

# Performance of Sales and Operation Plan : Literature review & Perspectives of improvement

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*Abstract*—The impact of Globalization on business management was very significant, specifically on supply chain management. Given the important link between industrial and commercial planning as a tool determining the strategic objectives of the company and the production plan, the choice of a good SOP model taking into account all the constraints proves to be therefore determining.

Our objective in this article is to present some definitions of Sales & Operation plan in the literature, to give an insight on the various researches and publications realized, and finally discuss about perspectives of improvement.

**Keywords**— Sales and Operation Plan, literature review, performance, perspectives.

## Introduction

The major role of sales and operations planning (S&OP) is to coordinate between sales and logistics in industry. It includes all process to establish the estimated production plan at the tactical level, linking the strategic objectives of the company with the operational issues of the production master plan to best balance the demand and offer; according to Feng et al. (2008) [1].

Logistics and sales negotiate, through the S&OP, in order to establish optimal production volumes. The logistics ensures sufficient stocks of parts and finished goods to avoid bad delivery performance. From another side, commercial strives to maximize sales and control the mix to maximize profits. The purpose of the S&OP is to efficiently use the available production capacity to better respond to market demand in terms of cost, time and quality.

The S&OP is particularly important for international supply chains in an uncertain environment, where production management needs stability and visibility. Another major Ahmed EL KHALFI Laboratoire génie mécanique Université Sidi Mohammed Ben Abdellah, Faculté des sciences et techniques Fez, Morocco <u>aelkhalfi@gmail.com</u>

difficulty in coordination between sales and logistics concerns managerial and organizational aspects. Opposites and often conflicting objectives, lack of cross between the two entities and the fact that they are at the same level in the company induce that there is no clearly defined process for arbitrating conflicts and seek global optimum for the company : Rexhausen et al. (2012) [2]. Resolving these issues requires a strong involvement of the company's management and the creation of cross-functional teams.

## **Approach of Research**

Given the need to do a comprehensive research on the subject, and given the large number of documents available, we proceeded by analyzing certain issues related to our problem.

Figure 1 explains the approach used to prepare this literature review.



Figure 1 Approach of research

**Evolution of Research** 



Due to the important number of publications about this topic, and to target our thematic, we proceed by reading the titles of articles, summaries and full texts if necessary.

The keywords were used in the research and articles that have not given satisfaction were eliminated. A total of 92 articles were selected for our literature search.

Fig. 2 shows the evolution in the number of papers selected for our literature review, interest in the subject believes increasing, as evidenced by the number of recently published articles on various aspects of the S&OP.



*Figure 2 Number of publications on S&OP by year (N=92)* 

## Literature review about S&OP

Malhotra and Sharma (2002) [3] begin their article with a question: "In Harvard Business Review published 25 years ago, Shapiro (1977) posed the question: marketing and manufacturing can co-exist". This question pinpoints the appearance of conflicting objectives, and often antagonistic of the two functions. In the early 1950s, Charles C. Holt, Franco Modigliani, John F. Muth, and Herbert A.Simon (HMMS) began work on a project, "Planning and Control of Industrial Operations", at the Graduate School of Industrial Administration (GSIA) at the Carnegie Institute of Technology. William W. Cooper, who was also at GSIA, initiated the project, and the Office of Naval Research supported it. This early work of HMMS in aggregate production planning has evolved into a major business process known as sales and operations planning; according to Singhal and Singhal (2007) [4].

The S&OP as terminology was originally in the articles on MRPII (manufacturing planning resources), or similar systems, where some authors have used interchangeably to refer to the term of the aggregate production planning (APP). Since the 1980s, the significance of the S&OP has been expanded, and sales planning has been included in the process of S&OP.

So the S&OP has two components; sales planning (based on demand) and production planning, which determines the

capacity requirements, inventory levels and / or the level of the order book; according to Olhager et al. (2001) [5].

The S&OP includes all the processes that link the strategic objectives of the business with the production plan, to best adapt the supply (or capacity) to market demand; according to Feng et al. (2008) [6]. The S&OP is developed horizontally and involves numerous business functions (sales, finance, marketing, supply chain). It's development was the subject of many varied studies in recent years. This research area is experiencing a growing interest among researchers and industrialists. Thomé et al. (2012) [7] present a detailed literature review on the S&OP, they show that this area of research is very sparse, varied and has many research opportunities. Tuomikangas and Kaipia (2014) [8] show the considerable impact of effective management of the S&OP on business performance through a platform and the coordination mechanisms that play a central role in the S&OP to align corporate strategy and operational planning. Lim et al. (2014) [9] show how the operational control has evolved over the last fifty years to go from a very operational level planning (production facility) at a more aggregated level (S&OP and more generally the overall supply chain planning), to better satisfy customers and link directly to suppliers through a concrete study of the automotive industry that has perfectly followed the trend, but highlighting the growing need for more flexibility in the S&OP, particulary the supply chain internationalization and the high volatility in demand.

The supply chain concept (Christopher, 1992) has introduced the value of integration to business partners. This integration not only applies to the material flow from raw material supplier to finished product delivery, but also to the information flow from the market (i.e. the anonymous consumer) back to the supply chain partners. Supply chain management (SCM) mostly focuses on using of this information to optimize the material flow through the successive steps of inbound logistics, operations and outbound logistics across the supply chain. More recently, the term demand chain management (DCM) has emerged, focusing on the marketing, sales and services part of the value proposition. Demand chain management tries to obtain more reliable and detailed information about (prospective) consumers. It provides feedback on changing customer taste, evolving product life cycles, and the impact of promotions. The integration of SCM and DCM will lead to supply chains which more often deliver the right products and services: Landeghem and Vanmaele (2002) [10].

Nothing is more important for a product-based firm than the ability to deliver the right quantities of the right product to the right customer at the right time, without stockpiling unnecessary inventory. This requires a continuous and balanced matching of product supply and demand. Betteraligned operational and strategic plans and a better balance of supply and demand would benefit firms in the forms of smaller inventories, higher utilization, lower costs, and happier customers. It would also increase firms competitive advantage. However, even today many organizations stilloperate under central control through functional



departments. The linkage between sales and operations especially requires better integration and collaboration across operational silos. The outcomes of this disjointedness are delays and amplification of the information flow, suboptimal corporate plans, uncoordinated reactions within the business, insufficient operational flexibility, and discrepancies in supply and demand; according to Wagner et al. (2014) [11].

## The S&OP in the Hierarchy of Planning Systems

Malhotra and Sharma (2002) [12] present in Fig. 3, a simple framework that lists the key areas of decision-making within a firm where opportunities exist for inter-functional integration between marketing and operations functions. The S&OP is between the strategic and tactical levels. They also emphasize the importance of:

• The alignment between the goals and objectives of marketing and production functions;

• The alignment between product pricing and production costs;

• Alignment between the manufacturing and distribution channels;

• Problems in the supply and their interaction with the maintenance of the different segments of the market chain.



Figure 3 Marketing and operations integration framework within a firm.

Landeghem and Van Maele (2002) [13] introduced the S&OP as a tactical level in the supply chain as shown in Fig. 4.



Figure 4 Hierarchical levels in Supply Chain Planning.

Genin et al. (2001) [14] report the principle of MRP (Material Requirements Planning) and how did the need for synchronization of the available quantities of materials, components and subassemblies in a context of fixed deadlines and stable products. The move to MRP II (Manufacturing Resources Planning) was justified by the need to take into account the resource capacity, production, procurement, subcontracting, storage, distribution ... but also needs financial. adjustments to decisions about these resources are taken in advance to different levels in the light of their implementation deadline. So the MRP II planning structure has five levels and planning decisions as shown in Fig. 5:

- Strategic plan ;
- Sales and Operations Planing (S&OP);
- Master Production Schedule (MPS);
- Planning Requirements Components (MRP);
- Workshop Piloting.



Figure 5 Framework of hierarchical planning structure of MRP II



Genin et al. (2001) [14] also explain how the S&OP shall adjust the availability of resources on industrial factorys, labor, machine capacity, material inventories, etc .. to achieve the sales plan at defined dates. If these goals cannot be reached, a decision of outsourcing can be taken. In some supply chains, the problem of the allocation of distribution volumes between sites is also treated at this level: the possible transfer of materials, testing and quality approvals with unavoidable delays which require to make these decisions in right moment.

Lim et al. (2014) [9] specify the precise positioning of the S&OP in the hierarchy planning decisions, and that its scope can vary from one study to another, and depend on the context highly. Generally, management decisions in an organization are prioritized according to the following three levels (Anthony, 1965), illustrated in Fig. 6. The boundaries between these categories may differ depending on the context of study:

• The strategic level concerns decisions over the long term to carry out the company's strategy. Strategic planning is based on aggregate data.

• The tactical level includes medium term decisions on the use of resources and the planning of activities, from a more detailed level than the strategic plan (product family, finer temporal stitch, etc.).

• The operational level includes short-term decisions to plan in detail the operations defined in the production plan at the finer details (finished products, components, production workshop, etc.).



Figure 6 Hierarchy of planning levels, according to (Anthony, 1965).

Chen and Chen (2005) [15] explain how the latest manufacturing technologies enhance crossfunctional interaction between manufacturing and marketing such as Flexible manufacturing system (FMS), just-in-time (JIT), quick response (QR), manufacturing resources planning (MRP II), and enterprise resource planning (ERP). In spite of increasingly emphasizing on the aspect of customer demands, many production decision-making processes do not take marketing's dynamic nature into accountles. They schematize two processes as shown in Fig. 7: (a) coordinated decision process between marketing and production planning, (b) decentralized decision process between marketing and production planning.



Figure 7 Decision process (coordinated and decentralized) between marketing and production

Fleischmann and Meyr (2003) [16] treat the supply chain planning matrix (SCP) and give an overview of the planning tasks in all possible supply chain as shown in Fig. 8. However, according to the type of supply chain under consideration, the importance of simple tasks of planning is quite different. In addition, the allocation of planning tasks for planning levels and the supply chain process is somewhat fuzzy because positioning can also vary depending on the type of supply chain.



Figure 8 Planning tasks according to the SCP-matrix.

Feng et al. (2008) [1] show that although the concepts of SCP and S&OP are relatively new, the idea of coordinated planning can be traced back to as early as 1960 by Clark and Scarf (1960), who studied multi-echelon inventory/distribution systems. Since that time, research on coordination of various partial sections of the supply chain has been conducted.



However, very few models have attempted to address the integration of sales, production, distribution, and procurement simultaneously. Based on this initial work, they proposed a modeling approach (a) to assess the value of the S&OP, with an extension to multi-site alternatives (b) as shown schematically in Fig. 9.



*Figure 9 The integrated S&OP in supply chain planning context.* 

Stadtler and Kilger introduced a matrix approach for the structure of advanced planning systems as illustrated in Fig. 10. It includes four stages in a supply chain, i.e. procurement, production, distribution, and sales. The structure holds for an individual firm as well as an entire supply chain; according to Olhager (2010) [17]. Käki et al. (2013) [18] use the same model to link models to generic planning process in a typical advanced planning system as shown schematically also in Fig. 10.



Figure 10 The supply chain planning matrix

Thomé et al. (2012) [7] propose a framework as depicted schematically in Fig. 11 summarizing the empirical results and gathering all "descriptors". These descriptors of the study summarize moderators or effects that occur between S&OP and its results.



Figure 11 Literature search synthesis framework (according to Thomé et al. 2012).

Wagner et al. (2014) [19] explained that the main purpose of the S&OP is to develop tactical plans that provide management the ability to strategically direct its businesses to achieve competitive advantage on a continuous basis by integrating customer focused marketing plans for new and existing products with the management of the supply chain. The process brings together all the plans for the business (sales, marketing, development, manufacturing, sourcing, and financial) into one integrated set of plans. Fig. 12 illustrates the vertical and horizontal alignment of the various plans.

They linked together that S&OP is an ongoing process of monthly planning, reviewing, and evaluation to generate one set of integrated profit maximizing plans by ensuring the involvement of all key stakeholders. These plans comprise the game plan for each business function, whilst business performance is regularly reviewed, in order to strategically



direct the organization. The process facilitates the sending of early warning signals when supply and demand are at risk of becoming imbalanced so that the company can respond quickly to changing market and operations situations. S&OP consists of five steps:

- Data collection ;
- · Demand Planning ;
- Procurement Planning ;
- Pre-meeting ;
- Implementation Meeting.



Figure 12 Alignment of plans through S&OP.

## Performance issues

According to all precedent studies about Sales and Operation Plan, we concluded that some real constraints that are daily affecting the production are not taken into consideration.

Generally, the urgent orders received from customers are urgently prepared even if this is not respecting the schedule agreement. Thus, this has an impact on production performance. The same for objectives in multinational companies. In fact, many industries are working according to new target defined by central functions, such as OEE (Overall Equipment Effectiveness). Doing their best to achieve the target, the team find itself making many changes that might create later issues related to production delivery performance and sales target.

## Perspectives of improvement

Industrials might create better models of sales and operation plan that takes those constraints into consideration. Otherwise, all urgent orders received not according to the schedule agreement must be declined. Also, working under central functions is, in some cases, an organization chart that need to be reviewed in order to give each plant the possibility of better work.

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