Framework for Modelling the Decision: View of the Supply Chains Collaborative Planning Process

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ABSTRACT

In the supply chains operations planning context, and from a research viewpoint, it has been mainly assumed that different supply chain members make decisions in a centralised manner (one decision centre). However, reality shows that this is not the most usual situation, rather distributed supply chain decision making is. This paper proposes a framework to support modelling the decisional view of collaborative planning from a decision-making process perspective for both centralised and distributed situations. Along these lines, the framework assumes that the supply chain may be composed of one or several decision centres which aim to support every supply chain planning operation. Therefore, the main framework contributions are: consideration of decisions jointly with physical, organisation and information views; the spatial and temporal integration among the different supply chain decision centres; the definition of the macro level for “conceptually” modelling the collaborative planning process and the micro level for developing analytical models in all the decisional activities identified in the supply chains operations planning process. Finally, a brief overview of a real case application is also described.

Keywords: Collaborative Planning, Decision-Making Process, Decisional View, Framework, Supply Chains

INTRODUCTION

In the last few years, many papers have emphasised the importance of Supply Chain (SC) Management (Cooper, Lambert, & Pagh, 1997; Croom, Romano, & Giannakis, 2000; Lambert & Cooper, 2000; Lejeune & Yakova, 2005; Min & Zhou, 2002; Stadtler, 2005). In this context, processes, traditionally developed at the intra-enterprise level, should be adapted to be designed and executed by different enterprises,
and separated with distinct characteristics, but which still belong to the same SC. In this sense, processes are becoming more collaborative. Moreover, as defined by Hernández, Poler, Mula, and Lario (2011), collaboration in the supply chain can be defined as the way by which all the companies in an SC actively work together towards common objectives, characterised by sharing information with many participants and processes. Among these processes, the present work offers one of the most relevant, the operations planning process, which is commonly known in the literature as the collaborative planning (CP) process in collaborative contexts.

There are many literature definitions of the CP process concept. Dudek and Stadtler (2007) define CP as the coordination of planning and control operations across the SC; i.e., production, storage and distribution processes. Another useful definition is that of Stadtler (2009), which identifies several decision levels, from the most strategic to a programming level, and which include the operations to be planned and carried out by different collaborating SC “entities.”

Based on Stadtler (2009), we define CP as a distributed decision-making process pertaining to an SC in which different decisional units (or decision centres) have to be coordinated to achieve a certain level of SC performance. However, this coordination is narrowed at a tactical level (aggregate planning) and also at a tactical-operational one (master plan). Therefore, neither the strategic (design) nor the operational programming levels are included in our definition.

On the other hand, the design, analysis, adaptation, monitoring, control and improvement needs of the CP process are increasing which, since the beginning of this century, has mainly led to the publication of many papers addressing the importance of its modelling from very different points of view: functional, analytic, etc. Nevertheless, for modelling to be efficient and effective, it is essential to consider all the aspects influencing it as well as the relationships among them.

Such contention justifies the development of a framework (Fleischmann & Meyr, 2002; Pontrandolfo & Okogbaa, 1999; Stadtler, 2009; Stadtler & Kilger, 2002) to facilitate the modelling of the SC CP process in an integrated manner. Some of the work of Alarcón, Lario, Bozá, and Pérez (2007) proposes an appropriate framework whose principal contributions are as follows:

Firstly, it integrates four different modelling views; physical, organisational, decisional and information; and their relationships. This facilitates the development of integrated CP process models, leading to more realistic and versatile models that can be applied to complex SCs. Specifically, the proposed framework mainly uses the decision view, which is complemented and enriched with other views as the CP process implies making decisions about the resources/items physical view) forming part of an organisation in which the different “entities” are more or less integrated (organisation view), and SC activities consume and generate information (information view) to make appropriate decisions and SC operations plans.

Secondly, the importance of distributed decision-making contexts (Schneeweiss, 2003) is stressed in which the CP process is embedded by explicitly taking into account the two interdependence relationships types at the same time: temporal (among the decision centres belonging to different decision levels) and spatial (among the decision centres belonging to the same decision level).

Finally, the framework is not only conceptual, but also analytical; that is, it includes all the necessary aspects to not only conceptually model the CP process (Macro-Level), but to also facilitate drawing up analytical models to help the CP process’ decision making (micro-level).

This paper explicitly analyses only the decision view at a macro-level or, what is the same, the macro-decision view. The decisional view is closely related to decision making and, therefore, to activities of a decisional nature, which mostly define the CP process. The macro-decisional view presents all the aspects
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