to the enterprise, next generation of enterprise content management technology, or as technology that enables people to collaborate and/or form online communities. According to Capuano et al. (2010) the term Enterprise 2.0 applies to the use of Web 2.0 technologies as a support for business activities within the organizations. These technologies are exploited to foster inter-persons collaboration, information exchange, and knowledge sharing and also to establish relationships to outside partners based on conversational modalities rather than on traditional business communication.

The Enterprise 2.0 is considered a strategic tool to improve Business-to-Business (B2B) interactions and communication capabilities for enterprise integration (Capuano et al., 2010). Enterprise integration is about connecting companies for particular business processes in the supply chain. Companies today no longer operate as isolated entities. Instead, they form supply chains with their suppliers, customers and partners.

The extent of B2B interactions and communications could be overwhelming between the various parties and services, especially in an adaptive environment where a lot of information needs to be exchanged. This requires higher capabilities of interaction and communication among businesses partners.

Bearing in mind the new SCM paradigms, it is important for supply chains to be aware of the implementation level of the main practices associated to each SCM paradigm (Lean, Agile, Resilient, and Green, hereafter referred as LARG).

The LARG assessment is a problem surrounded by a great deal of uncertainty resulting from the number of actors involved in the task and from the vagueness, imprecision and even incompleteness of some assessments. Fuzzy Logic as information processing science has given proofs of its adequacy to deal with problems defined in such imprecise and uncertain environments offering a range of tools and techniques which enable approximate inferences on (vague) linguistic terms and incomplete data in a very close agreement with the process of human reasoning (Zhou & Gan, 2008).

In this context, the main objective of this chapter is to propose a framework combining Enterprise 2.0 and fuzzy Logic approaches as a way to enable that global supply chains can assess their LARG index, that is, to get information about the leanness, agility, resilience and greenness of their practices.

BACKGROUND

Lean, Agile, Resilient, and Green Supply Chain Management Paradigms

The Lean approach is essentially focused on waste reduction as a means to increase actual value-added, in order to fulfill customer needs and maintain profitability (Womack et al., 1991). Disney et al. (1997) extended Lean to the SC context arguing that; Lean processes create value through the elimination of "waste" across the SC. To Parveen and Rao (2009) the Lean SC focus is on eliminating waste or non value-added processes or activities along the chain to achieve internal manufacturing efficiencies and set-up