



13th International Conference on Industrial
Engineering and Industrial Management

XXIII Congreso de Ingeniería de Organización

A large, abstract concrete sculpture with a central archway, set against a blue sky. The sculpture is made of dark, weathered concrete and has a modern, industrial feel. The archway is the central focus, and the overall shape is reminiscent of a stylized letter 'C' or a bridge structure.

**Organizational
Engineering
in Industry 4.0**

BOOK OF ABSTRACTS

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Supply chain procurement and production network design

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1 Introduction

The design of the SC is a complex problem that requires suitable methodologies and tools, as have pointed out several authors (for instance, Corominas et al., 2015, Chandra and Grabis, 2016 and Calleja et al. 2017). However, papers proposing operative methodological guidelines for designing supply chains are scarce.

In the framework of the supply chain, procurement and production must necessarily be considered together, because for each element that constitutes the final product and for the operations needed to assembly, in the broadest sense, those elements, generally exists the possibility of choosing between making or buying them.

Some insightful ideas concerning the relation between the characteristics of the product and those of the supply chain can help to approach the design of the later and particularly the part of the supply chain devoted to procurement and production. As it is known, the first paper that proposed this approach is Fisher (1997), in which the author introduces the distinction between efficient and responsive supply chains, required, respectively, by functional and innovative products. In a similar vein, other authors oppose agile and lean supply chains. A different idea is to consider the architecture of the product (integrated vs modular) and relate it to the degree of centralization of the supply chain, which, in short, refers to the proportion between what is done and what is bought.

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These ideas have to be had in mind when designing a supply chain, but they are not enough to guide with sufficient detail the whole design process, as the decisions do not need to be the same for all the components or modules of the product. Moreover, there is not unanimity concerning what characterises innovative and functional products (Calleja et al., 2017).

On the other hand, although there is a vast literature on the advantages and inconveniences of making or buying (see, for instance, Holweg et al. 2011 or Dolgui and Proth, 2013), it lacks generally from the adequate detail in the definition of the available options, since both make and buy are rather generic options, including a variety of significantly different more specific options (single sourcing, parallel sourcing, dual sourcing, multiple sourcing, etc.). Certainly, there are papers in which some of these options are defined and analysed, but in our opinion, based on the literature review and analyses, most classifications of the options corresponding to buy are neither clear nor complete because they mix two, or even three, dimensions (namely, the number of suppliers, the modalities of the relationship with them, and home country versus offshore outsourcing) in a single one. Even the make option is not that simple, because includes, at least, the possibilities of buying an adequate supplier or off shoring.

2 Objectives

The objective of this research is to propose a framework to help decision-makers to choose some procurement and production options and discard others, according to the relevant criteria, which are included in the framework, the characteristics of the product and its components and possibly the markets. We also propose a three-dimensional classification of the available options for making and buying the components of a product. In some sense, our approach is similar to those of Chopra (2003) and Ribas et al. (2018) for the design of the distribution network.

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