

Development of a diagnostic tool to measure the implementation level of Sales and Operations Planning (S&OP) in textile companies

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Abstract

Paper aims: to propose the development of a Sales and Operations Planning (S&OP) diagnostic tool to assess the degree of implementation in the textile sector.

Originality: the delivery of a set of issues, with levels of maturity and visual management, allows for benchmarking and the identification of strengths and weaknesses, not only internally but also externally. Also, the comparison with other companies and the diagnosis of the integration of the internal sectors of a company around a shared vision of demand and delivery of goods to reduce the gaps between industrial and commercial areas. The tool developed compiles a set of questions to implement S&OP, such as integration between areas, the use of software, leftover raw materials, and finished products, the degree of assertiveness of consumer demand, and other criteria. Thus, it is possible to compare each company and make improvements.

Research method: the diagnostic tool was developed from proposals for other sectors, and a survey was later carried out with 16 textile companies to validate the developed tool. Eleven questions were developed with five levels of answers – from the basic to the advanced level.

Main findings: We created a ranking of the level of S&OP implementation in companies, contributing to the advancement of the maturity of the entire sector. The implementation in companies resulted in improved communication, reduced barriers between areas, and increased engagement of teams in the sales process and delivery of goods – factors that contribute to the success of key performance indicators (KPIs).

Implications for theory and practice: the initial gamble level of the production of goods following the forecast of demand in the textile companies in Brazil is, on average, 30%, which is worrying since this indicates low assertiveness. Thus, this study contributes to the evolution of the theme by structuring a diagnostic tool for managers with a deployment of more assertive strategies and communication. The analysis of theoretical work in various sectors allowed a comparison with practical results obtained in the textile sector. Furthermore, the tool serves as a guide to achieve the results demonstrated in the literature, such as increased profits and delivery accuracy, improved planning, and integration between areas, which directly lead to a more pleasant work environment.

Keywords

Survey. Strategic planning. Demand forecast. Maturity model.

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1. Introduction

Competitiveness between organizations is a growing factor in the day-to-day of the corporate world, putting pressure on companies in the search for better performance. In parallel, the continuous improvement of processes and products is necessary for survival. With this, the alignment of processes with the strategic objectives of a company becomes a necessary and mandatory requirement for those seeking to achieve long-term success (Azemi & Bala, 2019).

In this context, a relevant concept for maintaining the competitiveness of a company is Sales and Operations Planning (S&OP) (Kreuter et al., 2022), which aims to integrate decision-making processes with strategic, tactical, and operational planning, thus seeking to ensure that long-term actions are indeed carried out, with a resilient and well-aligned supply chain (Calfa et al., 2015). This is a multidisciplinary process that may contemplate different business plans in one and thus helps balance supply and demand, creating a tactical bridge between the operational plans of a company (Thomé et al., 2012).

In the literature, the reported benefits of S&OP are numerous and include higher customer satisfaction, lower and more balanced inventories, shorter lead times, more stable production rates, more cooperation across the operation, better forecasting, efficient decision-making, and a greater focus on the long-term horizon. In general, the benefits of implementing S&OP are the following (Thomé et al., 2012; Wagner et al., 2014; Hulthén et al., 2016; Tuomikangas & Kaipia, 2014; Noroozi & Wikner, 2017):

- Stable production rates;
- Increased sales;
- Decreased inventory levels;
- Reduced delivery times;
- Reduced production costs;
- More optimized decision-making;
- Increased working capital;
- Increased customer satisfaction;
- Increased focus on the long-term horizon;
- Improved assertiveness of demand forecasting;
- Better alignment, cooperation, and socialization of the business policy.

In the textile sector, the application of S&OP concepts has been little explored. Mostard et al. (2011) indicated that in the clothing business, assertiveness in forecasts is crucial to the success of organizations since “collections” (product models) change quickly. According to Pedroso & Silva (2015) and Grimson & Pyke (2007), this S&OP scarcity is due to the complexity of implementation, considering this methodology has been studied since the 1980s (Thomé et al., 2012). Pedroso et al. (2016) also stated that, when implementing S&OP, companies face barriers such as isolated cultures, lack of stakeholder commitment, infrequent meetings, and lack of participation in the S&OP process. The authors identified that creating an S&OP department facilitates overcoming these barriers, as does a disciplined culture in meetings and the ability to drive cultural change and learn from mistakes. It is added that there are challenges in implementing S&OP and that academic research offers little guidance for companies on how to benefit the most from S&OP (Tuomikangas & Kaipia, 2014).

Vereecke et al. (2018) developed a model to assess the maturity of demand planning, an important pillar of S&OP. In the textile industry, maturity studies related to S&OP are important and provide necessary information for companies in this segment. A case study by Ballón-Echevarría et al. (2022) in inventory management in a textile company proposed the application of the S&OP process focused on demand planning and area integration and a supply plan based on MRP to increase revenue to at least four times a year, which corresponds to the minimum number of times a product with seasonal demand must run. Bofill-Altamirano & Avilés-Sacoto (2019) indicated that using the S&OP process promotes significant results in companies in this segment. However, the use of S&OP must take into account the level of maturity of a company. Authors such as Bagni & Marçola (2019) assessed the evolution stage of the S&OP process in a company from another segment yet failed to propose a diagnostic tool to measure the S&OP implementation level. In turn, Rampon Neto et al. (2022) proposed an S&OP tool framework and a maturity assessment model that provides a structured model to identify the

maturity levels of an organization and critical gaps in the S&OP process, yet the model was not validated. Thus, the research problem considered in this paper was the following: how may one evaluate an appropriate S&OP maturity level in textile companies?

There is no rule for structuring an S&OP team. However, participants must have a clear vision of their role within the process and the support of the person responsible for each area. This consensus is crucial to establish the commitment of all those involved.

As for the team, despite differences in leadership style and organizational culture, Seeling et al. (2022) reinforced that the financial sector must be present and active during the pre-meeting and executive meeting stages, adding significant value to S&OP decision-making from a systemic perspective. The participation of this sector throughout the S&OP process is beneficial for the company, serving to overcome cross-functional conflicts and allowing integrated decision-making with a constant focus on strategic business objectives and profit maximization.

First, an organized team structure is necessary, and it is up to the company to adopt criteria consistent with its organizational structure. The S&OP implementation process is not complex, but it is challenging to implement, requiring attention in the initial stage. If the following considerations are not verified at the initial stage, it will be difficult to complete the process (Stahl & Wallace, 2012):

- Having prior knowledge of production, commercial, distribution, and inventory practices;
- Not neglecting the cultural strength of the company;
- New processes entail changes;
- Changes mean people will be changing aspects of how their work is carried out;
- People need an understanding of processes and a vision of the future to make the necessary changes.

For the implementation of S&OP, selecting a pilot family of low-complexity products is recommended so that the process may be carried out more easily and communication and discussion dynamics may be learned (Pedroso et al., 2016). Thus, to implement S&OP, some issues must be clearly defined, such as who owns the process, which participants will work on it (Voluntary Interindustry Commerce Solutions, 2010), and which responsibilities and initial information must be delegated (Boyer, 2009), and participants must have authority to make decisions (Voluntary Interindustry Commerce Solutions, 2010). In addition, it is necessary to train employees and understand the process, spreadsheets, adopted policies, and support tools (Boyer, 2009).

According to Canitz (2018), the benefits of S&OP processes may significantly reduce company costs and increase agility, improve customer relationships, and leverage company profits. The following results have been obtained by companies with the S&OP process implemented in their workflows:

- 28% improvement in meeting order delivery deadlines;
- 47% increase in annual gross profit margins;
- 2.7% decrease in cash-to-cash cycle time;
- 31% improvement in quarterly forecast accuracy demand.

Arozo (2006) stated that there are eleven requirements for the S&OP process to occur as planned: company commitment, planning horizon, meetings planning, dynamics to be used in meetings, definition of responsibilities, process support tools, degree of aggregation of information to be analyzed, financial monitoring of results, process documentation, performance monitoring (process indicators), and coherent information flow.

First, the sales team gets together in formal or informal planning meetings to build a demand forecast that is unrestrained in the sense that it captures not what the company can produce but what could be sold to customers (Stahl & Wallace, 2012). The second stage involves meetings with the operations team. While the sales team is developing its forecasts, the operations team gathers information on internal and outsourced capacity and inventory strategy. Manufacturing resource planning (MRP II) modules may be used in this process to create a time-scaled picture of future plans and requirements (Stahl & Wallace, 2012). Third, the S&OP team formally meets to develop the final operational plan for the coming period. The fourth step is to distribute and implement the action plan. The main recipients are the operations and sales teams (Grimson & Pyke, 2007). The fifth and final step is to evaluate the results and effectiveness of the S&OP process. Measurement is essential for both implementation and improvement. The literature suggests that the defined measures should vary according

to industry, process, and product line. Examples of commonly used measures for operations include percent utilization of production capacity, available inventory, obsolete inventory, frequency of expediting, inventory outages, variance from standard cost, and quality (Sheldon, 2006; Grimson & Pyke, 2007).

To verify the success of the implementation of this method, the initial project proposal in the company should include the structuring of internal processes, formalization of performance measures, and the measurement of S&OP (Silva et al., 2012). As for the progress of the method and its functionalities, such as using reliable data and didactic formats, they should not be underestimated to ensure a high degree of organization and control (Linares, 2004).

This research aimed to develop a diagnostic tool for the level of S&OP implementation in textile companies to be used for benchmarking. Later, it may be tested in other sectors that are interested in learning and improving the demand forecast and acting more strategically in the market.

2. Research methodology

To develop this diagnostic tool, the questions were supported by the literature and practical experience of the authors. Thus, the methodology consisted of a literature review using the term “S&OP” alone and in combination with “textile”. For this stage, the goal was to identify the results obtained upon applying this methodology in other sectors and thus benchmark them with the textile sector.

The “narrative review” does not use explicit and systematic criteria for the search and critical analysis of the literature. The search for the studies does not need to exhaust the information sources. It does not apply sophisticated and exhaustive search strategies. The study selection and information interpretation may be subject to the subjectivity of the authors. It is appropriate for the theoretical foundation of articles, theses, dissertations, and program completion papers. The narrative literature review presents an applied nature and aims to generate knowledge for practical application (Frank & Hatak, 2014; Wiles et al., 2011).

After this step, we developed the tool and the scoring scale, in addition to defining the sample and the form of presentation and analysis of the results. Such methodological procedures will be detailed in Subsections 2.1 and 2.2, ending with a classification of maturity levels validated by 16 responding companies from southern Brazil.

2.1. Development of the diagnostic tool and definition of the sample

The tool comprised three questions focused on the methodology and the other questions focused on the implementation results. All questions were closed-ended, with five options of answers (Likert scale). The questions were elaborated through a literature search and prevalidated with university experts and consultants (Appendix 1 – diagnostic tool).

Objectives of each question:

- S&OP implementation percentage, ranging from 0% to 100% – considers whether the methodology is applied to the entire company portfolio.
- Integration level of the planning between the commercial and industrial areas, ranging from 0% to 100% – evaluates the entire portfolio.
- Percentage left over from each collection, ranging from 0% to 15% – items sold at a discount and usually with a negative margin.
- Percentage of raw materials left over from the collection, ranging from 0% to 15% – leftover fabric.
- Lack or surplus of inputs at the end of the collection, ranging from 0% to 15% – zippers and trims, buttons and accessories.
- Destination of products left over after the collection – this question relates the planned forecast to the actual sales and identifies the company’s strategy for quality and cost reduction. We do not assess whether the company has its own store and what discount is provided for the sale of leftover products.
- Achieving financial goals – this question also mainly verifies the sales against the company’s strategy but does not evaluate the variables that influence it.
- Comparison of hiring and firing costs – this issue is more related to production and is also aimed at assessing the assertiveness of the demand forecast.

- Order assertiveness – the higher the degree of assertiveness, the more aligned the S&OP is.
- S&OP monitoring software – using technology aims to facilitate and integrate systems within the company. Thus, an ERP-type management tool helps in the success of the S&OP.

The diagnostic tool was applied in twenty textile companies from Santa Catarina, starting in February 2022, when 16 contributing companies responded. The companies were chosen randomly. The research took place through the *Google Forms* platform, with 11 closed-ended questions for respondents to choose one of the five alternatives. The companies involved in the research were from the clothing and other textile sectors. The diagnostic tool was sent to only one person in charge of the company, and they were instructed to seek the other relevant sectors in case of doubts.

2.2. Diagnostic tool application and feedback

After applying the tool in the companies, a return rate of 80% was obtained. The identification of the S&OP maturity level in the studied companies was based on the compilation of the obtained and generated graphs.

The maximum score that could be obtained when answering the diagnostic tool was 55 points, with each question seeking an answer to the analyses below the respective S&OP maturity level in each company. The quadrant classifications were “under preparation/planting”, “under preparation/harvesting”, “consolidated/planting”, “consolidated/harvesting” (see Figure 1).

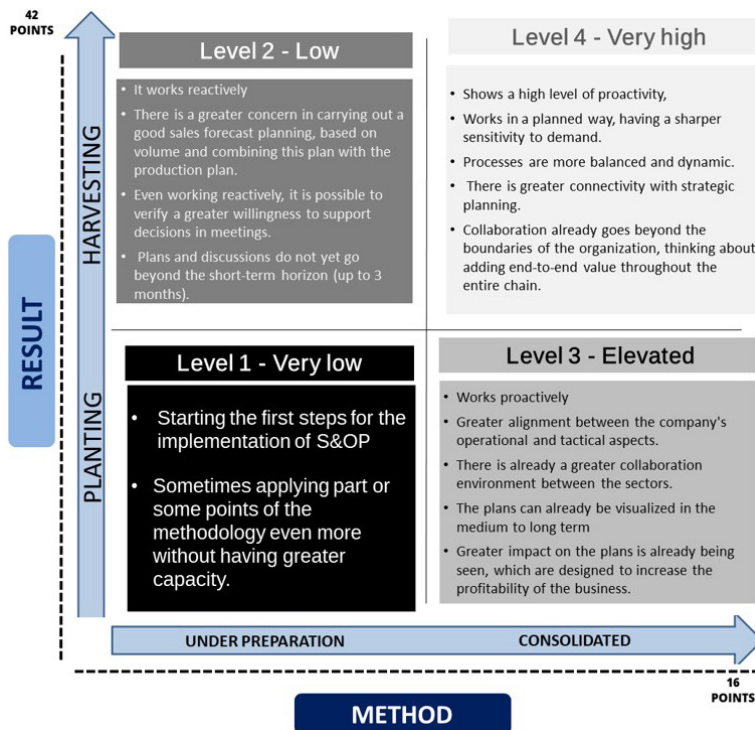


Figure 1. Quadrants of the method.

- **Under preparation/planting:** the level at which the company takes the first steps to implement S&OP, sometimes applying part or some points of the methodology even without having greater capacity.
- **Under preparation/harvesting:** the level at which the company works reactively, but there is already a more significant concern with carrying out a good sales forecast planning based on volume and combining this plan with the production plan. Even when working reactively, it is possible to verify a greater willingness to support decisions in a meeting. Plans and discussions do not yet go beyond the short-term horizon (up to three months).

- **Consolidated/planting:** the level at which the company works proactively and the alignment between the company operations and tactics is executed with greater force. There are signs of a more collaborative environment between the sectors. The plans may already be visualized in the medium to long term, and a more significant impact is already seen on the plans, which are now elaborated for greater profitability of the business.
- **Consolidated/harvesting:** the level at which the company works at a high level, in a planned manner, having a sharper sensitivity to the demand. Processes are more balanced and dynamic. There is more significant connectivity with the strategic planning. Collaboration already goes beyond the boundaries of the organization, thinking about adding value from end to end of the entire chain.

3. Results

The initial search started with the term “S&OP” as a general form (i.e., for any application), then the term “textile” was added. The objective was to compare the textile sector with other publications. Research on S&OP has few publications, with a significant difference in the number of publications in textiles compared to other sectors. In 2020 and 2012, when the maximum number of publications in textiles occurred, the number of articles corresponded to only 6% of all publications. This number is lower in all other years, showing the need to deepen studies in the sector. However, the topic has slowly gained some notoriety over the past five years internationally, with 200 to 500 publications per year focused on S&OP and a maximum of 26 documents addressing textiles. Compared to other sectors, the food sector was the most representative from 2016 to 2022 (787 articles), followed by the agricultural sector (145 articles), manufacture of plastic products (147 articles), textiles (142 articles), and, finally, the metallurgical industry, with only 11 publications in this period.

Of the analyzed studies, in a case study carried out with three companies from different sectors, it was possible to observe that the main challenges are reconciling demand and supply internally, exercising capacity control, and evaluating the impacts generated by functional areas (Pedroso & Silva, 2015). In the mentioned study, Company 1 operated in the construction and mining machinery sector, Company 2 in the agricultural machinery sector, and Company 3 in the timber industry. The challenges faced by Company 1 were reconciling demand and supply and evaluating the impacts generated on the other functional areas. In turn, Companies 2 and 3 faced difficulties carrying out capacity planning and promoting the balance between demand and supply.

Seeling et al. (2022) reinforced the importance of the financial sector participating in the S&OP process. The authors conducted multiple case studies in large companies in the chemical, pharmaceutical, and consumer goods sectors (plastic home products, hygiene and personal care products). When such an involvement exists, the analysis of sales, marketing, and operation plans is better supported for revenue, cost, and margin calculations.

After the theoretical results, this step describes the application in 20 companies, of which 16 responded (80% return rate). The respondents worked in Production Planning and Control (25%), Logistics (19%), Industrial Management (31%), Commercial (19%), and S&OP Management (6%). Most respondents had little professional experience (less than five years), but four of the sixteen had over 20 years of experience. We observed and discussed the identification of the S&OP maturity level in the studied companies from the results presented in Figures 2 to 12.

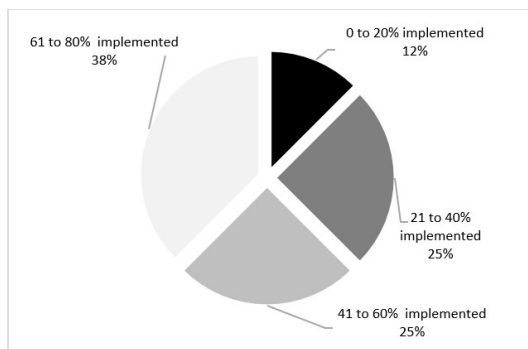


Figure 2. Implementation percentages of the S&OP methodology in the studied companies.

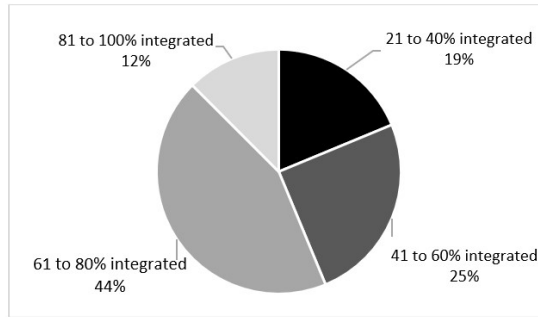


Figure 3. Percentages of integrated planning in the companies.

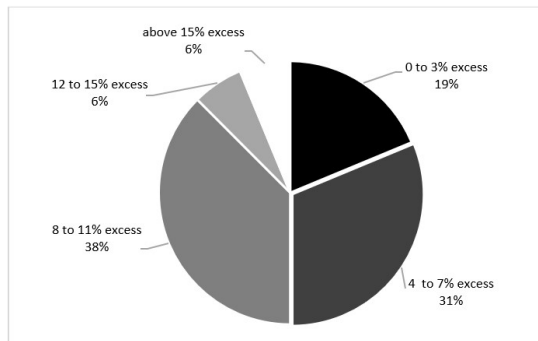


Figure 4. Percentages of finished products left over after the end of the collections.

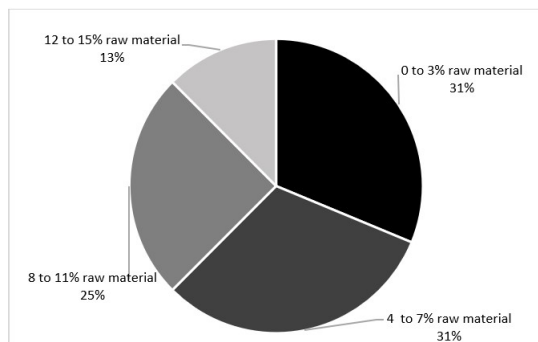


Figure 5. Percentages of surplus raw materials after the end of the collections.

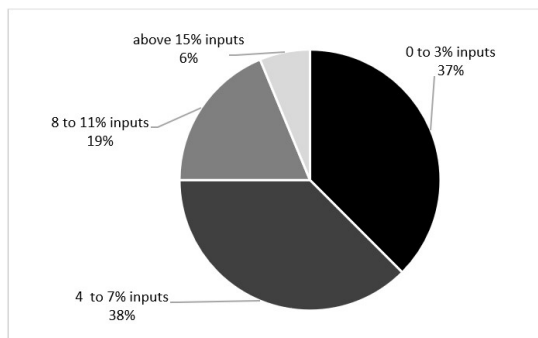


Figure 6. Percentages of surplus or lack of inputs after the end of a collection.

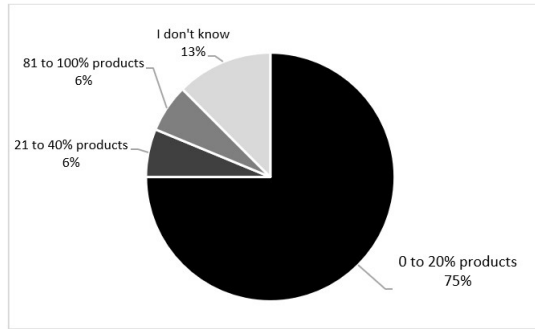


Figure 7. Percentages of sales of discounted products during the collections.

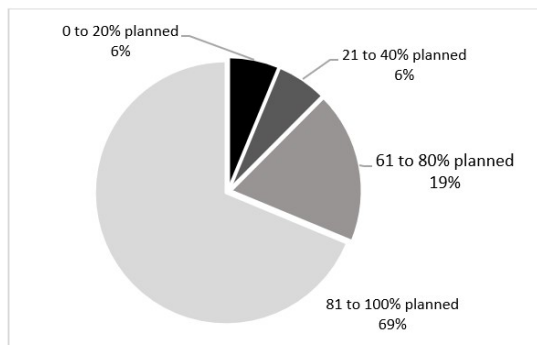


Figure 8. Percentages of assertive financial planning.

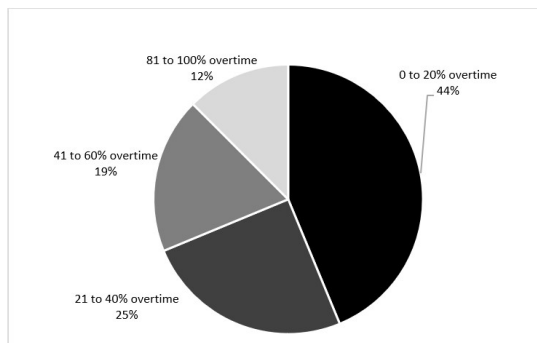


Figure 9. Percentages of unscheduled overtime work.

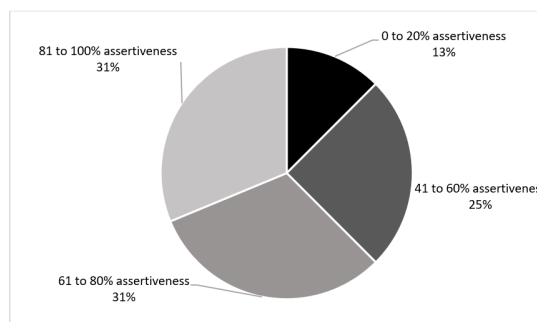


Figure 10. Percentages of planned hiring and firing.

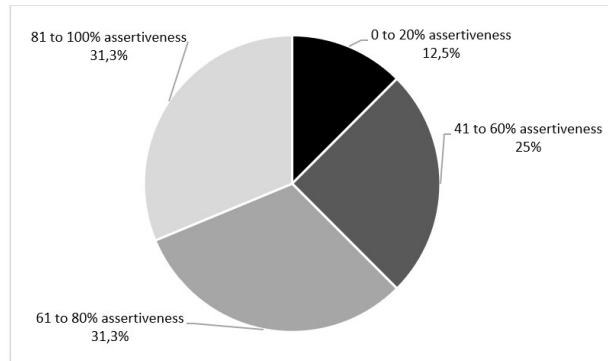


Figure 11. Percentages of OTIF deliveries.

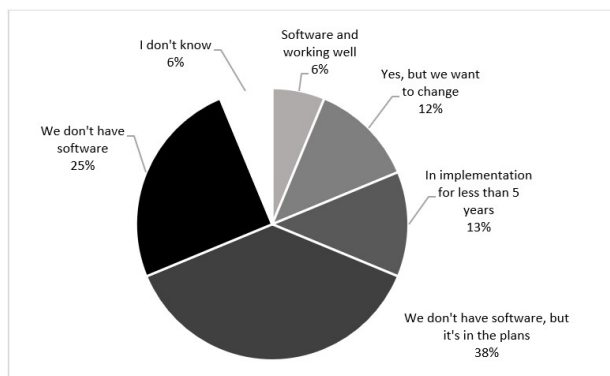


Figure 12. S&OP monitoring analysis.

Analyzing Question 1 regarding the implementation percentage of the S&OP, the results showed that no company had 100% of their S&OP implemented. According to Figure 2, six companies had implementation levels ranging from 61% to 80%, which indicates a good S&OP development index in the factory environment; four fluctuated from 21% to 40%; four companies had implementation maturity levels of 41% to 60%; and two companies were starting their implementation (0% to 20%).

The literature classifies whether S&OP is being implemented proactively or reactively. At the beginning of the implementation process, the vast majority of companies work reactively. After some time, depending on the learning curve and, consequently, the level of organizational maturity, it evolves from reactive to proactive.

Figure 3 shows the percentage of company planning that aligned the commercial and productive sectors. Although none of the companies had the S&OP effectively implemented, the results showed that two companies had already been conducting the planning along with the commercial sector (81% to 100% integration). This is considered one of the most effective pillars for indicating whether the S&OP methodology has been implemented. The alignment between the commercial and industrial sectors is necessary for there to be S&OP.

The other companies were on their way to achieving this more significant alignment between the commercial and industrial sectors, and through the question and the comments generated, we could not identify whether there were communication problems or a lack of support from senior management for the implementation of the methodology.

Having finished products left over after the end of a collection is unhealthy for business and not at all ecologically favorable. Since the textile sector works a lot with gambles, the communication between the areas must be very effective. Based on the results presented in Figure 4, one may observe that most studied companies worked with a surplus of less than 15%, and the lower this number is, the better and more plausible the existence of a movement related to S&OP. Although the cost of leftovers is part of the total cost, when leftovers are high, competition in the market does not allow a company to absorb such losses. Companies are more and more pressured by their competitors to avoid leftovers.

Although the previous questions did not show the degree of maturity of the studied companies, one may observe through the results that there was still much reactive work. The best expected result for a textile company is to have at most 3% of leftovers, and only three of the 16 surveyed companies were within this margin. Moreover, Figure 5 shows the percentages of leftover raw materials after completing the collection.

The results show how much knitted and woven fabric is being assertive in purchasing raw materials and the level of inventory within the company. We observed that five companies had 0% to 3% of leftover materials, five had 4% to 7%, four companies had 8% to 11%, and only one of the companies had a percentage of up to 15% leftover raw materials, which already indicates maturity in the forecast of purchases by companies.

Figure 6 shows the results for the next question, which addressed the general percentage of surplus or lack of inputs, such as zippers, buttons, threads, etc., after completing a collection.

Similarly to the leftover raw materials, the lowest percentage range of surplus of inputs, 0% to 3%, was observed for six companies, while six companies presented 4% to 7%, three showed 8% to 11%, and only one had over 15%. This surplus presents aggravating factors since supplies are usually purchased for a specific collection in a customized manner, so they may not be effectively used in the following collections.

Figure 7 presents the results for the sale of products with discounts during the current collection, which would indicate a lack of assertiveness in their launch since sales were not as expected. We observed that twelve companies approached margins of 0% to 20% discounts in sales, one used 21% to 40%, and one employed 81% to 100% discounts. Additionally, one of the companies claimed that they did not know the discount percentage applied.

The vast majority of studied companies did not provide discounts during the collections or only offered small discounts. Strategically, this means that they were being assertive in their collections and, thus, there was no need for discounts, or that their gambles were successful, or that they were able to forecast how sales would occur and, hence, were able to adjust the production curve in time so as to not produce in excess and then have to offer discounts. These are some of the possibilities highlighted in this chart.

Figure 8 shows the financial issues of the companies and whether their results were in accordance with the developed planning. It turns out that most of the studied companies were financially healthy, with 11 claiming they fit in the range of 81% to 100%, three in the range of 61% to 80%, one in the range of 21% to 40%, and one in the range of 0% to 20%.

Figure 9 shows the percentage of unscheduled overtime. There is no effective index, and the results are well distributed, with seven companies in the range of 0% to 20% overtime work, four in the 21% to 40% range, three in the range of 41% to 60%, and two from 81% to 100%, presenting an opportunity for improvement in the productive planning of these two companies with high indices, given that overtime work implies unscheduled activities.

Figure 10 shows the planning percentages for hiring and firing costs in the studied companies. During the survey application, there were reports of more resignation requests from employees than dismissals by companies. Three companies reported having their hiring and firing costs in the range of 41% to 60%, three in the range of 61% to 80%, and three in the range of 81% to 100%, which are high and should be analyzed further. In addition, two companies reported not knowing this index and its cost, thus an opportunity to improve and track this data to achieve a more significant contingency and control of expenses.

Figure 11 shows the percentages of assertiveness of control over orders delivered in full and within the stipulated time to the end customer, i.e., On-Time In-Full (OTIF) deliveries. For the percentage of assertiveness of the products delivered completely, we found that only five companies out of the 16 that responded were delivering from 81% to 100% to customers. For the others, a little more alignment is missing. Each customer is paramount to a company since retaining a customer again after a negative experience it is much more expensive.

Finally, Figure 12 presents the evolution level for monitoring these companies in the application of the S&OP. Analyzing the results, we found that there were many opportunities for the development and application of software in the 16 companies that responded, of which only one had such software and it worked perfectly. The others were in the process of implementing it, wished to change their software, or had the desire to implement it. In the study by Seeling et al. (2021) containing 15 multiple case studies in Brazil, only 33% of the studied companies adopted S&OP software, with the other 67% running their S&OP using spreadsheets with data extracted from their ERPs.

Table 1 shows the scores of the responding companies after the analysis of the data collected from the diagnostic tool and based on their responses.

There were three questions related to the method and eight related to the results of those who practiced the S&OP method. In Figure 13, the more a circle is positioned to the right and up, the more the methodology is consolidated and the company is reaping the results of its implementation.

Table 1. Scores of the responding companies S&OP.

Company	Profile	Method				Result						Maturity Total			
		1. S&OP implemented	2. Integration of commercial and industrial	11. S&OP Software to control	Method category sum	3. Excess finished product	4. Raw material excess	5. Inputs in begin or end collection	6. Sell products in collection	7. Financial result planned	8. Overtime not scheduled		9. Firing and hiring costs not planned	10. Assertiveness of customer requests	Result category sum
Company 1	Other textile	3	3	3	9	3	2	4	4	4	4	3	4	28	37
Company 2	Children clothes	1	2	2	5	4	3	5	1	5	4	2	5	29	34
Company 3	Other textile	4	4	5	13	4	5	5	5	5	5	6	6	41	54
Company 4	Clothes adult and children	2	3	2	7	4	5	3	5	1	5	1	6	30	37
Company 5	Clothes adult and children	2	2	3	7	3	5	5	5	5	3	4	4	34	41
Company 6	Adult clothes	4	5	2	11	5	4	4	5	5	5	6	6	40	51
Company 7	Other textile	4	4	5	13	4	3	4	5	4	1	5	5	31	44
Company 8	Adult clothes	2	3	4	9	2	4	4	5	2	1	2	2	22	31
Company 9	Children clothes	4	4	6	14	3	3	3	5	5	4	6	6	35	49
Company 10	Clothes adult and children	3	5	3	11	1	5	5	5	5	3	3	2	29	40
Company 11	Men clothes	2	2	3	7	5	2	1	5	5	5	4	4	31	38
Company 12	Other textile	4	4	4	12	3	4	4	5	4	5	4	4	33	45
Company 13	Children clothes	4	4	3	11	3	3	3	2	5	3	5	6	30	41
Company 14	Children clothes	3	4	1	8	5	5	5	5	5	4	1	5	35	43
Company 15	Children clothes	3	3	2	8	4	4	5	5	5	5	3	5	36	44
Company 16	Children clothes	1	4	3	8	3	4	4	5	5	5	5	5	36	44

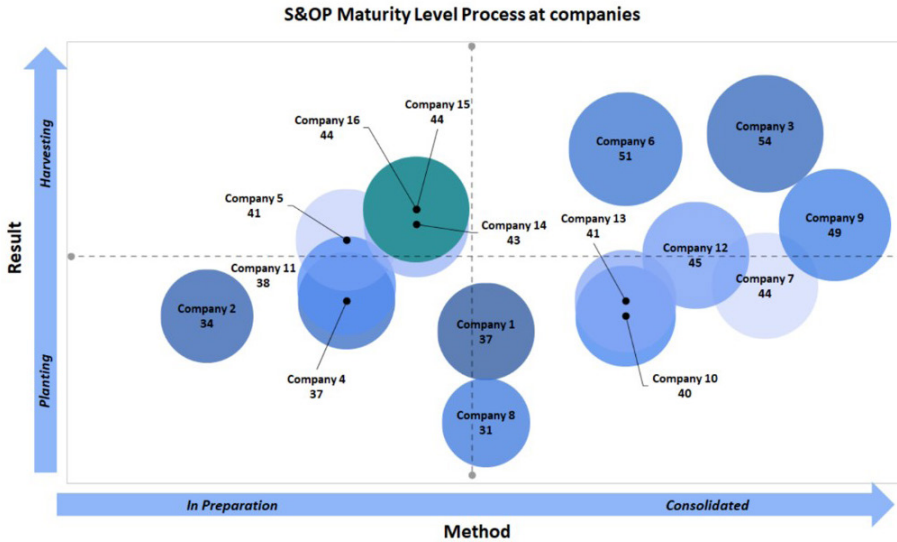


Figure 13. Classification of the S&OP implementation maturity levels in the studied companies.

It was possible to observe relevant opportunities for the evolution of the S&OP methodology in the participating companies, given that most of them were still in the elaboration stage, initial stages, or starting to harvest the results. Three companies were in a consolidated stage of the S&OP and still analyzing the data; three were already in a consolidated stage and reaping the fruits of implementation, although the S&OP was not fully implemented. Still, even without an adequate method, some companies were already having results, so we believe their results would be even more considerable with a more consolidated method. Although the analysis was applied to several textile segments, no particularity was observed between them. As this method may be applied in any segment according to the literature, we observed with this research that there was no particularity when it came to the results, as observed so far.

4. Conclusion

This study aimed to gather information on the existence and maturity of S&OP in textile companies in the state of Santa Catarina, Brazil. For this purpose, a diagnostic tool was developed based on the literature and empirical knowledge of experts who had already worked with the S&OP methodology and in the textile sector for over 20 years. Sixteen different medium and large-sized textile companies responded to the questionnaire we developed, through which the degree of maturity of their S&OP was verified. From the responses, the level of S&OP maturity we observed was such that only one company had it implemented and working perfectly. The others were in the implementation stage, wished to change, or had no methodology implemented but intended to do so. Even companies with a low degree of implementation of the S&OP methodology were reaping the results, so we believe that, as the implementation evolves, the gains will become even more significant for the companies and their customers.

The tool will guide the implementation of S&OP as the level questions show whether there is a formal and structured process, the integration of functional areas and portfolio of a company, the leftover finished products and raw materials at the end of a collection (characteristic of the textile sector), and whether it is necessary to provide discounts, that is, questions to show the gap between what was planned and what was achieved, a daily challenge for all companies. In addition, the questionnaire also checks whether there is management software to assist, the degree of assertiveness of the demand, and the extra costs involved with overtime work.

From this work, it was possible to verify as a point of scientific contribution the offer of a feasible method that may be replicated in the most diverse areas and industries. And as a professional contribution, we consider that in the business sphere, it is possible to verify the level of maturity of S&OP by comparing a company to others. In addition to the diagnosis, it is also necessary to align the implementation to occur systematically and understand the market to improve the assertiveness of demand. For future work, we recommend applying the method in sectors other than textiles and other geographical regions, which will also help to share the learnings of benchmarking.

Data availability

Appendix 1. The questionnaire can be accessed at the link <https://docs.google.com/document/d/1mwEBfZuOGbNscDA6dbRPLFVvdiD66kLv/edit?usp=sharing&oid=105796577281580546001&rtfpof=true&sd=true>

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