Sales and operations planning maturity models: literature review and application in a consumer goods company in Brazil

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Abstract

There is much interest in S&OP by academics and practitioners, and many companies have implemented the process worldwide. However, the academic literature can still benefit from more empirical studies. This paper assesses the S&OP maturity level in the Brazilian subsidiary of a consumer goods global corporation. A review of S&OP maturity is performed, and one framework is applied to the subsidiary case. The investigation indicates that S&OP has been key to align the subsidiary's efforts to pursue its targets. Research findings also position the subsidiary in an intermediate maturity level. Suggestions for future research are offered at the end.

Keywords: S&OP, case study, framework

Introduction

Sales and Operations Planning (S&OP) is an integrated planning process adopted by an increasing number of companies worldwide. S&OP is commonly a five-step cycle performed to balance demand with supply (Thomé et al., 2012). Horizontally, it reconciles plans from the organisation's business functions in a consolidated set, which is also vertically aligned with enterprise's strategic planning (Tuomikangas and Kaipia, 2014). S&OP has gained increasing interest in the last decades (Danese et al., 2017) from practitioners and academics because much empirical evidence and research papers have described its positive impact on company performance, when well executed, improving supply chain and financial indicators (Thomé et al., 2012). An S&OP implementation may be assessed using a maturity model (MM). A MM describes advancements in a process, every stage showing improvements in the manner it is conducted and monitored (Mendes Jr. et al., 2016). Several studies have investigated the theme embracing MM building and application (Thomé et al., 2012; Danese et al., 2017) but there is still a lack of studies on the topic, especially the analysis of maturity using real-life data and

observations. Moreover, many researchers emphasise that more empirical studies about S&OP, embracing different contexts and foci, would enlarge the knowledge in the area (Goh and Eldridge, 2015; Noroozi and Wikner, 2017). The purposes of this paper are to present a literature review on S&OP MM and a MM application case study in the Brazilian subsidiary of a consumer goods multinational company.

The paper is structured as follows. The second section provides a theoretical background on S&OP. The third section presents the research method adopted. The fourth section offers the case study with its main findings. The authors' final remarks close the paper.

Theoretical Background

Thomé (2013) provides a synthesis of the different definitions available in the literature for S&OP, both as a process and as a management practice, as follows: "Sales and Operations planning is a cross-functional and integrated tactical planning process and a cohesive bundle of management practices that unites different business plans (sales, marketing, new product development, manufacturing, sourcing, and financial) into an integrated set of plans internally and in the supply chain, with the ultimate goal of creating value and impact upon firm's performance. It aims to balance supply and demand at family and individual product levels, with a planning horizon that matches the strategic business planning cycle. The efficiency of the process is measured and evaluated for continuous improvement. It comprises a set of cohesive management practices directed to boost alignment horizontally (across functions) and vertically (from business plan to operations), within the firm and in the supply chain" (Thomé, 2013, p. 30).

S&OP is usually performed in 5 main steps (Wallace and Stahl, 2006; Grimson and Pyke, 2007; Thomé et al., 2012, Wagner et al., 2014). The steps are described following Wallace and Stahl (2006). Step 1 is Data Gathering, performed at the beginning of the month. Step 2 is Demand Planning when sales and marketing teams review historical data and projections, include market initiatives (e.g. new product launches and trade-marketing promotions) and generate the unrestricted demand plan. Step 3 is Supply Planning, when operations analyze the unrestricted demand plan and generate the supply plan, including constraints (supply, production, logistics, and financial). Step 4 is Pre-meeting when representatives from different business functions discuss the gaps between demand needs and supply capacities and work together to find solutions to mitigate the issues. The agreed plan proposal with financial analysis and the unresolved issues and trade-offs that need senior managers' decision are taken to the Executive meeting (Step 5). In Step 5, the company's senior managers (e.g., directors and the managing director) analyze the S&OP plan proposal versus budget and approve it or choose another course of action.

S&OP implementations may be assessed through maturity models (Thomé et al., 2012). MM are frameworks that propose sequential progress steps in a process, every higher stage corresponding to an advancement in the means the process is performed and managed (Lockamy and McCormack, 2004; Mendes Jr. et al., 2016). A MM may be used to assess a process presenting its current development stage, gaps and improvement opportunities (Mendes Jr. et al., 2016). Academics and practitioners have developed and applied S&OP MMs with various foci using different numbers of stages and dimensions as previously presented by Thomé et al. (2012), Noroozi and Wikner (2017) and Danese et al. (2018). Table 1 summarises the main S&OP Maturity Models found in the literature.

Table 1 - Main Maturity Models for S&OP

References	Maturity stages / levels	Dimensions
Wing and Perry (2001)	Three stages: Integrated Planning Solution, Collaboration with Trading Partners and Network Hub.	Information Technology, Planning Integration
Lapide (2005a, 2005b)	Four stages: Marginal, Rudimentary, Classic and Ideal.	Information Technology (Process Enabling Technologies), Cycle Meetings, Planning Integration (Demand and Supply Balance)
Cecere (2006), Cecere et al. (2009)	Four stages: Reactive, Anticipative, Collaborative and Orchestrate.	Planning Integration (Operations and Sales Balance), Ownership, Goals and Metrics.
Snow (2007)	Four stages: Tactical, Advanced, Strategic and Innovative.	People, Process, Technology, Measurements and Incentives.
Grimson and Pyke (2007)	Five stages: Non-existent, Reactive, Standard, Advanced and Proactive.	Five dimensions: Meeting and Collaboration, Organization, Measurements, Information Technology Planning Integration
Feng et al. (2008)	Three stages: Decoupled Plans, Partially Integrated Plans and Integrated Plans throughout the Supply Chain.	Planning Integration (supported by Information Technology)
Viswanathan (2009)	Three stages: Laggard, Industry Average and Best in Class.	Measurement: success achievement based on three key metrics: customer service level, average cash conversion cycle and average forecast accuracy at the product family level.
Wagner et al. (2014)	Six stages: Undeveloped, Rudimentary, Reactive, Consistent, Integrated and Proactive.	Four dimensions: Process Effectiveness, Process Efficiency, People and Organization, and IT.
Danese et al. (2018)	Five stages: No S&OP Process, Reactive, Standard, Advanced and Proactive.	Four dimensions: People and Organization, Process and Methodologies, Information Technology and Performance Measurement.

Particularly, the framework proposed by Grimson and Pyke (2007) is one of the most adopted in the literature. Therefore, it was chosen in this research paper to assess the Brazilian subsidiary in the case study. Grimson and Pyke's (2007) seminal research work bases Thomé et al.'s (2012) S&OP framework; it is used by Goh and Eldridge (2015) in their investigation about S&OP implementations and results in two Asian companies, and it is a reference for Danese et al.'s (2018) MM.

Grimson and Pike's (2007) S&OP integration framework is built with five stages (non-existent, reactive, standard, advanced, proactive) and five dimensions: meeting and collaboration, organisation, measurements, information technology (IT) and S&OP plan integration. In the first stage, there is not an S&OP process implemented yet. Along the following stages, an S&OP structure is created, and routine meetings are scheduled, cyclic activities are defined, and integration systems are implemented. In the most advanced stage, the meetings become event-driven, the integration across the supply chain (within the company and with suppliers and customers) is complete and S&OP key performance indicators are applied to assess the process and reward good results. The process target is optimising profit.

Research Method

The empirical study is performed through an exploratory case study approach (Yin, 2009) in the Brazilian subsidiary of a consumer goods multinational company. Grimson and Pike's (2007) MM was chosen to assess the organisation due to its adherence in this case and representativeness, similarly as in Goh and Eldridge (2015). Convenience drove sample choice as researchers had access to organisation's professionals, information, and facilities. It is representative though because the Brazilian subsidiary is complex (number of suppliers, customers, products, and employees; revenue figures, multi-facility, strong international commerce etc.) and it is the biggest operation in Latin America for the multinational corporation regarding revenue and sales. Additionally, Brazil is the biggest country in Latin America considering its area, population and gross domestic product. Results obtained from visits, interviews with important stakeholders of the process, internal and public information were analysed, and quality tests and triangulation were performed.

The S&OP process in the Brazilian subsidiary

The company investigated in this research work is the Brazilian subsidiary of a multinational North-American corporation that manufactures and commercialises a wide portfolio of consumer and commercial goods of recognised brands. The corporation operates in more than 50 countries, employing around 20,000 people, generating revenues of US$ 6 billion annually. Among its customers, there are distributors, wholesalers, speciality supply centres, industrial clients, mass merchandisers and smaller retailers.

The Brazilian subsidiary sells around 6,500 stock keeping units (SKUs) to approximately 8,000 clients, responding for almost 40% of the Latin American revenues. The main product line commercialised in the country is responsible for approximately 85% of the sales. Around 65% of the portfolio is locally manufactured in two company-owned plants. Other finished goods are imported from many countries, mainly from North-America and Asia. The company has two distribution centres (DCs) and also ships to customers from one manufacturing plant warehouse.

The demand plan, the supply plan, the inventory position, the new product development data, the trade-marketing promotions, the updated costs, the price changes and the budget figures are the main inputs for the Brazilian subsidiary's S&OP process updated in its Enterprise Resource Planning system (ERP). The sales team has skilled trained people and uses an IT tool to generate the demand plan at an aggregate level and also opened by SKUs. Marketing provides new product and promotions information. The supply team generates a sourcing plan and the master production schedules (PMP) for the two local plants. The manufacturing planning team in each plant performs capacity simulations based on the PMP and informs the supply team the feasible production plan and the gaps. The plants have dedicated IT tools to support production planning and scheduling at the shop floor level.

The foreign trade team has a key role communicating with suppliers and freight forwarders, considering the importance of imported products for the Brazilian subsidiary,

moving loads efficiently and providing accurate product arrival information to supply, sales and marketing teams.

Finance is responsible for building the Brazilian subsidiary's budget based on inputs (e.g. resources, capital expenditures, costs, prices, sales, production, imports, inventory, and costs) provided by the business functions and on guidelines provided by the corporation. Once it is defined and approved for the following year, finance follows it up on a monthly basis. Financial results including all costs, asset and inventory values, margins, cash flow and profit are determined every month and kept updated in the ERP system. This information is available for the people involved in the S&OP process.

Wallace and Stahl's (2006) 5-step S&OP process is executed every month. There is an official meeting calendar, and people have clear roles and responsibilities and participate collaboratively. Observations indicate that not everybody out of the S&OP designated team demonstrates the same level of commitment even though S&OP is considered a priority by the corporation and it is locally sponsored by the managing director. Sales team eventually prioritises sales revenue over the sales forecasted by SKU when it becomes difficult to deliver the budget financial commitments. Finance representatives attend the Executive Meeting, but they are not frequent attendees in the other cycle meetings. Finance is kept informed of all meeting results though. All directors that compose the management team attend the Executive meeting but they also attend other cycle meetings related to their business function's responsibilities. The sales and the marketing professionals are divided into different teams by product line or by market channel, each one led by a director and focused on their specific customers.

There is an S&OP manual developed by the corporation that presents in detail how the process must be executed by the company. This manual is used as a reference to train people and to audit the subsidiaries around the world. The empowered representatives from all business functions are defined. The supply manager plays the S&OP manager's role in Brazil. His responsibilities include: to build an agreed calendar, to coordinate meetings, to communicate with all areas, to support and gather information, to prepare meeting minutes, to present the consensus S&OP plan and KPIs. In case of difficulties or disputes, the supply chain director or the managing director support him. The supply chain director has the overall responsibility for managing the S&OP cycle execution supported by all his peers.

A standard S&OP KPI dashboard is regularly maintained to be analysed during the cycle meetings, and it is also sent to the corporation, where it is consolidated globally and eventually reviewed. Standard reports are taken from the ERP to verify inventory positions, service levels, costs, prices, open sales orders, open purchase orders etc. The standard set of metrics that all subsidiaries worldwide have to keep, track and report are: service levels (perfect orders and line fill), forecast accuracy, inventory (raw material, work in process, finished goods, excess and obsoletes, inventory turns and days on hands), SKU count, ABC curve of SKUs and logistics costs as a percentage of sales. There is an S&OP grade given to each subsidiary audited by the corporation, reflecting its compliance to the overall company's standard process and progresses achieved. The Brazilian subsidiary went through its first audit and ended with a 83 grade which is considered a very good result in the company. Manufacturing KPIs are also reviewed in the Brazilian operation, as there are local plants. From S&OP perspective, the schedule attainment is one of the most important production indicators monitored. These metrics are also reviewed in historical series to monitor progress. Other reports became commonly used as top 20 clients' service levels, top 20 missing products (quantity and sales lost), sales concentration per week etc. Performance enhancements are still being evaluated as the new S&OP process standardised by the corporation globally has been recently revamped. But there are some positive preliminary indications regarding improvements in inventory position, forecast accuracy and service level. Based on the observations, the evidence is that

S&OP has been key to manage the complexity and dynamic changes, keeping all business functions aligned towards the Brazilian subsidiary's planned objectives.

It is possible to identify elements that provide indications about in which level the organisation could be classified according to Grimson and Pyke's (2007) MM, analysing the Brazilian subsidiary's S&OP implementation. Figure 1 presents the Brazilian subsidiary assessment, similarly to what was previously done in Goh and Eldridge (2015).

The Brazilian subsidiary could be classified in an intermediate level of maturity, with a solid process running, very far from an initial stage with decoupled plans and short-term view, and also distant from an ideal stage with the supply chain fully integrated by systems with suppliers and customers.

Final Remarks

This paper reviews the topic on S&OP maturity and offers a case study in a Brazilian subsidiary of a multinational organisation. Nine MMs are identified. Although they present many similarities, some categorise the advancements from different perspectives. The stages vary from three (e.g., Wing and Perry, 2001) to six (Wagner et al., 2014) and the dimensions from two (e.g., Wing and Perry, 2001) to nine (e.g., Baumann, 2010). Most MMs evolve from basic to best-in-class S&OP implementations, although presenting diverse intermediate stages. The first stage in some models cannot be even considered an S&OP process (e.g., Danese, 2017). In others, the top stage is aspirational as cannot be easily achieved presently (e.g., Lapide, 2005). Even though with different names in the MMs, many dimensions are conceptually similar or encompass others. The empirical study held in Brazil reveals a five-step S&OP implementation running monthly; dedicated team and S&OP leader; senior leadership support; defined structure, roles, responsibilities, and procedures. Information technology is used to support the process although there is no dedicated S&OP system. There are challenges to overcome to progress to higher stages related to, among others, level of commitment from sales force with demand forecast and low participation of finance along the cycle. Integration of suppliers and customers is incipient. There has been progress but still much room to improve. According to Grimson and Pyke's (2007) the organisation could be classified between stages three (Standard) and four (Advanced).

In future research work, it would be interesting to continue observing and investigating the Brazilian subsidiary progress to be able to measure more results as this implementation matures. Another research theme to be explored could be performing a Systematic Literature Review (SLR) about maturity model for S&OP together with a multi-case application to validate the findings

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	Step 1	Step 2	Step 3	Step 4	Step 5	Evidences
Meeting & Collaboration						There is a good level of collaboration along the entire process. People understands the importance of S&OP for the organization. The sales team eventually prioritizes sales revenue over sales forecasted by SKU when delivering the committed in budget financial objective becomes difficult. Finance representatives are present at the Executive Meeting but rarely attend other cycle meetings. The S&OP meetings are held every month .
Organization						The designated S&OP team is non-dedicated. Representatives from the business functions have other positions, roles and responsibilities in their original areas. The supply manager accumulates the S&OP manager's role. These are characteristics of step 3. There is good executive participation along the entire cycle which is more commonly observed in step 4..
Measurements						The Brazilian subsidiary periodically keeps track of a set of KPIs defined by the corporation that reflects both the business and the S&OP performance. It also manages new product developments inside the S&OP process. The corporation audits its subsidiaries and assigns an S&OP grade to them reflecting the adherence to the company's standard process and the performance progress achieved. The Brazilian susbsidiary is well ranked according to this indicator. KPIs are used to set priorities and to track performance.
Information Technology						The Brazilian subsidiary is moving from an Oracle to a SAP ERP system and utilizes many different IT tools in its operations and in the S&OP process. Material requirements planning (MRP) is performed inside the ERP, generating purchasing and prodution orders. Other IT tools are linked to the ERP and used in demand planning, production planning, sales order entry and sales order tracking (through a warehouse management system and a transportation management system). All S&OP information is kept in a share point accessible by everybody involved but the organization does not utilize a dedicated S&OP software solution. Many spreadsheets are also used for specific purposes but the subsidiary does not run the S&OP process merely relying on them.
S&OP Plan Integration						The business functions' plans are internally integrated and cover a 18-month window. The budget committed between the Brazilian subsidiary and the corporation provides the targets for the next 12 months. The S&OP plan is built collaboratively allong the process aligning the organization horizontally and vertically. There are initiatives to involve some key suppliers and customers in the process but it does not happen sistematically and inside the cycle meetings yet. S&OP is basically run internally at this moment.

Figure 1 - Brazilian subsidiary maturity assessment

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