Tony Segersvärd

Suitability Study of Sales & Operations Planning Process for a Growing Company

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Abstract

Author:	Tony Segersvärd
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The objective of this thesis was to determine if a sales and operations planning process would be suitable process for a growing company. The focus was to conduct a current state analysis to find out if an S&OP process would be suitable for the company and to suggest the next steps before implementation.

The thesis was conducted by carrying out a current state analysis and building a conceptual framework. For the current state analysis, the main business areas were studied using semi-structured interviews and the company's internal documentation. For the conceptual framework the main S&OP subjects were studied from available literature and articles.

From the current state analysis and the conceptual framework, it could be extrapolated that an S&OP process is suitable for the company. Suggested steps on what to do before implementation were given based on the S&OP theory.

This thesis underlines the importance of S&OP. Using the suggested steps before S&OP implementation the company can make the needed decisions to move to S&OP implementation.

Keywords: S&OP, Sales, Production, Planning, Forecast

Tiivistelmä

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Tämän opinnäytetyön tarkoituksena oli tutkia ’sales and operations planning’ -prosessin sopivuutta kasvavalle yritykselle. Opinnäytetyön tavoitteena oli selvittää nykytila-analyysin avulla olisiko, ’S&OP’-prosessi sopiva yritykselle ja mitä yrityksen kannattaisi tehdä ennen sen käyttöönottoa.

Opinnäytetyössä yhdistettiin nykytila-analyysi ja teoreettinen viitekehys. Nykytila-analyysi suoritetiin tutkimalla yrityksen eri osa-alueita puolirakenteisten haastatteluiden ja yrityksen sisäisen dokumentoinnin avulla. Teoreettinen viitekehys rakennettiin käyttäen ’S&OP’-prosessin keskeisimpiä aiheita.

Nykytila-analyysin ja teoreettisen viitekehyksen avulla pystyttiin päättelemään, että ’S&OP’-prosessi on sopiva yritykselle. Seuraavat askeleet ennen ’S&OP’-prosessin käyttöönottoa annettiin teoriatietoon perustuen.

Opinnäytetyötä käyttäen yritys saa käsityksen ’S&OP’-prosessin tärkeydestä, soveltuvuudesta heidän käyttöönsä ja siitä, mitä heidän kannattaisi tehdä ennen sen käyttöönottoa.

Avainsanat: S&OP, Myynti, Tuotanto, Suunnittelu, Ennusteet

Contents

List of Abbreviations

S&OP: Sales and operations planning

SWOT: Strengths, weaknesses, opportunities and threats

CSA: Current state analysis

CRM: Customer relationship management

ERP: Enterprise resource planning

IBP: Integrated business planning

KPI: Key performance indicator

SKU: Stock keeping unit

1 Introduction

In the last 30 years sales and operations planning has gained popularity amongst many companies. It has shaped the way demand and supply are managed across business areas. Sales and operations planning, also known as S&OP, is a process that brings demand and supply to a balanced state. S&OP uses different methods and tools, according to the business need, to forecast, manage & improve business functions of the company. In today's business world an S&OP process is an important process used by many large companies to stay as profitable as possible and to gain knowledge of future possibilities.

1.1 Business Context

This thesis was conducted for a Finnish Biotechnology company Oy Medix Biochemica Ab. Medix Biochemica was established in 1985 and its headquarters are located in Espoo Finland. Oy Medix Biochemica Ab is a subsidiary of Medix Biochemica group that also controls six other subsidiaries in Europe, Asia and USA.

Today the company is focused on producing immunodiagnostic - and molecular diagnostic reagents, IVD biomaterials and diagnostic tests. The products produced by Medix Biochemica are sold worldwide and in 2021 Medix Biochemica's revenue was over 50 million euros. Currently there are 220 employees working across Medix Biochemica and its subsidiaries. The main customers of Medix Biochemica are companies working in IVD industries.

Medix Biochemica's core processes are product development, customer management and order-to-delivery. These core processes are supported by business operation processes that are purchasing, quality assurance, human resources, logistics, financial administration and information technology. While having many crucial processes an S&OP process has not been implemented. The possibilities of an S&OP process could be significant for the company. But first there should be a way to ensure that an S&OP process would be compatible for Medix Biochemica and what kind of steps would be needed before its implementation. (Medix manual v9.0; Organisation v19.0)

1.2 Challenge, Objective & Outcome

Medix Biochemica has many business functions that use different kind of forecasts to plan their actions. Currently some elements of an S&OP are present in Medix Biochemica and in its functions, but if an S&OP process would be implemented, those elements could be combined, and more sufficient process could take place. Medix Biochemica would like to know how implementing an S&OP process would improve their planning processes and if it would be a practical process for their company to manage current end-to-end operations. The challenge is that the company has not implemented an S&OP process and would like to know its suitability and usefulness.

The objective of this thesis is to conduct a current state analysis in Medix Biochemica to determine if an S&OP would be a suitable process for the company and to create recommended steps on how to proceed to the S&OP process implementation. Following the objective of this thesis, the outcome will be results of the current state analysis that determines the suitability of S&OP and recommended steps on how to proceed to the S&OP process implementation. The scope of this thesis is the immunodiagnostic reagents business unit of Medix Biochemica, specifically the Espoo Finland site.

1.3 Thesis Outline

The way this thesis is carried out is by describing the current state through interviews, internal documents, and meetings. Next the theoretical framework is formed with literature and available knowledge to find solutions to development targets of the current state. Finally, solutions are proposed with collaborative methods with case company and the proposal is validated using feedback gathered after the first solution proposal.

This thesis is divided in seven sections, the first section introduces the thesis subject, the scope of the thesis and the case company. The second section of the thesis presents the research design of the thesis. In the third section the current state of the company is studied. In the fourth section available literature and best practices of S&OP are examined. In the fifth section of the thesis the initial solution proposal is created. In the sixth section, using the initial solution proposal and feedback a final solution proposal is created. Finally in the seventh section conclusions of the thesis are drawn.

2 Methods and Material

This section of the thesis describes the research design, project plan and data collection and analysis. The research design describes the thesis. The project plan provides a timeline for the thesis. Finally, the data collection and analysis a data plan shows what kind of data was used and when, to conduct this thesis.

2.1 Research Design

The research design shows the steps taken to conduct this thesis. The research design consists of four sections: current state analysis, literature & best practices, creating initial solution proposal and validating solution. The research design shows three data sets of this thesis to indicate what data was used and for what section and what kind of outcome each section has. In figure 1 is a diagram of the research design.

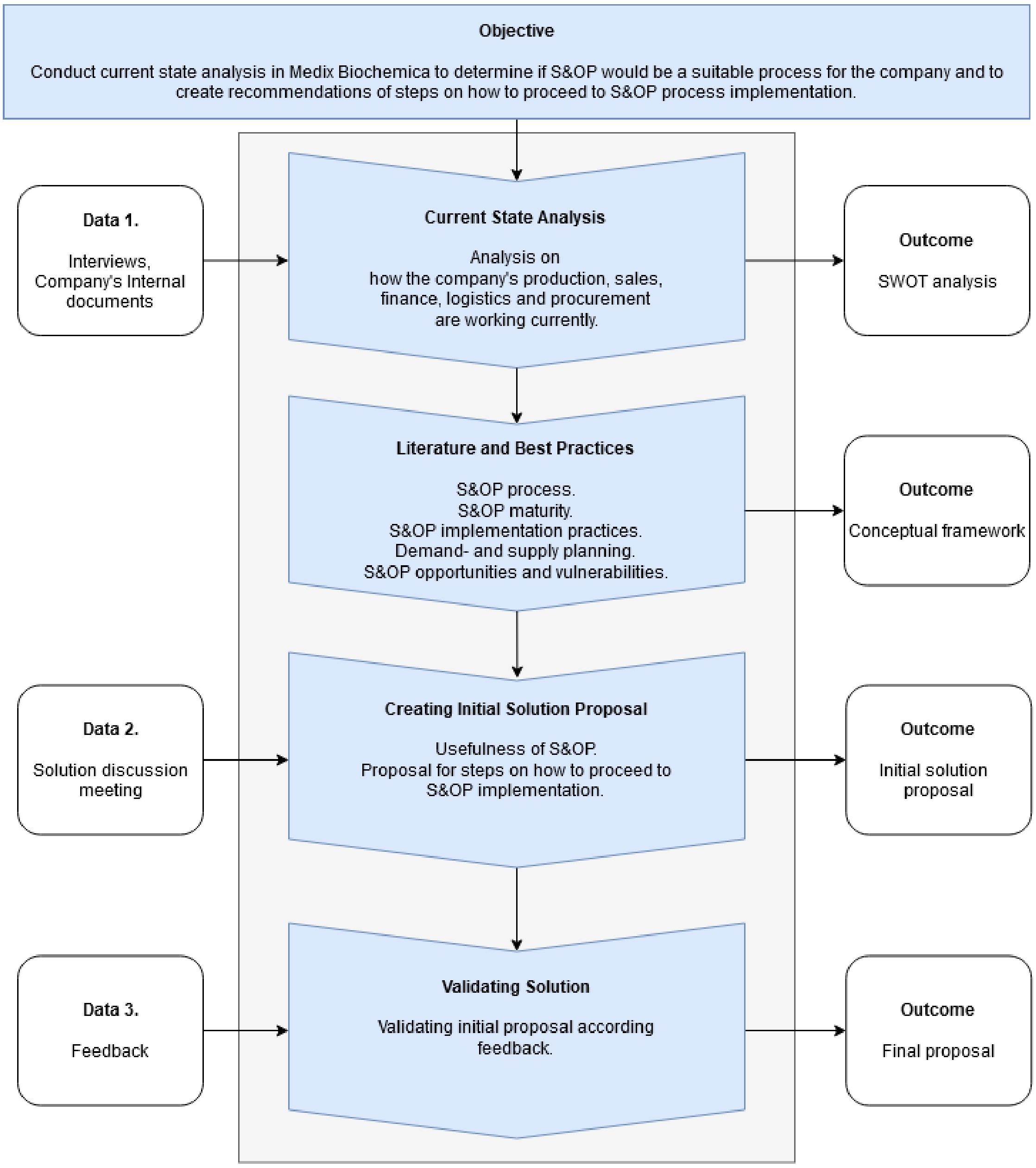

Figure 1. Research design

The research design diagram starts from the objective of the thesis going through four sections that describe the vital steps of the thesis. The objective is set on top of the diagram to indicate how each section of the thesis follows the same objective through the whole project.

The first stage in the diagram, the current state analysis, describes how processes are working currently at the company. The current state analysis uses data set 1 that consist of interviews and the company’s internal documentation to analyze the company's production, sales, logistics, financial and procurement processes. The outcome of current state analysis is a SWOT analysis.

The second section of the diagram is the literature and best practices. In literature and best practices literature and articles on S&OP are researched to create a conceptual framework. Five topics of S&OP are used: S&OP process, S&OP maturity, S&OP implementation practices, demand – and supply planning and S&OP opportunities and vulnerabilities.

The third stage in the research design diagram, creating solution proposal, describes how the first solution proposal is created using the second set of data. Data 2 includes a meeting to get input for the initial solution proposal. The outcome of this stage is an initial proposal.

The last stage is the validation solution, where the initial solution proposal is validated by using data from the third data set that consists of feedback. The outcome of the validation is the final proposal for the company.

2.2 Project Plan

The research design was used to guide the project plan. To visualize the project plan, a timeline graph was created as shown in Figure 2.

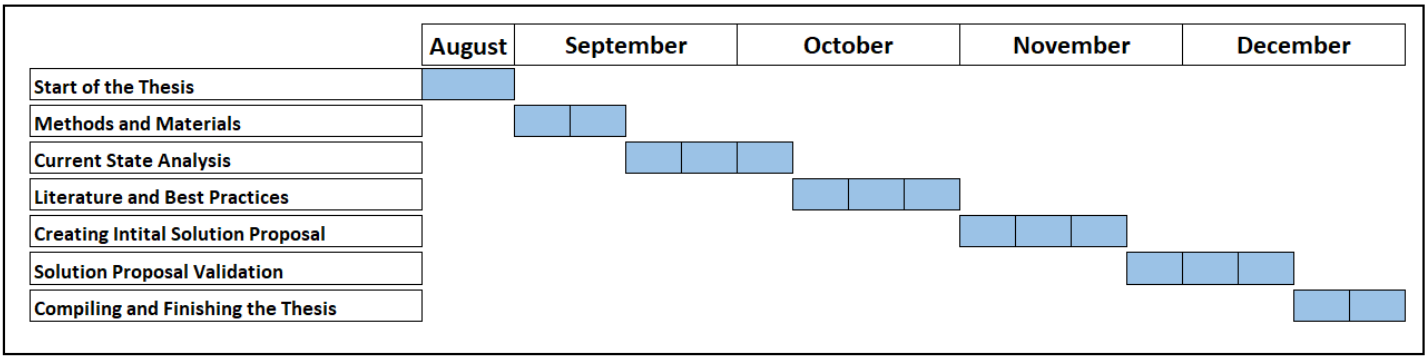

Figure 2. Thesis timeline

The thesis was started in August and completed at the end of December. The timeline was divided to seven stages including all four sections of the research design and start of the thesis, methods and material and compiling and finishing the thesis. The thesis was evenly distributed throughout the four months. The next stage of the thesis could be started always after the stage before it was completed.

2.3 Data Collection and Analysis

Data for the thesis was collected in three different data sets. Each set is appointed to appropriate section on the research design. The data plan was created to indicate in more detail how data was collected in Figure 3.

	Data Type	Topic	Participants	Date & Lenght	Documentation
Data 1.	**Current state analysis**				
1	Interview	Current state of production	Process manager	27.9.2021 & 45 minutes	Field notes & recording
2	Interview	Current state of production	Production manager	28.9.2021 & 45 minutes	Field notes & recording
3	Interview	Current state of order-to-delivery	Logistics manager	29.9.2021 & 45 minutes	Field notes & recording
4	Interview	Current state of sales	Vice president commerial operations	7.10.2021 & 30 minutes	Field notes
5	Interview	Current state of finance	CFO & Business controller	11.10.2021 & 30 minutes	Field notes & recording
6	Internal documents	Current state of processes	-	-	Field notes
Data 2.	**Creating initial solution proposal**				
1	Meeting	Initial solution ideas	Supply chain manager	22.11.2021 & 30 minutes	Field notes
Data 3.	**Validating solution**				
2	Feedback & meeting	Initial solution feedback	Supply chain manager	7.12.2021 & 60 minutes	Field notes

Figure 3. Data plan

As seen in figure 3 the data plan starts with data set 1 that was used to conduct the current sate analysis. Data set 1 consists of five interviews, each having their own topic and appropriate participant. Each interview was conducted as a semi-structured interview where questions were prepared in advance, but participants could also pitch in with related information. Each interview was documented using field notes and when possible recordings. Internal documents were also used to get an understanding of the current state.

Data set 2 was used to create solution proposal, using one meeting where solution proposal ideas were discussed, and possibilities and feasibility were gone through.

In data set 3 solution proposal was validated in a meeting and using feedback. First feedback for the initial proposal was given to guide the final proposal. In the meeting feedback was gone through and ideas for the final solution were discussed.

The Company's internal documents were also used to conduct the current state analysis. In figure 4 document name, topic, read pages and read date are listed. Mainly documents describing company functions and processes were used.

	Document Name	Topic	Pages & Read date
1.	Medix manual v9.0	Company context	1-3,7-8 & 3.9.2021
2.	Organisation v19.0	Organisation structure	2-3 & 6.9.2021
3.	Medix Biochemica Order-to-delivery process v4.0	Order-to-delivery process	1-5 & 20.9.2021
4.	MVA-tuotannon menettelyohje v3.0 / MVA-production instructions v3.0	Production process	1-3 & 27.9.2021
5.	Procurement v1.0	Procurement process	2-6 & 13.10.2021

Figure 4. Internal documents

3 Current State Analysis

This section of the thesis describes the current state of the company regarding S&OP key concepts. The purpose of the current state analysis was to gain an understanding of the current processes and identify their characteristics and elements.

3.1 Overview of Current State Analysis

The Current state analysis (CSA) is divided to three stages. In the first stage the current state of five functional business areas were described regarding the S&OP key concepts. The five functional business areas that were included for the CSA were production, sales, logistics, finance and procurement. The method to gather information for the CSA was five different interviews for each functional business area. The key concepts of S&OP that were reviewed in the interviews were forecasting, planning and communication. In the second stage characteristics and elements of the current state were identified using a SWOT analysis. In the third stage a summary of the findings from the current state was made.

3.2 Current State of Functional Business Areas

3.2.1 Production

For company use only.

3.2.2 Sales

For the current state of sales a vice president commercial operations of Europe & RoW was interviewed. The questions in the interviews focused on the sales process, forecasting, sales budgeting and communication. The sales process at Medix Biochemica has five sales channels that it can use to initiate the process. These sales channels are direct sales, ecommerce, distributors, resellers and OEM. First in the sales process, the customer is provided with validating sample of the product to validate if the product is compatible for their use case. The validation of the product on behalf of customer can take from six to nine months. After the samples are validated and accepted, the sales team negotiates the quantity with the customer and makes sure that the production can produce the negotiated quantity of product.

A sales forecast is created monthly with finance team. The forecast uses data from last year's sales and already planned sales to predict expected revenue for the next year. Customer relationship management (CRM) software is not currently used for the forecast, although there is a sales forecast feature in the CRM software that the company is using that is not taken in use yet. This is also due the data and reporting in the CRM software not being standardized among the users.

The sales budget for the sales teams comes from the finance and it is projected for the following year. The sales budget is based in revenue and quantity of sales. It is done in cooperative manner and it takes in account opportunities to cross sale and new business areas.

The communication between sales team and other business units to make cross functional decisions is minor. The communication with other business units is also more reactive than proactive, meaning that communication takes place more when things have already happened than when future possibilities could be assessed proactively. (Medix Biochemica Order-to-delivery process v4.0)

3.2.3 Logistics

For the logistic and delivery side of the current state, a logistics manager was interviewed. In the interview the logistic side of order-to-delivery process, forecasts and communication were reviewed. The logistic side of the order-to-delivery process starts by getting an order from a customer that the sales team has negotiated an offer with or by customer contacting about new purchase. Using information from the sales team and customer register, first the ordered product is checked if it is in stock using the first in first out principle. If the ordered product is not in stock, the production team is asked about the production time for the needed product. Depending on the customer, once the production has produced the ordered product and it has been quality checked or the ordered product is picked from existing stock, appropriate transportation method for the shipment is chosen. Few days before shipping all documents regarding the customer order are prepared and if external courier is used, agreement with them is endorsed. Once the product has been shipped it is tracked and it is made sure that the customer receives it in time and in a good condition.

The sales forecast can be used to plan upcoming orders. Especially when large orders are coming up and the sales team has information about the order, the logistics team can be informed, thus they can start to plan the delivery possibilities and preparing documentation for the order.

The communication between the logistics and the production teams, specifically with the purification production team, is active. The customer orders that are not in stock are always discussed with the production teams therefore the production team can add the order for the production plan and inform the logistics, when the product is ready to be shipped for the customer. Communication with the sales team is more case specific, being more reactive, when changes happen that affect the logistics. (Medix Biochemica Order-to-delivery process v4.0)

3.2.4 Finance

In Medix Biochemica one of the finance team’s main objectives is to gather as accurate and up to date information as possible for leadership team and stakeholders to support decision making. The main processes that guide the finance team are order to cash, purchase to pay, record to report. These processes use key performance indicators (KPI) to measure performance according set objectives, the main KPI’s are sales growth, EBITDA/EBITDA-% and EBIT gross profit-%.

In the finance team sales forecast is gone through with the sales team every month and it is based on revenue. The sales forecast does not include volume or product level, because of long lead times of the production, if the sales forecast was volume based it would need to be forecasted around six months ahead which would reduce the accuracy. Due to the nature of the business, sales are used to indicate profits and thus sales are used by the finance, the leadership and the sales team. The finance team goes through the sales with the sales managers to create a sales forecast template that is used to create forecast until the end of current year for each month and is based on product portfolios. Every month the sales forecast is gone through with finance, sales managers and leadership team to check if the forecast has been correct and if there are changes that need to be made for the sales forecast.

The sales budget is done yearly, and it starts by a salesperson making a draft of the sales budget using their own customer base and product portfolios. The sales budget is done based on volume using sale units, for example milligrams, for the next year and due to the use of sales units the sales budget can be used for the long-term production planning. Once each salesperson has done their sales budget proposal for the following year, the leadership team estimates if the budget is in line with objectives and modifies it if necessary.

3.2.5 Procurement

The current state of procurement was researched using observations and internal documentation. The procurement process, communication and the use of production plans were gone through for the current state of procurement. The procurement process starts by purchase requisitions that are registered to an ERP system. These purchase requisitions are made by different personnel of all the teams that need materials for their operations. The purchase requisitions are checked, and purchases are made two times a month by a purchaser. Before ordering the requisitions for the same supplier are combined to minimize the number of purchase orders. Once the requisitions are combined a purchase order for each requisition is sent for the suppliers. After getting confirmation about the order and delivery times, the new information is updated on the purchase orders in the ERP system. Purchases are monitored to make sure that they arrive in time. Once the goods arrive, they are received and message about the arrival is sent to the purchase requisitions submitter.

Communication with other business units is mostly focused on order tracking, availability checks of products and new material orders. Cooperation and communication with the cell culturing production team to ensure that all key materials arrive in time is done actively. Materials with long lead times are planned by making a purchasing contract with suppliers. (Procurement v1.0)

3.2.6 Relation between Functional Business Areas

Using the interviews from the five functional business areas a relation diagram was created. The relation diagram shows the relationship between different business areas and relationship of planning and forecasting processes. In the relation diagram, in Figure 5, it can be easily visualized where the information is coming from and how the different planning and forecasting processes are used.

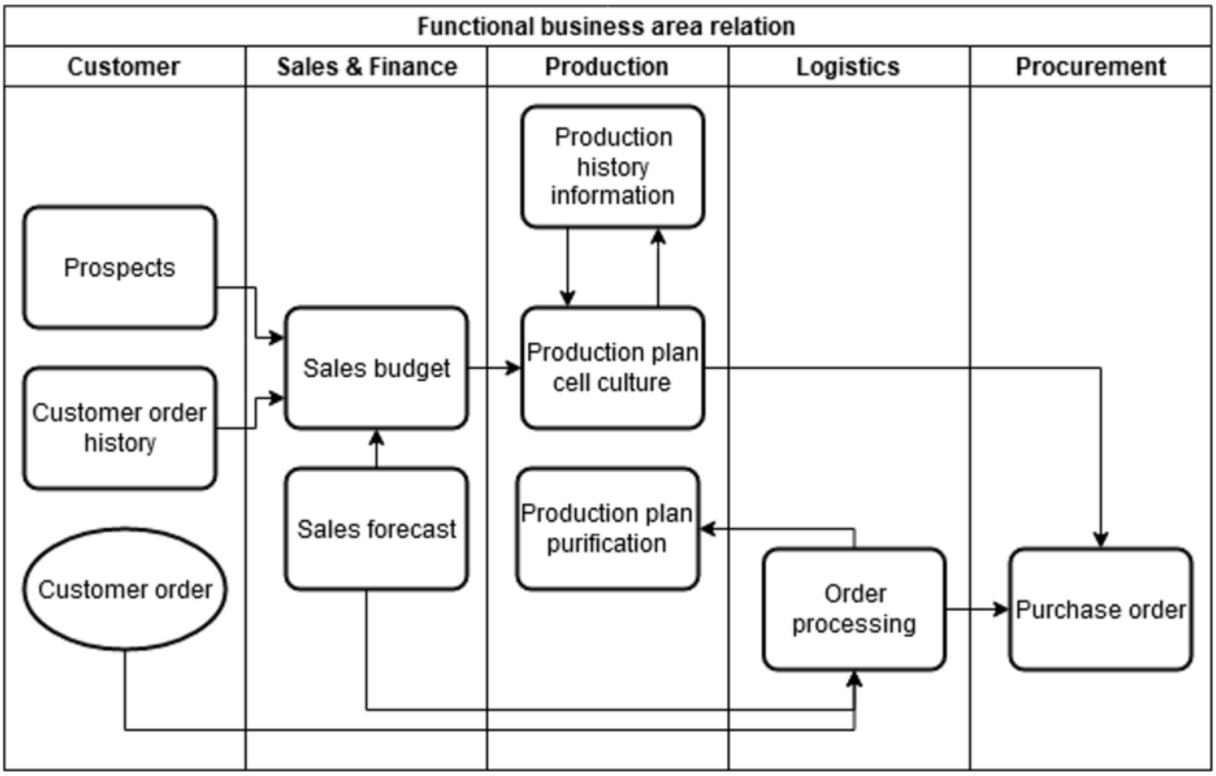

Figure 5. Functional business area relation diagram

3.3 Current State Analysis Key Findings

In each interview some of the same characteristics and elements of the current state were noticed. Using a strength, weaknesses, opportunities & threats (SWOT) diagram as seen in Figure 6 the characteristics and elements of the current state could be divided according to their nature.

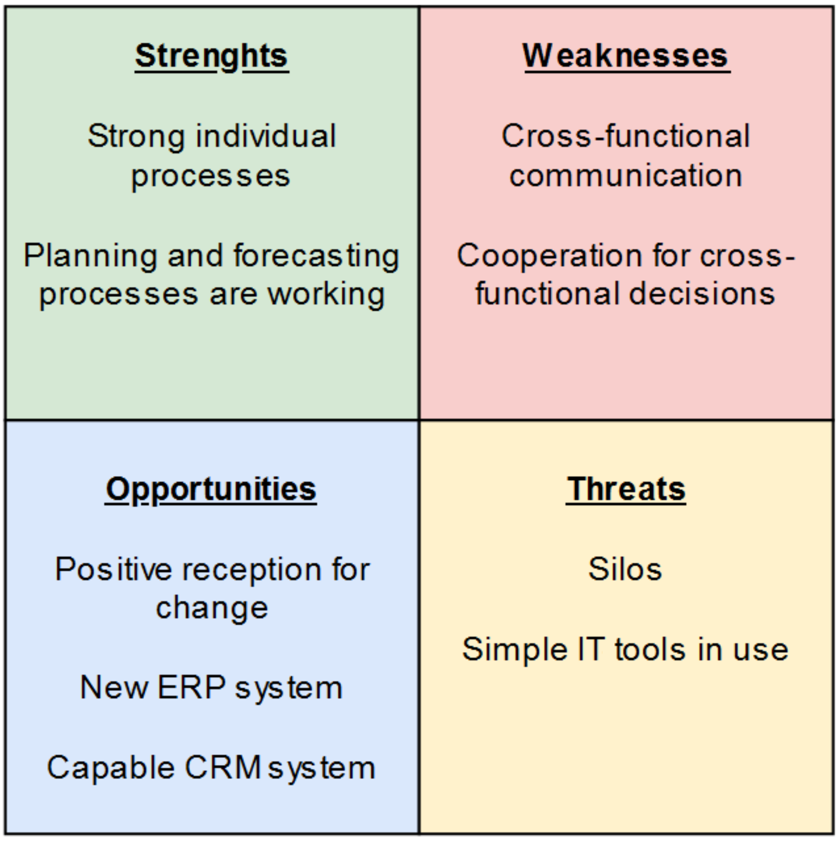

Figure 6. SWOT diagram

3.3.1 Strengths

From interviewing the different business functions of Medix Biochemica the individual processes stood out to work on their own strongly. Each interview showed that the processes for business functions are formed to work very well with the nature of the business. The main processes were, in most parts, clearly described in the internal documentation and worked as described.

The planning and forecasting processes seemed to work great. Both production plans, sales forecast and sales budget were thought out well and they used, for the most part, standardized processes. When possible, they were regularly updated and reviewed to match current status.

3.3.2 Weaknesses

Weaknesses noticed from the interviews were about cross-functional cooperation. Cross-functional communication between different business units was not done regularly. Some processes were done in cooperation and communication was strong but there was not a meeting that would bring every business unit at once together. This also led to lack of cooperation for cross-functional decisions. The lack of cross-functional decisions meant that everyone's opinions were not usually brought together, leading to decisions that may affect some business functions negatively.

3.3.3 Opportunities

Opportunities to affect future possibilities were noticed in the interviews. Positive reception to change was perceived from the interviewed personnel, as they had a positive and open view to new opportunities and changes. This is an important part of change management and allows new projects and processes to be well received.

Another opportunity was a new enterprise resource planning (ERP) system that was implemented recently. The new ERP system contained many features, that were not in use yet, which could be implemented to make processes smoother and faster. Also, the current CRM system had untapped potential to improve sales forecast capabilities. Combining the ERP and CRM systems would be also a possibility to create more streamlined flow of data.

3.3.4 Threats

As there were opportunities for new possibilities in Medix Biochemica there were also threats that needed to be considered when introduction changes. The interviews revealed organizational 'silos' in the different departments. Organization having silos means that the departments are working well on their own but interaction between other departments is not optimal. This could also be seen from the strengths and the weaknesses of the current state as individual processes were strong but cross-functional communication was lacking.

Another threat in the long run were simple IT tools that were used in some cases. As for now the simple IT tools are working to manage certain parts of operations, but in the future as the company grow the simple IT tools become harder and more time consuming to use than dedicated IT tools for the job. For example, spread sheets are currently used for the production plans and they are working well for now, but in the future as the amount data used for planning grows updating individual spreadsheet by hand could lead to a lot of unnecessary time consumption. Individual spreadsheets also introduce the risk of contradictory data, as there were multiple sets of individual data instead of one set of shared data.

3.4 Summary of Findings from Current State Analysis

From analyzing the current state and using SWOT analysis a summary of the current state could be concluded. The strengths and opportunities of the current state will help the company to grow and reach new opportunities as for the most part processes were working great and continuous development in the company could be seen. The weaknesses and threats need attention to make the company more stable and to avoid possible problems that could come from them. Next using literature and best practices, theory on the S&OP process was studied and used to find possible solutions to these problems.

4 Literature and Best Practices

In this chapter the literature and the best practices about S&OP were studied. The different aspects of S&OP that were studied were S&OP process, maturity, implementation practices, demand– and supply planning and S&OP opportunities and vulnerabilities. Using literature and articles a theoretical framework for S&OP could be made. The theoretical framework includes the ideas that are commonly seen in S&OP and visually shows how they are related and how they can be used for the thesis objective. The conceptual framework could be used with the CSA to reliably find solutions to the problems found in the CSA.

4.1.1 Sales and Operations Planning Process

Sales and operations planning is a term that has been used in a corporate context for over 30 years. Due the long history and the nature of consultancies S&OP has gained many alternative names over the years. For example, some may refer to S&OP as integrated business planning (IBP), sales operations and inventory planning (SIOP), supply chain sales and operations planning or demand and supply integration (DSI). Although these names refer to same main process, they have their own business orientations (Andy Coldrick et al. 2003:3-6; Kristensen et al. 2017:1-2, Grimson et al. 2007:2-3).

An S&OP process can be implemented in many ways. This means that an S&OP process has no one certain way it should be implemented but it should take in account the company context. S&OP processes aim is to align strategic plan with operational planning processes in a company. By aligning the strategic plan and the operational planning processes, demand and supply can be balanced. S&OP processes advantages, if implemented correctly, are better forecast accuracy, lower inventory levels, better capacity utilization and improved customer service (Kreuter et al. 2021:1-3; Grimson et al. 2007:2-4).

Commonly an S&OP process is divided to five parts that are carried out in order. These parts are demand planning, supply planning, pre-meeting, executive meeting and result measuring as seen in the Figure 7. An S&OP process is usually carried out in one-month cycles, but the company context may affect the cycle time (Kreuter et al. 2021:3-4,9-15; Grimson et al. 2007:3-5).

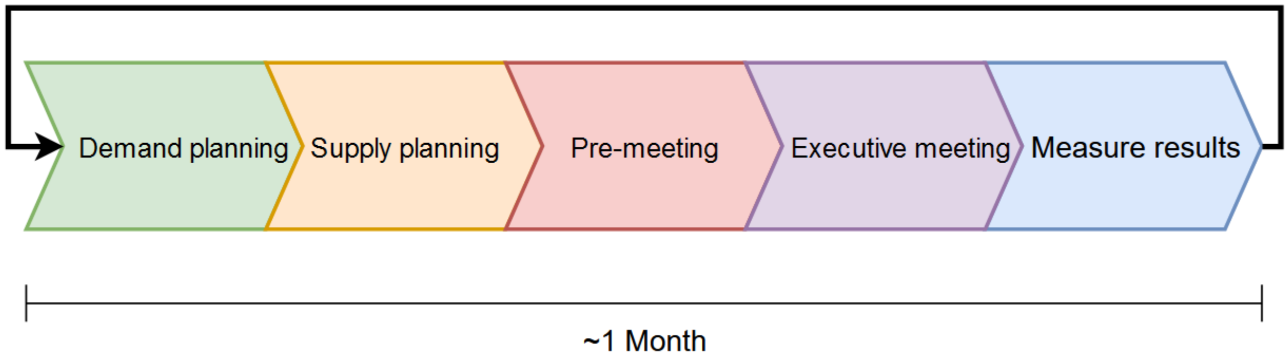

Figure 7. S&OP process steps

In the first step of an S&OP process, demand planning, company's sales and marketing teams are usually working together. Using sales related data such as projected sales, a forecast is created. When creating the forecast sales and marketing team should think about customer needs and leave production capabilities out of the picture. The outcome of demand planning step as seen in Figure 8 is a demand plan that is realistic but leaves production out of the equation.

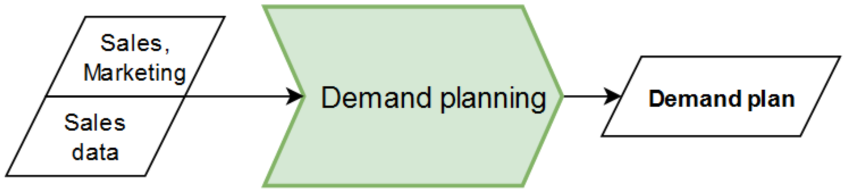

Figure 8. Demand planning step

Supply planning as shown in Figure 9 is the second step of an S&OP process. It usually includes teams that are involved in supply chain and operations. In the supply planning step, the data about company's internal capabilities is gathered such as inventory capacity, production capabilities and supply chain capacity. Using the gathered data and the provided demand plan from sales and marketing an initial proposal for supply plan is created. Aspects that should be considered when creating supply plan are revenue, profitability and customer satisfaction.

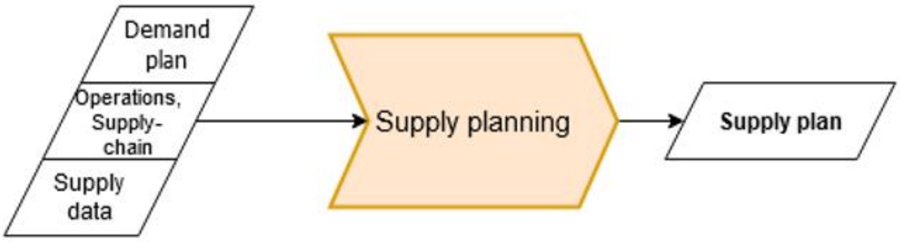

Figure 9. Supply planning step

Third step of an S&OP process is pre-meeting, as shown in Figure 10, is the step when a dedicated S&OP team meets. The dedicated S&OP team usually includes personnel from many business areas of the company, especially the personnel that have made the demand – and supply plans. This means that the S&OP team usually consists of at least one person from sales, marketing, R&D, production, finance, logistics and procurement. Purpose of the pre-meeting is to bring the demand – and supply plan together to balance them according to the company's strategic plan. By including personnel from many different teams, every one's point of view can be considered in the decision making and risks and opportunities can be more thoroughly reviewed.

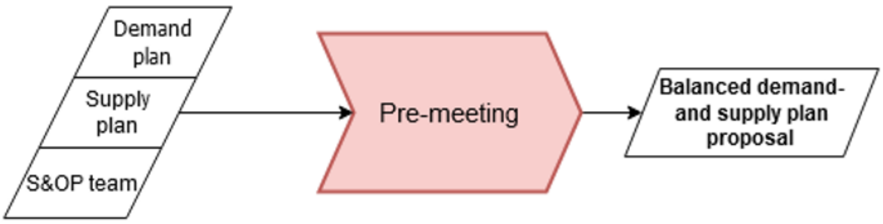

Figure 10. Pre-meeting step

After decisions a proposal is made for the demand– and supply plan in the pre-meeting. Following that the executive meeting as seen in Figure 11 is held. In the executive meeting executive team including personnel from a leadership team and leader of the S&OP team go through the proposed decisions and check if they are aligned with the company's business goals. During the executive meeting changes are made if needed and final decision for the demand plan and supply plan are released to be executed.

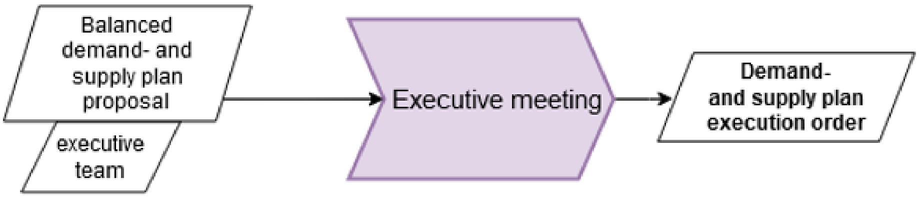

Figure 11. Executive meeting step

After the plans are executed, their results are measured as shown in Figure 12. In the result measuring step, the efficiency of the S&OP process and the made decisions are measured according to the company's chosen KPI's. The result measuring is used to improve the S&OP process itself and to give information about S&OP performance to leadership team and company board (Ávila et al. 2019:2-3; Kreuter et al. 2021:3-4,9-15; Grimson et al. 2007:3-6).

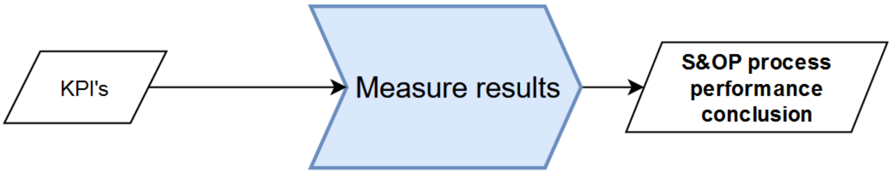

Figure 12. Measure results step

4.1.2 Integrated Business Planning

S&OP has gained many alternative names during its long history. Integrated business planning is the most used alternative term for similar process as S&OP and is sometimes even represented as its own process. IBP is known to have the same basic concept as S&OP, but it includes finance as its main driver. IBP can be viewed as a more mature form of S&OP. The main difference described between S&OP and IBP is the more efficient cross-functional cooperation. Lower maturity stages of S&OP are almost always concentrated on the supply chain side of cross-functional cooperation unlike IBP where the cross-functional cooperation is concentrated on all departments using financial goals as the driver to achieve common goals. (Schlegel et al. 2021:1-5).

4.2 Sales and Operations Planning Maturity

An S&OP process can be approached in many different ways. This leads to some S&OP processes that are more complex than other S&OP processes. This complexity can also be viewed as a maturity of the process as an S&OP process is typically evolving over time. The maturity can be measured on many different aspects of an S&OP process, the main aspects seen on S&OP processes are communication, planning/forecasting, organization and IT systems. The maturity can be divided in stages depending on the complexity of the S&OP main aspects. These stages are stage 1 - no S&OP process, stage 2 - basic S&OP process, stage 3 - proficient S&OP process and stage 4 - advanced S&OP process as shown in Figure 13. Companies can have parts of some stage and other parts from other stages.

	Stage 1. – **No S&OP**	**Stage 2.** – **Basic S&OP**	**Stage 3.** – **Proficient S&OP**	**Stage 4.** – **Advanced S&OP**
Communication	- Minimal cross-functional meetings	- Collaboration between teams to make cross-functional decisions - Mediocre meeting attendance	- Dedicated S&OP team - Major meeting attendance	- Event driven meetings
Planning/forecasting	- Rudimentary planning/forecasting	- Demand plan and supply plan are used in conjunction	- Demand plan and supply plan are aligned	- External inclusion - Seamless cooperation of plans
Organization	- Silo culture	- Formal S&OP process - S&OP is lead by spesific department	- S&OP is used in executive manner for decisions	- Proactive S&OP process - S&OP is understood by everyone
IT systems	- Many systems - No shared information	- Individual spreadsheets - Information is shared between teams	- Centralized information - Use of standardized system	- Dedicated IT system - Integration with other IT systems

Figure 13. S&OP process maturity stages.

In stage 1 an S&OP process has not been formally implemented in a company. There are still elements of S&OP aspects seen in everyday activities. Company's departments are formed in silos and this leads to minimal cross-functional communication. Planning and forecasting are done but in rudimentary level and demand- supply plans are not used together. IT systems are fragmented, and information is not shared regularly between systems.

In stage 2 a basic S&OP process has been implemented. An S&OP process is formally recognized and usually in control of specific department. As the process is formal, collaboration between teams is expected, but the lack of knowledge about S&OP importance leads to non-optimal meeting attendance. The Demand – and supply plans are now used in conjunction, meaning that the demand plan is considered when supply plan is created. In stage 2 individual spreadsheets are used to control the S&OP process and information between teams is shared.

In stage 3 an S&OP process is working proficiently. An S&OP process is used to make executive decisions and dedicated S&OP team is assigned to handle the S&OP process. A dedicated S&OP team means that S&OP meetings are seen as important and the attendance levels are high. In stage 3 demand – and supply planning are aligned, and decisions are made according to mutual understanding. IT systems are standardized, and information is centralized, making it easily available to everyone.

In stage 4 an S&OP process is in its optimal state and is as advanced as possible. The S&OP process is more proactive than reactive, meaning that the process meetings are also event driven alongside the regular meetings. The planning includes external participants such as customers and suppliers and the plans are working seamlessly together. At the Stage 4 the importance on S&OP should be understood by everyone and the process should be one of the top business priorities. IT systems have dedicated system or software to manage the S&OP process including forecast capability and real-time simulated problem solver. The S&OP software should also be integrated with other IT systems such as ERP and CRM systems (Grimson et al. 2007:8-14; Ávila et al. 2019:3; Thomé et al. 2011:3-11).

4.3 Sales and Operations Planning Implementation Practices

S&OP is usually easily understood but implementing S&OP in practice can be difficult, leading a lot of varying success among companies. There is not a one-way solution to implement S&OP, but there are guidelines that should be considered when a company starts to implement S&OP. When starting to implement S&OP the maturity stages should be examined to determine what kind of S&OP elements the company already has.

The first step in S&OP implementation is to decide to implement it, this means that there must be a definite decision by a person with enough authority to be able to assign time and resources to it. After it has been decided that S&OP will be implemented, a team should be assembled to design and to start using an S&OP process. The team is usually assembled by a dedicated person or consultant who is experienced with S&OP and has time to implement it. In best case scenario the S&OP team includes members from many different departments such as IT, sales, finance, logistics and production, but usually in lower maturity state of S&OP the team might include only few different departments. As the team has been assembled, they must be educated about S&OP to understand the fundamentals of it and what its importance to the company is. The understanding of the S&OP is important when starting to design the process, since attendance and interest are key factors in a successful S&OP process.

Factors that should be thought out when starting to design an S&OP process are, structure of the process, data collection and measurement plan. As an S&OP process structure is dependent on the company context it should be done to correspond the company’s way of working, but elements of a typical S&OP process give a great reference for the process structure. When implementing an S&OP process a good practice is to start with certain product portfolio, brand, or geographical location as it is easier to manage at the beginning. Later, the process can be expanded, and more products or locations can be integrated to the process. For data collection, the S&OP team should think about what kind of data is required and from where to run the process. For the data collection a suitable IT solution can be used. It is good to start with existing solution and even basic spreadsheets are a great start for the process, later more complex solutions can be implemented, but like the process structure, it is desirable to start small and expand later.

When starting with S&OP a measurement plan should be put together for a way to measure performance. The measurements should be used to improve the process in a long run and to prove that S&OP has influenced business performance. The measurements chosen for S&OP vary from business to business but some basic KPI’s such as decreased costs, lower inventory level, forecast accuracy and on-time delivery should almost always be tracked. After the process structure, data collection, and measurement plan have been designed, the S&OP process can be started for the first time. Important part of the process is for participants to show up on agreed meetings, the S&OP process is a cooperative process therefore without attendance the whole process loses its meaning. When the process starts rolling it is important to document the process and to improve it overtime. Typically, an S&OP implementation takes from one to two years. Almost half of the implementation time is usually used for the design and other half for refining the process. (John, E. 2009:1-5; Grimson et al. 2007:5).

4.4 Demand – and Supply Planning

Demand – and supply planning are key components of S&OP. The S&OP processes essence is to align demand with supply. This is done by the cross-functional cooperation that an S&OP process drives. It is important that along the S&OP process demand – and supply planning are done correctly, otherwise S&OP becomes useless.

4.4.1 Demand Planning

Demand planning is a process where a forecast of possible demand for predetermined timeframe is constructed. There are elements that are seen in every demand plan and that should be done correctly to unlock full potential of demand planning. First the ownership of the plan must be clear, sales and marketing usually own demand plan and are accountable on its progression. Sometimes a dedicated demand manager is hired to ensure that the demand planning is working correctly and everyone who is needed is preparade for necessary demand reviews. Second is a working statistical forecast. Statistical forecasting is used as an input for demand planning, providing large amount of data based on history information to give indication of possibilities. Statistical forecasting needs appropriate systems or tools as its enablers.

Third, assumptions of demand plan should be managed correctly. As forecasting creates assumptions based on inputs, there should be a proficient way to manage these assumptions to keep the forecasting scope in focus. Usually there should be 5-10 assumptions that are documented and focused on, if the company has close to 20 assumptions, demand integrity gets worse. The inputs used for the plan vary but commonly consists of price change, promotions, customer needs, product launches and competition analysis. Fourth element that should be considered when creating a demand plan is demand control. Demand control means that the demand plan is followed constantly, and possible prediction errors are addressed. As the demand control is used to correct prediction errors and the accuracy of the demand plan, the plan should be measured as part of it. Measuring the demand plan accuracy should consider the history of the plan as currently happening actions have been forecasted in the past. (Peter, M. 2020:2-10).

4.4.2 Supply Planning

Supply planning is a process where a plan is created, to the best ability of a company's supply chain management, to satisfy a demand plan. In a typical S&OP process the demand plan is used as an input for the supply plan. Supply planning as a process is usually owned by supply chain managers and should include personnel from procurement, logistics and production. In the supply plan the capabilities of the company should be addressed to create coherent plan how inventory, manufacturing and procurement are managed to match the demand plan. Inventory management is important part of the supply plan and should include optimal inventory level, cycle time and inventory capacity. The level of needed manufacturing efficiency is an important driver of inventory and should be taken in to account in the supply planning. Procurement follows the manufacturing needs and is in direct effect of inventory meaning that efficient procurement management is important part of supply planning. (Dawn, K. 2020:2-6; Ávila et al. 2019:2).

4.5 Sales and Operations Planning Opportunities and Vulnerabilities

Sales and operations planning is an excellent way to execute the strategy a company has developed. But while it brings in many advantages, S&OP has also its vulnerabilities that should be considered when using or implementing S&OP. Assessing the opportunities and vulnerabilities of S&OP can give a company an understanding how and what ways S&OP could impact their performance.

4.5.1 S&OP Opportunities

S&OP is a great opportunity for a company to improve the alignment of functions, vertically and horizontally. One of the main advantages that S&OP brings is that it allows company to execute strategy in an efficient way. This means when implemented correctly more of the short-term decision-making moves away from the leaders to operations personnel and the leaders have more time for long-term decision-making. Some of the improvements overall, that S&OP can bring are improving forecast accuracy by 20-50%, cut production downtime by 5-25%, reduce inventory by 10-30%, increase delivery time by 5-10% and in higher maturity levels revenue can be increased by 2-8%. (Ávila et al. 2019:1-2, Kristensen et al., 2017:1-2).

4.5.2 S&OP Vulnerabilities

The lack of a systematic S&OP process and interest of personnel can lead to more harm than good, that is why it is important to have an in depth understanding of S&OP. S&OP's core idea is easy to understand, but the implementation of ideas can be difficult. Implementing S&OP almost always brings change to organizational culture meaning that failed change management, leads to failure in the S&OP implementation. If implementation has failed or real advantages are not seen, companies tend to move away from S&OP. The nature of S&OP is that it is very context-based process. When companies fail to understand that an S&OP process should be built around their company context, rather than using a "one-size-fits-all" concept, they tend to concentrate on unnecessary elements of the process. This amplifies the importance of understanding the in-depth S&OP process. (Grimson et al. 2007:1-4, Timo, R. 2021:10-15, Kristensen et al. 2017:2).

4.6 Sales and Operations Planning Conceptual Framework

Using the theory of S&OP a conceptual framework, as seen in Figure 14, was created. In the conceptual framework the subjects of S&OP were brought together to show what was needed for the objective of the thesis. The framework combines the S&OP process, maturity, implementation and planning/forecasting. From each of these subjects' major features are mentioned and the main references from the theory are cited. The framework gives and easy to understand picture how the S&OP can be divided. The elements of the framework could be used for example in this case to find if S&OP would be suitable for a company and what steps could be taken before implementation.

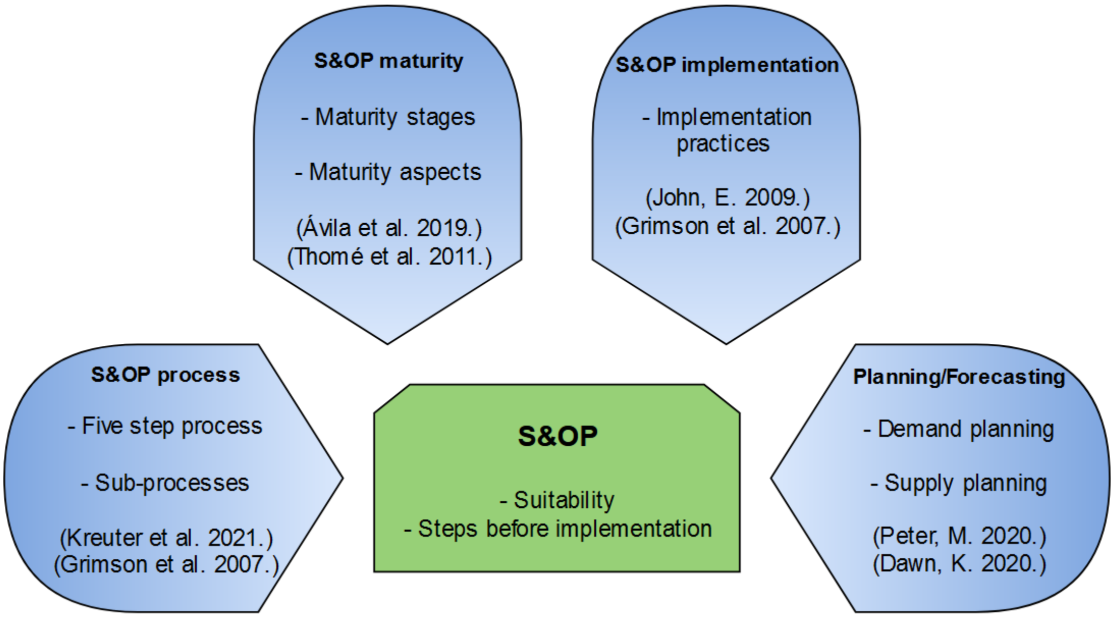

Figure 14. S&OP conceptual framework.

4.7 Summary

From the literature and best practices, an understanding of S&OP theory was developed. The understanding of S&OP process, maturity, implementation, opportunities and vulnerabilities and demand – & supply planning were used to create conceptual framework. The conceptual framework summarizes the key elements of the theory to indicate what needs to be assessed for the objective of the thesis. Next solution proposal was created using the current state analysis and conceptual framework according to the objective of the thesis.

5 Creating Initial Solution Proposal on S&OP

In this chapter a solution proposal was created using the current state analysis and the S&OP theory. The solution proposal follows the thesis's objective and the solution proposals outcome will also follow the overall outcome of the thesis. First, the overview of the solution proposal creation is introduced, after that the S&OP maturity stages were compared to the current state. Then the usefulness of S&OP for the company is assessed and suggestion of steps to an S&OP implementation are presented. Finally, an overall initial solution proposal draft is created.

5.1 Solution Proposal Overview

For the solution proposal the SWOT analysis from the CSA and conceptual framework from S&OP theory were combined with information from solution discussion meeting. The solution proposal uses the conceptual frameworks elements to assess the SWOT analysis segments. The solution discussion meeting was used to get information about the company's thoughts on the solution proposal. In the solution proposal the usefulness of an S&OP process and steps to implementation are combined to one solution draft. In Figure 15 the steps of solution proposal building are shown.

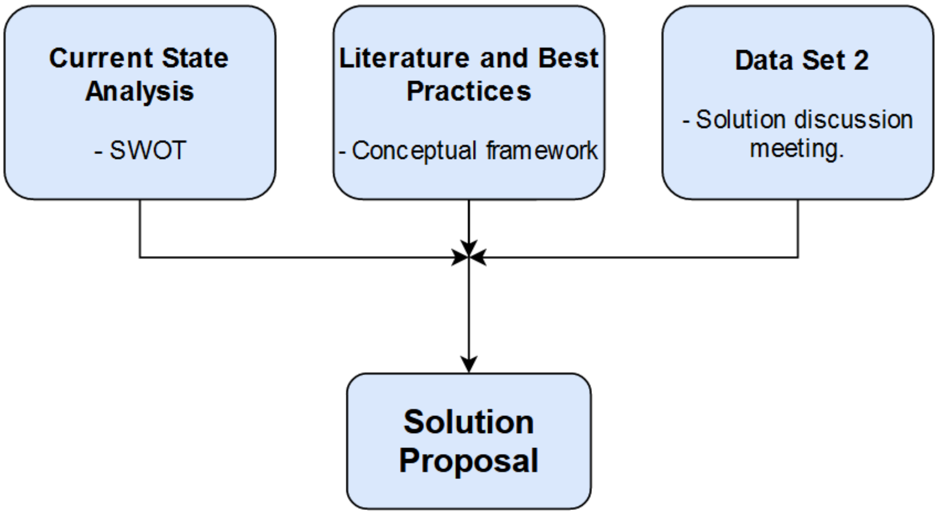

Figure 15. Solution proposal steps.

5.2 Maturity Evaluation

In chapter four using S&OP theory, the S&OP maturity stages were identified. These stages could be compared to the current state of the company to get understanding in which stage each S&OP aspect lands as seen in Figure 16. The S&OP aspects used in the maturity stage figure were communication, planning/forecasting, organization and IT systems. Each of these aspects were, in some level, seen in the current state analysis and in the SWOT diagram.

In the SWOT diagram cross-functional communication and cooperation for cross-functional decisions were listed as weaknesses. In the maturity stage figure communications first two stages are minimal cross-functional communication and collaboration between teams with poor meeting attendance. In this case the company's current state would be in the first stage as cross-functional meeting are minimal. There was collaboration between teams in the company, but they were not often used to make cross-functional decisions.

The second main aspect in the maturity stage figure is planning/forecasting. The SWOT diagram had listed planning and forecasting processes as strengths of the company. This indicates that the planning/forecasting were more than just rudimentary as in the stage 1 of the maturity diagram. In this case planning/forecasting would be in the stage 2 of the maturity diagram, where demand – and supply plan are used in conjunction.

As an S&OP process was not in use in the company the organization aspect of the maturity stage figure cannot be in stage 2 where a formal S&OP process has been defined. Also, in the SWOT diagram silos were listed as a threat and in stage 1 of the maturity figure silo culture is mentioned as part of the organization aspect of an S&OP. This led to the company being currently at stage 1 on maturity figure regards the organizational S&OP aspect.

In the SWOT diagram use of certain simple IT tools were mentioned as threats and new ERP system was mentioned as an opportunity. In the maturity figure stage 1 IT systems are said to be divided into many systems and information is not shared. And in stage 2 individual spreadsheets are used, and information is shared. From the SWOT diagram it could be concluded that the company was in stage 2 as spread sheets were used, and information was shared.

	Stage 1. – No S&OP	**Stage 2. – Basic S&OP**
Communication	- Minimal cross-functional meetings	- Collaboration between teams to make cross-functional decisions - Mediocre meeting attendance
Planning/forecasting	- Rudimentary planning/forecasting	- Demand plan and supply plan are used in conjunction
Organization	- Silo culture	- Formal S&OP process - S&OP is lead by spesific department
IT systems	- Many systems - No shared information	- Individual spreadsheets - Information is shared between teams

Figure 16. Current maturity stage distribution.

5.3 Usefulness of S&OP for the Company

To confirm why an S&OP should or should not be implemented, the usefulness of S&OP for the company must be assessed. As noticed in the CSA company's individual processes were strong and were working as intended. And the company's planning and forecasting practices were aligned to work with the individual processes. But as mentioned in the CSA the cross-functional collaboration and decision making were not as strong as they could be, this aspect of business could be greatly improved with S&OP where communication is one of the key elements. From the theoretical point of view the potential improvements, for many business processes, that S&OP bring are also very compelling reasons to implement S&OP. While S&OP would bring many advantages to the company there are also reasons why it could not be implemented or how the implementation could not be as effective as expected. A problem with S&OP is that it takes a lot of effort to be implemented and it does change major key concepts of processes. This means that S&OP should be one of the top priorities in a long run, but if it does not get the attention that it needs, it will not be worth the effort to implement.

S&OP's forecasting – and planning aspect could be useful as new subsidiaries are acquired and as product portfolios grow meaning that planning and forecasting accuracy become even more important. Without dedicated process to align demand – and supply it is harder to predict and keep up with plans for sales and production. S&OP would also bring a continuous cycle to the forecasts as the forecast is updated each month. The decision-making actions would also change if S&OP would be implemented, it would move the short-term decisions more to the operation personnel and allow the leadership team concentrate even more on the long-term strategic decisions.

5.4 Suggestion of Steps to S&OP Implementation

The implementation of S&OP is a long journey and depending on the context can take from months to years. A basic S&OP process can be implemented quite quickly but as S&OP is a continuously evolving process, the wanted level of intricacy will take a long time. Before implementation there are suggested steps the company should take to ensure the implementation would go as smooth as possible.

First, before the implementation, the S&OP must have attention and understanding from leadership team. The leadership team should assess the S&OP as a possibility to improve strategy deployment. As there are many ongoing projects the decision to implement S&OP should be timed to a date when adequate resources can be allocated to it. When the leadership team has made the decision that S&OP could be a plausible choice for the company it is good to start small and grow the process as time goes on. It is a good idea to concentrate on one portfolio or category of products to keep the S&OP process simple and easier to measure as the chosen portfolio can be compared to other product portfolios.

The next step before the implementation is to think how the next maturity stage could be reached. Currently planning/forecasting and IT systems are on the second stage of the scale, but communication and organization are on the first stage. For communication more cross-functional meetings should be made to advance to the next maturity stage, especially between production and sales. The second stage for the organizational aspect includes a formal S&OP process this means that it is possible to achieve that stage only after S&OP has been implemented. Overall, the next maturity stages could be only properly achieved when S&OP is formally implemented.

As a proper S&OP process implementation needs a person that manages the implementation. A person with deep knowledge of S&OP, project management and change management should be dedicated for the implementation. The person could be from the company, or a consultant could be hired.

5.5 Summary and Initial Solution Proposal Draft

Overall, the implementation of S&OP would be a good idea if it gets enough recognition and time invested on it. As the company becomes more complex due to its rapid inorganic growth and number of SKU's the impact of cross-functional decision making becomes more important. There are risks that need to be considered about S&OP before implementation, if they are not acknowledged the implementation has a high chance of failing.

The first solution proposal draft for steps before the S&OP implementation includes four steps. The next four proposed steps for the company are:

1. Project justification
2. Decision of S&OP usage and area of impact
3. Dedicated S&OP personnel
4. Progression to the next maturity stage

Following these steps, a good base for the implementation could be created. A stronger base for the implementation means there is a better chance that implementation would be successful. Next the solution proposal was presented, and feedback was received to validate the solution proposal.

6 Solution Proposal Validation

In this chapter the solution proposal is validated and final solution proposal is created. First, overview of the solution proposal validation is described. After the overview, feedback from the initial solution proposal is reviewed. Finally, a final solution proposal is created using the feedback from the initial solution proposal.

6.1 Solution Proposal Validation Overview

First the solution proposal draft and the methods how it was conducted were introduced to the company. The company gave feedback on the steps to implementation. Using the feedback, the solution draft was modified to follow the company's needs and suggestions. After the needs and suggestions were assessed the final solution proposal could be made. The final solution proposal includes the steps that could be taken before the implementation to ensure that the implementation would be smooth. The purpose of the solution proposal validation was to validate that the final solution proposal was sensible and that it met company's needs.

6.2 Feedback from Initial Solution Proposal

The initial solution draft was sent to the company to receive feedback. There were three points that the company pointed out from the initial solution proposal. First, the possible use of consultants, that was mentioned on the third step of first solution proposal draft. The use of consultants was mentioned as a possibility for the personnel that would be dedicated to carry the implementation. In the company's opinion it would be a better idea if the dedicated personnel for the S&OP implementation would be from the company instead of consultant. This was mainly because continuous improvement in the process would be easier to maintain when the dedicated personnel would from the company. However, it was noted that external help of consultancy would still be required as it would help to avoid common pitfalls of an S&OP implementation with the help of experienced professional.

Second point in the feedback was about benchmarks. Benchmarks on how other companies have implemented S&OP and how S&OP has worked in a long run for others. For this, a person from another process industry company, where IBP have been used for substantial time, was interviewed. As the IBP process is based on the same concept as S&OP, it could be used to testify the usefulness of an S&OP process. In the interview questions about IBP implementation and how IBP has worked for the company were asked. In the company an IBP process was started about a year ago and in that period had already improved their strategic execution. The company also mentioned how important the implementation stage is and how they are still constantly improving their IBP process. This was sufficient information to indicate that a similar process as S&OP works in other companies and that the implementation can be successful if done correctly.

The last point was about IBP, as finance is in big role in the company. In the feedback it was suggested that IBP could be assessed as an option for the implementation. As the higher maturity stages of S&OP include S&OP as an executive decision-making method, the company could emphasize a more financially oriented S&OP process evolution. This means that an S&OP could be used instead of an IBP, but the orientation could be more finance focused.

6.3 Final Solution Proposal

For the final solution proposal the initial solution proposal was followed adding the points that the company made in the feedback. The final solution proposal gives the company suggested guideline before the implementation. Like in the initial solution proposal the first step is project justification in the company, for this the benchmark of the S&OP functionality from the interviewed company gave a more ensuring argument for the implementation. Ultimately it is the company's decision if S&OP should be implemented. The second step, the same as in initial solution proposal, is to determine S&OP area of impact, where S&OP is conducted and what product portfolios are used. The third step is to choose the dedicated S&OP personnel, as the feedback suggested the personnel should be from the company to ensure continuous development of the process. Finally, the last step is similar as in the initial solution, but more finance orientated.

Final proposed steps before implementation:

1. Project justification
2. Decision of S&OP usage and area of impact
3. Dedicated S&OP personnel from the company
4. Progression to the next maturity stage with emphasizes on finance

Using these steps before implementation, an easier implementation can be ensured. And a more stable foundation for the implementation can be established.

7 Conclusion

This chapter provides the conclusion for this thesis. First an executive summary of the thesis is presented. In the executive summary the whole thesis was summarised to show what was done in the thesis. After the executive summary there is the self-evaluation of the thesis where the whole thesis process was evaluated.

7.1 Executive Summary

The objective of this thesis was to a conduct current state analysis to the company to determine if S&OP would be a suitable option and to create recommendations for how to proceed to an S&OP process implementation. This objective was chosen as the company has not implemented an S&OP process and would like to know if an S&OP process would be a practical process to implement.

The thesis was conducted using a current state analysis to determine how the company is working currently and exploring theory on S&OP to find the solution to the objective of the thesis. For the CSA interviews were conducted as a data source. For the theory best practices from appropriate articles and literature were researched.

For the CSA five different functional business areas of the company were investigated including production, sales, finance, logistics and procurement. After information of the areas was collected a SWOT analysis was conducted to identify the strengths, weaknesses, opportunities and threats of the current state. From the SWOT analysis it was seen that for the most part processes are working great and continuous development can be seen, but threats and weaknesses need attention to ensure stable functionality.

For the theory most relevant topics that could be used to solve the weaknesses and threats from CSA were researched. These topics were S&OP processes, S&OP maturity, S&OP implementation, demand – and supply planning, S&OP opportunities and vulnerabilities. From these topics a conceptual framework was created.

After the CSA and conceptual framework were done, they were utilized to create an initial solution proposal following the objective of the thesis. For the initial solution proposal ideas were discussed in a meeting with the company. In the initial solution proposal first the current state of the company was evaluated with the S&OP maturity stage diagram to get understanding of current maturity of communication, planning/forecasting, organization and IT systems. From the comparison it could be concluded that currently the company is between first and the second stage of the S&OP maturity scale. After this the usefulness of S&OP was evaluated for the company's context, it was found that S&OP could be a suitable possibility if implemented correctly.

Next, suggested steps before to implementation were listed. The steps for the initial solution proposal were 1. project justification, 2. decision of S&OP usage and area of impact, 3. dedicate S&OP personnel and 4. progress to next maturity stage. After this the initial solution proposal was presented to the company and feedback was received. The final solution proposal was created using the initial solution proposal and the feedback from the company. In the feedback it was suggested that the S&OP personnel for the implementation should be from the company, benchmark from another company could be used to affirm the success of S&OP and that IBP could be an option instead of S&OP. Using the feedback new suggested step before implementation were done. The final proposal steps were 1. project justification, 2. decision of S&OP usage and area of impact, 3. dedicated S&OP personnel from the company, 4. progression to the next maturity stage with emphasizes on finance.

Overall, the implementation of S&OP could impact business positively. The implementation, if done properly, could bring a more effective way to manage planning and forecasts and make cross-functional communication more sufficient.

7.2 Evaluation

Primarily this thesis followed the set objective. A sufficient proposal for the business challenge following the CSA and theory was made. For the CSA also quantitative methods could have been used among qualitive methods to get even more in depth understanding of the current state. The theory section covers a valid range of topics but could have used more variety in the references. Overall, this thesis can be used to get information about S&OP and how and why it should be implemented.

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