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The transition from Sales & Operations Plan to Integrated Business Plan:

A Systematic Literature Review

TESI DI LAUREA MAGISTRALE IN
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I. Abstract in English

The nowadays dynamic environment necessitates organizations to adopt an agile approach to remain competitive. Sales and Operations Planning emerged in the 1990s as a solution for enhancing internal coordination by integrating sales and production plans. Its potentialities and advantages caught the attention of companies and managers, that start to seek its evolution into a more complete process, called Integrated Business Planning. However, there is still a lack in the literature that clarifies the differences between the two and how to transition toward this higher level, or if they are just the same process under different names. This thesis conducts a comprehensive systematic literature review, analyzing both academic and practical perspectives to provide a clear definition of IBP, its key features, and difference from S&OP. The study aims to fill the gap in the literature by also offering an academic perspective on a concept largely shaped by practitioners' opinions. Two research questions are addressed: 1) What differentiating factors characterize S&OP when compared to IBP? 2) How can organizations evolve from S&OP to IBP? The findings provide insights into their differentiation, the transition from S&OP to IBP and future research directions.

Keywords: Sales and Operation Planning, Integrated Business Planning, Transition, Evolution,

II. Abstract in Italiano

L'ambiente dinamico di oggi impone alle organizzazioni di adottare un approccio agile per rimanere competitive. La pianificazione delle vendite e delle operazioni è emersa negli anni '90 come soluzione per migliorare il coordinamento interno integrando i piani di vendita e di produzione. Le sue potenzialità e i suoi vantaggi hanno attirato l'attenzione di aziende e manager, che hanno iniziato a cercare la sua evoluzione in un processo più completo, chiamato Integrated Business Planning. Tuttavia, manca ancora una letteratura che chiarisca le differenze tra i due e le modalità di transizione verso questo livello superiore, o se si tratta semplicemente dello stesso processo con nomi diversi. Questa tesi conduce una revisione sistematica e completa della letteratura, analizzando sia le prospettive accademiche che quelle pratiche per fornire una definizione chiara dell'IBP, delle sue caratteristiche chiave e delle differenze rispetto al S&OP. Lo studio mira a colmare la lacuna della letteratura, offrendo anche una prospettiva accademica su un concetto in gran parte modellato dalle opinioni dei professionisti. Vengono affrontate due domande di ricerca: 1) Quali fattori di differenziazione caratterizzano il S&OP rispetto all'IBP? 2) Come possono le organizzazioni evolvere dal S&OP all'IBP? I risultati forniscono indicazioni sulla loro differenziazione, sulla transizione da S&OP a IBP e sulle future direzioni di ricerca.

Parole Chiave: Sales and Operation Planning, Integrated Business Planning, Transizione, Evoluzione

Content

1. Introduction

The present market is characterized by a high level of unpredictability and ambiguity, owing to factors that influence both the supply and demand aspects. The supply side faces the challenge of managing the demand for versatility, quality, and speed in the supply chain, made more complex and susceptible to disruptions due to the globalization and intricacy of supply chains. On the demand side, alterations in customer demands and behaviors, as well as the advent of new products and technologies, result in increased competition and volatility in the market. Hence, organizations are obliged to adopt an agile approach to remain competitive in this dynamic environment. The priority in product-oriented industries has transitioned from maximizing revenue to delivering a tailored product that meets the customer's requirements, including timeliness, quantity, price, and quality (Wagner, Ullrich, and Transchel 2014).

Traditionally, organizations have followed a passive approach, characterized by a fragmented structure where each department functions autonomously, focusing on individual objectives. Such an organizational design tends to disregard the bigger picture and hampers the creation of a flexible and responsive supply chain.

To tackle these obstacles, the concept of Sales and Operations Planning (S&OP) gained popularity in the 1990s. S&OP represents a systematic approach aimed at enhancing internal coordination by integrating the sales and production plans, thereby addressing the delicate balance between supply and demand. However, this narrow and tactical viewpoint, which is exclusively centered on synchronizing the physical flow, has demonstrated its limitations and lack of adaptability in the face of continuously changing market scenarios (Oliver Wight 2020b). The Literature Reviews conducted first by (Grimson and Pyke 2007) and later on by (Thomé et al. 2012) finally clarified its structure, composed by a 5-steps model: “Data Gathering” “Demand Planning”, “Supply Planning”, “Pre-Meeting”, “Executive Meeting”.

The advancements in technology have presented numerous opportunities for organizations to thrive, and S&OP was no exception. The evolution of the internet and the subsequent increase in connectivity capabilities allowed for real-time data sharing among departments, a development that was crucial for a process aimed at interdepartmental coordination. Over time, the S&OP process, initially limited to periodic meetings between the sales and operations departments, started to expand to other functions in mature organizations. It was evident that the term "Sales & Operations" was becoming restrictive (Harman 2022).

To avoid this restriction, the transition to Integrated Business Planning (IBP) was initiated by the consulting firm Oliver Wight, who first introduced the term in 2005 with the aim of transforming S&OP into *“a common-sense process designed for effective decision-making”* (Harman 2022; Oliver Wight 2023a). In the early 2010’s the concept of IBP started gaining popularity. With the 4th industrial revolution, indeed, new

technologies increased the chances of companies to effectively be able to exploit Integrated Business Planning to effectively support decision-making. The abundance of data, combined with the processing capabilities of Big Data Analytics techniques, allowed organizations to begin seeking tools to support decision-making at all levels, leading to the widespread adoption of advanced or next-generation S&OP. This marked the beginning of the popularity and widespread use of Integrated Business Planning.

Since its birth, the term IBP has been in the center of the debate. There is still a lack of consensus on the definition of the concept itself. Multiples are the detractors: the literature is very polarized between those who believe that IBP is the future and other authors that believe it's just a new name for an old concept (Bower 2012). Some even state that it is just a newly invented term by consulting companies, such as Oliver Wight, that are constantly seeking to claim that they have a unique and superior approach to Sales and Operations Planning (Bower 2012).

Moreover, as often happens for young and not formally defined concepts, it appears that in this matter academic literature lags behind practitioners. As mentioned above, companies started embracing the concept of IBP since the early 2010's by writing articles and sharing opinions in an unorganized attempt to reach a common ground on the possible definition of Integrated Business Planning, but with very little success. Indeed, IBP can be considered a "predominantly practitioner's phenomenon", as a shared academic definition of the concept doesn't exist yet (Schlegel, Birkel, and Hartmann 2020a). The main source of material on the topic comes from the coiners of the name: the Oliver Wight consulting firm. With their so-called white papers series (Oliver Wight, n.d.), which however still lies in the domain of the practitioners' literature, they attempt to share and impose their idea of IBP. However, their view on the concept cannot be taken for granted, as many points the finger at them and other consulting companies for creating just a "Marketing Hoax" (Bower 2012).

Over recent years, researchers have focused their attention on exploring the potential evolution and expansion of Sales and Operations Planning (S&OP). Five literature reviews (Kristensen and Jonsson 2018; Pereira, Oliveira, and Carravilla 2020; Neto, Barcellos, and Panizzon 2022; Kreuter et al. 2022; Nicolas, Thomé, and Hellingrath 2021) have been conducted in the past five years that examine the topic, but none of them focuses specifically on the transition towards the new concept of Integrated Business Planning.

(Kristensen and Jonsson 2018) examined the need for contextualizing S&OP based on the industry, complexity, and structure of an organization while (Pereira, Oliveira, and Carravilla 2020) investigated the lack of mathematical models that support decision-making for the main functions involved in S&OP, such as procurement, production, distribution, and sales, still in a strictly tactical perspective (Nicolas, Thomé, and Hellingrath 2021) highlight the significant role that information technology should

play in the S&OP context and defines it as a key enabler for planning optimization and integration. (Neto, Barcellos, and Panizzon 2022) take a different approach and propose a new maturity model of six pillars that synthesizes the basis of S&OP, including forecasting, demand management, new product introduction, supply chain management, tactical planning, and human resources, along with a meta-framework that encompasses the entire business flow. Finally, (Kreuter et al. 2021) consolidate existing research on S&OP into three main streams: S&OP and performance, the implementation of S&OP, and the contextualization of S&OP.

Despite the focus on various aspects of Sales and Operations Planning in recent years, there has been a lack of literature regarding the concept of Integrated Business Planning. This is surprising given the growing interest in the topic among practitioners and the increasing prominence of IBP as a potential evolution of S&OP. The existing literature reviews on S&OP do not address the topic of IBP, which presents an opportunity for further research to explore how S&OP can be transformed into a process that drives the entire business, rather than simply balancing supply and demand.

Aim of the project and next chapters

This thesis aims to contribute to the ongoing discourse on IBP by conducting a comprehensive Systematic Literature Review (SLR). The review will analyze both academic and practical perspectives on the topic, providing relevant and up-to-date information on the concept of IBP. The objective is to provide a clear definition of IBP, highlighting its key features and differences from S&OP. This research seeks to fill the gap in the literature by offering an academic perspective on a concept that has largely been shaped by practitioner opinions. Ultimately, this work aims to further the understanding of IBP and its potential role in driving the overall success of a business.

We have outlined two research questions to address the themes discussed earlier:

> RQ 1: What differentiating factors characterize S&OP when compared to IBP?
>
> RQ 2: How can organizations evolve from S&OP to IBP?

The first research question aims to bridge the gap in the literature and provide clarity on the differences between "Sales & Operations Planning" and "Integrated Business Planning". It seeks to address the issue of the lack of a clear definition of IBP and guide the study toward proposing a precise definition of the concept and its key features. While the second research question digs deeper by exploring the potential for the transition. This question will investigate the potential implications and future developments of both processes as they converge and integrate.

The present work is structured as follows: In **Section Two**, the methodologies we adopted during the Systematic Literature Review process are described in detail.

Section Three present a descriptive analysis of the material selected. **Section Four** provides a comprehensive explanation and summary of the current state of the art of S&OP, describing the structure of the process, benefits and drawbacks. **Section Five** offers an analysis of the various perspectives put forth by academic and practitioner literature on IBP, culminating in a comprehensive description of all its aspects and features. **Section Six** delves deeper into the key differences between IBP and S&OP. **Section Seven** offers guidance on transitioning from S&OP to IBP, avoiding common pitfalls, and provides insights into the potential evolution of IBP. The findings from the previous sections are discussed in **Section Eight**, while **Section Nine** summarizes the conclusions drawn from the preceding analysis.

2. Methodologies

Our goal in this introduction was to illustrate the ambiguous nature of the Integrated Business Planning concept, particularly within the academic realm. To address this, we employed a systematic literature review (SLR) research method on both academic and practitioners' literature, with the aim of highlighting the potential evolutions of S&OP to IBP and ultimately defining the primary differences between the two. The rising interest of academics combined with the lack of a clear definition or view of IBP triggers the necessity of running an SLR, whose objective is to "integrate a number of different works on the same topic, summarizing the common elements, contrasting the differences, and extending the work in some fashion" (Kreuter et al. 2022). Our focus was on gathering information about the emerging trend of IBP to expand knowledge about the topic and provide a clearer definition and explanation of its role. This would enable us to develop future propositions and identify the direction for further implications or studies.

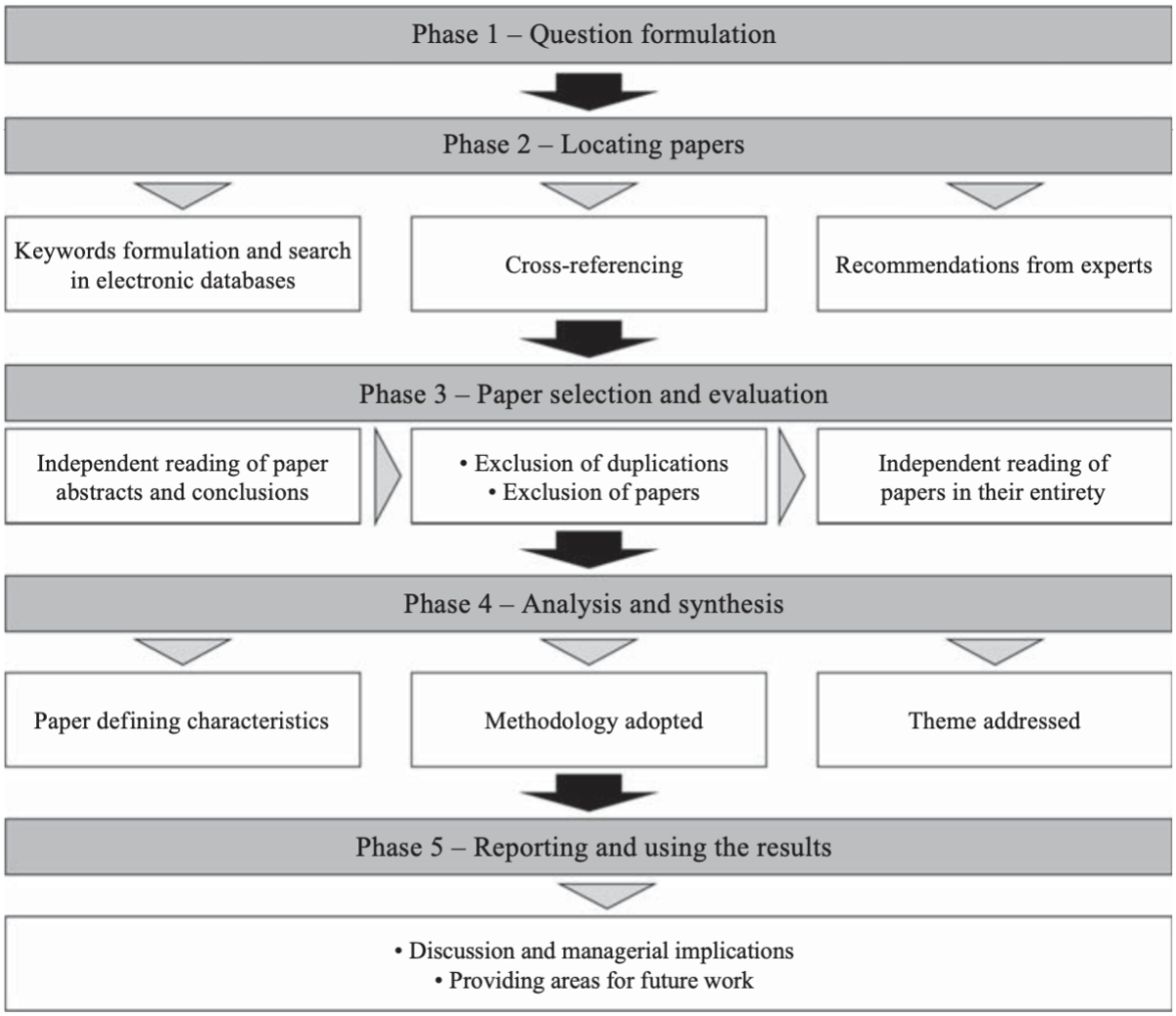

Figure 1: SRL methodology. Source (Melacini et al. 2018).

To ensure the replicability and reliability of our research, we adopted the 5-step framework developed by (Melacini et al. 2018), reported in Figure 1, both for white and grey literature. We adapted the framework to better suit the needs of the Practitioners' domain by still keeping the five main steps. The adaptations will be explicated for each phase. In the subsequent sections of this chapter, we will provide a comprehensive discussion of the first four phases, which are primarily related to the research and selection of papers. We will address phase 5 (Reporting and Using the Results) starting from Chapter 4.

2.1Question Formulation

The initial stage of the in-depth methodology involves formulating research questions to serve as a guide for the literature review. These research questions must be well-defined, informative, and clearly formulated to avoid ambiguity (Hohenstein 2015). The research questions were introduced in the Introduction and are reiterated below for clarity:

1. RQ 1: What differentiating factors characterize S&OP when compared to IBP?
2. RQ 2: How can organizations evolve from S&OP to IBP?

The two research questions are aimed at filling the gaps in the most recent Systematic Literature Reviews available in academic literature. The first RQ aims at finally overcoming the confusion present around the topic of IBP by defining its characteristics and the major differences from S&OP in a more structured manner. On the other hand, the second RQ aims at taking a step further by providing a possible evolution path for those organizations that are willing to embrace the change from S&OP towards IBP.

The two RQs arise once having identified a lack in the existing literature reviews in the S&OP context about the evolution in IBP. Besides the first two literature reviews of (Grimson and Pyke 2007) and (Thomé et al. 2012), which study the concept and principle of the S&OP process, we analyzed the literature reviews only of the last 5 years given the recent trend of IBP.

The 7 SLRs are shown in Table 1 and they stemmed out of the following string used on Scopus, with the further restriction of papers from 2018 to 2022:

(TITLE-ABS-KEY (("sales and operations" OR "S&OP" OR "sales & operations" OR "sales and operations plan" OR "S&OP plan*" OR "sales & operations plan*" OR "integrated business plan*") AND ("literature review")))*

Table 1: Systematic Literature Reviews on S&OP

Authors	Title	Year	Journal
Kreuter T., Scavarda L.F., Thom√© A.M.T., Hellingrath B., Seeling M.X.	Empirical and theoretical perspectives in sales and operations planning	2022	Review of Managerial Science
Neto J.R., Barcellos P.F.P., Panizzon M.	Beyond S&OP implementation: A maturity model and meta-framework for assessing and managing evolution paths	2022	Brazilian Journal of Operations and Production Management
Nicolas F.N.P., Thom√© A.M.T., Hellingrath B.	Usage of information technology and business analytics within sales and operations planning: A systematic literature review*	2021	Brazilian Journal of Operations and Production Management
Pereira D.F., Oliveira J.F., Carravilla M.A.	Tactical sales and operations planning: A holistic framework and a literature review of decision-making models	2020	International Journal of Production Economics
Kristensen J., Jonsson P.	Context-based sales and operations planning (S&OP) research: A literature review and future agenda	2018	International Journal of Physical Distribution and Logistics Management
Thomé A.M.T., Scavarda L.F., Fernandez N.S., Scavarda A.J.	Sales and operations planning: A research synthesis	2012	International Journal of Production Economics
Grimson J.A., Pyke D.F.	Sales and operations planning: An exploratory study and framework	2007	The International Journal of Logistics Management

2.2 Locating papers

The purpose of this phase is to compile a list of contributions related to the previous research questions. To address this issue, we chose to both focus on the white (academic) and grey (practitioners') literature to have a more complete overview of the studies run on the topic.

2.2.1 White literature

Regarding the academic domain, the research was conducted exclusively on the Scopus Database due to its widespread use in literature research and its focus on modern sources, as compared to other databases such as "Web of Science", which better suited our needs (Melacini et al. 2018). The first step in this phase involved identifying the keywords to be used within the Scopus search string, that are better explained later. The primary keywords considered were obviously S&OP (and its derivatives) and IBP (and its derivatives). Additionally, other keywords were included to broaden the research spectrum and ensure that no relevant articles were overlooked. The search string was formulated as follows:

(TITLE-ABS-KEY (("sales and operations" OR "S&OP" OR "sales & operations" OR "sales and operations plan" OR "S&OP plan*" OR "sales & operations plan*" OR "integrated business plan*") AND ("IBP" OR "integrated business plan*" OR "CPFR" OR "collaborative planning forecasting*

replenishment" OR "technolog" OR "financ*" OR "profit" OR "revenue" OR "optimiz*" OR "evolut*" OR "holistic" OR "trend" OR "supply plan*" OR "demand plan*" OR "executive meeting")))*

The string was divided into two parts. The first was designed to provide a broad list of articles relating to S&OP and IBP, while the second aimed to narrow the results down to those that were more relevant to the research objective, by including specific keywords such as "optimization," "technology," and "finance." Other keywords such as "Trend," "Evolution," and "Holistic" were used to highlight the current trends in S&OP, while "demand plan*," "supply plan*," and "executive meeting" were included to ensure that no study focused on a particular step of S&OP was missed. Additionally, the keywords "IBP" and "integrated business plan*" were incorporated into the second part of the string to avoid overlooking any articles on the IBP topic. In the first phase, no constraints or limits were applied to include all available material in the database.

2.2.2 Grey Literature

As mentioned in the introduction, there is limited attention given to the topic of Integrated Business Planning in academic literature. As the concept was developed in the early 2010s, there is no academic consensus on its meaning yet. To gather information on the evolution of S&OP into IBP, a common approach in SLR is to examine the practitioners' domain, using the so-called Grey Literature. Indeed, practitioners may represent a valuable source of empirical knowledge and provide complementary material to the traditional "white literature" (Adams, Smart, and Huff 2017).

To organize the available content in the vast domain of the *Grey Literature,* we followed the guidelines provided by (Adams, Smart, and Huff 2017).

Content type

First, we had to select the type of content: in this direction we chose to follow the framework proposed by (Adams, Smart, and Huff 2017) and shown in Figure 2. As the practitioners' content is vast, they chose to cluster it by outlet control, intended as the extent to which the content is moderated in conformance with some transparent criteria, and source expertise, intended as the authority of the source producing the content. For this SLR, we decided to focus only on the 2nd and 1st tier of grey literature presented in the framework, as the 3rd presents some difficulties both in physically finding the material and in evaluating the source's reliability.

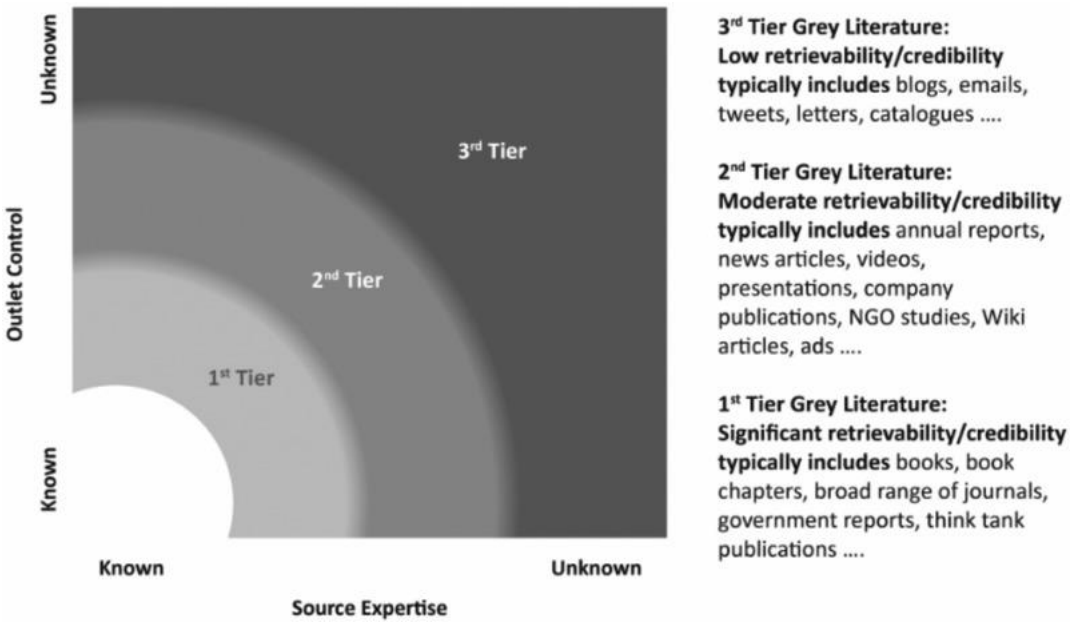

Figure 2: Shades of Grey. Guidelines to use Grey Literature. Source (Adams, Smart, and Huff 2017)

Searching Technique

The second decision to be made concerned the technique used for locating relevant material, which presented three options to choose from:

1. Searching in specialist online databases
2. Searching on search engines
3. Issuing requests to policy experts for relevant sources of literature

Due to practical considerations, we opted to use only the first two techniques. Regarding the research string used, in this case we opted to use *"Integrated Business Planning"* as the research engines available for grey literature content work best with a simple string.

Source selection

The third decision involved source selection, which is a crucial step in the Paper Location phase, particularly because there is no certified database such as Scopus for non-peer-reviewed studies. To find relevant materials, we worked in collaboration with our supervisors to identify sources from the two primary channels of information on strategy and supply chain management topics: reputable magazines and consulting firms' websites. As indicated in Table 2, out of the 15 sources we analyzed, only five contained relevant content for our research purposes. Furthermore, some articles were found inaccessible without costly subscriptions. For these reasons, we decided to expand our search by using Google Search and Google Scholar, as well as conducting cross-referencing, to ensure that we did not miss any critical results.

Source Title	# results
Oliver Wight	109
Material Handling and Logistics	387
Forbes Tech	65
Mckinsey & Company	4725
Industry Week	Indefinite
Google Search	Indefinite
Google Scholar	Indefinite
Bloomberg Businessweek	0
Fortune	0
Business Insider	0
CNBC	0
Inc.Magazine	0
Reuters	0
BCG	0
Bain & Company	0
Accenture	0
Deloitte	0
PWC	0

Table 2: Number of results per browsing tool

2.3 Paper Selection and Evaluation

This section covers the selection and evaluation phase of the papers, which involved multiple skimming phases of the initial set of articles and the application of inclusion and exclusion criteria.

2.3.1 White literature

Firstly, a preliminary sample of articles was collected, which was then filtered to only include articles from the last 20 years (2003 – 2022). Indeed, as this thesis focuses on the evolution from S&OP towards IBP it was not relevant to include content developed in a much antecedent phase of the invention of the latter, that dates back to 2005 (Oliver Wight 2023a). In addition to articles, conference papers were also included in this study, as it would be counterintuitive to exclude them from a study also concerning the practitioners' literature. The eligibility criteria for the study were limited to papers at the final publication stage and written in English, resulting in 172 eligible papers.

The skimming first phase has been performed by reading the title of the article and classifying them into three categories: *"Relevant"* (95) *"To be discussed" (38) "Not Relevant" (39)*, based on the coherence with the two RQs. The titles were read

independently by both of us to avoid any personal bias in the selection of titles. At the end of this phase, a total of 103 articles were chosen, while the remaining 69 were discarded.

After this, a careful analysis of the abstracts was performed to select papers that addressed the formulated questions. The exclusion criteria for the papers were:

1) *S&OP as secondary topic*: Papers that showed the S&OP as a secondary concern were discarded.
2) *Focus on a particular process without S&OP context:* articles that discussed a particular process (e.g Demand Planning, Supply Planning) that was not contextualized in S&OP were discarded.

The result was a list of 71 papers independently read by both authors to ensure the validity of the research and minimize personal bias.

The final selection process was carried out during a thorough reading of the articles. By cross-referencing, an additional four papers were identified and added to the existing list. However, 27 papers from the initial list were eliminated for two reasons. The discarded papers were excluded due to their irrelevance to the review if not focused on the possible evolution or improvements of S&OP. Ultimately, a research sample of 48 papers and seven literature reviews were chosen for the study. The whole

procedure is shown in Figure 3, with the respective literature reviews in **Error! Reference source not found.**.

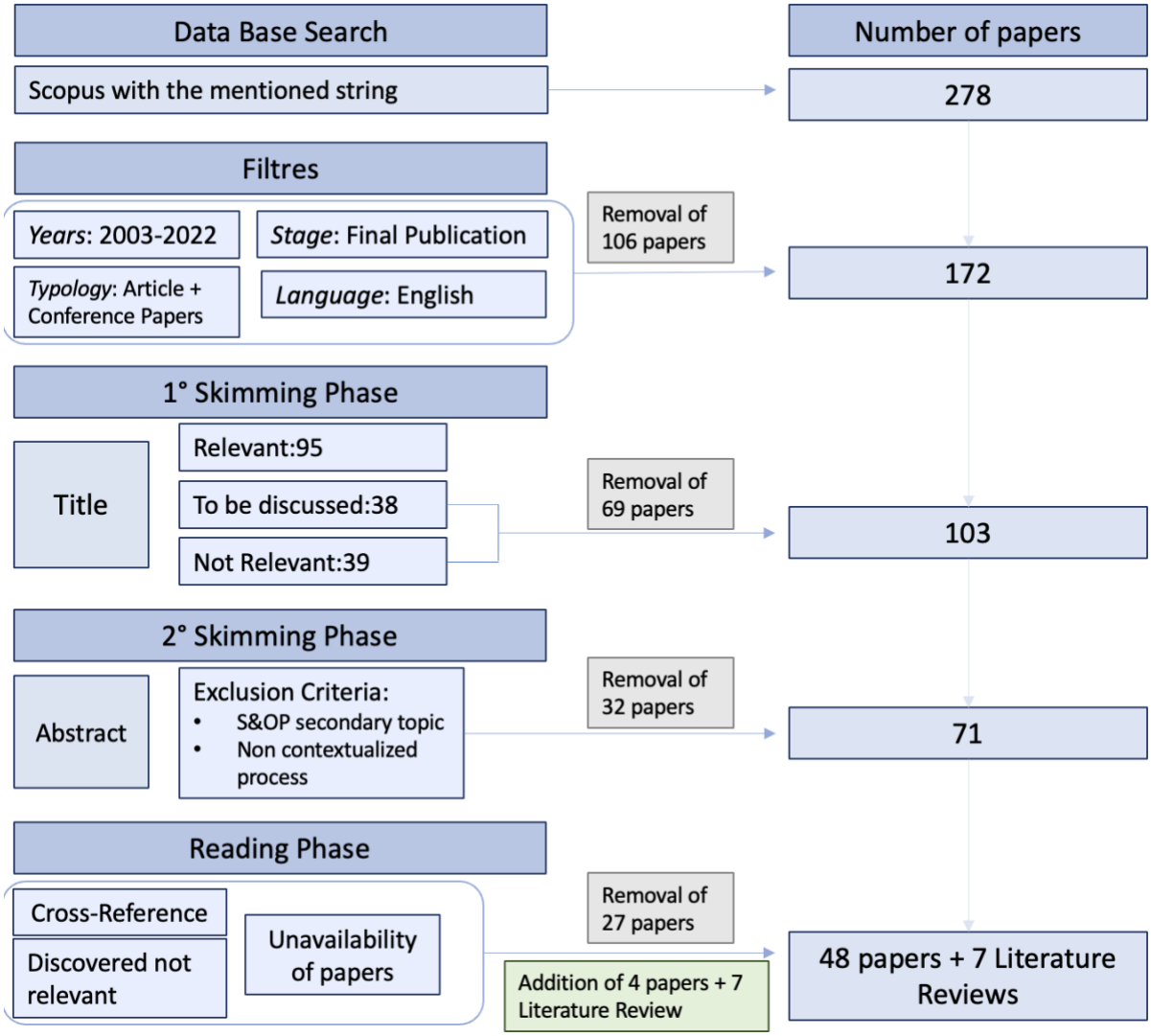

Figure 3: Paper Selection for White Literature. Adapted from (Kristensen and Jonsson 2018)

2.3.2 Grey Literature

Due to the absence of abstracts and the heterogeneous nature of browsing tools and articles in the grey domain, a distinct approach was necessary. The first selection phase involved scanning the article titles, and the number of search results obtained from particular sources, namely Material Handling and Logistics, McKinsey, IndustryWeek, Google Search, and Google Scholar, was exceptionally high. Consequently, the research was halted after no intriguing outcomes were found for two consecutive pages. However, all titles from the remaining sources were meticulously reviewed. Initially, 92 articles were identified from the eight sources, and

2 additional were included through cross-referencing in subsequent stages. Table 3 exhibits the number of articles per content type.

Content type	# articles
Article	85
Book	4
Blog Post	1
Master Thesis	1
Presentation	1
Advertisement	1
Web Page	1

Table 3: Number of articles per content type

A second skimming process was conducted in a following phase, integrating two exclusion criteria.

- All the articles that were *not available for free* were excluded from the research
- *Blog Posts* and *Advertisements* were offset since, as mentioned Section 2.2, it was chosen to rely solely on the tier 1 and tier 2 domains shown in Figure 2 (Adams, Smart, and Huff 2017).

15 articles failed to meet the first criterion, and 2 articles failed the second criterion, resulting in the elimination of a total of 17 articles, leaving 75 articles to be reviewed.

In the final selection phase, the papers were read in-depth, and only articles that presented insightful information on Integrated Business Planning were considered, resulting in the final selection of 49 articles. Figure 4 presents the number of articles chosen in each skimming phase.

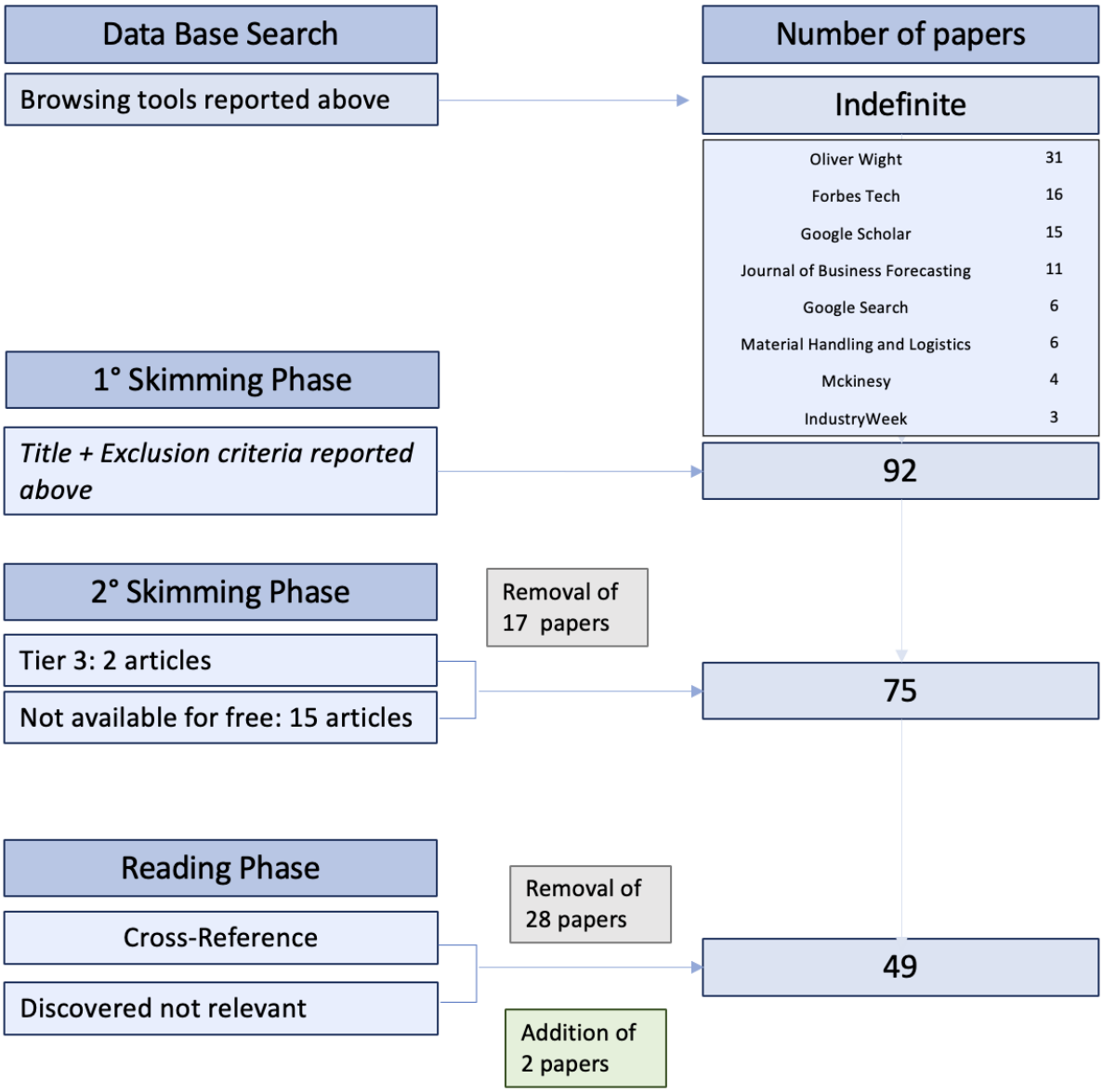

Figure 4: Paper Selection for Grey Literature. Adapted from (Kristensen and Jonsson 2018)

2.4 Analysis and Synthesis

In the analysis and synthesis section, we will concentrate on the significant insights derived from the Scientific Literature Review conducted on both the white and grey domains. Initially, we will examine the distribution of topics, followed by a more detailed investigation of the most valuable analyses on the sources, publication dates, and origins. During the first phase of this analysis, it was deemed unnecessary to divide the rationale between the academic and practitioner domains into separate chapters as the tools and criteria employed were relatively similar for both. Nonetheless, we will present the findings highlighting the key differences between the two domains, as per the guidelines established by (Adams, Smart, and Huff 2017)

The classification of the selected material has been conducted through a Microsoft Excel Spreadsheet according to the following criteria:

- Defining characteristics: Year of publication, Journal Title, and Methodologies. (The Grey Literature has been classified only with the first two parameters due to the unavailability of the other information)
- Themes addressed: The papers were classified based on the focus of the study and the topic investigated, specifying if the context is related to S&OP or IBP.

The themes addressed have been defined during the reading of the papers, after having identified key issues and emerging discussions about the subject. We decided to focus on these topics as they represent the potential railways of the evolution of S&OP into IBP. According to us, analyzing in depth the material related to these topics is fundamental to understanding the key differences between the two processes and the points that companies should leverage when deciding to embrace an innovation process.

1) **Role of Technologies**: how technologies can improve and enable the process.
2) **Role of Finance**: in terms of impact and contribution the finance department.
3) **Portfolio Management**: papers that investigate the connection of the process linked with Portfolio Management.
4) **Stakeholders Integration**: is the inclusion of main customers/suppliers in the process.
5) **Scenario Planning:** papers that highlight the impact of what-if scenarios in the outcome of the process.
6) **KPIs**: papers that mention KPIs to define a complete scorecard.

The division of the selected material into several topics allowed for a structured discussion of the work. However, it should be noted that most of these topics may be closely related to each other and considering them independently may lead to a lack of a comprehensive view of the respective evolution.

The division per topic is shown in Table 4 for the white literature and Table 5 for the grey literature.

White Literature	Technologies	Finance	Portfolio Management	Stakeholder	Scenario Planning	KPI
(Almeida et al. 2022)			x			

(Ohlson, Riveiro, and Bäckstrand 2022a)	x					
(Tchokogué, Ngniatedema, and Pache 2022)	x				x	
(M. Seeling et al. 2022)		x			x	
(Stentoft et al. 2022)		x				x
(Papier and Thonemann 2021)						x
(M. X. Seeling et al. 2021)	x					
(Hansali, Elrhanimi, and Abbadi 2021)			x	x		
(Selmi et al. 2021a)		x			x	
(M. X. Seeling, Panitz, and Cassel 2021)	x	x	x		x	
(Kreuter et al. 2021)	x		x	x	x	
(Sulistyo and Arvitrida 2020)	x					
(Stentoft et al. 2020)	x					
(Wolfshorndl, Vivaldini, and De Camargo Junior 2020)	x		x			
(Schlegel, Birkel, and Hartmann 2020b)	x					
(Willms and Brandenburg 2019)	x	x			x	
(Nemati and Alavidoost 2019a)			x			
(Vaz et al. 2019)	x					
(Ali et al. 2019)		x	x			
(Ávila et al. 2019)	x			x		
(Bagni and Marçola 2019)	x	x		x	x	
(Danese, Molinaro, and Romano 2018)	x			x		
(Vereecke et al. 2018)						x
(Ben Ali et al. 2018)		x				
(Dreyer et al. 2018)				x		x
(Wery et al. 2018)		x	x		x	
(Ben Ali et al. 2017)		x				
(Lim, Alpan, and Penz 2017)			x			
(Taşkin et al. 2015)					x	

(Goh and Eldridge 2015)			x	x		
(Ivert and Jonsson 2014)	x				x	
(Wagner, Ullrich, and Transchel 2014)	x					
(Thomé, Sousa, and Do Carmo 2014)			x			
(Olhager 2013)	x					
(Hahn and Kuhn 2012b)		x				
(Hahn and Kuhn 2012a)		x	x			
(Toor and Dhir 2011a)		x				
(Oliva and Watson 2011)						x
(Hahn and Kuhn 2011)		x				
(Wang and Hsu 2010)		x				
(Baumann and Andraski 2010)				x		
(Song, Wang, and Wang 2008)	x					
(Feng, D'Amours, and Beauregard 2008)	x					
(Affonso, Marcotte, and Grabot 2008)	x					
(Thomas, Genin, and Lamouri 2008)	x		x			
(Zalewski, Kirche, and Tharp 2005)	x					
(Lapide 2005b)	x					

Table 4: Taxonomy for white literature articles

Grey Literature	Technologies	Finance	Product Portfolio Management	Stakeholder Integration	Scenario Planning	KPI
(Barba 2023)		x		x		
(Oliver Wight 2023a)	x					
(SAP 2023)	x					
(Lindsey, Groven, and Hirschey, n.d.)					x	
(Metcalfe, n.d.)		x			x	
(Oliver Wight, n.d.)		x	x	x	x	
(Alle and Ferguson, n.d.)			x			x
(Reiher, n.d.)					x	
(Greg, Matthews, and Deutsch, n.d.)	x					
(Lee, n.d.)	x					
(Oliver Wight 2020b)			x		x	
(Oliver Wight 2023c)		x	x	x		
(Hirschey and Spira, n.d.)	x		x		x	
(Reed and Ireland 2023)		x	x	x		x
(Harman 2022)		x				
(Banker 2022)	x					
(Dumitrescu et al. 2022)		x	x		x	
(Martiz and Food 2022)		x			x	
(Van Hove 2021)	x					
(de Korver KJ and van Dam HP 2021)	x	x			x	
(University of Tennessee - Haslam College of Business 2021)		x		x		

(Banker 2021)	x	x	x		x	
(Kinaxis Brandvoice 2021)		x	x			
(Phillips D 2021)	x	x			x	
(SAP Brandvoice 2020)		x	x			
(Banker 2020)	x				x	
(Hozack R 2020)		x	x			
(Oliver Wight 2023b)			x			
(Matthews, Dixon, and Reiher 2020)	x					
(Oliver Wight 2020a)	x				x	x
(Reed 2020d)		x	x		x	
(Maritz 2020)	x					
(Holmes D 2020)			x			
(Reed 2020b)			x		x	
(Hirschey and Spatz 2020)		x			x	x
(Palmatier and Correl 2020)						x
(Ireland and Crum 2020)				x		
(Reed 2020a)						x
(Reed 2020c)			x		x	x
(Banker 2019)	x				x	
(Kepczynski et al. 2019)	x	x	x		x	
(Wehberg et al. 2018)				x		
(Oliver Wight 2017)			x	x		
(M&L Staff 2016)	x					
(Banker 2015)		x	x			
(Jurecka 2013)		x	x		x	x
(Banker 2013)		x				
(Bower 2012)		x	x	x	x	
(Aberdeen Group 2006a)	x	x			x	

Table 5: Taxonomy for grey literature articles

3. Descriptive Analysis of the results

This part is aimed at giving a descriptive analysis of the results by looking at the categorization of the materials oh white and grey literature. The discussions of their content will be tackled starting from Chapter 4.

The divisions into the 6 topics allowed us to organize a structure for the discussion of the work. However, the topics might be strictly related to each other, and considering them independently can lead to a lack of a full view of the S&OP and IBP context. In this section we will proceed with a general analysis of the results of the SLR, without delving in detail in the content of the articles found.

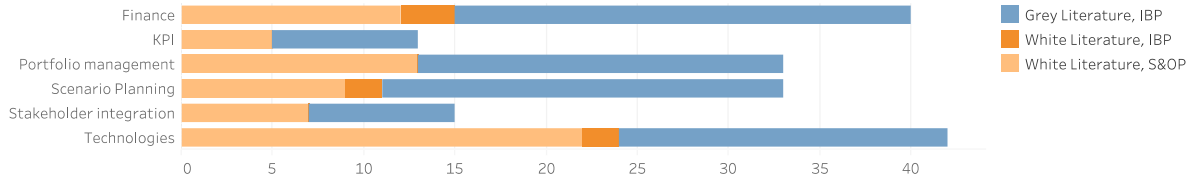

Figure 5: Divisions per topic in White and Grey Literature

Figure 5 illustrates the reason behind the decision to include grey literature in the Systematic Literature Review. Indeed, from Figure 5 it is evident that IBP is a topic that is mostly addressed by Practitioners. Despite the recent and growing interest in various aspects of S&OP, the research shows that there are only four articles (Toor and Dhir 2011a; Willms and Brandenburg 2019; Selmi et al. 2021a; Schlegel, Birkel, and Hartmann 2020b) that contain the exact phrase "Integrated Business Planning" in the Abstract, Keywords or Title, and their publication is mostly concentrated in recent years. Relying solely on academic articles may not provide sufficient evidence and studies to support this work.

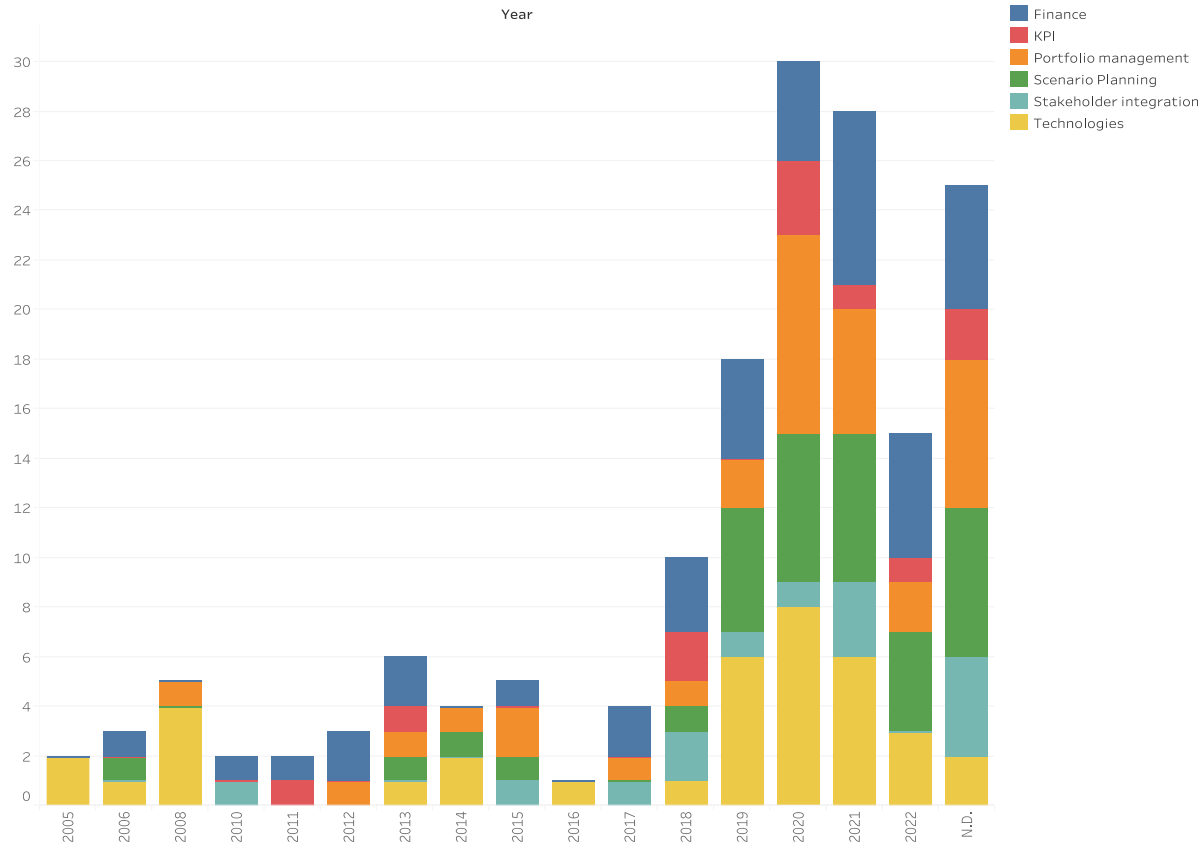

Figure 6: Divisions of topic over the years for White and Grey Literature

Figure 6 represents the divisions per topic over the years combining White and Grey Literature. It is clear that most of the discussion is concentrated over recent years, coherently with the emerging topic of the IBP and the evolution of S&OP.

Both Figure 5 and Figure 6 demonstrate the significance of technology as a driver of S&OP and IBP development. Most of the publications, indeed, discuss the use of technology to enhance the process, highlighting it as a key factor. The majority of research is based on case studies (see for example (Thomas, Genin, and Lamouri 2008; Wolfshorndl, Vivaldini, and De Camargo Junior 2020; Kreuter et al. 2021)), which are primarily found in academic papers due to their comprehensive analysis. As a result, grey literature's contribution is primarily limited to providing possible directions instead of thoroughly investigating them.

Given the importance of finance in S&OP, it is unsurprising its growing interest over the years, as it can be seen in Figure 5. This avenue was previously identified as a potential research area in two SLRs, (Grimson and Pyke 2007) and later by (Thomé et al. 2012). This is consistent with the grey literature's findings, which emphasize the importance of incorporating finance into the process to create a more consistent and efficient process.

As shown in Figure 5, Product portfolio management is not a dominant topic in the white literature on S&OP, but the results show how mature companies recognize the

benefits of managing their product portfolio within the process to improve performance. A different trend is seen in the grey domain, where practitioners frequently discuss this issue as an established step of the IBP cycle, especially over recent years.

Stakeholder Integration has only caught the attention in the literature only over recent years in Figure 5. It means that it is a topic still under evolution.

Scenario planning acts as a key difference between S&OP ad IBP. The material related to the former considers it a secondary topic, and the only contribution is restricted to mentioning scenario planning. On the other hand, practitioners present a large discussion about it, evaluating the topic as a relevant step forward in the IBP transition.

The topic related to KPIs is not largely discussed neither in the white or grey domain. Most discussions merely list a few KPIs, with only a few papers presenting an explanation of the advantages of using a scorecard rather than explaining which KPIs should be adopted.

White

The completely different nature of the sources and content types between the grey and the white literature, led us to prefer to split the discussion between the two domains in this phase of the SLR.

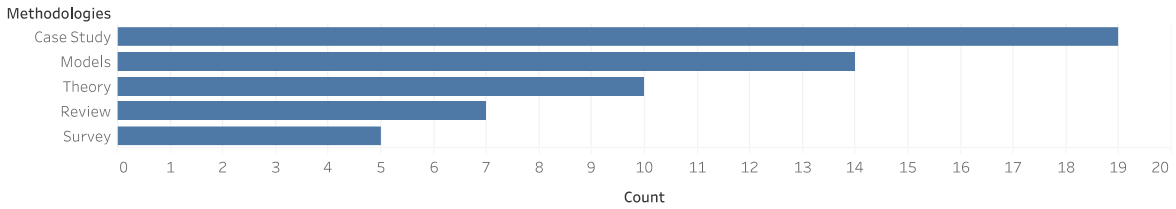

Figure 7: Methodologies of the papers selected of the White Literature

As seen in Figure 7, the most common methodology used in the selected papers is the "Case Study." Case studies provide a detailed analysis of the implementation of S&OP in real-world scenarios, offering a level of depth that other methodologies might not provide. No interesting insights could be outlined from the analysis on the sources, as the content is homogeneously spread across multiple different research centers, as visible in Figure 8.

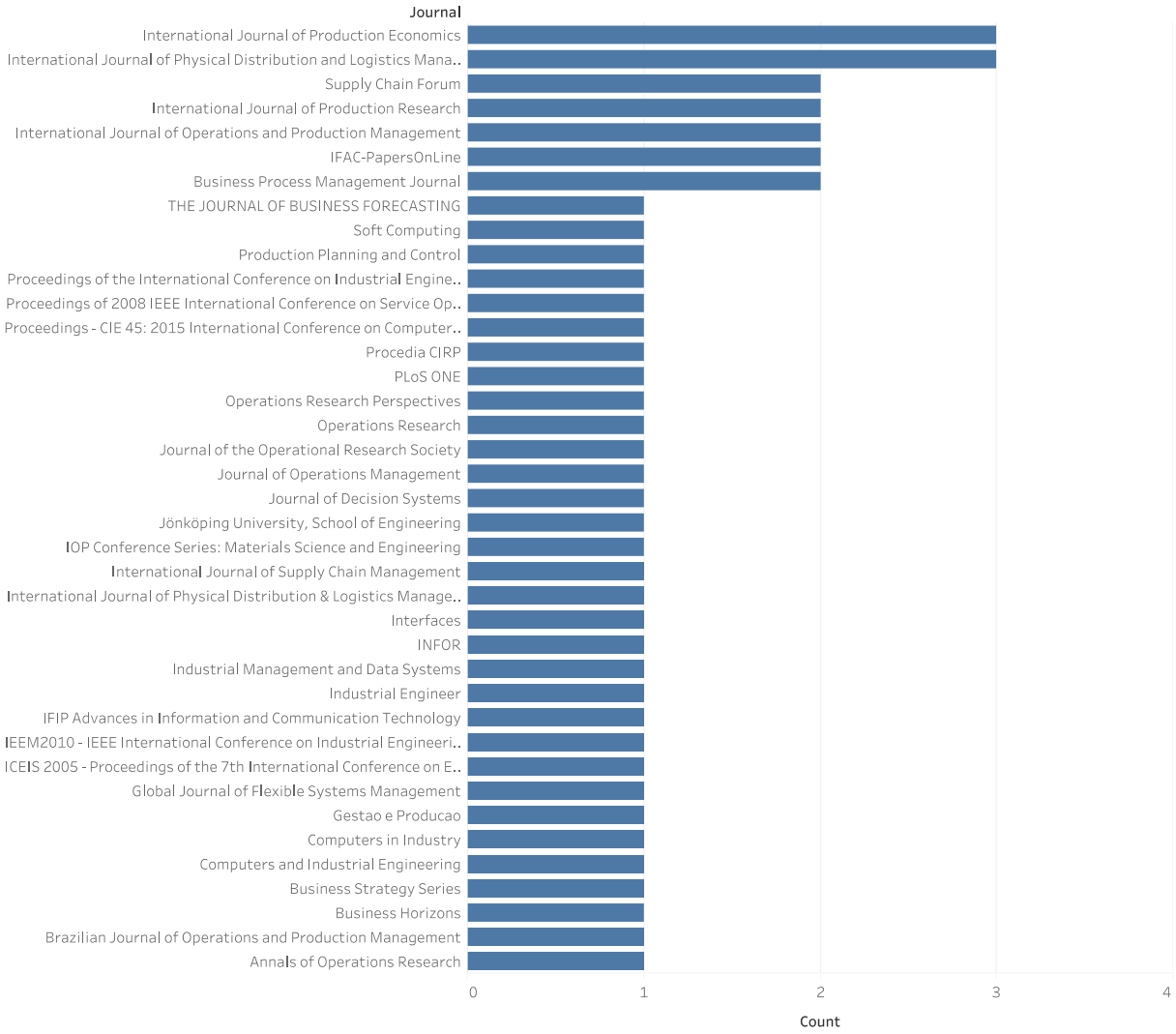

Figure 8: Sources of the selected papers for the White Literature

Grey

As previously noted, obtaining information on the region of publication for the available articles was not feasible in the gray domain. Additionally, it is worth mentioning that the articles under analysis predominantly comprised theoretical information, with only three case studies and five articles using surveys to support the theories.

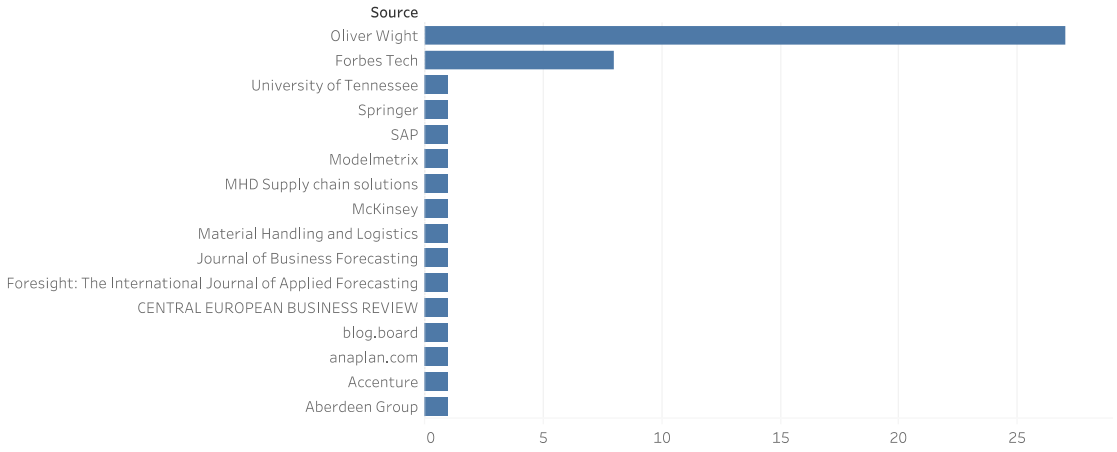

Figure 9: Sources of the selected papers for the Grey Literature

As illustrated in Figure 9, the consulting firm Oliver Wight (27 papers) was the primary contributor to this thesis, followed by Forbes Tech (8 papers), a section of Forbes Magazine that focuses on the latest technological news and trends in various industries. The remaining articles were sourced from several other distinct sources. Although most of the content was derived from Oliver Wight's consultants, who developed the process, the presence of multiple other sources lends credence to their findings and reinforces their somewhat biased perspective. It is curious noticing that the sources of grey literature are much more polarized compared with their academic counterparts. This is because the biggest source of information on the topic can be found in the Oliver Wight consulting firm, the inventors of the process. This might introduce a source of bias in the thesis that we will need to address carefully.

3.1 First impact of the selected material

The sample size of the white literature is 48 papers, whereas 49 materials were chosen for the grey literature. In overall, the white literature seems not to be enough to run this systematic literature review, given the poor number of articles that address the topic of IBP. However, they are still relevant to understand the current state of S&OP and analyzing if the direction of its evolution matches the practitioners' view. Given the growing interest in the topics shown in Figure 10, which highlights the exponential trend of publishment in the grey domain, suggests that the idea of Integrated Business Planning might be too idealistic, and easy to say but difficult to implement. Moreover, the high concentration of material provided by Oliver Wight suggests that this concept might be polarized toward its side and viewpoint.

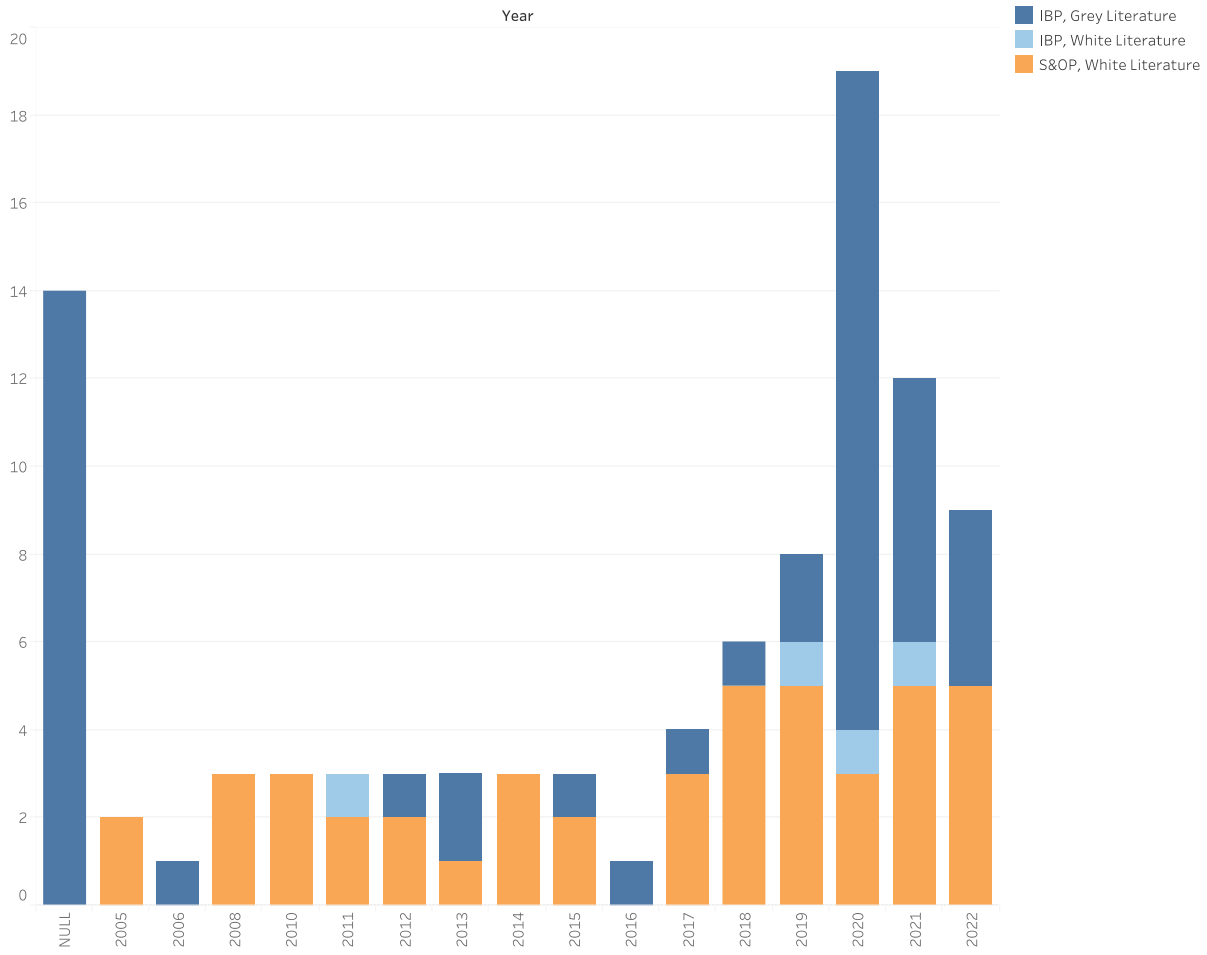

Figure 10: Distribution of White and Grey Material over years

4. Sales and Operations Planning

Prior to delving into the explanation of the Integrated Business Planning process and its distinguishing features from Sales and Operations Planning, it is imperative to provide an overview of the origins and primary characteristics of its precursor. This chapter will elucidate the inception of the S&OP concept and the fundamental requirements that led to the establishment of such a procedure in organizations. Subsequently, a comprehensive description of the process will be presented, guiding readers toward an enhanced comprehension of the rationale behind the evolution to IBP.

4.1 Internal Conflicts

Traditionally, companies have structured their operations around separate functions, each with its own internal planning processes. This approach, however, often results in an unsynchronized management style, with functions prioritizing their individual goals and neglecting the company's overall strategy. As a result, this siloed approach can lead to significant misalignment and a lack of coordination between various plans, resulting in decreased company performance (Oliva and Watson 2011).

In this context, companies often find themselves facing two opposing priorities: customer-oriented functions striving for revenue growth and production-oriented functions aiming to reduce costs. Among the internal conflicts that arise, the tension between Sales & Marketing and Supply Chain & Operations is particularly intense, given the notable divergences outlined in Figure 11(Wagner, Ullrich, and Transchel 2014).

The source of the conflict between marketing and operations can be traced back to how the two departments have been structured over the years and how their performance is evaluated. The marketing department is driven by sales and revenue, with a primary focus on delivering exceptional customer service. Meanwhile, the operations department is primarily concerned with maintaining optimal inventory levels and managing production costs. To achieve the desired results for the company, it is essential to strike a balance between these two opposing priorities. An exclusively market-oriented approach may lack efficiency, while a manufacturing-oriented approach may hinder the company's ability to seize market opportunities (Bagni and Marçola 2019).

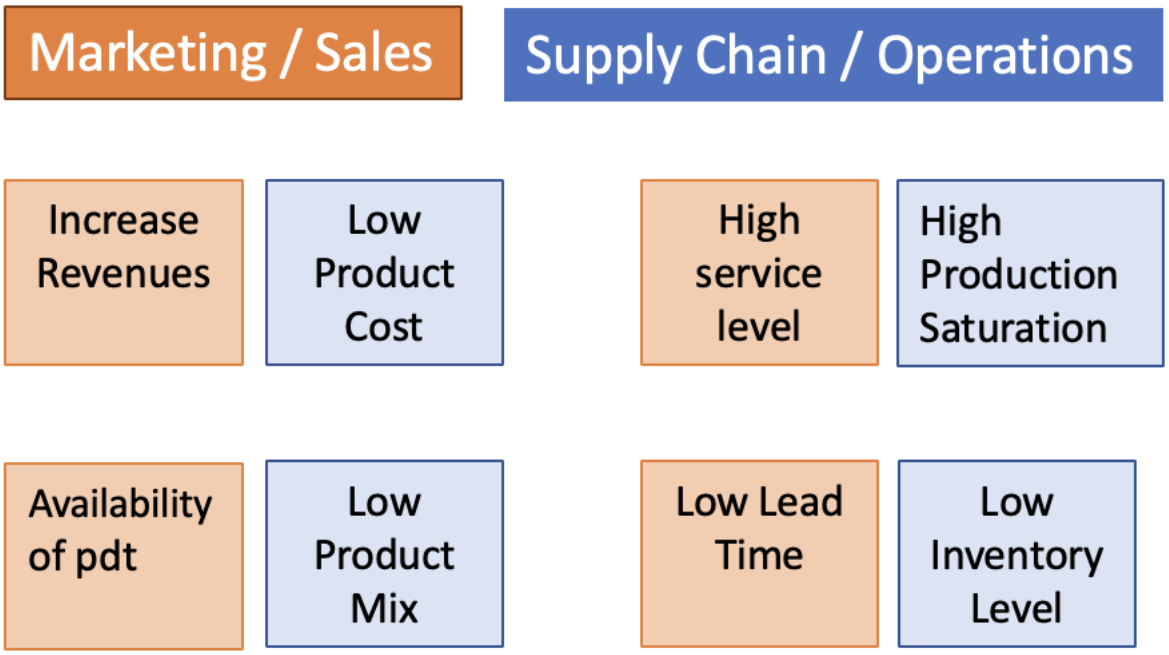

Figure 11: Internal conflicts between Marketing/Sales & Operations. Adapted from (Bagni and Marçola 2019)

The conflict between Sales & Marketing and Supply Chain & Operations is further compounded by one of the greatest challenges in supply chain management: balancing demand and supply. Managers struggle to close these gaps, resulting in inventory shortages or excesses, which can have several negative consequences that ultimately impact the company's profits. In situations where demand exceeds supply, the company may experience stockouts, leading to revenue loss and customer dissatisfaction. Conversely, when supply exceeds demand, the company may find itself with an overstocked inventory, incurring carrying costs and the need to sell products at a lower price through discounts or promotions, ultimately affecting the company's financial performance. (Wagner, Ullrich, and Transchel 2014).

The aforementioned challenges have led to the need for improved integration and alignment among all players involved in the supply chain. In response, the concept of S&OP was introduced in the 1980s. S&OP can be defined as a tactical planning process that aims to enhance the balance between supply and demand through the alignment of corporate strategy with operational activities (Grimson and Pyke 2007).

4.2 Evolution of S&OP in the time

The term Sales and Operations Plan (S&OP) was first introduced by (Ling and Goddard 1988) in their book "Orchestrating Success", in which it was defined as a method for aggregating demand and supply plans on a monthly basis at an aggregate level. However, the principles of S&OP were first used in the early 1950s under the name of *Aggregate Production Planning* (APP), which later evolved into *Manufacturing*

Resource Planning (MRP, and MRP II) in the mid-1980s. Although S&OP is considered an evolution of MRP II, its development has primarily occurred in recent years (Bagni and Marçola 2019).

(Olhager 2013) notes that the term MRP II began to be used in supply chain management in the late 1980s. MRP II offered a broader perspective compared to the previous Material Resource Planning (MRP), which was limited to computing the resources required for production. MRP II software was an innovative solution for industries, allowing the inclusion of various types of information, such as forecasting, cash flow analysis, productivity, and more. As technology progressed, tools were developed to enlarge the concept of MRP II beyond operations. In the 90s, MRP II was replaced and extended to Enterprise Resource Planning (ERP), which encompassed the entire organization with a unique and automated flow of data. The timeline is shown in Figure 12.

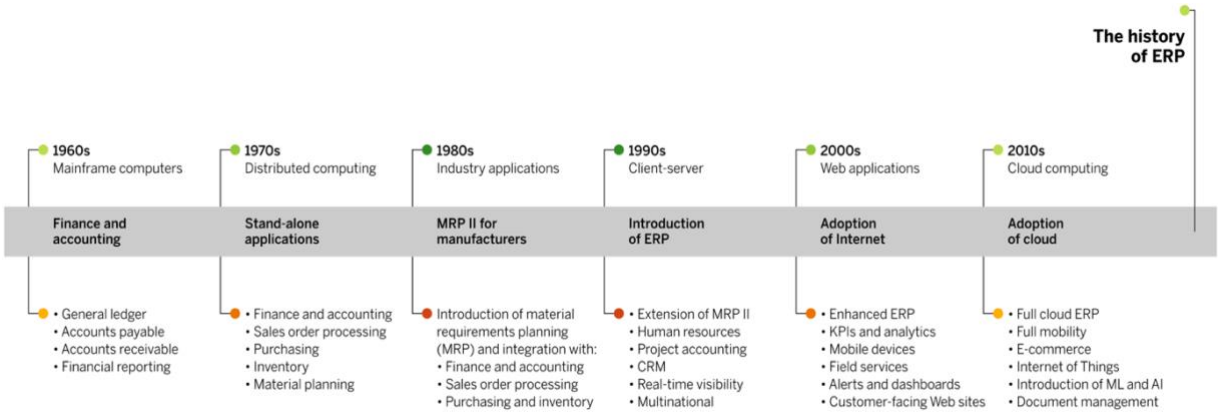

Figure 12: History of ERP. Source ("What Is ERP | Enterprise Resource Planning Definition | SAP Insights" 2023)

Enterprise resource planning (ERP) has greatly improved the productivity of companies by providing greater accessibility to business information, which has also enhanced real-time reporting. The gained visibility allows for data to be shared not only within the same department but across all functions. However, managers soon realized that the real advantage of this tool is not just the data visibility, but the possibility to perform a proper decision-making phase by aligning plans with other departments. (Grimson and Pyke 2007; Thomé et al. 2012)

The introduction of ERP was a significant catalyst for the implementation of the S&OP process, as it made it possible to turn theory into practice (Danese, Molinaro, and Romano 2018). As a matter of fact, several studies, such as those by (Grimson and Pyke 2007; Kreuter et al. 2022), have shown that there has been a growing interest in S&OP since the advent of ERP, as evidenced by an increasing number of published papers in recent years. S&OP has become the subject of various studies, resulting in different definitions in the literature and its adoption in various industries and contexts, which will be further described in Section 4.3.

Sales and Operations Planning has emerged as a topic of interest in Supply Chain and Operations Management (OM), and various definitions have been proposed in the literature due to its evolution over time and application across different industries and contexts. (Kreuter et al. 2022).

(Ling and Goddard 1988) offered a definition that accurately reflects its focus, defining it as: *"a business process which links the corporate strategy with operations plan and enables companies to balance supply and demand"*.

In more recent times, (Cox and Blackstone John 2005) elaborated on the purpose of S&OP, defining it as: *"development of tactical plans that provide managers the ability to strategically direct its business to achieve competitive advantage on a continuous basis by integrating customer-focused marketing plans for new and existing products with the management of the supply chain. The process brings together all the plans of the business (Sales, Marketing, Development, Manufacturing, Sourcing and Financial) into one integrated set of plans"*.

Throughout the years, three directions have emerged in defining S&OP in the academic literature. The first considers S&OP to be a high level of planning due to its alignment between the strategic and tactical levels. The second emphasizes that S&OP is primarily an operational tactical plan with a broad view, including Sales/Marketing. The third focuses on the process itself, highlighting the importance of monthly meetings among the roles involved to adapt internal processes to each other (Bagni and Marçola 2019).

4.3 S&OP Process

(Thomé et al. 2012; Grimson and Pyke 2007) agree that S&OP is a monthly process composed of five steps, which are shown in Figure 13.

1. **Data Gathering**: The first step is Data Gathering, which involves collecting all necessary information required for the subsequent stages. If the company does not own a structured IT system, it is typically performed manually. The goal is to consolidate data from the previous month, including past sales, production rates, costs, inventory levels, forecast accuracy, and other relevant information, along with a KPI scorecard that measures the performances (Wagner, Ullrich, and Transchel 2014).
2. **Demand Planning**: The second step is Demand Planning, which is jointly conducted by the Sales and Marketing departments to generate a consensus and unconstrained demand forecast over the entire planning horizon (Grimson and Pyke 2007). Advanced statistical tools are combined with input and insights, such as promotional activities, new product launches, and market opportunities, to improve the reliability of the forecasting model. The planning horizon typically ranges from 3 to 18 months, depending on the industry or type of product. Products

with high seasonality tend to have longer horizons, while commodities with low seasonality and lower lead time will tend to lay on a shorter one. The horizon covers the total lead time of supply, manufacturing, and delivery (Affonso, Marcotte, and Grabot 2008).

3. **Supply Planning**: The third step is Supply Planning, which is managed by Operations to translate the Demand Plan into an actual Supply Plan. The main decisions are made considering available capacity, inventory strategies and targets, safety stock levels, lead time, production methods, or other contingencies. The functions involved in this process may vary depending on the context or company structure, but typically include Supply Chain, Production/Operations, Procurement, and Logistics. The output of this process can be referred to as a *rough capacity plan*, which leaves unsolved issues concerning the lack of balance in the following step.
4. **Pre-Meeting**: The fourth step is the Pre-Meeting, which involves a cross-functional conference aimed at reconciling the established volumes from the previous plans. The people involved work for most of the departments and, together with the S&OP process owner, are responsible for discussing potential actions and strategies aimed at validating the supply and demand plan. The team is expected to develop a constrained plan that is outlined together with a financial report of the expected results, which will be analyzed in the following step.
5. **Executive Meeting**: The fifth and final step is the Executive Meeting, where the management has the final decision for the approval of the S&OP plan. The constrained plan is presented to the board, who analyzes the plan and reviews the crucial KPIs, discussing the pending issues that could not be solved in the previous step. The approved S&OP plan is then communicated to the entire organization through a shared and centralized interface.

To conclude, S&OP can be described as a planning process that aims to balance supply and demand through a consensus plan built through horizontal collaboration among departments and vertical integration that links mid-term strategy with short-term operations. It typically covers a mid-term horizon of 3-18 months and is applied either at an aggregated level of product families or to a single SKU (Stock Keeping Unit) (Thomé et al. 2012).

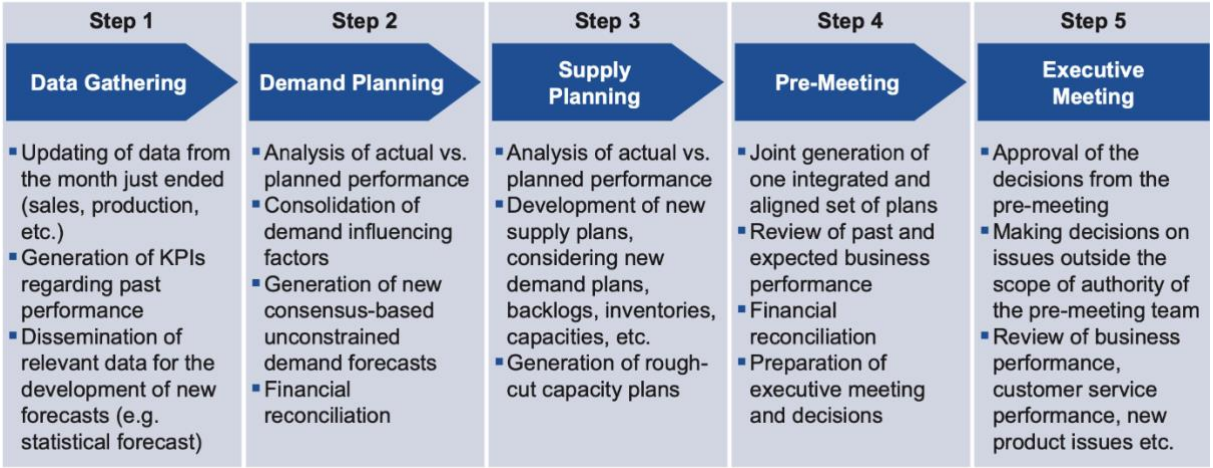

Figure 13: S&OP steps. Source (Wagner, Ullrich, and Transchel 2014)

4.4 Success Factors and Benefits of S&OP

Up to this point, it has been clarified the S&OP structure, which can be considered a valuable process for an effective management enterprise and maintaining an optimal supply chain. This section is aimed at summarizing the main success factors that are fundamental to getting the most out of S&OP and the respective benefits.

4.4.1 Success Factors

In his article, (Lapide 2005a) summarizes the factors that contribute to the success of Sales and Operations Planning in 12 key points, highlighting why it should be considered a winning condition for any organization.

1. **Ongoing, Routine S&OP Meeting***:* The success of the planning phase depends on the relevance perceived from ongoing and routine S&OP meetings, which should be considered as the first step to guarantee the effectiveness of S&OP.
2. **Structured Meeting Agenda***:* S&OP typically runs on a monthly basis with a well-structured meeting agenda that communicates the univocal output of each meeting to the entire organization.
3. **Meeting Preparation***:* Each function is responsible for preparing the required material that supports the analysis and decision-making phase. Generally, the operational figures and numbers should be translated into a business dashboard to assist the managers involved.
4. **Cross-Functional Participation***:* The active participation of representatives from each function enhances horizontal collaboration, and the cross-functional nature is the key value of the S&OP process where the contribution of each player plays an important role.
5. **Participants empowered to make decisions***:* While top management involvement is necessary for critical or strategic issues, the functional managers are delegated and empowered to make decisions for the operational alignment of the plans.

6. **An unbiased, responsible organization to run a disciplined process***:* Since S&OP is a rigid and disciplined process, it should be conducted through the presence of a dedicated S&OP team that schedules and moderates meetings and guarantees a general consensus. For this reason, it is suggested that the S&OP owner is not a high-level manager to avoid dominance in their leadership.
7. **Internal collaborative process leading to consensus and accountability***:* S&OP introduces a new approach that shifts from a sales-driven mindset to a collaborative enterprise management where no function should prevail over others. The success of S&OP derives from generating a consensus plan rather than focusing on satisfying business constraints.
8. **An unbiased baseline forecast to start the process***:* The baseline forecast, which is the main and starting input to run the process, must be unbiased and unconstrained. Thus, the insights and knowledge from experts are usually assisted by the usage of statistical tools to ensure objectivity.
9. **Joint Supply and Demand Planning to ensure balance***:* Both the demand and supply plans should be conducted concurrently and revised and adjusted during S&OP meetings to ensure balance between the Demand and Supply sides.
10. **Measurement of the process***:* S&OP performance measurement represents a complete view of a supply chain balance scorecard that embraces different metrics.
11. **Technology Support***:* The integration of the Enterprise Resource Planning (ERP) system with the S&OP framework allows a complete view of all the elements necessary to support the process. Companies should rely as much as possible on newer technologies to avoid duplication of activities.
12. **External Input to the Process***:* While the source of input information of supply and demand is mainly internal, the growing visibility along the supply chain, thanks to procedures like Vendor Managed Inventory (VMI), Customer Relationship Forecasting Replenishment (CPFR), or Point of Sales (PoS), admits the possibility of incorporating external inputs into the S&OP process.

4.4.2 Benefits of S&OP

The benefits that arise from the Sales and Operations Planning cover a wide range of aspects, both from a strategic and operational viewpoint, thanks to its comprehensive approach.

S&OP Benefit
Increase Forecast Accuracy
Reduce Inventory level while maintaining or improving Customer Service Level
Increase Order Fill Rate/ Reduce Stock Out
Reduce Lead Times
Increase ROA / Increase Gross Margin
Increase Capacity Utilization
Improve product availability for marketing and promotional campaign
Reduce Supply disruptions
Reduce Obsolete Products
Drive Revenue Growth through clear focus on high margin products
Increase Sales

Figure 14: S&OP Benefit. Adapted from (Aberdeen Group 2006a; Wagner, Ullrich, and Transchel 2014)

Figure 14 shows a summary of the benefits of S&OP, combining the results of the survey of (Wagner, Ullrich, and Transchel 2014; Aberdeen Group 2006a) and ordered by relevance. Most of the listed benefits are strongly interconnected. Although an increase in forecasting accuracy is expressed as the most significant benefit, paradoxically, it is an indirect consequence of S&OP. It does not aim to develop new forecasting methods or applications, but companies with existing S&OP practices have a higher level of demand planning maturity compared to those that have not implemented it (Vereecke et al. 2018).

By gaining greater visibility across the company, S&OP enables a more efficient planning phase, leading to lower operational costs and better utilization of production capacity. Moreover, inventory management is optimized in terms of stock reduction and avoidance of obsolete products (Ávila et al. 2019). Therefore, the overall optimization of manufacturing performance is reflected in a larger Return on Asset (ROA) or Gross Margin (Bagni and Marçola 2019).

On the other hand, an increase in forecast accuracy, along with the alignment of marketing and sales campaigns with the supply plan, avoids over-promising sales, which helps to prevent stockouts. These are direct consequences of an improvement in customer service levels that derive from a more reactive and flexible approach, along with lower lead times (Aberdeen Group 2006a).

It is worth noting that the least impactful benefits are related to the product portfolio and sales growth, while they are not even mentioned in the other survey. Although S&OP should provide a better understanding of the Stock Keeping Unit (SKU) profile, the companies surveyed encounter some difficulties in focusing on high-margin products and driving the business toward higher revenue (Nemati and Alavidoost 2019b).

4.5 Mathematical Models

The previous section shows S&OP benefits according to a survey of managers, but most of their answers are based on their perception and not on quantitative data. Therefore, we decided to illustrate the S&OP benefit based on the outcome of mathematical models in order to rely on measurable performance.

As pointed out by (Pereira, Oliveira, and Carravilla 2020), the majority of studies and research on S&OP have focused on its definition, theories, processes, or case studies, with insufficient attention to mathematical models. The existing models in the literature only refer to the Aggregate Production Planning stage, which is limited to determining the production schedule, setting the inventory level and backlog, under the constraints from marketing/sales departments. However, the extended range of S&OP has made it necessary to develop a more comprehensive model that incorporates the main functions involved in the process: procurement, production, distribution, and sales (Feng, D'Amours, and Beauregard 2008). In manufacturing industries, where complexities arise from a vast product portfolio and supply chain network, a mathematical approach can better handle all variables and planning constraints when implementing S&OP (Nemati and Alavidoost 2019a). The framework developed by (Pereira, Oliveira, and Carravilla 2020), shown in Figure 15, is useful in visualizing which planning elements and objectives are necessary to consider in order to perform the activity within the department.

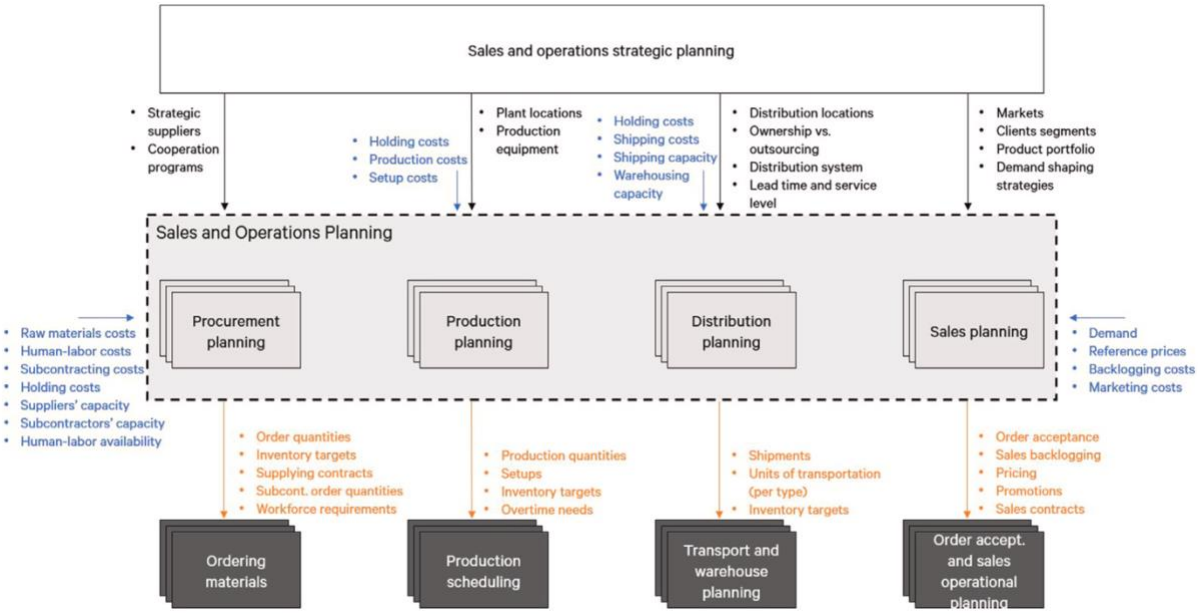

Figure 15: A framework for S&OP tactical plan. Source Pereira et al. (2020) (Pereira, Oliveira, and Carravilla 2020)

(Feng, D'Amours, and Beauregard 2008; Nemati and Alavidoost 2019a) present three distinct models: Fully Integrated S&OP (FI-S&OP), Partial Integrated S&OP (PI-S&OP) and a Decoupled Planning S&OP (DP-S&OP), simply described in Figure 16. These models are employed in their case studies to provide empirical evidence of the advantages of S&OP in comparison to other planning techniques.

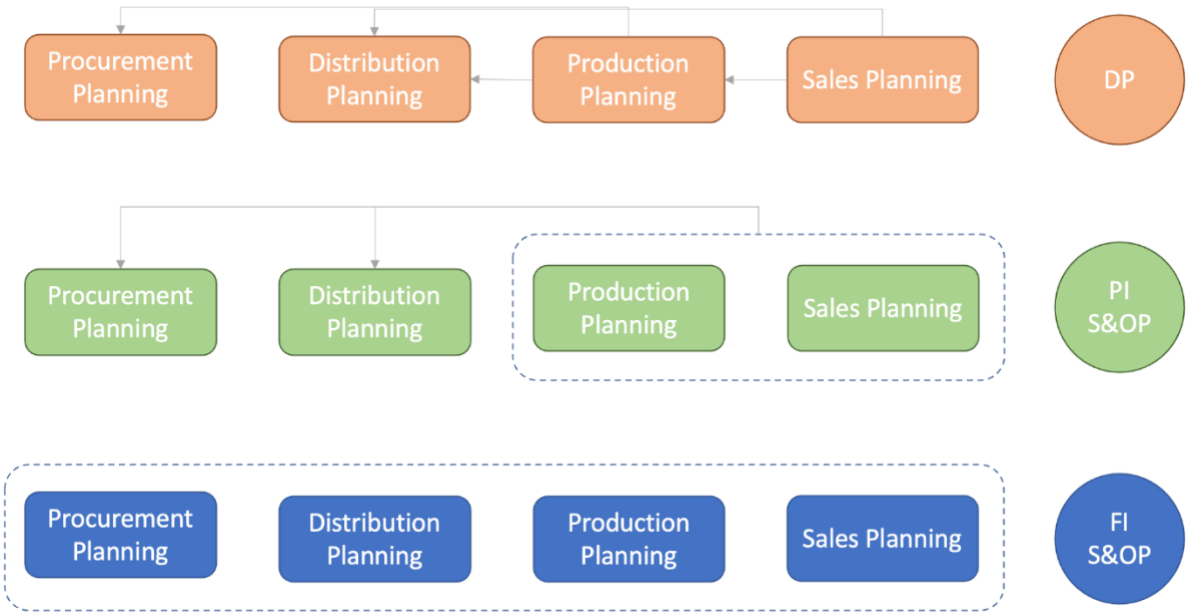

Figure 16: Different Planning Approach. Adapted from: (Feng, D'Amours, and Beauregard 2008; Nemati and Alavidoost 2019a)

DP-S&OP represents the typical situation in which sales are managed centrally, while the rest of the functions pursue their individual goals at local sites. Therefore, it is intuitive to understand that DP-S&OP follows a waterfall path with sequential

planning, where the output of the sales department is translated as a constraint for the other departments.

PI-S&OP represents the planning approach where production and sales are managed jointly, while procurement and distributions are carried out separately and at local levels.

FI-S&OP is a centralized model that integrates the four functions (i.e., Procurement, Production, Distribution, and Sales) into one integrated plan with the goal of maximizing profit by balancing revenues and supply chain costs.

The results of their case studies are carried out by comparing financial performance in terms of revenues, profits, supply chain costs, and customer service levels. As expected, FI shows the highest profit in all the scenarios considered, thanks to the lowest supply chain cost in all the departments involved. The performance on supply chain cost of FI highly outperforms DP, whereas the difference with PI is more moderate due to the bigger impact obtained in integrating sales and production in comparison to distribution and procurement. The evidence is shown in Figure 17, where from the same value of customer service level, FI clearly stands out as the best solution to adopt.

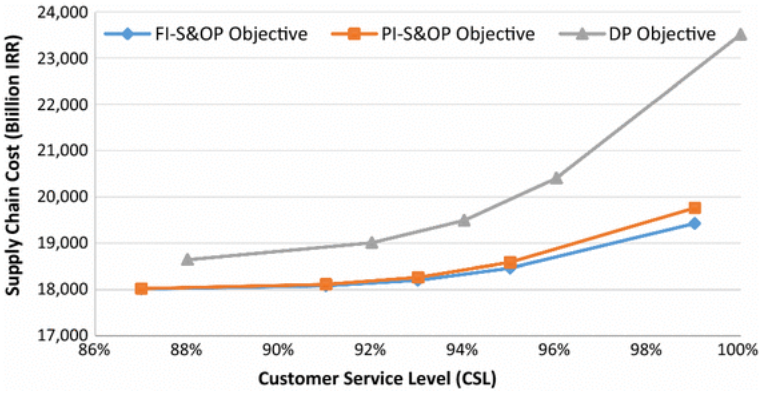

Figure 17: Comparison of SC costs with same CSL. Source (Nemati and Alavidoost 2019a)

However, it is worth noticing that the highest profit in FI derives from a large cost reduction that counterbalances a slight decrease in revenues. Indeed, the DP approach tends to maximize sales and accept orders without constraints because of the leading position of marketing/sales in driving the business. This leads to larger revenues, but at the same time, to an erosion of supply chain performance due to the lack of consideration of production capacity, which is translated into backlog sales or supplier orders (Feng, D'Amours, and Beauregard 2008). On the other hand, the FI approach avoids accepting unjustified sales that would cause a profit loss due to the misalignment with other plans. The models conciliate the trade-off between supply chain costs and customer service level while aiming at the maximization of profit. (Lim, Alpan, and Penz 2017).

These results are in contrast with the expected benefits shown in Figure 14. This insight shows how managers that implement S&OP are so biased by the outstanding results that S&OP delivers to their business that they fail at recognizing that its true value is not in incrementing sales but rather profitability.

4.6 Downsides and Limits of S&OP

Sales and Operations Planning (S&OP) may seem easy and intuitive to understand as it is a relatively straightforward process. However, companies often struggle to implement a proper S&OP process due to its degree of complexity, which arises from several challenges. This section aims at highlighting the difficulties and challenges that the literature has identified in the S&OP context.

In particular, (Stentoft et al. 2020) investigate why companies are not operating through S&OP. Their findings reveal that the reasons can be divided into three groups: "*Lack of knowledge about S&OP*", "*Lack of implementation skills*", and "*Unrecognized need of S&OP*". While the first is not relevant to the research, given that the answering sample is composed of Small and Medium-sized Enterprises (SMEs) that do not have the capabilities or need to implement S&OP, the attention should be focused on the second two groups as they highlight criticalities of S&OP.

Regarding the "*Lack of implementation skills*", the undefined boundaries and wide scope of S&OP require a prepared and experienced top management that needs to play a key leadership role in the entire process. The interviewed companies struggle due to a lack of human resources that can handle the complexity and difficulties that may arise (Stentoft et al. 2020). Moreover, the existing technologies adopted are no longer sufficient to sustain the amount of data necessary. Generally, managers are more comfortable using spreadsheets due to their simplicity and convenience, rather than more developed solutions such as integration with ERP systems (Aberdeen Group 2006b). This mindset or lack of capabilities prevents companies from establishing proper decision-making that can deal with the multidimensional nature of S&OP. In fact, the biggest challenge in data management is dealing with the different perspectives of each function, as they often use different units of measure and levels of aggregation. Relying on spreadsheets or a rudimentary IT system would imply strong limitations in terms of the number of variables considered and information accuracy.

The third group of reasons "*Unrecognized need of S&OP*" is represented by companies that are aware of S&OP but are unsure about its potential. This is mainly linked to the biased consideration of top management about the concept of S&OP, limited to a tactical process rather than an enabler for the business strategy, especially at the executive level (Oliver Wight 2020b). This can be described as a vertical disconnection that results from an excessive operative focus and a short time horizon (Ohlson,

Riveiro, and Bäckstrand 2022b). On the other hand, the horizontal scope is deemed inadequate due to the lack of completeness that can be obtained through insights from other functions, such as Research & Development or Finance.

The traditional S&OP process may struggle to keep up with the high pressure of the business environment, which has become strongly uncertain and volatile due to its lack of readiness (Aberdeen Group 2006b). Although it is cross-functional in nature, the expansion of the product portfolio along with the extension of the supply chain network through globalization has led to a need for flexibility and reactivity that traditional S&OP cannot guarantee (Aberdeen Group 2006b). With this perception, companies decide not to invest enough resources because managers do not see its potential since the perception is that the costs would outweigh the benefits (Stentoft et al. 2020). This condition also arises from a strict internal focus that does not go beyond the boundaries of the company. The lack of integration of key stakeholders, such as strategic customers or suppliers, is identified as a significant weakness that prevents achieving the desired performance (Danese, Molinaro, and Romano 2018).

While S&OP represents a significant improvement in the planning phase, the strict supply chain orientation prevents raising it into a business driver, due to its limited focus on balancing the volumes between supply and demand. (Oliver Wight, n.d.). The current market circumstances and internal challenges have led S&OP to not be an effective practice as expected. Therefore, companies are compelled to seek improvements or reshape the process to avoid jeopardizing their business.

5. Integrated Business Planning

In the previous chapter, we provided a detailed description of Sales and Operations Planning and its various aspects. In this chapter, we will discuss the presumed evolution of S&OP, known as Integrated Business Planning (IBP). As with any process or practice, companies are constantly seeking ways to improve their operations, and IBP is one such advancement. It will be provided an overview of the so desired and praised characteristics that it is supposed to own, giving an initial understanding of the possible differences with its ancestors, which will be furtherly in Chapter 6.
The chapter is organized as follows: first a section with the different definitions given in the literature, both for white and grey domains. Then, the 5 steps model will be described, concluding with the respective benefits.

5.1 What is Integrated Business Planning?

As mentioned in the Introduction, the term Integrated Business Planning was coined in 2005 by Oliver Wight Consultants. Although S&OP had already started evolving in the 1990s, this term provided formal allowance for the expansion beyond the Sales and Operations domains in an attempt to create "*a common-sense process designed for effective decision-making*" (Oliver Wight 2023a; Harman 2022). In the following years, particularly in the 2010s, the concept gained popularity among practitioners. Several companies attempted to bring their Sales and Operations planning process to the next level by implementing Integrated Business Planning. However, depending on where they gathered the information to implement the process, they likely encountered a different version of IBP, since the available literature presents different opinions and interpretations of what the process is and what its impacts are on the business.

The focus of this chapter is to break down these different definitions and provide a general overview of the main definitions that have been given to IBP from the available sources. Following the guidelines provided by (Adams, Smart, and Huff 2017), we will report the resulting information coming from the limited amount of content provided by the academic literature in a separate chapter from the one concerning the practitioners.

5.1.1 White literature

As described in the Methodologies section, the Scopus search resulted in only four relevant articles on the academic literature related to the Integrated Business Planning (IBP) process. These articles suggest that IBP is an enhanced version of Sales and Operations Planning (S&OP) that integrates other departments and stakeholders, especially the finance one.

Among the four articles found, (Willms and Brandenburg 2019) use the terms IBP and S&OP as synonyms. By stating that they *"are used synonymously for the process to include the financial perspective in SC decisions as well as the horizontal and vertical alignment within the organization"* they align with what is commonly known as "advanced S&OP" or "IBP" in most of the literature. Indeed, financial and vertical integrations are not typically found in companies that are still in the early stages of S&OP maturity. The reason for using the two names as synonyms is due to (Willms and Brandenburg 2019) analyzing the best software available for IBP and S&OP. Software vendors, such as SAP, do not differentiate between the two, as their solutions are suitable for both (SAP 2023).

The other three articles available present a different perspective, as they all suggest that IBP is an evolution of S&OP with the integration of different departments. (Toor and Dhir 2011a) mention only the integration of finance, while (Schlegel, Birkel, and Hartmann 2020b) propose the involvement of key suppliers and customers. However, the most advanced idea of IBP is presented by (Selmi et al. 2021b), who propose integrating all departments: *"IBP aligns sales, marketing, R&D, operations, logistic, purchasing, finance, HR and IT, in all the business sectors, at different geographical and aggregation levels"*.

Furthermore, (Selmi et al. 2021b) provide a clear vision of the evolution from S&OP to IBP in four main steps:

1. Financial integration
2. Introduction of product and portfolio management
3. Scenario analysis
4. End-to-end supply chain collaboration

Financial integration is one of the basic steps described in maturity models for companies that want to achieve a mature S&OP (Thomé et al. 2012). Product and Portfolio management represents an important step towards company growth and profitability, introducing two fundamental activities that were previously considered as *"separate creative process belonging to the R&D or marketing functions"*(Selmi et al. 2021b). This was shortly followed by scenario planning, which further transformed IBP into a tool to support decision-making and corporate strategy execution. Finally, the: end-to-end Supply Chain collaboration represents the involvement of every actor and stakeholder in the supply chain, including customers and suppliers (Selmi et al. 2021b).

The three views on IBP mentioned in the articles suggest a trend toward the progressive inclusion of more departments over time. While a sample of three articles is not sufficient to derive strong hypotheses, this allows us to on one hand confirm the

idea that IBP is a concept in continuous evolution. On the other hand, we can hypothesize that the more time advances, and therefore technology, the more companies will receive a benefit from the integration of a higher number of different business units and key stakeholders. As a matter of fact, technological growth has always been at the heart of the IBP rise, and in particular, the improvement of BDAC was fundamental, as Schlegel et al. (2020) state: "*there is no successful IBP implementation without BDAC*" (Schlegel, Birkel, and Hartmann 2020a).

Another fundamental factor that recurs in the literature on Integrated Business Planning is its ability to enable top management to apply their strategic view to different departments. This aspect of IBP is mentioned in all the academic articles available on the subject. In particular, Schlegel et al. (2020) define IBP as "*an organization's unique, cross-functional business planning process, which results in a common set of tactical and strategic goals for profit optimization with the involvement of customers and suppliers*". The strategic-oriented approach of IBP involves the set of goals and KPIs that are applied to different departments to ensure their collaboration and adherence to the strategic direction.

5.1.2 Grey literature

As mentioned in Methodologies section, practitioners have been analyzing the concept of IBP to a much larger extent compared to their academic counterparts. There is a vast amount of material available on the web about the topic provided by different sources of different natures. In this section, we will make an attempt to summarize and find the main touchpoints between the different views about Integrated Business Planning given by the different sources found in the practitioners' domain.

The interpretation of Integrated Business Planning presented in the grey literature is diverse and polarized. Although some sources assert that IBP is merely a rebranded version of Sales and Operations Planning, this chapter focuses solely on those sources that posit IBP as an evolution of S&OP.

As shown in the Methodologies section, the Oliver Wight consulting firm is the primary source of grey literature on IBP, having coined the term itself (Harman 2022). Throughout their numerous articles, a consistent and unified perspective on the IBP process is evident, which is partly shared by other literature.

The firm's article, "Transitioning from S&OP to IBP," offers a clear historical overview of the evolution of IBP, as depicted in Figure 18. It is apparent that this progression from S&OP to IBP bears similarities with the model proposed by (Selmi et al. 2021b).

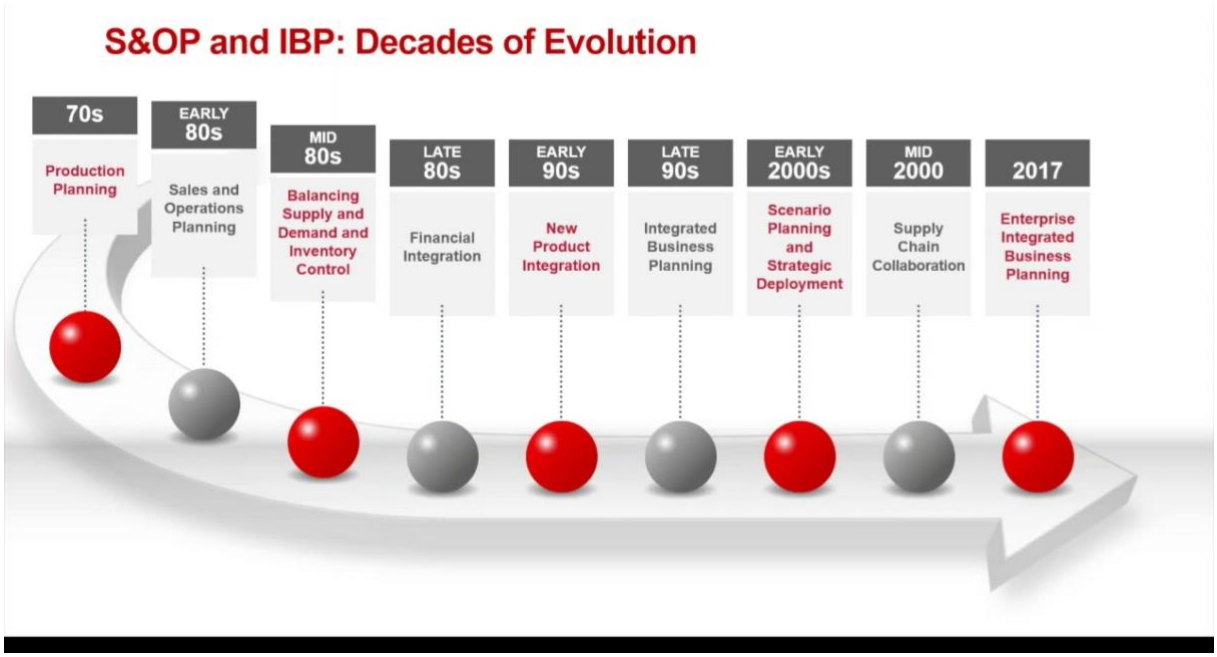

Figure 18: Timeline from S&OP to IBP. Source (Oliver Wight, n.d.)

According to (Oliver Wight, n.d.) in their article "Transitioning from S&OP to IBP", the S&OP process has undergone continuous evolution since its inception. Initially, it emerged in the early 1980s as a mere alignment between Sales and Operations, and over the next decade, the Finance function was incorporated into the planning process. In the 1990s, Oliver Wight consultants introduced Product and Portfolio Management activities, which they described as "creative" tasks belonging to the domains of Marketing and R&D departments (Selmi et al. 2021b). During this period, the phraseology that was later formalized as "Integrated Business Planning" was also adopted. In the early 2000s, the analysis of different Scenarios was added to the planning process, followed by a shift towards an End-to-end Supply Chain Planning Process in the mid-2000s. This shift necessitated increased collaboration and trust with suppliers and customers, who became more involved in the planning process. These changes transformed IBP from a mere Supply Chain process into a Strategic Management process. As stated in the introduction, the Oliver Wight vision of IBP is "a common-sense process designed for effective decision-making." The shift towards Strategic Management is even clearer in the latest evolution of the process, Enterprise Business Planning (Krusters J and Merril E 2020).

From the paragraph above it is easily understandable how the views of the Grey and White literature are closely related.

The shift described by Oliver Wight consultants illustrates a process that develops strong ties with long-term strategy development and the control of long-term plan implementation and reconciliation with the mid- and short-term execution (Kepczynski Ret al. 2019).

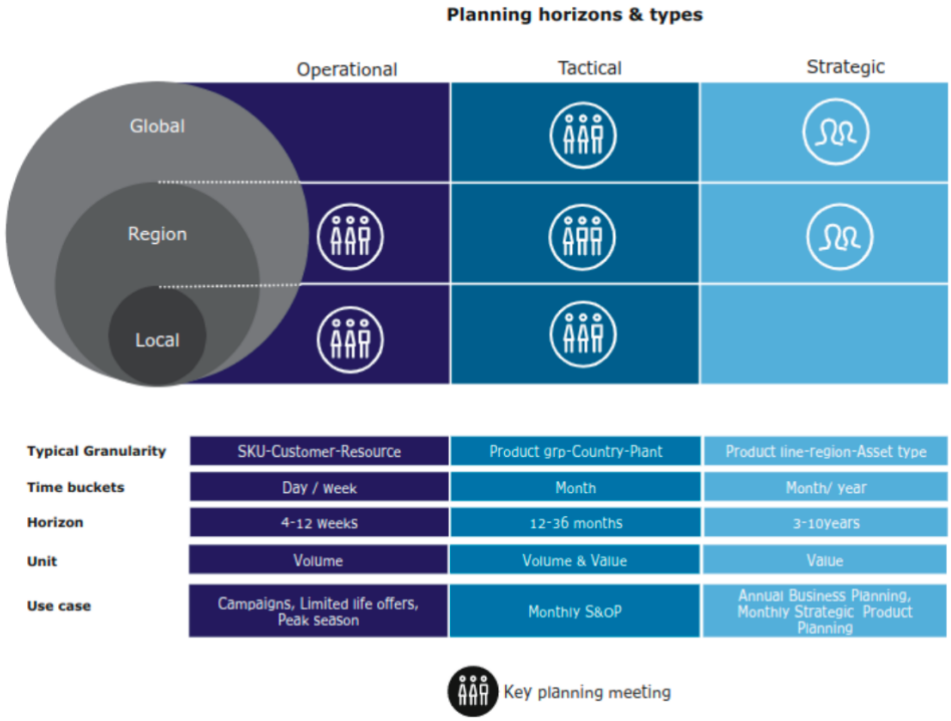

Figure 19: Planning horizon types and their key characteristics. Source (Kepczynski et al. 2019)

The view proposed in suggests that Strategic Planning comprises planning activities related to long-term decision-making that typically span 3-10 years. This planning process is segmented into two distinct yet interrelated activities: Annual Business Planning and Monthly Strategic Product/Asset Planning.

The Annual Business Planning, led by top management, takes place once a year and encompasses decisions related to the company's direction in the coming years, such as new product introductions, production investments, and macroeconomic trend analyses. The monthly Strategic Product/Asset Planning, on the other hand, involves the planning of strategic products, raw materials, and assets within a 5- to 7-year timeframe and is usually led by Marketing and Supply Chain functional managers.

Tactical Planning, also known as Sales and Operations Planning, is focused on reconciling product, demand, supply, financial, and volumetric data to achieve the business objectives set forth in the long-term plans. This process involves various company functions and is typically updated monthly, focusing on the following 12-36 months.

Meanwhile, Operational Planning was introduced in those companies where Tactical Planning lacked the necessary granularity to design a day-to-day production plan. Its frequency varies from daily to bi-weekly, and it is concerned with the production volume for the next 4-12 weeks (Kepczynski et al. 2019).

Companies struggle to reconcile these three levels of planning, which leads to a mismatch between their long-term strategies and actual outcomes. To address this

issue, Integrated Business Planning (IBP) emerged as a process that integrates all the possible dimensions of Business Planning:

- The Operational, Tactical and Strategic planning processes
- Volumes and Values
- Risk and Opportunities
- The Local, Regional and Global levels
- Processes, People and Technologies

(Kepczynski et al. 2019)

Oliver Wight consultants provide a practical perspective on how to reconcile all levels of planning in their *white paper series*. According to their work, Integrated Business Planning is a monthly process that "*allows senior managers to plan and manage the entire organization*" over a 24 to 36-month timespan (Harman 2022; Hozack 2020; Oliver Wight 2023c, 2023b). During each IBP cycle, that will be discussed in detail in Section 5.2, the entire plan is revised and reassessed based on actual results achieved during the previous period (Hozack 2020; Harman 2022) The process involves both detailed bottom-up feedback from various functions on the current business situation and top-down strategic input from senior management regarding the company's future direction (Oliver Wight 2020a). By the end of each cycle, which mainly lies within tactical and operational planning domains, the output plan is compared with the long-term strategy. Through this analysis, the IBP team identifies gaps and provides senior management with the necessary information to plan for the following months and reshape the long term orientation accordingly. The outcome of the entire cycle is a plan that both senior executives and functional managers believe in and that delivers no surprises at the end of the year (Oliver Wight 2023b). As Matt Davis, senior vice president at SCM World, notes, "*Tomorrow's IBP will foster a process in which supply chain will arm the C-suite not just with visibility on the future but, more importantly, what to do in response to that insight, all while balancing risk and opportunity*" (M&L Staff 2016).

One of the significant innovations that IBP brings to the organizational framework of companies is the formal involvement of top management. While Sales and Operations Planning is a process mainly run by supply chain managers to integrate supply and demand planning activities, it remains within the supply chain domain. IBP, on the other hand, must be treated as a company-wide business initiative to be successful. It involves IT, finance, HR, product development, R&D functions, aiming to provide each of them with a clear role in the implementation of the strategic plan and involve more people in day-to-day decisions within the business. It is essential for companies willing to embrace the IBP journey to engage all employees proactively in the process. After achieving a mature level of internal collaboration, companies can extend the

process to external stakeholders, including customers and suppliers, and move towards an end-to-end supply chain collaboration approach (Oliver Wight 2017, n.d.).

Alongside the involvement of all the departments within the organization, the core of IBP lies in the integration of financial, scenario, product, and portfolio management planning activities. Financial planning integration is crucial to performing strong and indisputable financial analyses that support each decision within the long-term strategic context (Harman 2022). The first step in the IBP cycle is analyzing products and portfolios, which represent a fundamental input for developing a demand and supply plan. Scenario planning plays a vital role in the strategic contribution of IBP, particularly given the level of uncertainty in modern markets. A planning process capable of quickly adapting to changes in previously developed assumptions is critical. Companies must develop thorough scenario analyses to anticipate and adapt to foreseeable opportunities and risks, and quickly adapt the plan when the unforeseeable occurs. Research conducted by Oliver Wight consultants revealed that companies performing scenario planning activities were statistically more prepared to react to shocks such as COVID-19 (Banker 2020).

Regarding the frequency of IBP cycles, different views emerge from the literature. The Oliver Wight consultants recommend running the cycles monthly, but evidence suggests that increasing the frequency of the cycle could be beneficial in certain environments. Researchers at (Aberdeen Group 2006b) asserts that the frequency should depend on the industry in which the company operates, as shown in Figure 19, and a more frequent recurrence could benefit companies with limited production capacities that aim to fulfill their demand to the best of their abilities. While according to (Banker 2020) in his article published for Forbes Tech, it is often even convenient for companies to implement concurrent planning. The technologies that initially enabled IBP allow companies to obtain real-time data and change plans accordingly, even on a daily basis. This, together with the availability of IoT technologies that enabled predictive maintenance, allow in his opinion to finally get rid of frozen horizons, a well-established practice in SCM that was aimed at avoiding disruptions in operations and maximizing production capacity. In this way companies could enhance responsiveness and plan in a more frequent way (Banker 2019). A clear example of this is Procter and Gamble, that is now performing Operational Planning activities twice a day (Aberdeen Group 2006b).

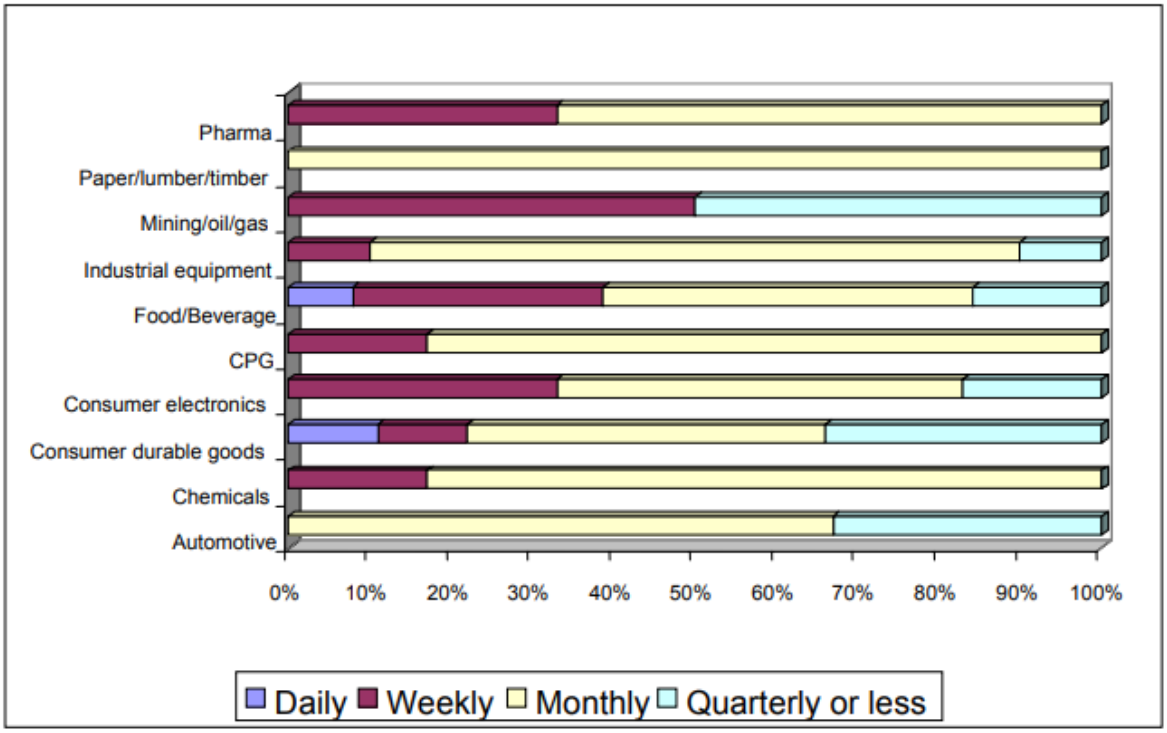

Figure 20: Frequency of IBP/S&OP cycles depending of the industry. Source (Aberdeen Group 2006b)

5.2 5 steps model

The literature available on Integrated Business Planning (IBP) also provides a highly practical description of how to structure the IBP process on a monthly basis, or more frequently in some cases. Similar to Sales and Operations Planning (S&OP), the IBP process is structured as a five-step cycle that addresses all the features described in the previous chapter. This framework is evident in most of the literature on Integrated Business Planning, and in particular, the book "Implementing Integrated Business Planning" by (Kepczynski et al. 2019) provides a clear overview of the primary activities to be performed in each step. Each meeting within the cycle should be action-oriented and represent a fundamental step that builds upon the previous steps to provide all possible information that could support Senior Management in making effective decisions in an organized and insightful manner (Reed 2020e). In their paper titled "Transitioning from S&OP to IBP," Oliver Wight consultants describe the framework as *"not a series of discovery meetings but a continuous process of orchestrating those who are business-accountable to review, present, and communicate progress and change"* (Oliver Wight, n.d.).

According to their view, IBP cycles are divided into five phases, as illustrated in Figure 21.

- The **Product Management Review**

- The **Demand Review**
- The **Supply Review**
- The **Integrated Reconciliation Review**
- The **Management Business Review**

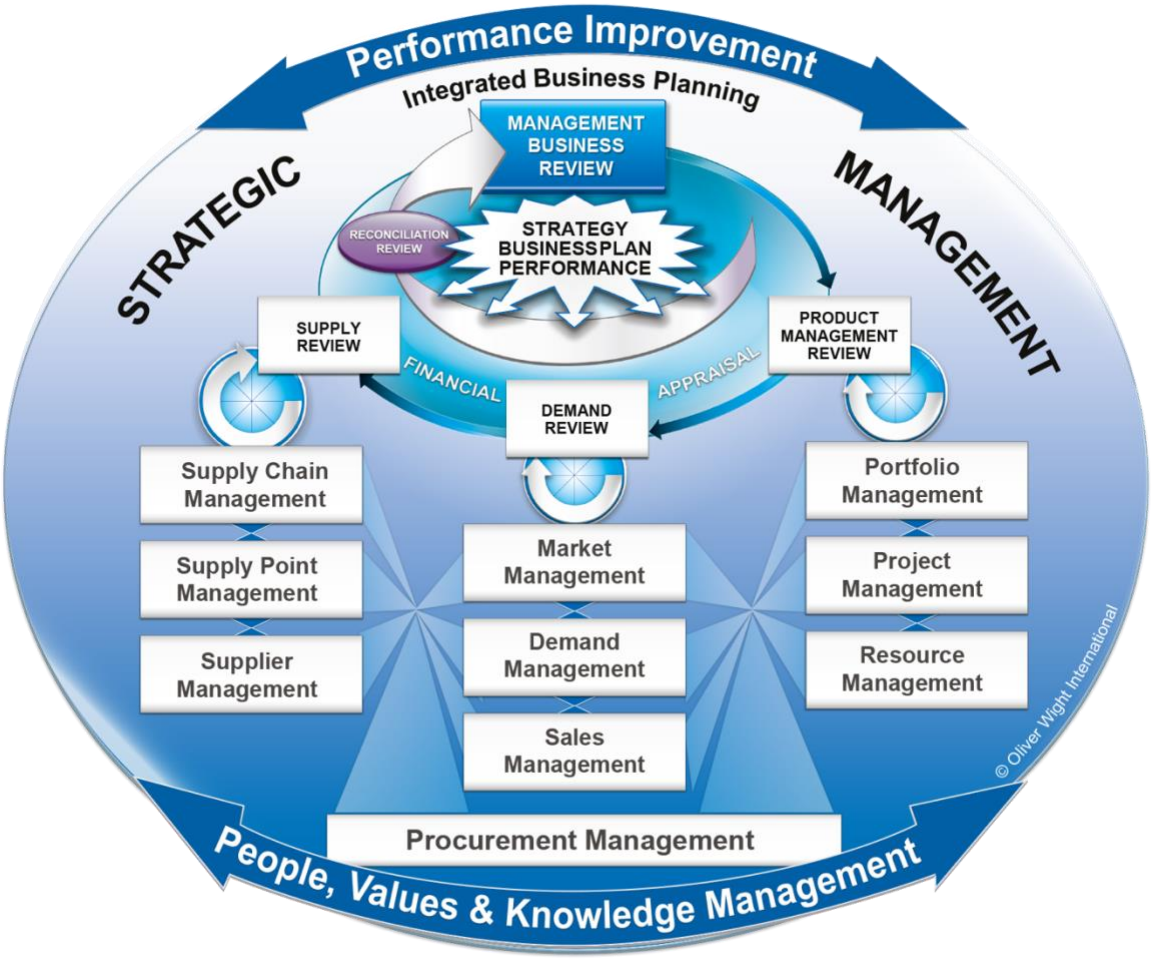

Figure 21: The 5 steps of Integrated Business Planning. Source (Oliver Wight 2020a)

The goal of this next section is to analyze and explain each step of the Integrated Business Planning process.

5.2.1 Product Management Review

Advancements in technology have allowed the most mature organizations to bypass the "Data Gathering" phase of S&OP and replace it with the Product and Portfolio Management activity (Tchokogué, Ngniatedema, and Pache 2022).

The **Product Management Review**[1], also known as the Activity or Portfolio Management Review, depending on the nature of the business, is the initial step of the IBP cycle, which seeks to make all necessary decisions regarding how to structure the product portfolio in the next 24-36 months, depending on the lead times for product innovation and development. This phase is led by the Product Planning Manager and includes participation from Sales, Marketing, Operations, and Supply Chain managers, as well as key representatives from Finance, who ensure the incorporation and understanding of the financial implications associated with any planned changes to the portfolio, and R&D, who are essential for planning activities related to New Product Introductions (NPIs) (Reed 2020e). During the meeting, analyses of the margins of different products and where they stand in their lifecycles are conducted (Kepczynski et al. 2019; Alle and Ferguson, n.d.; Selmi et al. 2021b). As a result of the analysis, the team makes all product portfolio decisions aimed at maximizing profits, such as NPIs, discontinuing some of the current products, or increasing marketing activities on others (Selmi et al. 2021b; Oliver Wight 2023b). The outcome of this phase is a well-defined product portfolio that serves as the basis for Sales and Marketing teams to derive their demand forecasts.

5.2.2 Demand Review

During the **Demand Review**, also known as Demand Management Review, the Sales, Marketing, Demand Management, and Finance teams convene to develop a demand plan for the next 12-36 months (Reed 2020e; Oliver Wight 2023b).This requires collaboration among all the aforementioned functions as the forecast provided by each team is naturally biased.

The plan will be made up of three main different inputs: the *sales input*, the m*arketing input*, and the s*tatistical forecast* (Kepczynski et al. 2019). The Sales team will collect information from customers and provide a short- to mid-term bottom-up demand plan. The Marketing team will provide corrections to the demand plan in a top-down manner, balancing short-term goals and long-term strategy. Therefore, the marketing input will be more long-term oriented than the sales input (Holmes D 2020). Finally, the demand management team will perform a statistical forecast by incorporating all the assumptions provided by Marketing and Sales (Kepczynski et al. 2019).

Before the meeting, the demand manager will review the whole plan in order to rule out bias as much as possible. In this sense, it will be fundamental for him to understand

[1] (LeMay 2023) defines Product and Portfolio Management as "*the systematic process of managing a firm's products, services, and business units as a portfolio, with the goal of maximizing overall profitability, growth, and future value, while ensuring alignment with the company's strategy*".

all the implications and assumptions taken by the forecasting tool and to run a comparison between what was forecasted during the previous cycle and the actual situation of the previous month (Kepczynski et al. 2019).

Finally, the demand review meeting will be aimed at having a discussion among all the participating actors in order to agree on an unconstrained forecast that fits with the long-term Strategic Plan. In this phase there will be a discussion among the key senior stakeholders of the meeting about the key assumptions taken and the possible risks and opportunities. Based on this discussion, a scenario planning activity will be performed to provide different versions of the final forecast based on the different scenarios available (Kepczynski et al. 2019; Reed 2020e).

As discussed by (Reed 2020e) in his paper for the Oliver Wight white paper series "The role of finance in Integrated Business Planning", the whole process will be focused on outlining a demand plan that optimizes the long- and short-term goals. It is natural to understand that Finance will play a key role in making sure that every assumption about the profitability of each product is correctly developed (Reed 2020e).

5.2.3 Supply Review

During the **Supply Review** the Supply Chain, Operations, Finance and HR teams gather to develop a production, logistics and procurement plan that best matches the consensus demand forecasted during the previous step (Selmi et al. 2021b). There are two main techniques that can be used during this phase:

- Unconstrained plan: This technique involves creating a supply plan that completely matches the proposed demand plan from the previous phase. Following this, each function analyzes whether they can adhere to the proposed quantities. Then, a trade-off analysis is conducted to determine whether to accept a plan that fails to meet the demand or increase investments to match the planned sales. Any necessary adjustments to the plan are made manually, with the assistance of heuristic algorithms.
- Constrained plan: This technique involves calculating a plan that takes into account the constraints of each function, using an optimizing decision-making algorithm. Each function then performs the necessary analyses based on this plan (Kepczynski et al. 2019).

According to the size of the company, and the number of sites available for production, it will be chosen to either break down the meeting into multiple Supply Points Review, followed by an Overall Supply Chain Review, or to directly perform the latter (Reed 2020e).

Each function participating in the Supply Review will have a fundamental role. Operations will be responsible for assessing the production capacity of the production sites. Supply Chain will be responsible for assessing the suppliers' capacity as well as the capability of delivering all the needed raw materials and finished products in the right place and at the right time. HR will be responsible for understanding if there is an adequate number of human resources available, and consequently plan the hiring. Lastly, Finance will play the key role of providing a reliable financial assessment on the proposed plan and verifying if it fits with the company's financial objectives (Reed 2020e; Selmi et al. 2021b).

As for the Demand Review, it will be fundamental for the key stakeholders present in the Supply Review meeting to perform scenario planning activities to challenge the assumptions and build an agile supply plan. As stated by the Oliver Wight consultants in the "Integrated Business Planning for high performance businesses" article, "*the output of the product, demand and supply reviews is an updated holistic plan which highlights any performance gaps compared to the strategic plan*" (Oliver Wight 2023c).

5.2.4 Integrated Reconciliation Review

The **Integrated Reconciliation Review** is the step that aims at shaping the Management Business Review agenda and represents the core of Integrated Business Planning, as it includes all the functions that took part in the previously described steps altogether (Oliver Wight, n.d., 2023c). One of the key principles of IBP is that decisions are always made at the lowest possible level, which is exactly the aim of this review (Oliver Wight, n.d.).

One of the primary objectives of this meeting is to ensure alignment between the three plans developed thus far, while also considering any additional information that was not previously included and its potential impact on the business (Oliver Wight, n.d.). This comprehensive approach is vital to the creation of a financial plan that incorporates all relevant data discussed during the meeting. At this point, as stated by the Oliver Wight consultants in their paper "Integrated Business Planning for effective decision making", "*gaps should be clearly visible and data integrity beyond question*" (Oliver Wight 2020a). For this reason, in some organizations, a Finance Review meeting is organized beforehand as preparation for the Reconciliation Review (Reed 2020e). During the meeting, the impact of the major changes outlined during the previous steps are analyzed and are integrated into an extensive analysis that compares the plan presented by Finance with the previously set goals and budget (Oliver Wight 2023b). In this phase, the meeting will proceed with the identification, understanding and addressment of the gaps arisen in the previous analysis and their implications (Selmi et al. 2021b). In the most complex and mature organizations, this

phase of the meeting focuses also on Business Optimization initiatives (Reed 2020e; Oliver Wight 2020a).

At this point of the review, it will be fundamental the performing of extensive scenario modelling and simulation activities (Selmi et al. 2021b). The participants of the meeting will run a thorough analysis of the possible opportunities and risks identified during the previous reviews, as well as new ones that might not have arisen (Reed 2020b). A special eye is given to the assumptions taken before, as possible sources of uncertainty that might have been overlooked in previous moments (Kepczynski et al. 2019). In Figure 22 we can see a list of the possible sources of uncertainty that need to be considered.

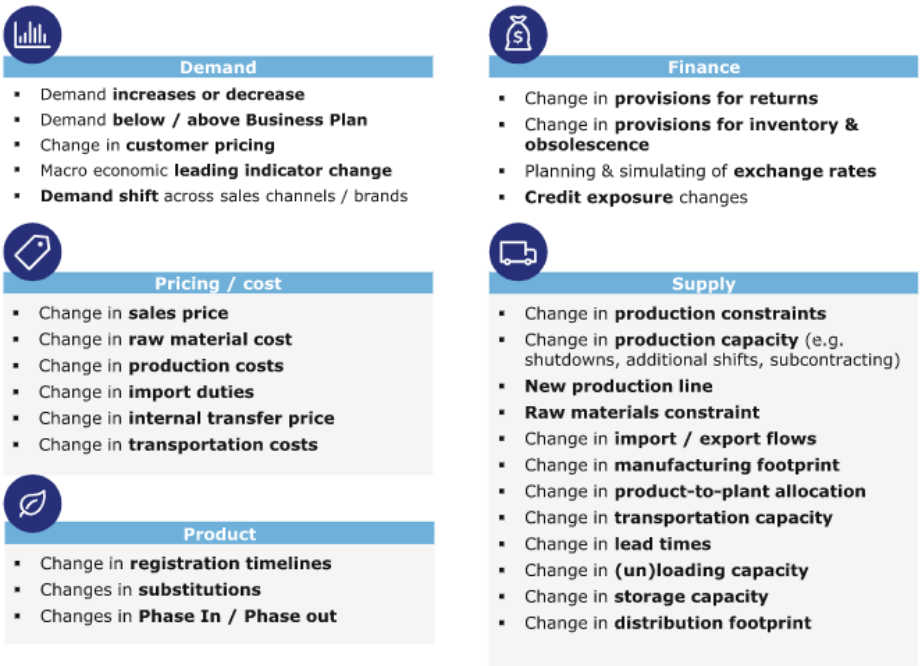

Figure 22: Possible sources of risks and opportunities. Source (Kepczynski et al. 2019)

At this point, with the help of regression and simulation algorithms, the most relevant and impactful scenarios are again analyzed, and strategies to address them are outlined. The ultimate goal of the Integrated Reconciliation Review phase is to identify all decisions that Senior Management will need to make, provide possible recommendations about which direction to follow, and clearly represent the consequences of each choice (Kepczynski et al. 2019; Reed 2020e).

5.2.5 Management Business Review

During the **Management Business Review** (MBR) the C-level Management convenes with the Integrated Business Plan (IBP) owner, demand manager, and finance controller to make the essential decisions required to shape the definitive IBP

(Kepczynski et al. 2019). During this review, the Senior Management is informed by the IBP owner and evaluates the following aspects:

- Key performance indicators
- Trends in operational and financial performance
- Gaps with the originally outlined budget and strategic plan
- Issue arisen during the previous steps
- Main assumptions taken
- Vulnerabilities and Risks addressed

(Selmi et al. 2021b; Oliver Wight 2023b)

At this stage, the senior management's primary responsibility is to make final decisions on each matter presented. They have to review and approve the decisions that have already been made and analyze the various scenarios proposed by the IBP team, who must provide all the necessary information to enable informed and effective decision-making both in the short-, mid- and long-term (Oliver Wight 2023c). It is essential to avoid repeating discussions that have occurred in previous meetings to ensure a smooth and efficient process (Kepczynski et al. 2019).

At the conclusion of the meeting, the final IBP will be formulated by resolving the following matters proposed by (Kepczynski et al. 2019):

- Approve or make decisions on each product family, accepting recommendations from integrated reconciliations or choosing another different course of action.
- Authorize changes in cost in production and procurement
- Compare monetized version of the integrated business plan with budget and:
    - Initiate sales and marketing, production, and procurement activities.
    - Adjust demand or supply plans.
    - Adjust final integrated business plan.
- Break ties if integrated reconciliation could manage to find consensus.
- Review critical KPIs from S&OP process steps.
- Define clear actions.

In Figure 23 we can see summarized all the tasks of each step of the IBP cycle

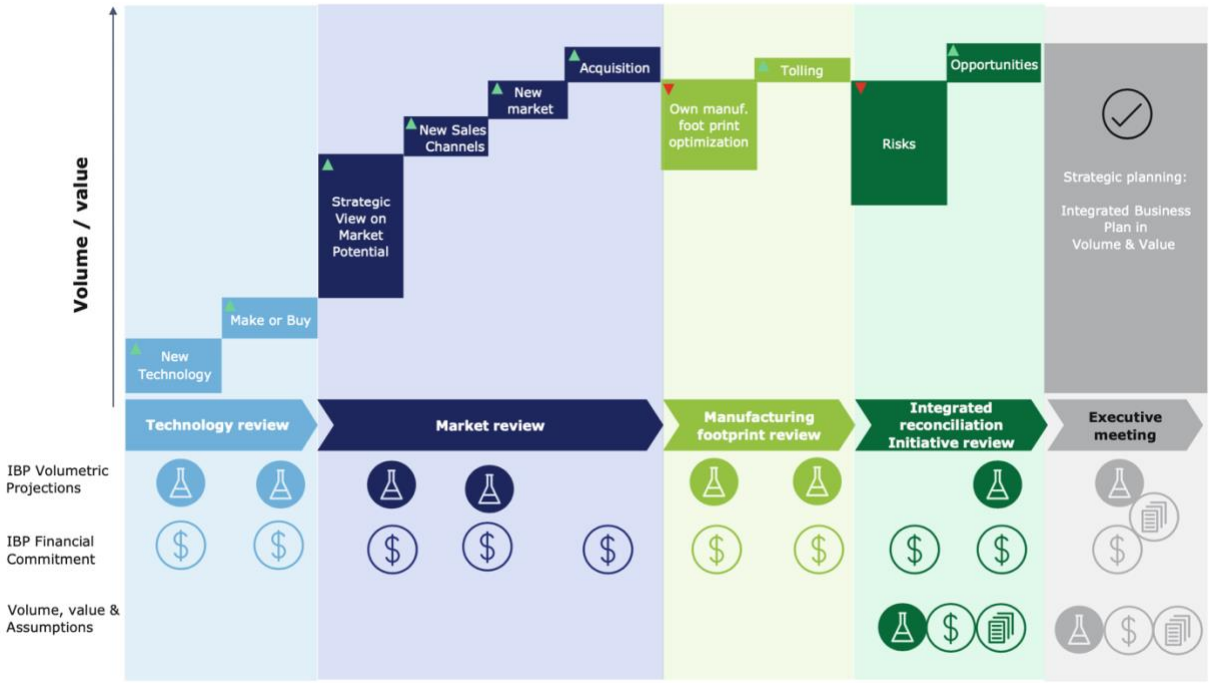

Figure 23: The Integrated Business Planning cycle. Source (Kepczynski et al. 2019)

5.3 Benefits of the application of IBP

Up to this point we have described the main characteristics of the process of IBP and its monthly cycle while occasionally mentioning the benefits that the application of the process can grant. Among the practitioners' literature, this topic is however tackled in depth, as companies that would like to undergo an IBP process want to be sure about the benefits it can bring and compare them to the upfront implementation costs.

In the grey literature, some quantitative studies aim to outline and disseminate knowledge to the public about the benefits that the correct application of the process can bring. In addition to these articles, multiple others approach the topic of the benefits provided by the implementation of IBP with a more qualitative approach. In this section, we will break down and describe the consequences of implementing IBP. In particular, the available literature describes six main areas of impact:

- Income Statement
- Resource efficiency
- Planning agility and adaptability
- Visibility, accountability and collaboration
- Relationships with key Stakeholders
- Strategy Implementation

5.3.1 Income Statement

Although most companies that wish to implement Integrated Business Planning expect to receive benefits from an operational standpoint, the application of the process usually has a more substantial impact on the overall financial performance of organizations (Palmatier and Correl 2020).

Revenue increase

The first and most obvious impact that IBP has on companies' income statements is the increase in revenues due to its power to enhance the ability of organizations to match their demand (Palmatier and Correl 2020). According to a study by (Reed 2020b), over 50% of the companies surveyed experienced this impact. (University of Tennessee - Haslam College of Business 2021) also found that 40 companies followed by Oliver Wight in their path toward IBP saw top-line increases of up to 15%. This data represents a substantial improvement compared to what was shown for the Sales and Operations Planning process in previous chapters, and it demonstrates how IBP takes a step further than its predecessor in terms of improving portfolio management and customer integration.

Gross Profit

(University of Tennessee - Haslam College of Business 2021) found that the companies that experienced an increase in revenue also reported an increase in their gross margins, ranging from 30-43%. However, this data alone does not clearly understand the improvements IBP can bring as the starting point and industry in which the company operates significantly affect this financial indicator. For example, a 30-43% increase in gross margins could be substantial for companies in industries where the cost of goods sold (COGS) significantly impacts the income statement, such as the automotive industry, but it may not be as significant for service-oriented companies, such as banking or software development.

EBITDA

The following line of the Income Statement that reported improvements is the EBITDA, that was shown to improve between 5 and 10% each year in the study run by (Banker 2021). This is likely due to IBP's ability to eliminate sources of internal inefficiency and reduce overhead costs related to supply chain and logistics activities, marketing, and sales expenses.

EBIT

Several studies show improvements in EBIT after implementing IBP. An analysis run by (Dumitrescu et al. 2022) on 170 companies, found an improvement in EBIT of about 2 percentage points, while (Palmatier and Crum 2013) reported a 5-fold increase in the same financial value after the implementation of IBP at DuPont. Additionally, (Alle

and Ferguson, n.d.) found that companies that implemented IBP showed exceptionally higher increases in operating income compared to both S&P 500 organizations and the average of the whole market over a five-year period, as reported in Figure 24.

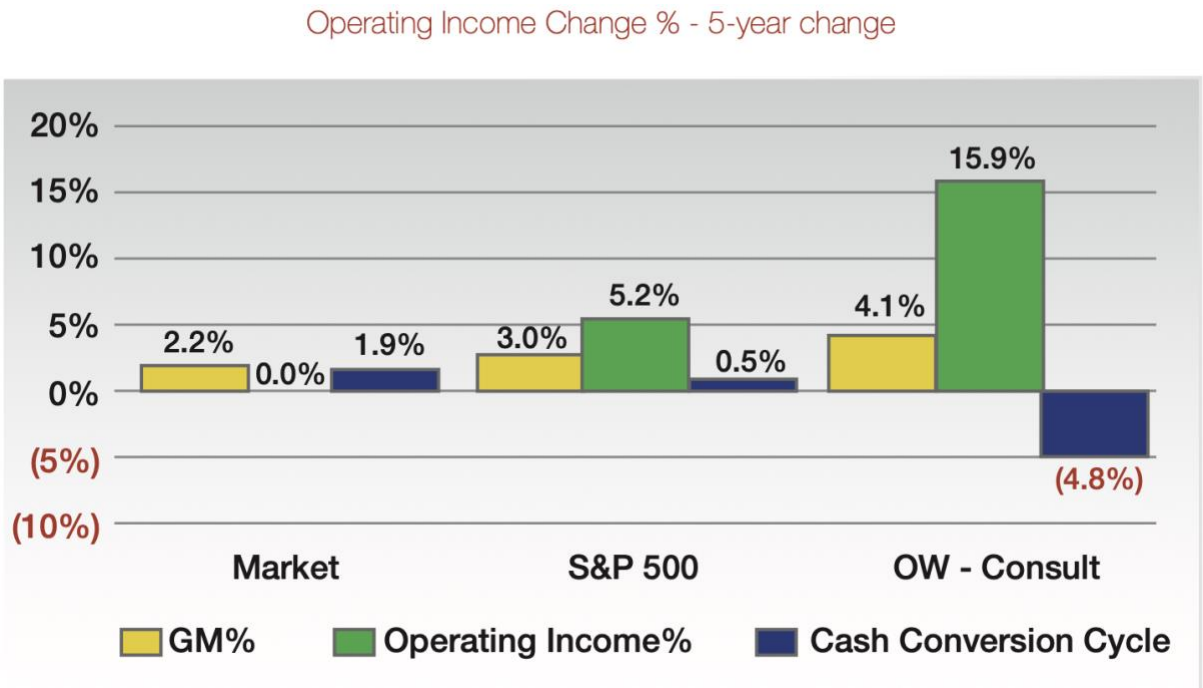

Figure 24: Improvements in financial indicators over a five-year period. Source (Alle and Ferguson, n.d.)

Net Income

All the improvements shown above have a consequently positive impact on the bottom-line of companies that implement IBP. According to Oliver Wight consultants, profitability can increase from 2-3% to 10-15%, sometimes even 20% (Oliver Wight 2017). (Barba 2023), (Banker 2021) also mention the improvements in the bottom-line, with the latter showing an improvement in profits of more than €100m.

5.3.2 Resource efficiency and planning accuracy

The preceding section highlights the enhancements in financial performance mainly attributed to the increased synergies and efficiency achieved throughout the business by enhancing the credibility of the entire planning process.

Notably, companies that have successfully implemented Integrated Business Planning have demonstrated significant improvements in demand planning. For instance, a study conducted by (University of Tennessee - Haslam College of Business 2021) shows a demand planning improvement of 46%, while (Palmatier and Correl 2020) report an improvement in item-level accuracy from 50% to 70%, and a decrease in plan inaccuracy from +100% to +15% variations.

Inventory, SS and Working Capital

The increased granularity of planning activities, coupled with coordinated efforts between the Supply Chain and Operations departments, has led to improvements in inventory and safety stocks levels. For example, (Banker 2021) (Banker 2013) show significant improvements in this regard. The first company analyzed, Tata Steel, reported a 20% reduction in inventory while meeting projected demand, while the second, PL Developments, saw a reduction of €3 million while maintaining a 99% on-time stock metric. Similarly, some companies have achieved exceptional results, such as a 60% reduction in inventory, as reported by (Oliver Wight 2017).

The decrease in inventory levels has a direct impact on working capital. A study by ((de Korver KJ and van Dam HP 2021) revealed that companies that implemented IBP reported a 10% reduction in working capital, and (Palmatier and Crum 2013) report an outstanding reduction of 30% in working capital for DuPont.

On-time shipments

Improved planning activities have directly led to an improvement in on-time shipments that caused the aforementioned reduction in inventory levels. (University of Tennessee - Haslam College of Business 2021) showed how companies boosted on-time deliveries by 50% through the application of IBP, and (Dumitrescu et al. 2022) reported a reduction in customer delivery penalties and missed sales by 40-50%(. These results were again confirmed by (Banker 2021), that reported an increase in on-time shipments of 5/10% each year at Tata Steel Europe.

Other Improvements

IBP has also positively impacted other areas, such as **operational costs**, that were found to be reduced by 30% in the study run by (de Korver KJ and van Dam HP 2021), new products were shown to reach market 30% quicker at PL Developments (Banker 2013), while freight costs and capital intensity were shown to be 10-15% lower by (Dumitrescu et al. 2022). All this, while companies have been able to enhance planning productivity through the automation of copy and paste activities, as noted by (Phillips D 2021), and the automatization of the preparation of the annual budget as an automatic output of IBP (Oliver Wight 2023c). These factors, together with the improvement in technology and process discipline, were shown to lead to a 10-20% increase in planning productivity by (Dumitrescu et al. 2022).

5.3.3 Planning agility and adaptability

The increased efficiency in planning activities achieved through IBP did not come at the expense of companies' ability to adapt to changes in the external environment in an agile manner, allowing them to take advantage of opportunities and mitigate risks. In a study conducted by (de Korver KJ and van Dam HP 2021) it was found that

companies that effectively implemented IBP had an advantage in volatile environments over their "slower reacting competitors". The reason behind this can be seen in the nature IBP, which enables companies to shift from a static to an agile-continuous planning process, which is achieved through concurrent planning, event-driven meetings, and thorough scenario analyses (Phillips D 2021). This allows companies to be prepared for foreseen changes and ready to react to unforeseen events, as dynamic scenario planning allows for quick modification of the entire plan through adjustments to one or more constraints. For instance, the cosmetics company Hologic was able to pivot from producing women's health products to antigen tests quickly, avoiding a significant decline in sales revenue, as reported by (Kinaxis Brandvoice 2021).

5.3.4 Visibility, accountability and collaboration

IBP also enhances visibility and accountability in the planning process, promoting collaboration between departments to achieve common goals (Barba 2023). Inclusion of members from each department in the planning process ensures that everyone is accountable for forecasted numbers and helps avoid the *"these are their numbers, not ours"* mindset (Hirschey and Spatz 2020). This also ensures that business objectives, rather than personal or functional goals, are at the center of everyone's focus (Oliver Wight 2023c). With increased visibility and decision-making power for all functions, it becomes clearer how each job influences the business's performance, making everyone accountable for the company's overall performance (Phillips D 2021). This prevents the use of top-line data and "praying for margins to align as expected" as reported by (Kinaxis Brandvoice 2021).

5.3.5 Relationships with key Stakeholders

When internal alignment is achieved, the resulting benefits can be leveraged by the entire value chain. Customers will receive their orders on time and with no errors, and suppliers will be able to anticipate the number of raw materials needed by the organization (Oliver Wight 2023c) A study by (University of Tennessee - Haslam College of Business 2021), demonstrated that the implementation of Integrated Business Planning resulted in 91% customer retention rates in the 40 analyzed companies. According to (Oliver Wight 2017) once outstanding internal collaboration is achieved, companies can extend their planning process to include customers and suppliers, leading to end-to-end supply chain collaboration.

5.3.6 Strategy Implementation

Integrated Business Planning has a significant impact on an organization's ability to effectively develop and implement long-term strategies, as its definition suggests. Involving members of every function in the planning process allows for informed decisions and reduced decision latency, resulting in a more realistic plan that takes into account all the boundaries and constraints present in the business (Barba 2023) This enables companies to put their previously planned strategies into practice effectively. According to the Oliver Wight consultants: "*The difference between companies that execute their strategies and those who do not? Frequently, it is Integrated Business Planning*" (Alle and Ferguson, n.d.).

6. How to differentiate S&OP and IBP

Up to this point, we outlined and explained the main definitions and characteristics of S&OP and IBP, giving an initial idea of what are the main touchpoints and differences, without however delving into detail on what the unique features of the two processes are. This chapter attempts to better define the differences between S&OP and IBP, by addressing the RQ1.

It begins with the exploration of the central role of technologies with the objective of understanding their impact on the planning process. It will be followed by an analysis of the S&OP maturity models to discern whether more advanced S&OP processes align with or diverge from IBP. Then, a comparison between potential touchpoints between S&OP and IBP is given, concluding with a summary of the results.

6.1 Role of Technology

As (Lapide 2005b) points out, a complex business process risks becoming cumbersome if its required scalability is not sustained by adequate technologies. S&OP and IBP are both intuitive processes characterized by a high degree of complexity. Therefore, the acquisition of all this information is the basic and first step to start performing the process. It is clear that the role of technologies plays a central and enabler role, which is an aspect that is catching the attention of managers and companies.

The introduction of ERP systems in the late '90s, enabled the realization of the S&OP process by providing a means to handle the increasing degree of complexity in the planning phase. However, the use of spreadsheet technology remains a significant impediment for companies currently adopting S&OP, with some still relying on copy-and-paste activities to transfer data from one document to another. In manufacturing industries, the number of planning elements can easily reach the order of thousands, if not millions, of variables that must be considered. It is not feasible to develop a detailed plan manually, and this is why the S&OP aggregation level might be usually at product families rather than at SKU, which is a manageability issue rather than a strategic decision (Lapide 2005b).

Over recent years, companies started to recognize the necessity to adopt an appropriate IT system with the objective of performing an efficient and less time-consuming data acquisition. The S&OP implementation program in a Portuguese wine producer analyzed by (Ávila et al. 2019) reveal that the introduction of the SAP S&OP software boosts decision-making thanks to its support in displaying dashboards and generating "what-if scenario". (M. X. Seeling, Panitz, and Cassel 2021) conducted a multi-case study of 15 Brazilian companies and compared those that extracted ERP data through spreadsheets to those that adopted a dedicated S&OP software.

Companies that used spreadsheets found the preparation phase of S&OP documentation, such as calculating KPIs, manually inserting information, and simulating different scenarios, to be time-consuming and difficult to integrate with all business function data. In contrast, companies that used S&OP software overcame the "Data Gathering" step thanks to an automated information flow and replaced it with a "Portfolio Management" step. Additionally, these companies developed capabilities in "What-if Scenario" analysis due to the utilization of mature simulation and regression algorithms, and even fully integrated Supply Chain digital twin in the most forefront environments (Kepczynski et al. 2019; Banker 2020). Similar conclusions were reached in the case study of a European chemical manufacturer conducted by (Kreuter et al. 2021). After identifying inadequacies in the IT system, where information was exchanged via email with Excel files, the company introduced an enterprise cloud storage to increase connectivity within and outside the organization. As a result, the manual update effort was reduced, and accuracy increased due to customers being able to include their demand in the Demand Planning stage. These findings are consistent with the change that occurred through the improvement of the first S&OP step in the case of an Indonesian cement company studied (Sulistyo and Arvitrida 2020). The automation of "Data gathering" provided a trustworthy and transparent sharing of data that could be obtained in real-time.

The studies mentioned above demonstrate the significant impact of IT systems that allows overcoming internal barriers with more visibility and accessibility. While IT was initially seen as simply enabling the materialization of the process, companies now recognize the need to leverage its scalability to expand the S&OP scope. However, despite the progress made in this area, most companies fail to focus only on the direct effects of technological improvement, namely the speed and efficiency gained in the first phase.

This is where Integrated Business Planning succeeds in comparison to its ancestor. If S&OP promotes horizontal and vertical integration, as shown in Figure 25, IBP strength derives from their concretization and realization by ensuring a well-connected information flow within the whole organization. The real advantage goes beyond simply avoiding the “Data Gathering” activity but expanding the process boundaries by incorporating valuable information from various sources and departments for effective decision-making. As a matter of fact, this enlarged perspective enables the execution of the “Product Portfolio Review” step at the beginning of the process.

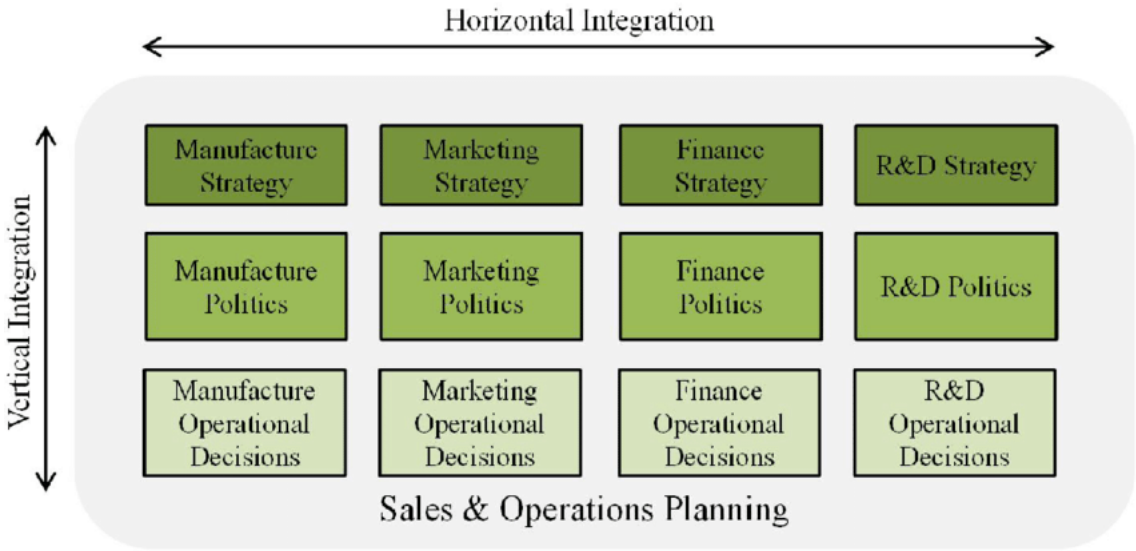

Figure 25: Vertical and Horizontal Integration in S&OP. Source (Bagni and Marçola 2019)

(Lapide 2005b) defines the technological architecture that allows implementing the planning process, which should be structured into three main categories, as illustrated in Figure 26.

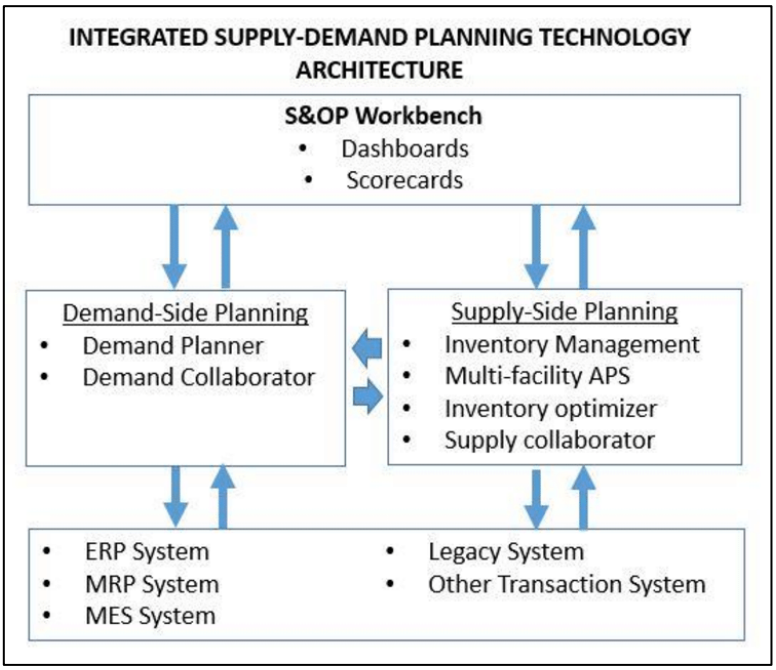

Figure 26: S&OP software architecture. Source: (Lapide 2005b)

The first category is the Demand-Side Planning System, which encompasses all the software that facilitates the creation of an unconstrained demand plan to support the business. Typically, companies generate forecasts based on statistical models that consider various factors related to the Marketing & Sales plan, such as pricing strategy, promotional campaigns, NPIs, and market trends. The accuracy of the demand

forecast can be improved by integrating the results with "Demand Collaborator" systems that process information directly from input received from final customers, such as Vendor Management Inventory (VMI) or Collaborative Planning, Forecasting, and Replenishment (CPFR) procedures.

The second category is the Supply-Side Planning System, which includes software for developing the supply plan in terms of inventory, production, and procurement shipping program. Common practices in this category include Material Requirement Planning (MRP) for procurement, Master Production Scheduling (MPS) for production, and Warehouse Management Systems (WMS) for inventory management (Lapide 2005b). The current trend is to use Advanced Planning and Scheduling (APS) solutions to produce a more accurate and optimized plan.

The third category is the S&OP Workbench, which integrates the output of the supply and demand plan to create a view that supports cross-functional meetings. The synchronization of all planning elements into a comprehensive S&OP dashboard gives managers a comprehensive view for decision-making, including KPI scorecards for tracking performance and identifying areas for improvement.

The S&OP Workbench software is aimed at overcoming two big challenges in terms of Big Data Analytics Capabilities (BDAC). Since different departments might adopt different perspectives on the data, both in terms of aggregation level and in terms of unit of measure, it is fundamental to have a software that homogenizes the data. Secondly, this software should be able to integrate information that may not be present in the ERP system but is still relevant for the analysis. This information spans from communication with stakeholders through CRM or SRM platforms, outcomes of APS models or qualitative information such as assumptions, risks or opportunity assessments (Oliver Wight 2020a).

The weak point of the existing S&OP cycle in companies lies in the final stage of the structure outlined above, missing a single access point that can convey the whole information flow from all the departments (Lapide 2005b). Although there has been an unprecedented interest in big data over recent years, its application in the S&OP field remains limited (Vaz et al. 2019). As a result, this bottleneck condition impedes its execution and slows down the transition towards Integrated Business Planning, particularly in a highly complex planning environment, where uncertainty cannot be counterbalanced by transparency alone. The so-called "Information Processing Requirement" (IPR) increases with the complexity of the S&OP process. In the study conducted by (Schlegel, Birkel, and Hartmann 2020a) it was found that only companies that enhanced their "Information Processing Capabilities" (IPC) were able to successfully implement an advanced S&OP process. This is because the preparation phase did not result in a time-consuming activity, and the saved time was better spent in the analysis and planning phase. IPC can also be enhanced with the support of machine learning techniques, which range from detection methods to predictive

modeling or clustering processes (Ohlson, Riveiro, and Bäckstrand 2022a). However, while the technical skills of data scientists may aid in extracting information and designing the information flow, advancement in the maturity stage is only possible if the decision-makers possess adequate management skills (Tchokogué, Ngniatedema, and Pache 2022; Song, Wang, and Wang 2008).

Nowadays, SCM software vendors specialize in developing solutions that provide an efficient planning tool solution, based on the architecture proposed by (Lapide 2005b) and by addressing the challenges and weaknesses previously discussed. (Willms and Brandenburg 2019) conducted research to provide a list of the main software available in the market, shown in Figure 27. While there are differences in their interface, the commonality among these solutions is the presence of a platform that converges and consolidates all the information into a single and holistic view.

Figure 27: List of Software Vendors. Adapted from (Willms and Brandenburg 2019)

In conclusion, this section highlights the significant impact that technologies have in the context. ERP has played the enabler role at the origin of S&OP, with the possibility of extracting and finally visualizing the required information that supports the execution of the process (Danese, Molinaro, and Romano 2018). Then, more efficient IT systems or ad hoc S&OP software represent the turning action to consider for the transition from S&OP to IBP, thanks to a higher contribution in the planning phase rather than just ensuring visibility (Van Hove 2021).

As a matter of fact, Ivert and Jonsson strongly suggest the use of APS (Advanced Planning Scheduling) tools in the demand and supply planning phase, opening the door to the next frontier of operational excellence: Real-time Data. In this way, companies would move from the Capable-to-promise (CTP) approach, which

monitors the lead time of production together with the current inventory level, to deliver a more reliable order commitment, to Profitable-to-Promise (PTP) concept, which does not limit to considering the production constraints, but also incorporates financial parameters in order to accept only the most profitable orders (Zalewski, Kirche, and Tharp 2005; Ali et al. 2019).

It is important to consider two key factors when contemplating the use of technology: the company's maturity level and the complexity of the planning environment. Firstly, the company must be ready to adopt a data-driven mindset to effectively utilize advanced tools. Secondly, if the planning environment is not particularly complex and the company is still able to produce high-quality and detailed plans without additional assistance, then the functionality provided by APS systems may not be necessary (Ivert and Jonsson 2014).

6.2 Maturity Models

A further level of analysis by investigating the maturity models developed in the white literature, as they provide interesting insights on the evolution of S&OP towards a more complete process that presents similarities with IBP. Amongst these models, the framework presented by (Grimson and Pyke 2007) is the most comprehensive and well-regarded. The framework comprises five dimensions, of which the first three are business processes, while the last two are information processes, as shown in Figure 28.

- *Meeting and Collaboration*, referred to the effectiveness of human resources.
- *Organization,* which represents the structure of the S&OP process and the respective creation of an ad-hoc team.
- *Performance Measurement.*
- *S&OP Plan Integration*, defined as the capability to integrate the plans of all the functions involved.
- *Information Technology*, which describes the IT systems used.

The S&OP process is classified into five levels of maturity: “Stage 1- No S&OP Process” “Stage 2 – Reactive" “Stage 3 – Standard" “Stage 4 – Advanced" “Stage 5 – Proactive".

	Stage 1 No S&OP process	Stage 2 Reactive	Stage 3 Standard	Stage 4 Advanced	Stage 5 Proactive
Meeting and Collaboration	• No collaboration • No meetings • Silo culture	• Top management discussions • Focus on financial goals	• Staff Pre-Meeting • Executive S&OP meeting • Partial supplier/customer integration	• Suppliers and customers data incorporated • Supplier and customer partecipation	• Event-driven meetings • Real-time data
Organization	• No S&OP organization	• No formal S&OP function • Components in S&OP are in other positions	• S&OP function is part of other position	• Formal S&OP team • Executive partecipation	• S&OP is perceived as a tool to optimize company performance
Measurement	• No measurement	• Focus on how well operations meet demand • Many spreadsheets	Stage 2 plus: • Forecast Accuracy	Stage 3 plus: • New Product Introduction • S&OP effectiveness	Stage 4 plus: • Company profitability
Information technology	• Managers keep individual spreadsheets • No consolidation of information	• Many spreadsheet • Some consolidation done manually	• Centralized information • Revenue or operations planning software	• Softwares link to ERP but not jointly optimized • S&OP workbench	• Integrated S&OP software • Full interface with ERP • Real-time solver
S&OP Plan integration	• No formal planning • Operations attempt to meet incoming orders	• Sales plan drives operations • Top-down process	• Bottom-up plans influence business goals • Plans integration but in a sequential process	• Plans highly integrated • Concurrent & Collaborative process • Constraints applied in both directions	• Seamless integration of plans • Process focus on profit optimization for the whole company

Figure 28: Maturity Model. Source (Grimson and Pyke 2007)

In the early stages of S&OP implementation, a sales-driven mindset prevails, with the primary objective being to fulfill the demand plan, viewed as an immutable input for the entire process. In the absence of a dedicated S&OP team, planning is informal and sequential, with operations being driven by sales. The weak coordination system is evident, with each function pursuing individual objectives that generate internal conflicts during critical situations. Performance measurement focuses solely on how operations meet sales, in which the revenue-oriented functions have no responsibility for resolving any criticalities or closing the volume gaps. The information system is rudimentary, relying on a few spreadsheets that are not shared among the involved functions.

Moving up to the third stage of Standard S&OP, awareness of the potential benefits of S&OP increases. A formal but not dedicated S&OP team provides structure to the process through an initial definition of role responsibilities. The approach remains sales-driven, and development of the demand and supply plan is still performed independently, with the aim of adjusting them during an informal S&OP meeting. Information starts to be shared, albeit not in an automated way, while performance measurement is more comprehensive, including indicators related to forecasting accuracy.

Stage 4 of the maturity model shares some commonalities with the IBP features described in the previous section. S&OP moves towards a more outward focus by including key stakeholders, such as customers or suppliers. Some companies address the issue of NPI by incorporating the R&D department's contribution, while others improve their IT systems or begin adopting ad hoc software for the process. Nevertheless, according to (Danese, Molinaro, and Romano 2018), no companies currently belong to the "Advanced Stage" and are thus capable of striving for the

"Proactive" stage. The improvement path for the most successful S&OP processes currently aims toward the "Advanced Stage."

Stage 5 represents a seamless and well-integrated Sales and Operation Planning thanks to a 360° view on the whole process.

(Danese, Molinaro, and Romano 2018) present an alternative model that addresses the limitations of the previous model, which only described different stages with a slight variation in the dimensions while maintaining the same maturity level, as illustrated in Figure 29. The authors apply their model to three companies ascending the maturity ladder to determine the order in which dimensions should be addressed.

	Stage 1 No S&OP process	Stage 2 Reactive	Stage 3 Standard	Stage 4 Advanced	Stage 5 Proactive
People and Organization	• Lack of ownership • No S&OP Team • Silo culture domination	• Some collaboration between demand and operations • No definition of responsibilities	• New planning culture with no S&OP team • Definition of roles and responsibilities	• Formal S&OP team • Collaboration with key customers/suppliers • Personnel training	• S&OP owner becomes the coordinator of the entire network • Top management partecipation
Process and Methodologies	• No formal S&OP process • Frequent replanning and revenue focus	• Emerging but still inconsistent process • No financial integration	• Formalized and structured process • Regular meetings • Financial integration	• Process balanced with external collaboration • Demand and supply jointly aligned	• Event-driven meeting • Dynamic process
Information Technology	• Managers keep individual spreadsheets • No consolidation of information	• Many spreadsheets of functional solutions • Some consolidation done manually	• Integrated supply and demand software • Improved data rationalization and integration capability	• Technology to access partner data and information sharing within and outside the company	• Innovative technology (Risk management or Scenario planning)
Performance measurement	• Basic measurement	• Functional metrics • Focus on how well operations meet demand	• Integrated internal supply chain metrics to manage trade-offs	• External supply chain metrics • New product Introduction • S&OP effectiveness	• Assessment of company profitability • Measurement of the impact on the ecosystem (including social and environmental)

Figure 29: Maturity Model. Source (Danese, Molinaro, and Romano 2018)

Their discussion highlights the commonality in the sequence of dimensions addressed, indicating that actions on "*People & Organization*" should precede interventions in other dimensions, followed by "*Meetings*", "*Information Technology*", and "*Performance Measurement*." A formalized and well-structured process fosters greater involvement from stakeholders and helps recognize its value. S&OP is predominantly a managerial concern, where a cultural mindset shift is the key to improving the maturity level. As the maturity stage increases, the transition becomes more complex due to the strong interdependence among the four dimensions. At an early stage, formalizing an S&OP team is enough to oversee its realization, while at an advanced stage, its evolution requires greater collaboration within and beyond the boundaries of the company, along with a dedicated IT system and appropriate performance measurement.

6.3 Analysis of the differences between S&OP and IBP

This analysis helps to state that the last two stages of the maturity models are not far from the concept of Integrated Business Planning. As a matter of fact, IBP seems to be a formalization of the Advanced and Proactive stages, with most of the implementations already suggested. Coherently, (Willms and Brandenburg 2019) support the idea that S&OP and IBP can be used as synonyms. A similar conclusion is given by (SAP Brandvoice 2020), suggesting that a sophisticated S&OP process can be interchanged with IBP given that they share the same goal of aligning departments and supporting managers to take business actions.

From a superficial analysis, it seems that the IBP term was just created and rebranded by consulting companies to appear more innovative than their competitors, by proposing to sell something new, as S&OP is becoming a well-established practice. This idea matches with the one proposed by (Bower 2012), who provides a structured criticism of Integrated Business Planning, stating that it is nothing more than an S&OP process that is implemented at its higher stages of maturity and performed in a correct and ideal way.

This enters in contrast with the interpretation of (Oliver Wight, n.d.), who identifies five points considered as the key differences that characterize IBP as a completely different process compared to its ancestor:

- The goal and objectives of the two processes
- Involvement of Finance
- Product and Portfolio Management
- Scenario Planning
- End-to-end Supply Chain Collaboration

In the following section, we will analyze what the literature says about each of these aspects, comparing S&OP and IBP practices with the aim of shedding light on these presumed differences. The analysis will be done by exploiting the categorization per topic proposed in Section 2.4. To conclude, it will be provided a summary of these first results.

6.3.1 Goal and Objectives of the two processes

Sales and Operation Planning is predominantly perceived as a tactical process aimed at balancing supply and demand in the mid-term, by mainly focusing on closing the gap in terms of physical flow (Grimson and Pyke 2007). Once the business strategy is settled and defined, S&OP contributes to building a bridge between strategy and operations. Therefore, the S&OP execution follows the typical top-down approach by

pursuing the goal and objectives that are received as input and required to be achieved from the business unit/corporate strategy (Thomé et al. 2012), as shown in Figure 30.

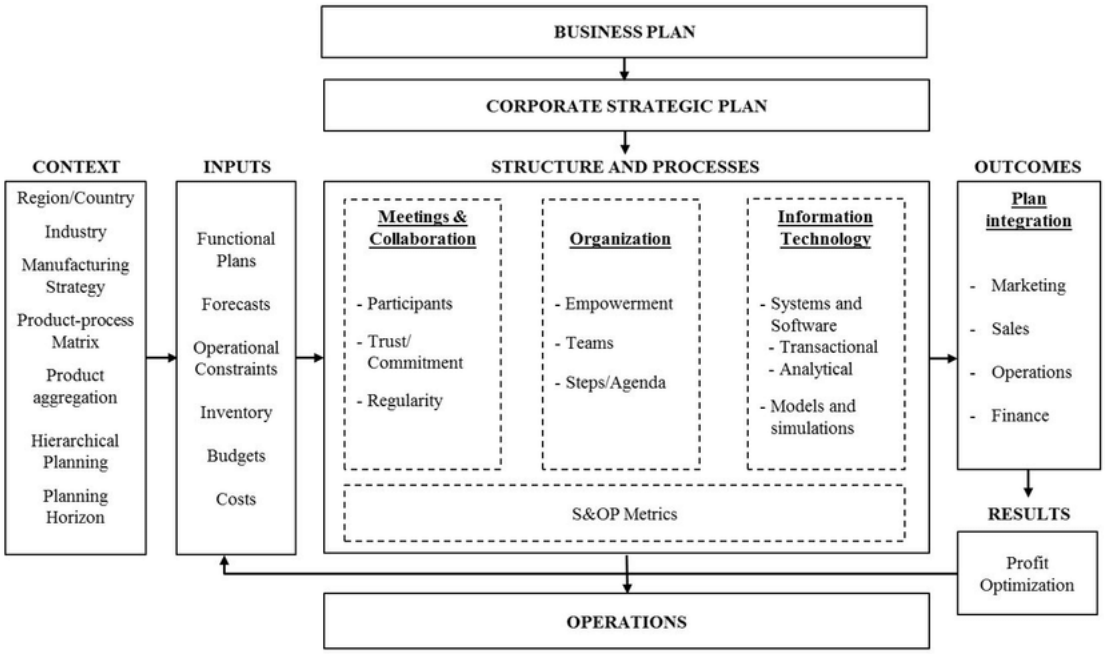

Figure 30: S&OP framework. Source (Thomé et al. 2012).

Obviously, the progress in S&OP inevitably catches the attention of senior managers within the organization, given that it embraces several planning aspects that might lead it to become a business orientation driver rather than a strategy execution tool. Many authors promote the significant impact of involving the top management in the Executive Meeting to increase their awareness about the impact of strategic decisions (Tchokogué, Ngniatedema, and Pache 2022). However, the current state of the existing S&OP in companies still fails to reach a strategic scope. The advanced implementations might show a formal S&OP team, recognized as the process owner, but they do not accomplish the executive participation, which is still poor or even absent in most cases, as the process tends to be considered more of a Supply Chain initiative rather than a Strategic one. The tactical orientation aims at building a plan that runs the operations rather in the short/mid-term than being a long-term strategy driver, by deprioritizing the profit maximization, discovering new opportunities or discussing possible disruptions.

From the IBP side, Strategy Planning and Execution are at the center of Executives' priorities, and most companies do not have a formal system to help them outline and execute their long-term strategy (Jurecka 2013). The resulting performance is thus highly affected by this lack of integration. Seeing this need, (Harman 2022) proposes a process that links strategy formulation and planning with operational execution, giving birth to Integrated Business Planning.

As stated in Chapter 5, IBP aims exactly at connecting the Strategic, Tactical and Operational planning domains. One of the main steps that IBP took in this direction is the formalization of the involvement of the Senior Management in the process. Indeed, as studied by the (University of Tennessee - Haslam College of Business 2021) S&OP tends to be mostly a process led by the CSCO (Chief Supply Chain Officer), while the owner and responsible for the IBP process is directly the top management, that is formally involved in the Management Review. As noted by the Oliver Wight consultants in their article "Transitioning from S&OP to IBP", "*S&OP was failing to even get the attention of the executive, never mind their ownership. Whilst S&OP does not resonate with business leaders, IBP does"*(Oliver Wight, n.d.). Coherently, the interesting case study of (M. X. Seeling et al. 2021) shows that only the aggregation of local S&OP reports into one global perspective led to catching the attention of the C-suits. In this way, IBP tends to combine the bottom-up approach, triggered by the outcome of the plans, with the top-down approach deriving from the top management.

Another fundamental step in this direction is the formalization of the implementation of Strategy Planning and Execution within the IBP process. Regarding the former, the breakthrough innovation proposed by IBP consists in the integration of long-term Strategic Planning activities within the Management Review. During that phase, the Senior Management combines the top-down information gathered during the previous steps and performs Scenario Planning activities in order to outline the long-term direction of the company. Concerning the latter, (Jurecka 2013) underlines how a fundamental step in this direction is the inclusion of Gap Analyses during the Management Review. This activity consists in understanding how the proposed plan outlined during the previous phases fits with the long-term goals of the organization (Jurecka 2013; University of Tennessee - Haslam College of Business 2021).

6.3.2 Involvement of finance

Among the most discussed topics in the literature regarding IBP and S&OP, one of the most treated is surely the role of Finance due to the different and controversial opinions that emerge.

(Thomé et al. 2012) express that the involvement of Finance in the S&OP is a sign of a high maturity level of the process, as it indicates that the company is taking a more comprehensive approach to the decision-making phase. As mentioned above, the extension of the horizontal collaboration to other functions that are not strictly involved in the planning phase contributes to the superior execution of S&OP (Bagni and Marçola 2019). In particular, the inclusion of finance would broaden the focus to the evaluation of financial metrics within the S&OP planning process (M. Seeling et al. 2022).

However, it is worth noticing that the growing interest in the topic is not adequately supported by the amount of academic material that was found. As noted by (Kreuter et al. 2022), there is still a lack of empirical evidence on the topic that properly explains and clarifies the role of Finance in the S&OP process. The reason is linked to the traditional concept of S&OP, that originally did not include Finance in the process.

This research-practice gap has been currently explored by only two articles, reflecting the scattered findings in academic literature. (M. Seeling et al. 2022) conduct a multiple case study on 5 companies operating in Latin America, observing the role played by Finance in each step of the S&OP cycle. (Selmi et al. 2021b) analyze the degree of its involvement through a survey on 5 French multinational enterprises, developing the theoretical framework shown in Figure 31 through a cross-analysis that compares the different ways of including Finance in each step. In both cases, all the companies perform a mature and stable S&OP that has been running for several years.

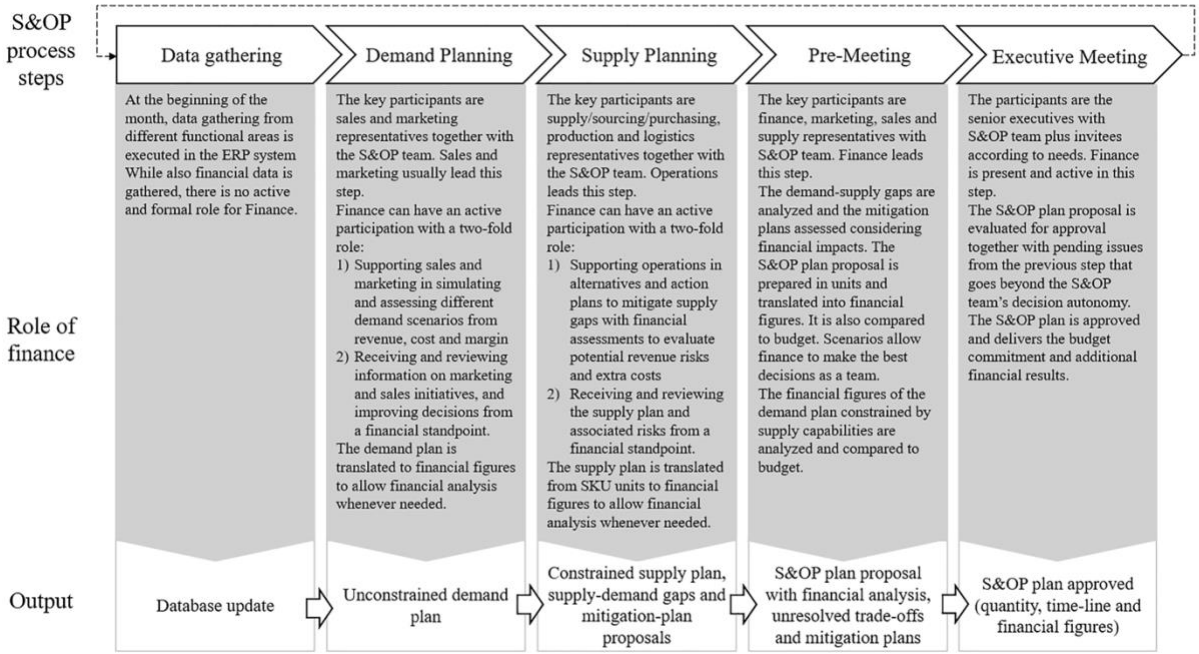

Figure 31: The role of Finance in S&OP. Source (M. Seeling et al. 2022)

During the Data Gathering process, the role of Finance is never active, but it indirectly contributes to the generation of relevant information that is automatically uploaded to the ERP system.

The participation of Finance in Demand and Supply Planning steps is beneficial in two ways. On the one hand, the planned volumes are translated directly into financial figures. In particular, the Demand Plan is converted in expected revenue and projected marketing cost, while the Supply Plan is measured in COGS, together with distribution, inventory and overhead costs. This procedure facilitates the preparation of the documents for the *Pre-meeting* and *Executive Meeting*, where such information is inevitably required to run the analysis. Moreover, it is possible to directly take

decisions with the financial approval rather than keeping pending issues that delay the pre and executive meetings.

On the other hand, the Finance department gains benefits from the alignment with the S&OP cycle thanks to a continuous update that reduces the burden of the budgeting activity. Indeed, the time-consuming tasks of revenue and cost budgeting are automated as a result of the two plans (Selmi et al. 2021a).

While Finance does not play a central role in the previous steps, it becomes the main character in the Pre-Meeting step. The review of the S&OP plan is discussed by considering the financial commitment, which becomes an essential requirement to achieve to be proposed to the Executive Meeting (M. Seeling et al. 2022). Generally, the S&OP plan is enough to compute the revenue projections or COGS, given that most of the elements are easily linked to these financial figures. However, the financial assessment of the S&OP plan would lack capital expenditure and working capital analysis without the presence of Finance (Comelli, Féniès, and Tchernev 2008).

The attendance of Finance in the Executive Meeting challenges the organization to pursue profit maximization. The discussions are conducted adopting a financial perspective, thereby raising the participants' awareness of the monetary implications of the S&OP plan (M. Seeling et al. 2022). Hence, financial KPIs are accurately defined to properly highlight the results of the company. Indicators such as Budget versus projections, Economic Value Added (EVA) or Weighted Average Cost of Capital (WACC) might be included, which come up aside with typical metrics that are usually considered, such as COGS, Expected Revenues or Operating Profit Margins (M. Seelinget al. 2022).

The two studies demonstrate that the enlarged cross-functional provides additional insights and complementary information. The added-value presence of Finance provides a more complete view, especially in the last two meetings. On the other hand, its absence leads to an unbiased consideration of being perceived as an external participant that merely needs to safeguard the budget constraints or financial goals, which can be hardly contested during the S&OP cycle (M. Seeling et al. 2022).

As it is clearly understandable from the paragraph above, all the literature streams that state that S&OP is a mere balancing of Supply and Demand without any consideration of financial perspectives are probably hasty. However, as it was in the previous cases the practitioners' literature on IBP takes a step further in formalizing and defining the role of Finance in the process. Indeed, as noted by a research run by the Oliver Wight consultants, only 42% of organizations have an integration with their financial plan in their S&OP (Oliver Wight, n.d.)

The consultant from the American company Reed Mike, in his article "The role of Finance in Integrated Business Planning" takes a step further than the academic literature on S&OP in defining the role of finance and proposes a possible structure of

the function that will be analyzed in Chapter 7. In the article the author states that the role of finance in IBP is three-fold:

- *Collaborator:* Finance collaborates with each function involved in the IBP process in the development of assumptions and their translation in financial terms.
- *Enabler:* Finance enables a smooth and exempt-from-iterations IBP process by making sure that all the financial implications are understood during each phase.
- *Custodian:* During the whole IBP process, Finance contributes to safeguarding the integrity of financial projections, by making sure everything is accurately reported and gaps from initial financial plans clearly visible.

(Reed 2020e)

6.3.3 Product and Portfolio Management

As evidenced in Section 5.2, this activity has been formally incorporated into the Integrated Business Planning process as the central component of its first stage: the Product Management Review. Conversely, the activity of Product and Portfolio Management are typically not explicitly integrated into Sales & Operations Planning. However, the literature available suggests that some companies with advanced S&OP maturity levels are beginning to implicitly adopt these perspectives.

One of the implications of S&OP is the impossibility of always maximizing sales due to supply constraints. The mathematical model section points out that the application of the process might result in a reduction in revenues. Therefore, the lack of a clear understanding of the product lifecycle creates difficulties in fully leveraging the S&OP potential. Furthermore, the wider the product range, the more complex the S&OP execution (Thomé, Sousa, and Do Carmo 2014).

(M. X. Seeling, Panitz, and Cassel 2021) conducted a case study on 15 Brazilian companies that support this claim. Indeed, only three out of the 15 firms analyzed were able to replace the Data Gathering step with a formal discussion about the Product Portfolio. These companies start the cycle with a proper business practice called Product Portfolio, where Marketing leads the analysis of the profitability of each product family, the definition of new launches, and the management of phase-outs for items at the end of their life cycle. On the other hand, other companies hold this discussion in parallel with the S&OP cycle, however, the Portfolio Management outcomes tend to be neglected instead of being exploited as an official input for the process execution (M. X. Seeling, Panitz, and Cassel 2021).

The main difference between the two approaches proposed lies in the ability to properly visualize the portfolio segmentation. The former set of companies derived useful insights during the Demand Planning phase to identify which items are more convenient to sell through each channel. This is also observed in the case study from (Almeida et al. 2022) on the steel industry, in which the company analyzed scores a larger revenue in the tactical planning of S&OP by focusing on products that generated higher margins. Another example is provided by the framework proposed by (Wery et al. 2018) for optimizing the S&OP plan for a softwood lumber company in North America, which faces challenges in managing the heterogeneity of the product portfolio. The outcome shows that accepting orders for the entire product spectrum leads to lower financial performance compared to exclusively opting for those products that provide a higher profitability (Wery et al. 2018).

Another important aspect highlighted in the SLR is the attention given to some case studies on companies that have a well-established sales and operations planning process and recognize the need to manage continuous and rapid changes in their Product Portfolio. For example, the automotive manufacturing company examined by (Hansali, Elrhanimi, and Abbadi 2021) identifies New Product Introductions as an area that should be improved due to its complexity, which is exacerbated by the lack of historical data. The integration of NPI within the S&OP process is crucial for achieving a more efficient launch of new products, while adhering to budget and lead time requirements (Hansali, Elrhanimi, and Abbadi 2021). In this regard, the case study run by (Goh and Eldridge 2015) compares the lead time performance of two newly introduced SKU pilots, where only one was included in the S&OP. Notably, the included SKU achieves a shorter delivery time and lower variability.

Furthermore, two case studies present an interesting perspective on this topic. (Kreuter et al. 2021) analyze a chemical company (referred to as Chemical) with a strong innovation focus. The company is facing challenges due to the high frequency of NPI and its engineer-to-order manufacturing strategy which is in contrast with its standard make-to-order products. The enlargement of the product portfolio is considered to have an important contribution to the increase in the complexity of the S&OP process (Kreuter et al. 2021). A similar situation was observed in Vestel Electronics, a television manufacturer studied by (Taşkin et al. 2015). The company presents a large product portfolio characterized by short life cycles, with the continuous development of new products from the research and development department. This aspect poses a challenge in aligning new products with existing ones during the planning phase (Taşkin et al. 2015).

The two examples provided demonstrate the common need for the extension of the horizontal collaboration to the R&D department, which has a strong impact on the S&OP plan execution, especially in contexts with a high frequency of NPIs. For instance, during the S&OP re-designing process at Chemical, managers recognize R&D as a key stakeholder at the same level as other functions typically involved in the

S&OP process. As a result, the demand plan benefits from the R&D's support that allows the incorporation of useful insights about new product development to enhance forecasting activities with additional internal inputs (Kreuter et al. 2021). In the case of Vestel Electronics, the R&D department provides greater S&OP performance through a clearer definition of the timing of new product developments to meet customer expectations (Taşkin et al. 2015).

Although it is evident that Product and Portfolio Planning perspectives are fundamental for establishing an effective Sales & Operations Planning, the literature available falls short of formalizing the presence of this activity at the core of the process. As seen in Section 6.1, the reasons behind this lack can be seen in the fact that most of the theoretical articles are referred to environments in which manual copy-and-paste activities and spreadsheets are still present in the S&OP cycle, and they thus focus on how to overcome these issues rather than how to formalize and where to place the critical activity of Portfolio Management.

A step forward in this regard is taken by practitioners who are striving to understand and define the Integrated Business Planning process. The IBP cycle formally includes the Product and Portfolio Management Review in its first step, hereby recognizing and formalizing the presence of this activity at the core of the process. Indeed, as one of the essential requirements for companies wishing to correctly implement IBP is a high level of maturity in technology development and integration with the company's ERP system.

6.3.4 Scenario Planning

Scenario Planning[2] represents a powerful tool for supporting decision-making and developing contingency plans by evaluating the potential risks, and opportunities that arise throughout the whole S&OP and IBP process. However, a research run by Oliver Wight consultants shows how only around 7% of organizations support their decision-making processes by developing scenarios monthly (Metcalfe, n.d.).

Most of the academic literature on sales and operations planning presents the process as being in a premature stage, lacking formal incorporation of scenario planning activities. Typically, the ultimate objective of the pre-meeting and executive meeting is to achieve supply-demand equilibrium, thereby ensuring alignment with company goals. Although scenarios and sensitivity analyses may be employed to reinforce the plan's robustness and validity, such practices often fall outside the tactical focus of

[2] Scenario Planning is defined by Rohrbeck et al. (2018) as " *a strategic foresight method that uses a structured approach to develop plausible, internally consistent, and diverse stories of the future. It aims to enable decision-makers to anticipate and prepare for a range of possible futures by exploring key uncertainties and identifying potential risks and opportunities*" (Rohrbeck and Gemünden 2011)

S&OP. As such, while scenario planning is undoubtedly an important tool for implementation, it is not generally perceived as a bottleneck or essential managerial practice for S&OP. (Bagni and Marçola 2019).

Furthermore, the ability to carry out scenario planning is closely tied to IT support, which is still primarily reliant on rudimentary Excel spreadsheets in traditional management settings. Consequently, most case studies that advance along the IT dimension by adopting advanced planning and scheduling (APS) solutions or customized software ultimately facilitate the incorporation of scenario planning (Willms and Brandenburg 2019; Schlegel, Birkel, and Hartmann 2020a). As an example, the qualitative case study conducted by (Ivert and Jonsson 2014) highlights that the adoption of an APS solution enabled the analysis of "what-if" scenarios during executive meetings. However, managers tended to focus on short-term scenarios due to the slow generation of different plans for mid to long-term horizons. In contrast, the APS implementation at Vestel Electronics demonstrated a different outcome, where the resolution of each scenario took mere minutes. As a result, the time saved from information updates could be dedicated to defining and analyzing possible scenarios, ultimately increasing the credibility and effectiveness of the outcome of the Executive Meeting (Taşkin et al. 2015). A similar outcome is observed in the S&OP implementation at Geistlich Pharma, a Swiss company studied by (Wagner, Ullrich, and Transchel 2014). The company quickly realized that the advantages of establishing a central database extended beyond ensuring high visibility within the organization. By enabling departments to gain a holistic view of the company's operations, the implementation fostered greater consensus among stakeholders, leading to the development of "what-if" scenarios or sensitivity analyses to substantiate their decisions.

Few examples in academic literature illustrate which variables are considered for generating scenario planning in the S&OP context. (Ávila et al. 2019) study Sogrape Vinhos, a Portuguese wine producer, which began performing Scenario Analysis by varying forecast accuracy to simulate changes in demand resulting from the lack of integration of customer information in the S&OP process. Another case study involving a North American company operating in the softwood lumber industry generates different scenarios based on product mix combinations to optimize expected profit (Wery et al. 2018).

From the information provided, it is evident that scenario planning is a widespread activity in companies with high S&OP maturity, although it is not formally integrated into any S&OP framework in the literature. However, the material provided by practitioners regarding IBP formalizes the presence of this activity in the process, establishes best practices, and provides frameworks and suggestions on how to perform the process effectively, which will be discussed in Chapter 7.

According to (Reed 2020b), scenarios and their triggers are mainly outlined and evaluated during the Reconciliation Review phase, through an analysis of vulnerabilities and opportunities arising in the previous phases, aimed at enabling informed decision-making during the Management Review. However, the literature on IBP goes a step further by stating that scenario planning is not only a concern of the Reconciliation Review phase but should be performed at each stage of the process to support impactful decision-making, as discussed in Section 5.2.

6.3.5 End-to-end supply chain collaboration

As the requirements from both end-Customers and Shareholders became more restrictive, the importance of ensuring a close collaborative relationship with those key stakeholders has dramatically increased in the last two decades according to (Brunette M et al. 2018). The original structure of S&OP is characterized by an inward-oriented focus as it mainly relies on internal data and processes. In a highly dynamic and competitive environment, the ability to incorporate external factors represents an opportunity to align the company outside its boundaries, in the whole business ecosystem.

According to the (Oliver Wight, n.d.) the achievement of an end-to-end collaboration is one of the latest steps that moved S&OP towards becoming IBP in the mid-2000s. Moreover, the definition given by the (University of Tennessee - Haslam College of Business 2021) to Integrated Business Planning is a clear attempt in the direction of including customers and suppliers in the IBP process: "*IBP aims to develop a single, integrated plan that includes end-to-end supply chain planning*"

However, as happens with the Product Portfolio Management topic, companies that perform an advanced S&OP process inevitably look for expanding their range of action. Upon this topic, (Hansali, Elrhanimi, and Abbadi 2021) introduce the Integration of key customers and suppliers as a proposal for improvement for the company object of their case study. Their expectation is that the organization would gain benefits in terms of forecast accuracy, delivery performance, order backlog and inventory level. The same recommendation is given by (Bagni and Marçola 2019), identifying that a closer relationship with suppliers of critical items, such as packaging in the case of a writing material company, would lead to a significant reduction in delivery time.

The articles found in the SLR only provide a restricted number of examples that address the theme. For instance, the S&OP re-designing process of Chemical, the case company of (Kreuter et al. 2021), proposes the involvement of key customers in the context, that is enabled by an APS system that avoids the manual sending of files. In this way, the forecasting activity is simplified through the integration of external information, along with the benefit of gaining more trustworthy numbers. Another

representative case study is the one by (Danese, Molinaro, and Romano 2018) who examine the transition toward a more advanced stage of the S&OP. The analyzed company undergoes an endeavor towards the reinforcement of the relationship with those customers with a high incidence on revenues or considered strategic. The two parties participate in two different types of meetings: one annual meeting to discuss the long-term forecast, and the typical S&OP monthly meeting. In addition, a collaborative web portal is developed to update information and confirm orders.

It is worth noticing that the previous examples mainly bring light to intangible benefits that can be obtained, especially in terms of incrementing the credibility of the S&OP process. Given that external figures are actively participating, the cycle acquires more formality and officiality. However, only the case study conducted by (Goh and Eldridge 2015) quantify the advantages by measuring them with KPIs. Here is a revised and more formal version of the paragraph. The key supplier aims to counterbalance the bullwhip effect, which has a significant impact on inventory levels throughout the supply chain, by pushing towards downstream integration. This integration is strengthened through mutual sharing of information such as stock levels, Master Production Schedule (MPS), production constraints, and downside forecast. Additionally, a Reorder Point system is jointly established, which quickly triggers supplier production due to direct access to the focal company's data. With the introduction of this new process, the focal company benefits from a substantial reduction in stock levels and the number of inbound shipments (Goh and Eldridge 2015).

According to the consultants at Oliver Wight, external integration is a complex and demanding process that requires significant investments in technology and personnel commitment. As a result, companies should only pursue this strategy once they have achieved full effectiveness in internal collaboration (Oliver Wight 2023b). As a matter of fact, the case studies presented above demonstrate that the few companies that were successful in integrating suppliers and customers had already achieved a high level of S&OP maturity. Furthermore, the lack of focus on external integration in research articles leads us to believe that S&OP primarily emphasizes internal collaboration. This view is supported by the (Aberdeen Group 2006b), which notes that IBP introduces a collaborative and outward focus, while S&OP remains primarily focused on internal collaboration.

6.4 Detractors of IBP

From the previous part, it is notable that both processes point in the same direction, and most of the “innovative” practices that IBP claims to show seem to be already embedded in S&OP. This idea is supported by (Bower 2012), who agrees that IBP is nothing else that the same process under a different name that is inevitably evolving,

as a natural trend for a business to achieve higher performances. He supports his argument in his article for the Journal of Business Forecasting, criticizing that the following 7 factors are already present in S&OP.

Financial Integration: In his opinion, financial integration has been embedded in S&OP since its very first days, as many software vendors propose solutions in this direction that have been adopted by multiple practitioners.

Inclusion of Strategic Plans: those companies that lack an alignment between the Tactical and the Strategic planning domains are guilty of lacking senior management involvement in the process.

Improved Executive participation: Although as mentioned above most of the companies lack executive involvement in their S&OP process, this is a key feature to enable an effective process.

Inclusion of Product and Portfolio planning: product and portfolio management is a feature that was added to S&OP since the '90s. Most of the companies, however, follow the primitive version of IBP, and in his opinion would see huge benefits by including this activity in the process.

Addition of what-if Scenario Planning: this direction is that most advanced S&OP processes employ Scenario Planning activities to drive informed decision making.

Plan gap identification leading to improved decision-making: gap identification is something that is already done in the S&OP process, and further states that the long-term view of 24 months provided by some author is exactly matching with the one considered by mature S&OP processes.

Better understanding of the external Supply Chain, Market and Customers: Also in this direction, every mature S&OP process should be externally oriented to a certain degree. Demand consensus processes should incorporate variables coming from the outside, as well as Portfolio Management processes should have a clear view of what the competition is doing (Bower 2012).

Although Bower's ideas align with the findings of this thesis, it is possible to argue that there is a significant difference between the two perspectives. Bower asserts that technology does not shape S&OP, but rather facilitates it, as S&OP was originally intended to be what it is now and technology has simply evolved to support it (Bower 2012). However, this thesis highlights that IBP platforms have enabled the integration of new features into the S&OP process, resulting in a name that is becoming increasingly limiting. Unlike Bower's perspective, we contend that IBP represents a formalization of the features that have been added to S&OP over time. As such, it is

essential to change the name in order to encompass all of the functions and activities that take place during the process, beyond simply aligning supply and demand.

6.5 Outcome of the results

Up to this point of the thesis, we have presented a large analysis of the literature to understand where the truth behind the differences between S&OP and IBP is. Once it is stated that IBP is comparable to a fully mature S&OP, it is possible to say that its term was rebranded because it better fits with its principles. Moreover, it is evident that the more an S&OP process is advanced in its evolution journey, the more the respective differences tend to fade away given that they might overlap to each other.

Therefore, the interpretation of a clear divergence is more precise if only looking at a traditional and not fully mature S&OP. Figure 32 summarizes the results of the previous chapters, concluding that there are 7 areas where IBP contributes to improving thanks to a redefinition of the whole structure.

Area	S&OP	IBP
Business Objective	Volume oriented Demand & Supply Balancing	Value oriented Demand & Supply Balancing
Focus	Inward Focus	Outward and collaborative docus
Ownership	No ownership / Supply Chain Manager	Executive Management
Technology	Rudimental/Medium IT systems	Advanced use of IT systems
Outcome	One single plan	Scenario Planning and gap Analysis
Planning Horizon	Short/Mid term (from 3 to 18 months)	Long term (from 24 months)
Frequency	Monthly	Monthly along with event-driven meetings

Figure 32: Differences between S&OP and IBP

7. The transition from S&OP to IBP

Up to this point, the thesis has endeavored to identify the main features that characterize Integrated Business Planning and Sales and Operations Planning as well as their primary touchpoints and differences. The findings presented thus far have allowed us to understand that there is no substantial difference between the two processes when considering a fully mature S&OP or IBP. However, the evolution path of these processes is ongoing, and continuous advancements in technology enable further innovations, facilitating continuous improvements over time. To avoid falling behind, companies must embrace new developments, and to do so, they must strive to achieve full IBP and S&OP maturity as quickly as possible. This chapter presents the most shared best practices and principles to maximize the positive impacts of the process and effectively transition from S&OP to IBP. Followingly, we will provide a high-level overview of the main future evolutionary directions, enabling practitioners and academics to identify the primary future research pathways that should be pursued, with the objective of answering to the RQ2.

7.1 How to effectively transition to IBP

According to a study run by (Dumitrescu et al. 2022) few companies can use the IBP process to effectively support decision-making. In multiple cases, IBP meetings are just periodic business reviews rather than serving their natural purpose of aligning strategic and tactical goals and they are mainly attended by junior staff.

The maturity models presented in Section 6.2 illustrate the challenging and complex journey from S&OP to IBP. Achieving the highest levels of maturity demands significant investments of resources, time, and attention to numerous organizational aspects. The existing literature offers a plethora of sources and articles addressing this topic, and our aim is to provide a concise summary and organization of the different points that companies should address to maximize the benefits of the process. We begin by outlining general guidelines for implementing and structuring the process and then delve into the key activities of IBP in greater detail.

7.1.1 How to enable the change and structure the process

To enable change and structure the process, it is critical for companies to secure commitment from individuals at all levels, even before finalizing the design and key characteristics of the process. This is especially true for IBP, as the process necessitates a comprehensive restructuring of the organization's operations, impacting all functions involved in day-to-day business.

(Reed 2020b) provides a practical set of guidelines that should be followed when initiating the implementation of IBP, organized into four primary areas of focus:

1. Effective Leadership
2. Commitment of resources
3. Education
4. The right design
5. Embedding the process

Effective Leadership

(Matthews, Dixon, and Reiher 2020) conducted a survey that revealed a concerning statistic: over 65% of the 125 companies surveyed failed to involve their executives in the IBP process. As with any organizational change, successful implementation of IBP requires strong leadership. As stated by (Oliver Wight, n.d.), it is essential for key managers to commit to the process, understand its key principles and provide the right direction to all stakeholders involved. In this regard, the Leadership team should sponsor and lead the design and implementation, establishing a clear mission, and ensuring that each process element is meticulously designed and executed in line with the initial implementation plan (Barba 2023). Additionally, Senior Management should allocate sufficient resources to the process. It is critical for members of the Executive team to oversee each of the five phases of the IBP process described in Section 5.2. The Leadership team should embrace the change and set an example for the rest of the company to ensure successful IBP implementation.

Commitment of resources

In terms of resource allocation, the leadership team should take charge. During the initial stages of IBP, the process may take away resources from the day-to-day operations of the company. Thus, it is fundamental to assign a highly respected full-time project leader who can drive engagement, organize the process, and ensure prompt execution. Building a strong integration team is also crucial for the success of IBP implementations. The team should comprise competent individuals from all functions who can design each step of the process (Barba 2023). Figure 33 illustrates which functions should be involved in each phase.

IBP Process Step	Major Functional Areas Involved	Cross-Functional Team Members
Product Management Review (PMR)	Marketing, R&D, Innovation, Operations, Procurement, Demand Planning, Supply Planning Technical, Project/Program Management	Sales, Finance
Demand Review (DR)	Sales, Marketing, Demand Planning, Customer Service	Supply Planning, Finance, Operations
Supply Review (SR)	Operations, Production, Engineering, Quality, Supply Planning	Finance, Demand Planning, Sales, Marketing, Innovation, Procurement
Integrated Reconciliation(IR)/ Management Business Review (MBR)	**Integration Team:** Project Leader IBP Process Leader Finance Design team leaders - Product - Demand - Supply IT HR	Sales, Marketing, Supply Chain/ Operations

Figure 33: Involved functions in each step of IBP. Source (Reed 2020b)

Education

In such kinds of innovations, competitive advantage often hinges on the behaviors and skills of the people involved. To improve the effectiveness of implementation, (Reed 2020b) proposes three key steps in educating the actors involved in the process:

Establish leadership for change: The leadership team must create a common definition of change and establish a shared language around it. This will enable them to understand and commit to the change, and effectively communicate it to the lower levels of the organization.

Develop internal experts and agents of change: The integration team plays a critical role in this phase. They must gain a deep understanding of IBP best practices and be able to explain the process in terms that make sense to others in the organization.

Ownership: The newly created team of experts, working alongside the leadership team, must bring the rest of the organization onboard. Everyone must understand why the change is important and how the new process will impact their daily work.

The right design

Up to this point, multiple articles underlined how a one-size-fits-all approach cannot be taken when implementing IBP. Therefore, it is essential to begin with the company matrix and ask the right questions to establish the correct IBP structure.

During the design phase, the design team must align the core steps of the process to the mission provided by the leadership team. This may be a complex process involving meetings at multiple levels, and the input, output, and RACI structure must be clearly defined by the team. One crucial activity in this phase is to remove any redundant meetings and activities that will no longer be needed after the implementation of IBP.

Embedding the process

From the shop floor to senior management, everyone must adopt new behaviors to support the IBP process. The leadership team must address these changes in behavior with an evolutionary, rather than revolutionary approach. In this sense, one of the most important activities is to enable people to think long-term rather than short-term, as well as overcoming the under-promising and then over-delivering mindset (Oliver Wight, n.d.).

To achieve a change in mindset and behavior, senior management must be willing to assess and correct any negative behaviors. Regular retrospective meetings can help to pursue continuous improvement of the process and address weak spots (Maritz 2020). An excellent example of this approach is Tata Steel Europe, which developed IBP through the agile methodology, adding new features each "sprint" to better suit the organizational needs (Banker 2021).

7.1.2 How to structure the IBP process

As demonstrated in the preceding section, the design phase of IBP is critical to the success of its implementation. This section aims to provide guidance on best practices to follow when structuring the IBP process, drawing on insights from the literature. To this end, (Martiz and Food 2022) suggest five key best practices to follow in the design phase.

Align and connect to your strategy: The first best practice is to align and connect the IBP process to the overall organizational strategy. This requires a mix of bottom-up and top-down approaches, with senior managers providing guidance while also considering inputs from the IBP cycle meetings. The IBP process must also facilitate the connection between long-term strategy and short-term execution, by answering the question: *"is the plan going to deliver the results we need?"* (Matthews, Dixon, and Reiher 2020; Reed 2020c). All departments should adopt a long-term approach in their analyses and decisions, with a focus on a minimum 24-month horizon. (Oliver Wight, n.d.) recommends dedicating 70% of available time to the process for the upcoming quarter, while reserving the remaining time for long-term thinking. Moreover, discussions on short-term issues should be addressed during the early phases of the cycle, while long-term decisions at an aggregate level should be discussed during the Management Business Review.

Ensure an effective response to change: Ensuring an effective response to change is a crucial aspect of implementing Integrated Business Planning. According to (Reed 2020c), effective IBP requires clear assumptions that are accompanied by actionable steps to turn them into reality. To achieve this, an efficient and responsive system that continually monitors the vulnerabilities and opportunities generated by the

assumptions at an aggregate level is essential. The design team must establish a process that can manage scenarios, options, and triggers to respond to change quickly and effectively. Section 7.1.4 will focus deeper into this issue.

Facilitate seamless synchronization: Seamless synchronization among the various departments involved in the process is one of the most significant outcomes of IBP. To facilitate this, the design team must ensure that the process avoids unnecessary complexities that could encourage silo-thinking. In this direction (Barba 2023) suggests that an effective governance structure with a clearly defined hierarchy of decisions and uniformity of data, processes, and reporting periods between departments is critical. As previously mentioned, aligning the behaviours of various departments is crucial for a successful IBP implementation, although it may pose a significant challenge.

Deliver dynamic "financialization": Financial implications of any decision taken at any step of the process need to be easily comprehensible and visible to all involved parties. To achieve this objective, it is crucial to ensure that the Finance team is included in every phase of the process and that the right set of tools and technologies are in place to enable clear and dynamic visualization. A detailed analysis of this issue will be presented in 7.1.5.

Support the Executive Agenda: Furthermore, the IBP process must support the Executive necessities by enabling them to make important decisions that will shape the organization's future. (Maritz 2020). To accomplish this, the process should be designed in a way that allows the Executive to obtain the necessary information without inundating them with excessive data, as accuracy in the long term is neither feasible nor necessary.

Adhering to these guidelines is vital for creating a comprehensive design of the process that does not neglect any essential principle of IBP. Additionally, (Jurecka 2013) offers valuable insights on how to establish the process based on the structure and objectives of the company's product portfolio. The study identifies several possible strategies that companies could adopt, including **Cost Leadership, Product Differentiation, and Focus on Customer Relations**.

The authors of this study have identified three primary strategic directions and have categorized them based on the product portfolio model. They suggest that most product portfolios consist of four main types of product lines:

- Current product lines
- Extensions and promos of the current product lines
- Products new to the company but not to the market
- Products new to the company and to the market

Based on these four categories and the strategic direction that companies wish to pursue, the authors have developed three primary Portfolio Management frameworks.

Model 1: Managing current portfolio

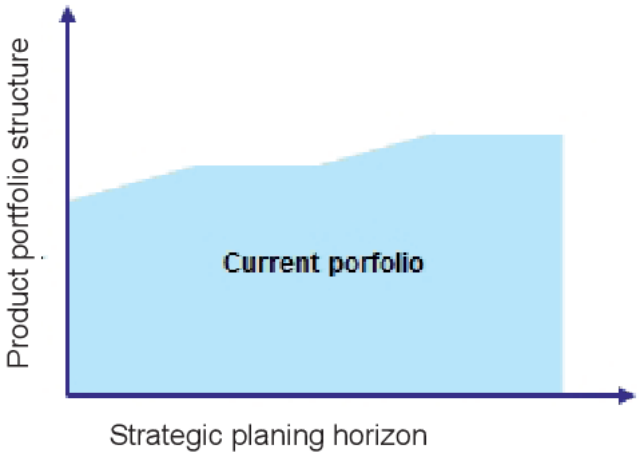

Figure 34: Product Portfolio Structure: Model 1. Source (Jurecka 2013)

This portfolio model is well-suited for companies operating in commodities industries that typically rely on *cost leadership* on their existing portfolio and face limited changes in their product lines. In such cases, the approach followed is similar to traditional Sales and Operations Planning, aimed primarily at balancing supply and demand to eliminate waste and reduce unnecessary costs. The Supply Chain, Finance, and Operations functions will lead this process, which is less likely to involve scenario planning activities as demand uncertainty is generally low. Figure 34depicts the typical structure of the main growth strategies for companies adopting Portfolio Model 1.

Model 2: growth through line extensions and new products

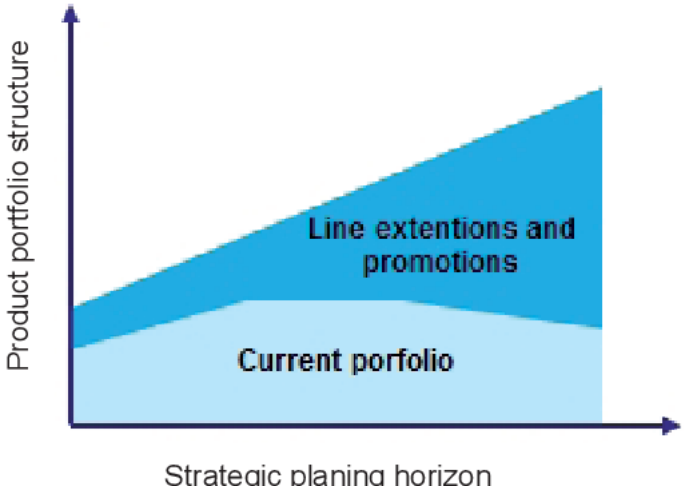

Figure 35: Product Portfolio Structure: Model 2 Source (Jurecka 2013)

While companies in certain industries may follow a *cost leadership* approach for their current portfolio, introducing new products requires a different strategy to justify potentially higher margins. In such cases, companies usually adopt a strategy based on customer relations or product differentiation, resulting in an Integrated Business

Planning process chaired by the Sales and Marketing functions, with a strong focus on strategic Portfolio Management activities. There are two possible ways in which companies can introduce new products: in the case of mergers and acquisitions, Finance plays a key role, whereas in-house production requires a greater focus on the R&D function. As uncertainty is typically higher when new products are introduced, companies following this model should have an agile and responsive Supply Chain, and it is recommended to perform Scenario Planning activities to minimize surprises. Figure 35 illustrates the typical structure of the main growth strategies for companies adopting Portfolio Model 2.

Model 3: Growth through brand new product lines

Figure 36: Product Portfolio Structure: Model 3 Source (Jurecka 2013)

According to (Jurecka 2013), the third portfolio model shown in Figure 36 represents the most challenging situation for a traditional Sales and Operations Planning approach. Companies in this portfolio model typically launch products that have never been seen by their usual operations or by the market. High-tech manufacturers are among the companies that adopt this model and face substantial issues in estimating demand accurately, a responsibility often delegated to senior management. Thus, Scenario Planning and supply chain responsiveness and agility become even more critical for companies in this portfolio model. The process is typically led by customer-oriented functions such as Sales and Marketing, with R&D and Finance playing a key role, similarly to Portfolio Model 2.

To ensure a smooth implementation that adheres to the key principles provided thus far, it is essential to establish a control mechanism that ensures the correct execution of the IBP process (Kepczynski et al. 2019), suggest creating a Center of Expertise aimed at facilitating the shift towards Integrated Business Planning by ensuring people's commitment and following the fundamental guidelines provided in the initial

design phase. The IBP CoE should comprise members from all the departments involved and focus on the following activities:

- Process improvement or lead transformation (in case IBP is not there yet)
- Transparency regarding project information and objectives
- Coordinating learning and development of various stakeholder groups
- Building education framework and knowledge-sharing platform
- Continuous improvements by design
- Process governance
- Talent management

When analyzing the Integrated Business Planning process, the CoE should always be prepared to detect any signals that may indicate something is not going as planned. In case of unexpected issues, it is crucial to investigate the root cause and fix it promptly. According to (Lee, n.d.) IBP implementations that follow a Do-It-Yourself approach often fail to meet the initial requirements and purpose of the project. To address this issue, the grey paper proposes an effective five-step process to get IBP back on track.

Step 1, Assess the current process: Determine what is not working well through an in-dept analysis and review of each step of the process.

Step 2, Revisit the original vision of IBP: As it is not unusual that the initial vision gets lost in the implementation. It will be key in this phase to understand if the issue was in a deceitful design of the initial aim of the process or in the execution.

Step 3, Reexamine roles and accountabilities: Here, the team will reassess the initial RACI structures to understand if the key responsibilities were given to people with the right seniority and capabilities.

Step 4, Revisit the IBP implementation process: Usually IBP takes a few months to get up and running. If it is taking years, this can be a good signal that something went wrong in the implementation process.

Step 5, Agree upon the improvement plan: The insights gathered in the first steps need to be analyzed and translated into an improvement plan that is presented to the Leadership Team. The improvement plan will need to have clear deliverables and expected results that should be measured constantly. It would be good practice here to add one sixth step to the IBP process for this purpose: the Improvement Review.

7.1.3 How to optimize decision-making

As previously mentioned, the design team is responsible for planning each activity in detail at every level of the process. When designing the key inputs and outputs of each meeting, it's important to consider the appropriate level of detail required.

Practitioners have offered valuable insights on how to structure this phase of the design process, which are summarized in this section.

One of the main challenges faced by the design team is to structure the process in a way that addresses the three main levels of planning discussed in Section 5.1.2, with the appropriate level of detail. Decisions related to mid- to long-term planning at an aggregate level should be left to senior management and require a lower level of accuracy compared to short- to mid-term decisions taken at the SKU level.

However, as noted by (Hirschey and Spira, n.d.) organizations often rely on exhaustive data even for long-term decisions. To avoid falling into the trap of "*Detail Dysfunction*", companies need to ensure the right level of detail is provided for each level of decision-making. Overwhelming senior management with data can be counterproductive to their long-term thinking, as it's often impossible to achieve the necessary level of accuracy. Instead, as (Greg, Matthews, and Deutsch, n.d.) suggest, it's crucial to focus on being "*roughly right*" rather than "*precisely wrong*". To avoid this mistake, the leadership team must be aware of this issue. Sometimes, detailed data and information are requested as an "excuse" to postpone important decisions, thus reducing the efficiency and effectiveness of IBP. A change in mindset among executives is necessary to prevent the key functional units involved in the process from spending an excessive amount of time forecasting long-term measures that cannot be predicted, as they often feel pressure to stick to their original long-term projections (Maritz 2020).

Additionally, (Banker 2022) emphasizes the importance of the quality of the information provided. When presenting insights to the leadership team, the IBP team should focus on distinguishing "*what is news and what is noise*" to optimize the flow of information and enable effective decision-making. Data processing and harmonization are crucial to achieving this goal. As previously noted, the technology dimension is one of the most important aspects to consider during the design phase of any IBP implementation.

Having a fully mature system is indeed crucial for achieving each of the key factors mentioned above. As mentioned in Section 6.1 of the thesis, it is fundamental to have a dedicated and responsive S&OP workbench, as well as a structured and efficient ERP system in place to enable the evolution to IBP. However, technological innovations enabled by wave three technologies, as noted by (Van Hove 2021), allow for further progress towards effective decision-making in the IBP process. The emergence of data analysis and Machine Learning algorithms has led companies to contemplate automating the simplest and least impactful decisions made during the IBP cycle. (Van Hove 2021) propose the complete automation of short-term decisions belonging to the operational domain and mid-term decisions with a low impact on the future of the business. This would free up the Executives' agendas and ensure their full commitment to long-term high-impact issues, while at the same time eliminating human errors from operational decisions and enabling an immediate response to

external inputs of the IBP plan, and the scheduling of event-driven meetings. Long-term decisions at the aggregate level, according to them, should remain human-centric, supported by a well-designed IBP workbench software that facilitates simulations, what-if scenarios, optimizations, and clear visualization of the key insights derived from previous analyses. Figure 37 illustrates all the possible enhancements that could be achieved through the integration of wave three technologies into the IBP process.

Traditional IBP Challenge	Machine-Centric and Human-Augmented IBP
Excessive focus on short- term issues	Wave 3 will enable a highly automated S&OE horizon implemented by rule-based machine learning.
Overly long planning process & decision cycle	IBP will be more integrated in day-to-day business meetings, with the option to call special meetings to deal with fast-breaking crises.
Information rather than decisions focus	Descriptive and diagnostic IBP analytics will be provided automatically and made available at all times throughout the business.
Process compliance rather than decision focus	IBP teams will be incentivized to provide strategic business scenarios and improve automated decision making rather than to police process compliance.
Significant resource requirements	Most analytics and planning will be automated, reducing time spent in meetings, freeing up planning resources.
Lack of attention to high value and strategic decisions	Time freed up through automation can be spent on big-ticket items such as business contingency planning and supply-network resilience planning.
Inability to deal with disruption	Probabilistic simulations will predict disruptions with opportunity to prevent or prepare for them. Special IBP meetings can be held to deal with urgent matters, and decision automation can be dialed down when there is significant disruption predicted. Decision augmentation can be dialed up to simulate impact of disruption.
Lack of insights	Wave 3 technology will capture and digitize every corporate decision. The history of IBP decisions/impacts will be available digitally to learn from and guide future decision making. This will enable putting metrics and rewards in place to drive cultural change around decision authority and accountability.

Figure 37: Beneficial consequences of Machine-Centric and Human-Augmented IBP. Source (Van Hove 2021)

7.1.4 How to perform Scenario Planning effectively

To this point, the thesis has addressed dynamic scenario planning without delving deeply into how to perform this activity effectively to enable informed decision-making. As stated previously, scenario planning mainly occurs during Integrated Reconciliation, but it can be adapted and extended to any other impactful decision made during the IBP cycle (Reiher, n.d.). According to (Reiher, n.d.), scenario planning should be based on the analysis of vulnerabilities and opportunities and should follow the framework depicted in Figure 38.

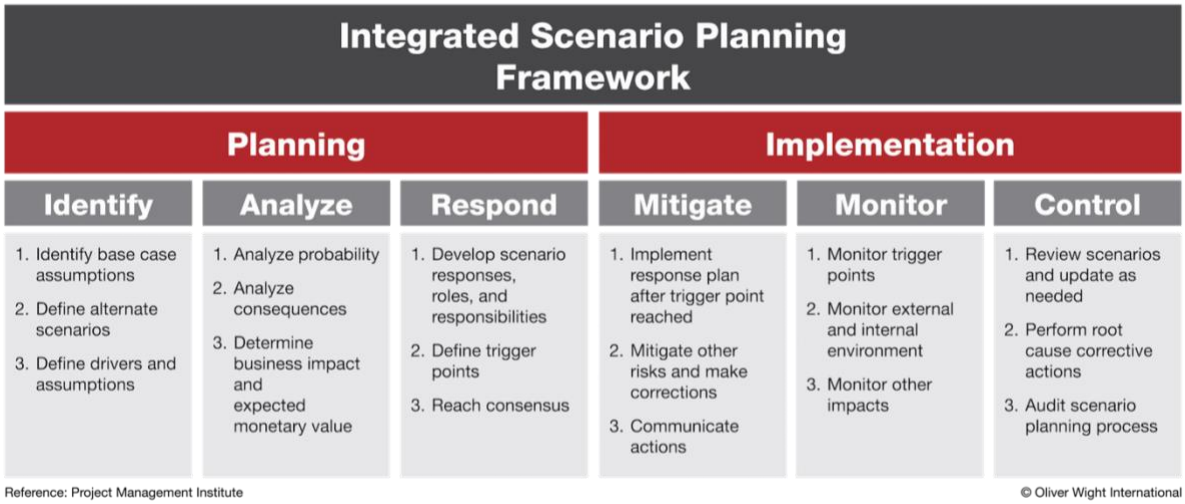

Figure 38: Integrated Scenario Planning framework. Source (Lindsey, Groven, and Hirschey, n.d.)

After conducting a thorough literature review, two main types of scenarios emerged: those triggered by external factors and those triggered by internal decisions.

The first type of scenario is based on the occurrence of a vulnerability or opportunity identified in previous analyses. In this case, it is crucial to establish a measurable threshold value that would trigger the activation of a different scenario. The main vulnerabilities and opportunities that need to be considered are illustrated in Figure 39.

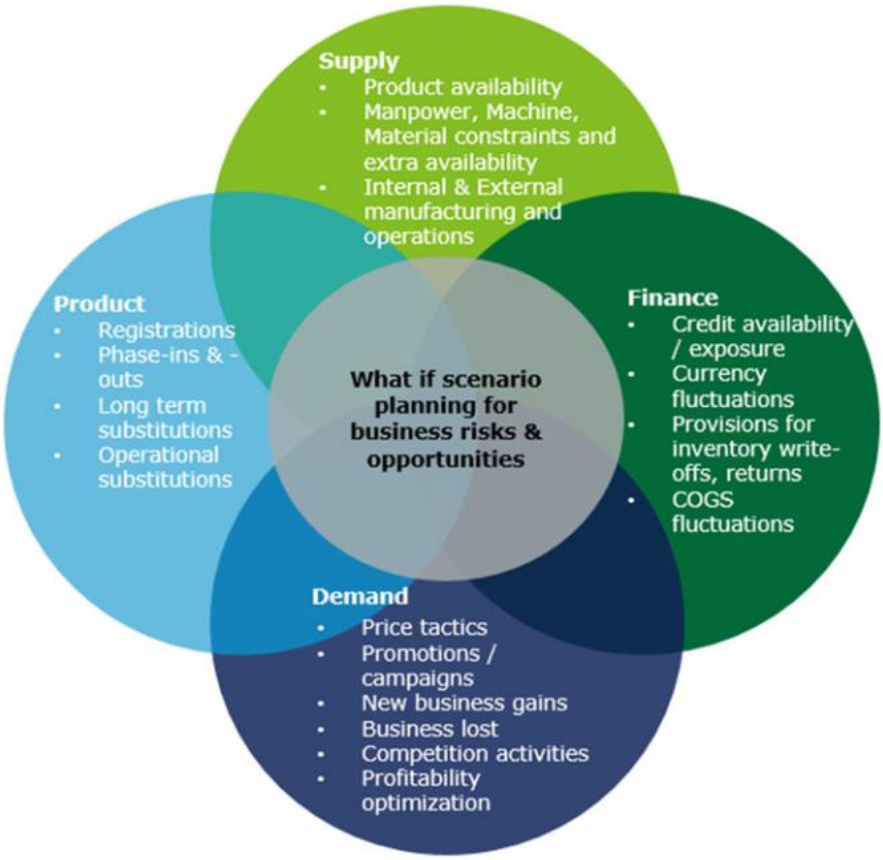

Figure 39: Main vulnerabilities and opportunities for scenario planning, Source (Kepczynski et al. 2019)

The second type of scenarios are aimed solely at supporting internal decisions. To illustrate, (Reiher, n.d.) provide an example of a company with a highly seasonal demand that experiences stock-outs each year. In response, the CEO asks the IBP team to develop two scenarios: one that considers building up inventory throughout the year, and the other that maintains the status quo. By evaluating the scenarios, the CEO was able to choose the most beneficial option for the company's health.

These scenarios are developed to support and guide the decision-making process during the Management Review. Therefore, it is imperative that any gaps are clearly visible, and data integrity is beyond question (Oliver Wight 2020a). In the following phase, the scenarios will be presented to the Senior Management, who will base their decisions on the information presented. The Executives may choose to accept the recommendations provided by the IBP team or opt for some of the other scenarios proposed. In some cases, they may dynamically adjust the scenarios based on their inputs, changing some of the variables present in the software. Thus, it is essential to have an advanced and responsive system capable of adjusting the impacts of the new scenario at each level of the organization based on the new parameters provided (Oliver Wight 2020a; Kepczynski et al. 2019).

According to (Lindsey, Groven, and Hirschey, n.d.), the primary objective of the IBP process is to enable the Leadership team to make informed decisions with confidence while ensuring that all departments align and adhere to the decisions made. Achieving this goal requires a robust and efficient IBP team that provides accurate recommendations and information to the decision-makers. In turn, the Senior Management must provide precise minimum criteria for the scenarios to avoid repetitive iterations. These minimum criteria should include projections on various parameters such as sales, production volume, cost, revenue, inventory value, margins, and market share. During the Management Review, well-prepared and informative scenarios aid the Executives in understanding the long-term upside and downside impacts of any decision, enabling each member to be on the same page. Therefore, it is imperative that the IBP team is diverse and comprises members from each function. Additionally, the Senior Management must maintain leadership to avoid ambiguity in decision-making, preventing any one department from taking over (Metcalfe, n.d.; Reiher, n.d.).

In conclusion, (Lindsey, Groven, and Hirschey, n.d.) highlight some best practices that should be followed while implementing Scenario Planning:

- Use relevant sources to monitor the environment: this will be fundamental to enable the activation of the triggers once the values surpass the predefined threshold.
- Don't wait for clarity: scenario planning is made on purpose to face uncertainty.
- Communicate clearly and often with stakeholders: both internal and external stakeholders will need to be informed of the direction of the business to enable integration.
- Assemble and support a strong team: the IBP team is at the core of the success of a well-implemented process.
- Run simulations to test the assumptions that underpin the scenarios: to ensure its credibility and integrity.
- Do not set your plans in stone: as it is fundamental to course-correct as the situation and assumptions evolve.
- Do not underestimate consequences and implications: it is fundamental to avoid neglecting worst-case scenarios.
- Do not hesitate to adjust the planning horizon and cadence: based on the situation it might be useful to update plans and scenarios more often than monthly. (e.g., covid pandemic) (Lindsey, Groven, and Hirschey, n.d.)

An example of how to execute Scenario Planning is provided by the analysis of the Tata Steel by (Banker 2021). The company has become proficient in this activity, where they put in place a set of scenarios to understand the consequences of each variation

of external inputs. For instance, if a customer wants to increase their purchase volume by 10%, they analyze the possible scenarios to determine what should be done if there is insufficient manufacturing capacity to meet the demand. The impact of each potential decision is then evaluated in terms of how it affects the customers and the company's financial health. Finally, a decision is made, and its impacts are communicated to the whole organization, making it clear to everyone.

7.1.5 How to improve the inclusion of the Finance function

According to (Reed 2020e) gives a formal explanation of how to structure the involvement of finance in the process. The author highlights that IBP provides an opportunity for finance to shift its role from merely recording financial performance to that of a "*finance business partner*". Among the various models available, Reed recommends the "Financial Business Partner" structure, as illustrated in Figure 40. This model involves embedding some members of the finance department within each department of the organization to provide day-to-day guidance to others.

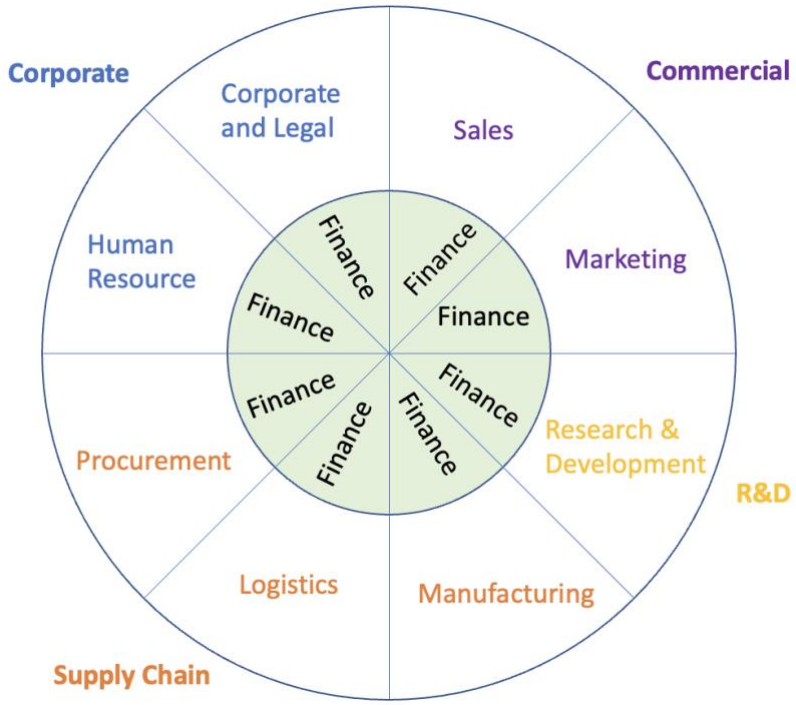

Figure 40: Finance Business Partnering Structure, Adapted from: (Reed 2020e)

One of the main advantages of adopting this structure is the close contact between the finance department and other departments. The model can be useful for companies that do not apply IBP, although it provides the best synergistic outcomes if implemented in parallel with the process (Reed 2020e).

Furthermore, (Hahn and Kuhn 2012a) propose an interesting approach to defining the contribution of finance in S&OP. They suggest optimizing EVA in the S&OP plan by addressing four value drivers: revenue growth, operating cost reduction, fixed capital, and working capital efficiency, as shown in Figure 41.

$$EVA = NOPAT_t - NOA_{t-1} * i_{wacc}$$

NOPAT represents the net profit generated by a company after accounting for taxes. On the other hand, NOA represents the amount of money invested in the company's operations, which is then multiplied by the WACC of the company.

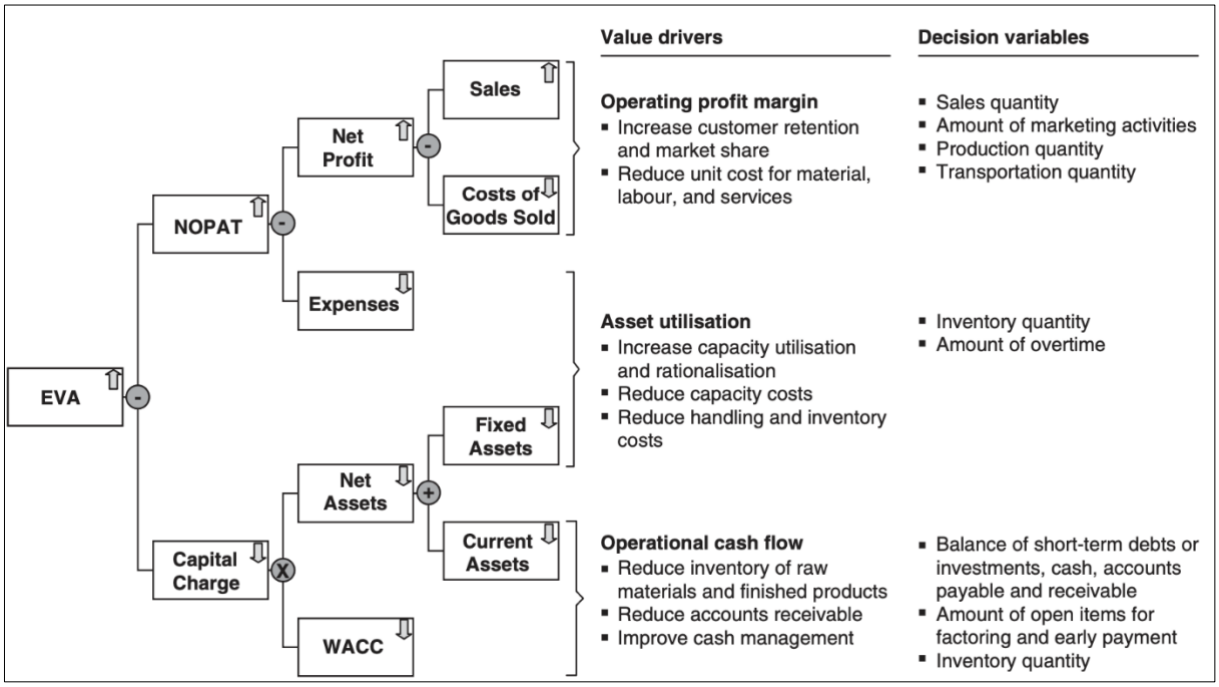

Figure 41: A decision-oriented value driver tree of EVA. Source Hahn & Kuhn (2010)

The purpose of EVA is to provide a clear and comprehensive picture of a company's economic profit, which is the one generated by the company after accounting for the cost of capital. By subtracting the cost of capital from the company's operating profit after taxes, EVA provides a more accurate picture of the company's financial performance and indicates whether the company is generating more value than it is costing for its shareholders (Hahn and Kuhn 2011). While NOPAT is generally considered in the S&OP plan, the Capital Charge, which is divided into WACC and Net Asset, should also be included in the analysis to assess the company's financial health (Hahn and Kuhn 2012b).

Particular attention should be placed on the Cash-To-Cash Cycle and Net Operating Working Capital (NOWC). The inclusion of payment terms is used for the computation of Accounts Receivable from customers and Accounts Payable to suppliers. NOWC determines the amount of cash required to run the operational business, while the C2C cycle indicates how many days a company takes to convert its

receivables into cash. In this way, it is possible to assess the cash flow situation and evaluate the company's liquidity (Wang and Hsu 2010).

$a)\ NOWC = AR + I - AP$

$b)\ C2C = DSO + DIO - DPO$

DSO = Days Sales Outstanding
DIO = Days Inventory Outstanding
DPO = Days Payable Outstanding

In this way, it is possible to assess the company's cash flow situation and evaluate its liquidity, as noted by (Wang and Hsu 2010). For instance, determining the minimum cash position can help minimize the risk of defaulting on short-term debts, as suggested by (Hahn and Kuhn 2012a). Therefore, it can be argued that working capital management plays a critical role in S&OP decision-making, particularly in preserving the company's financial position in the short term.

7.1.6 How to perform the Portfolio Management activity

The available literature has extensively explored how companies that implement IBP and S&OP, particularly the former, can improve their Product and Portfolio Management activities. Within this fundamental phase of the process, we focused on two main aspects: product categorization and handling of New Products Introduction.

1. How to categorize products
2. How to handle NPIs

How to categorize the products

(Hozack 2020) provides a comprehensive discussion regarding the categorization of products following the ABC analysis framework. The concept of ABC analysis originated from the principle developed by the Italian Economist Pareto, which states that in most situations, 80% of the consequences are generated from 20% of the causes.

During the Product Management Review, it is crucial to establish corporate guidelines on product categorization, especially during times of resource scarcity. This approach will encourage salespeople to focus on the company's objectives rather than applying their own principles in the process. The Pareto principle is a useful tool for identifying which products, consumers, outputs, locations, purchases, and suppliers have the highest share of volume, value, or impact on the overall business.

The ABC analysis involves categorizing each item into categories, typically following the numbers shown in Figure 42.

	% Item	% Volume /Value
A	20%	80%
B	30%	15%
C	50%	5%

Figure 42: Product categories for the ABC analysis, source (Hozack 2020)

Following this categorization, the Product Management Review provides an opportunity for key stakeholders to strategically allocate corporate resources. At this stage, decisions are typically made regarding which products to prioritize, which customers and channels to target for marketing and promotional activities, and which suppliers to establish closer relationships with. This process is crucial to avoid expending excessive effort on products that have a minimal impact on the organization as a whole, as illustrated in Figure 43.

	% Item	% Volume /Value	% Effort Demanded
A	20%	80%	20%
B	30%	15%	30%
C	50%	5%	50%

Figure 43: Wrong effort to the wrong products. Source (Hozack 2020)

By regularly revisiting the ABC categorization of the aforementioned items, companies stand to benefit in terms of both increased customer service levels and satisfaction, while simultaneously managing to decrease overall inventory levels (Hozack 2020).

How to handle NPIs

New Product Introduction has become an increasingly important challenge in today's market. It is rare for a portfolio to remain unchanged in the long run, given the rapid shortening of product life cycles that compels companies to continually renew and review their offerings. As highlighted in Section 7.3, it is highly recommended to involve the R&D department, which provides the primary benefit of aligning customer orders with new development timelines.

However, it is possible that employees may lack the business knowledge or experience required to fully comprehend S&OP dynamics. As such, the S&OP team should take

charge of organizing workshops to bridge the gap between business and technical aspects. This ensures that R&D prioritizes the appropriate products and communicates possible launch delays directly (Kreuter et al. 2021).

In addition, (Goh and Eldridge 2015) recommend to begin implementing this process on an SKU pilot rather than considering the entire range of NPIs in the S&OP process in order to manage the complexity of the planning effort. This is achieved by splitting and parallelizing the traditional S&OP with a dedicated "NPI S&OP" process. The latter is conducted on a weekly basis and addresses two specific themes:

- Possible inability to satisfy demand in the short-term horizon.
- Recommendations to revise demand.

Once potential challenges have been identified and discussed, the short-term outcome of the process is integrated into the traditional S&OP without any adjustments, while the remaining planning horizon is further reviewed during the traditional S&OP (Bagni, Sagawa, and Godinho Filho 2022).

7.1.7 How to include external stakeholders in the process

One potential avenue for expanding the scope of Sales and Operations Planning is to link its cycle with the CPFR process. Although this particular topic is not widely discussed, it represents a good practice for the transition from S&OP into IBP.

As previously highlighted, the nature of S&OP is typically internal, and collaboration with key stakeholders is established only in cases of advanced maturity. Conversely, the primary objective of CPFR is to operate outside the company's boundaries (Baumann and Andraski 2010).

The exemplary case of Walmart demonstrates significant advantages and efficiencies achieved throughout the entire supply chain. After ensuring high visibility through the sharing of information via Electronic Data Interchanges, the American retail giant established the VICS CPFR Working Group in 1996 with key partners. The visionary collaboration was based on the internalization of supplier information through the Retail Link portal into the S&OP cycle to properly synchronize the two sides, leading to a reduction of operational costs and stock levels (8th & Walton 2023).

If the next step in the maturity stage of S&OP involves the inclusion of key stakeholders, then the transition towards IBP occurs when the information flow is formalized and standardized, as in the Walmart case. By replacing the forecasting activity with customer/supplier inputs, the uncertainty level is minimized, resulting in more reliable and accurate plans that benefit all stakeholders involved (Ireland and Crum 2020).

Therefore, companies should pay attention to two critical factors. Firstly, it is imperative that the technology platform is capable of supporting and facilitating the

linkage between CPFR and S&OP. Failure to consider compatibility between an emerging process and an old architecture can result in problems. Therefore, it is important to ensure scalability is preserved in the long run and translated into a common framework to guarantee the smooth integration of both processes (Baumann and Andraski 2010).

Secondly, managers need to be mindful that any business change is unlikely to proceed smoothly. Combining S&OP and CPFR requires a high level of commitment that should not be underestimated to avoid jeopardizing the business (Brunette M et al. 2018). Indeed, the tight collaboration established between these two processes is unlikely to be reversible and it demands a proactive approach from the whole organization, starting from C-level management (Baumann and Andraski 2010). It is essential to recognize that CPFR is not a one-time event but aims to jointly run the business in the mid-long term. Therefore, linking S&OP and CPFR might be a double-edged sword if companies fail to consider all potential risks and benefits beforehand.

As an example, the integration of Lowe and Whirlpool was a gradual process that took place over three years from 2007 to 2010. Rather than immediately moving from short-term operational planning to long-term joint strategic planning, the companies began by extending their planning horizon from three to six months. This allowed them to collaborate on defining promotions, new product launches, and special event schedules. As a result, the two parties benefited from performing the Product Management Review better, thanks to an integrated promotional calendar for each product category. Once efficient alignment was reached, the two parties recognized the necessity to further strengthen their relationship by establishing the desired Integrated Business Planning. Through the joint efforts of senior leaders, the two businesses were able to determine their future direction and provide guidance for executing and implementing their collaboration ("Linking CPFR and S&OP: A Roadmap to Integrated Business Planning" 2010).

7.1.8 Possible performance indicators to be used to improve the effects of IBP

Thus far, we have discussed various methods for improving different aspects of the IBP process, but we have yet to delve into how to effectively evaluate the process's effectiveness. As highlighted in the Maturity Models section, having a clearly defined set of performance indicators that are connected to a corresponding incentive system is crucial to achieving a high level of maturity in both S&OP and IBP (Barba 2023). Although crucial for assessing the effectiveness and efficiency of the process, the literature lacks a clear example of a comprehensive scorecard, either in case studies or in theoretical frameworks. Research on the KPIs used is fragmentary and limited, with papers only briefly mentioning some indicators, but failing to provide a complete picture. A comprehensive scorecard provides a holistic view of the impact of individual function decisions on the overall process, discourages siloed decision-

making and selfish functional thinking, and therefore represents a critical requirement for enabling IBP.

The work of (Stentoft et al. 2022) is the only academic paper to date that presents a comprehensive list of possible S&OP indicators, as shown in Figure 44. These generic measures cover all functions and aspects involved in the process, but companies should group them based on geographical regions, product families or lines, channels, and tailor KPIs to ensure a more comprehensive evaluation (Alle and Ferguson, n.d.).

Sales Performance	Cost Performance	Financial Performance
• Customer Service Level • Customer Satisfaction • Acquiring New Customers • Market Share • % On-time delivery • % Order Fill-Rate • Order Cycle Time • Time-to-market for new pdt/service • Forecast Accuracy	• Production Saturation • Human Resource Allocation • Over time • Obsolescence Rate • Production Cost • Purchase Cost • Logistic Cost • Stock Turnover Rate • Time-to-market for new pdt/service • Inventory Level	• Profit • Revenues • COGS • Gross Margin • EVA • EBIT/EBITDA • WACC • C2C Cycle

Figure 44: List of KPIs. Adapted From: (Stentoft et al. 2022)

It is evident that the relevance of each KPI depends on the strategic direction adopted by the company. For example, a company following a cost leadership approach should concentrate on operational efficiencies such as inventory level or asset utilization, whereas a company following a product differentiation strategy should prioritize effectiveness measures like profitability or customer service per product. Similarly, a company following a customer relations strategy should focus on revenue/profit or on-time delivery performances per channel (Jurecka 2013).

However, simply keeping track of company performance is not sufficient to determine whether a company has successfully transitioned to an IBP approach. Since S&OP is predominantly a managerial process, it is crucial to identify the optimal combination of People, Processes, and Tools necessary to effectively implement the process (Oliver Wight 2020a). According to (Stentoft et al. 2022) tracking three factors (Process, Organization, and People) can help determine how effectively the S&OP process is being executed, as shown in Figure 45.

Process	Organization	People
• Meetings are held as planned and scheduled • Presence of process owner • Enough Human Resources • Alignment with strategy	• Support from Top Management • Definition of Roles and Responsibilities • Completeness of Performance Measurement • Support of IT system	• Cross-functional participation • CEO participation • Coaching and Training

Figure 45: KPIs to determine the quality of the S&OP execution. Adapted from (Stentoft et al. 2022)

(Vereecke et al. 2018; Papier and Thonemann 2021) suggest that an incentive system is a valuable tool for motivating employees and managers. A monetary reward is the first and essential solution as an incentive, but it is essential to ensure that it does not promote a functional silo mentality that could undermine the S&OP structure. Alternatively, a company could offer social incentives to foster a sense of belonging and awareness of the S&OP process. The proposed KBIs by (Stentoft et al. 2022) emphasize the importance of social performance as well, listed in Figure 46.

Key Behavioural Indicator
• Transparency • Participation Rate • Attention during meetings • Discussions are based on facts and not emotions • Accountability • Communication quality

Figure 46: KBI to measure the social performances. Adapted from: (Stentoft et al. 2022)

A successful transition to Integrated Business Planning requires more than simply optimizing operations and improving financial results. Companies must also pay close attention to how the process is managed, including communication, collaboration, and decision-making, in order to achieve a comprehensive and effective approach.

Finally, (Hirschey and Spatz 2020) provide valuable insight into the purpose of building a comprehensive performance indicators scorecard. KPIs not only measure the performance of individuals and departments, but also enable companies to

determine if they are headed in the right direction allowing extensive gap analyses. It is crucial for organizations to plan ahead and measure performance indicators against their initial goals. Any discrepancies indicate an issue that requires attention, and scenario analyses can be performed to anticipate and address potential issues in the future (Oliver Wight 2020a). Early detection and anticipation of problems is fundamental for achieving the long-term goals of the organization, as illustrated in Figure 47.

Figure 47: Decision imperative, the extended business horizon. Source (Oliver Wight 2020a)

8. Discussion

As explained in the Introduction section this work aimed at closing the gap in the literature about the Integrated Business Planning topic. As highlighted by the results of this research showed in the methodologies section, there has been little to no interest so far from academics in investigating the topic, that however was tackled in depth by Practitioners. Therefore, the two following research questions were outlined by the authors to try to put an order in the literature:

RQ 1: What differentiating factors characterize S&OP when compared to IBP?

RQ 2: How can organizations evolve from S&OP to IBP?

During the discussion of the results, Chapters 4, 5 and 6 were mainly aimed at providing an answer to the first question, while Chapter 7 outlines the results related to the second one. In this chapter, we will discuss and clarify the result reached with this work, by making an attempt to give an answer to the two research questions. For simplicity and easier understandability, the section will be split between the first and second research questions.

8.1RQ1

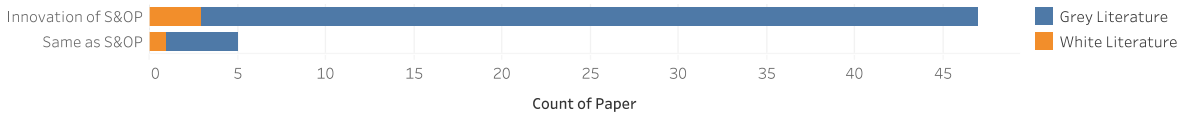

Figure 48: Counts of papers that consider IBP to be an innovative solution or not

The results highlighted in the taxonomical analysis highlighted in the methodologies section, and reported in Figure 48, provide a strong suggestion to hastily answer to the question that IBP provides a substantial innovation compared to S&OP. The available literature belonging to the" innovation" category shows a view of S&OP that seems too simplistic, while describing IBP as the holy grail that can turn around the future of businesses. The purpose of this work was to find a balance between this point of view and the one of those authors belonging to the detractors category (Bower 2012).

The results highlighted by this work suggest that the two processes are closer than what a superficial analysis might show, as IBP seems to be more of a formalization of the highest levels of maturity of its ancestor S&OP. To better allow readers to follow the flow of the discussion, we will follow the IBP and S&OP cycle in addressing the discussion of the results, which is shown in Figure 49.

Figure 49: S&OP and IBP cycles.

As evidenced multiple times across the results section, the S&OP cycle typically starts with the **Data Gathering** process, an essential activity necessary to collect all the data and information required to perform the following steps. In the S&OP context, the poor use of technologies forces the organization to manually perform this activity, resulting in a time-consuming task therefore considered as a formal step of the process. As highlighted in Section 6.1, a high technological maturity is a key enabler of the IBP process. Therefore, the advanced systems adopted in IBP allow companies to skip this phase, thanks to proper integration with the ERP system. This allows Data Gathering to become a hidden and automatized activity that does not demand any manual effort (M. X. Seeling, Panitz, and Cassel 2021). The most evident advancement that can be seen in Figure 49is therefore the inclusion of the Product Portfolio Management as the initial stage of the process. While some businesses that execute S&OP may bypass Data Gathering using an optimized IT system, they often still lack a formal discussion on the **Product Portfolio**. The incorporation of profitability and life-cycle assessments on the product lines within the process would help to better pursue profit maximization and actuation of long-term branding strategies, allowing companies to better focus on more valuable SKUs or Product Families/Lines, channels or customers (Cooper, Edgett, and Kleinschmidt 1999).

During the following two steps, namely the **Supply** and **Demand reviews**, the two processes proceed in a similar direction. Both S&OP and IBP aim at matching supply and demand while encouraging horizontal and vertical collaboration. However, their different execution strongly affects their goal, leading to different outcomes (Toor and Dhir 2011b).

One of the main differences in this sense is the perception of horizontal collaboration between the departments in the two processes. S&OP brings light to the advantages of aligning sales and marketing with supply chain and operations, shifting from a sequential and sales-centric approach to a more balanced and consensus-based planning. This horizontal collaboration is rightly perceived as the essential basis of the cycle, but it is often intended as the process' ultimate goal. The results of our work suggest that the IBP transition is enabled when this principle is assumed as a starting point, enlarging the scope to other departments that increase the process value thanks to their useful analysis and insights. This is also the reason why Product and Portfolio

Management activities are not formalized in the S&OP process. The lower technological development prevents placing the activity as the first step of the process, but the results suggest that the cause also lies behind the fact that this goes beyond the S&OP purely tactical focus.

The results of this work provide several examples of companies that acknowledge the involvement of Finance, R&D and multiple other functions in the first three phases of the process, which, as seen in Section 7.1.2 is a clear sign of scaling up along the maturity ladder. In this way, the Supply and Demand phases generate more consistent and robust plans by embracing variables and elements that Sales, Marketing, Supply Chain or Operation might not control. In the S&OP context, their presence shows a significant improvement, but their absence does not lead to a failure of its implementation. Traditionally, Sales and Operation Planning is accomplished when the gaps are closed in terms of physical volumes while respecting strategic goals (Grimson and Pyke 2007). On the other hand, the strategic positioning of IBP includes all the functions with the aim of becoming a business driver rather than a strategy executor (Alle and Ferguson, n.d.).

The academic literature identifies the Role of Finance as a key presence to evolve S&OP into IBP. The framework of (M. Seeling et al. 2022), shown in Figure 31, finally sheds a light on the role and responsibilities that it should have in the process. Its presence in the Pre and Executive Meetings is essential for financial assessment, while its contribution to the Demand and Supply Plan helps to quickly receive approval along with a direct translation of the plans into financial figures (Selmi et al. 2021a). However, their research presents the limit of not understanding if the process remains S&OP or moves to its evolution after the financial integration, given that only one company renames it under the name of IBP. On the other hand, the findings of our work suggest that the inclusion of finance is one of the key prerequisites for the evolution towards IBP. As suggested by (Reed 2020e), with IBP the Finance's role is formally enhanced from "*keeping the score*" to a much more active decision-making role in the business, and the formal inclusion of the function in the process allows to automatically draft the budget as an output of the process. However, as the last stages of the S&OP maturity models, as well as multiple case studies include Finance, stating that its integration into S&OP directly leads to IBP is probably misleading. Indeed, although the inclusion of financial figures is undoubtedly considered a minimum requirement for the existence of IBP, it is not enough to accomplish the transition.

On the other hand, the role of R&D has been under-investigated in the literature. Many papers discuss the issues of aligning NPIs in the S&OP plan due to its increasing frequency deriving both from a shortening of the life cycle and the need to continuously change the product offers (Kreuter et al. 2021). These challenges tend to

jeopardize the company's competitiveness and push them to include the department with the objective of conciliating and overlapping the traditional S&OP with NPI. Therefore, the integration of R&D strongly depends on the type of context, and it should be considered a step ahead from S&OP to IBP, especially if the company is operating in an innovation-driven sector (Bagni, Sagawa, and Godinho Filho 2022).

As discussed so far, IBP's innovation compared to its ancestor is the formal integration of the plans of all functions to achieve the company's objectives. However, the findings of this work suggest that the most advanced organizations might choose to expand this integration towards the outside. The inclusion of key external stakeholders is identified as a possible improvement for the S&OP implementation. Since S&OP starts as an internal process, no customers or suppliers are initially integrated. It is worth reminding that the examples in the literature demonstrate that the internalization of external information allows to achieve greater performances due to a strong reduction of the degree of uncertainty (Brunette M et al. 2018). This procedure counterbalances the weakness of the strict S&OP inward focus, raising the results in terms of stock level, number of shipments and reliability of the information. (Ireland and Crum 2020) emphasizes that the linkage between IBP and CPFR represents the right direction to establish an effective outward focus, and therefore improve the company performance. On the other hand, this procedure requires a high commitment from both parties because of the irreversible integration and shared long-term strategy, which can jeopardize the business if not well established. Therefore, companies should first focus on the internal process and later seek to expand the boundaries outside the company (Oliver Wight 2023b). In contrast to other aspects that distinguish between the two processes, involving external stakeholders cannot be considered a formal requirement for either S&OP or IBP. While it is clear that a company is performing S&OP rather than IBP if it does not include the Finance function in the process, the same cannot be said for the inclusion of external stakeholders. The conclusion, therefore, is that external collaboration cannot be regarded as a formal necessity for companies to claim they are implementing IBP. However, it is a desirable feature that has the potential to enhance process performance.

The latest two steps of the process are the **Reconciliation** and **Management Reviews**. Although these two phases are fairly similar in their structure among the two processes, their goals and approach to which they are attended make them represent the greatest point of difference between S&OP and IBP. The findings highlighted in the result section suggest that if S&OP promotes horizontal collaboration, IBP contributes to making it excellent, as well as vertical collaboration, intended as the integration of the Executives in the execution. S&OP stands as a bridge between strategy and operations, and it helps to align the strategic directions with the tactical

implementation. Although the last step is officially called Executive Meeting, the attendance of C-level Managers might not always occur, as it is too often replaced with the presence of middle managers. On the other hand, Executives involvement, in the Management Review is formalized by the literature on IBP. This difference creates a divergence in the outcome and execution of the process. Within the S&OP boundaries, the process follows a bottom-up feedback approach given that the difficulties and challenges arisen during the first steps are discussed and tackled in the last meetings. However, if S&OP is owned by the limited authority of middle management, it prevents the possibility of taking strategic decisions within the process. In this case, the S&OP execution follows a top-down approach, receiving strategic goals from higher levels and needs to respect them, with managers often times being held accountable for the forecasts provided during the process, thus fostering the under-promising and over-delivering mindset (Oliver Wight, n.d.). On the other hand, the direct involvement of the Top Management shifts to a mixed bottom-up and top-down flow, as shown in Figure 50 (Aberdeen Group 2006b). The last two steps of the process, the Reconciliation and Management Reviews become a chance to discuss important business matters that are directly triggered by all the functions involved (Toor and Dhir 2011b). When IBP manages to get the Executives' ownership, its primary goal of linking long-term strategy with short-term execution is achieved (Kepczynski et al. 2019). Also in this case, their presence is necessary to complete the evolution from S&OP to IBP, but not sufficient if it does not come with the other aspects.

The new strategic nature inevitably affects the planning horizon. Although it strongly depends on the type of context, the academic literature states that the S&OP time window is typically projected in the short/mid-term, ranging from 3 up to 18 months (Thomé et al. 2012). On the other hand, Executive participation ensures that the strategic perspective is reflected by extending and incorporating the long-term run into IBP (Kepczynski et al. 2019).

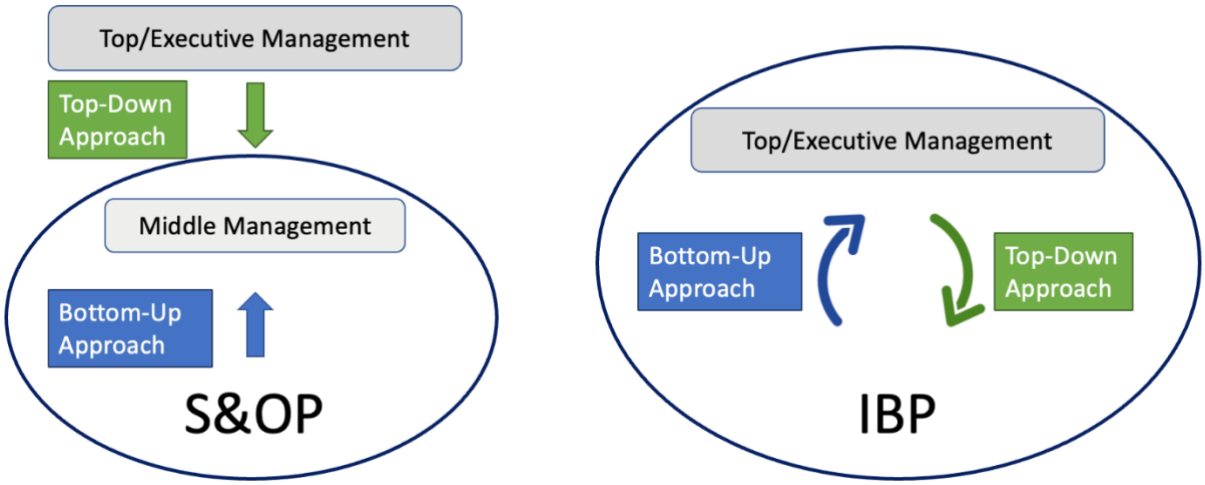

Figure 50: Different approach between S&OP and IBP.

Up to this point, the purpose of the last two cross-functional meetings follows a different direction between S&OP and IBP. On one hand, S&OP ensures that the operational business runs efficiently, conciliating between the unconstrained demand plan and supply plan strictly in terms of volumes. On the other hand, IBP deepens this concept by considering the gap between the company strategy and its tactical implementation (Oliver Wight 2020a). Moreover, the robustness of the plan is validated through Scenario analysis. The findings of this thesis suggest that while this activity does not always occur in the S&OP context, the IBP strength relies on anticipating potential future events or changes, based on variables and decisions that could impact the organization (Lindsey, Groven, and Hirschey, n.d.).

It is clear that the transition toward IBP occurs when both horizontal collaboration and vertical integration are simultaneously embraced and improved. Most of the time, companies might recognize the value behind these concepts but struggle to put them into practice. Section 6.1 highlights that the role of technology is the key enabler that allows handling the degree of planning complexity. However, the myopic S&OP perspective is restricted to the automatization of the manual "Data Gathering" activity, or to an increase of information quality or visibility within the organization. This is only a small step ahead since the real value is discovered in the possibility to expand the S&OP boundaries horizontally and vertically, which inevitably leads to a change in its scope. This is the reason why IBP should reach a high maturity level in the technology dimensions, by adopting ad hoc software that is well integrated with the ERP system (Willms and Brandenburg 2019). In this way, the rigidity drawback of S&OP would be overcome, by establishing a real-time exchange of data that would trigger event-driven meetings together with the scheduled ones (Zalewski, Kirche, and Tharp 2005).

The findings discussed in this chapter help us understand how both the theories put forth in the Detractors chapter, and the theories stating that IBP is a breakthrough innovation providing never-seen-before advances to S&OP, are probably hasty. Indeed, the multiple case studies mentioned in this work show us several examples of companies that were already implementing features proper of mature IBP processes, by still belonging to the S&OP domain. We can ultimately say that the findings highlighted in this work suggest that IBP represents an innovation compared to S&OP, by formalizing its highest stages of maturity present in the (Grimson and Pyke 2007) model, namely stage 4 "Advanced" and 5 "Proactive".

Nonetheless, the academic literature lacks a clear delineation of the criteria for defining a mature S&OP process as IBP (Danese, Molinaro, and Romano 2018). Hence, the primary contribution of this work is the proposal of a theoretical framework that identifies all the essential features that S&OP should own to be able to assert that it has successfully progressed into an IBP, as shown in Figure 51. It is necessary the co-existence of the following practices for a successful Integrated Business Planning,

given that they strongly increase the performance and the excellent execution of the process as discussed above.

Figure 51: Minimum Requirements for IBP

Although all these practices are already implemented, there might be cases of companies that would still call the process Sales and Operations Planning but it becomes evident that the term no longer matches the characteristics of the process. Rebranding it as Integrated Business Planning does not only not provide a more appropriate terminology for the revamped process but is also a way to better transmit the aim of the process throughout the whole company. Therefore, re-calling the process would increase the awareness of all the departments and people involved in participating into a holistic company management process rather than a simple tactical execution.

To conclude, the findings discussed so far can be effectively summarized into a clear definition of Integrated Business Planning:

"IBP is a process that aims at conveying the long-, mid- and short-term planning processes in a wholly integrated plan that guides the day-to-day tasks of the whole organization and is guided by them at the same time"

8.2 RQ2

Once clarified that the IBP process is a formalization of the highest maturity levels of S&OP, this thesis aimed at taking a substantial step forward by providing a high-level overview of the possible improvement steps that can be taken by companies that are willing to progress from S&OP and IBP.

Chapter 7 provides useful insight into what are the first steps to address when embracing such a complex change process. Focusing on people is fundamental, people

are at the core of the change, without having employees on board no change process could succeed. In this direction, the engagement should be driven by the executive management, which should set up an IBP design team with the right skills and seniority to effectively structure the process and to transmit the need for change through the whole organization (Reed 2020d).

The second factor upon which companies should place their concentration is the design process itself. In this phase, the design team will need to structure each meeting in the process by precisely defining the inputs and outputs required. In this phase, the design team will need to make sure to not follow a one-fits-all approach, and make sure the IBP design should be connected to the product portfolio strategy of the company, by tailoring the goals and functions included in the process to the specific needs of the organization (Jurecka 2013). This practice receives the support of a Center of Expertise, which acts as the guardians of the IBP process, by making sure it matches the initial design requirements and providing corrections whenever needed (Kepczynski et al. 2019).

When structuring each phase of the IBP process the design team will need to make sure that the information provided is adequate for effective decision-making, by treating in different ways long-term and short-term decisions (Van Hove 2021). Short-term decisions can be easily automated with ML and APS algorithms. On the other hand, long-term decisions that have a high impact on the future of the organization should be taken by the Executives, that should however be well supported by an ad-hoc IBP workbench software, that allows clear visualization of the key insights. Finally, the IBP team should not focus too much on details when analyzing long-term solutions at an aggregate level, to avoid the Senior Management getting lost in misleading data (Hirschey and Spira, n.d.).

When designed an effective IBP process that respects all the requirements mentioned in Section 8.1 and following the useful guidelines provided so far, organizations can focus on refining the most complex activities of the process. As mentioned in the methodologies section scenario planning, the inclusion of finance, portfolio management and the potential integration of key external stakeholders are the most important topics addressed by both academic and practitioners' literatures, especially in the latest years. In this sense, it is fundamental for companies to not only include them in their IBP process, but to master them and ensure that they are correctly performed.

As highlighted in the results, a mature IBP process should present two main kinds of scenario planning activities: ones that support decision-making, and ones that anticipate the occurrence of certain vulnerabilities and opportunities. Being able to

plan all kinds of scenarios and visualize all the relevant data in the workbench in an insightful way is one of the key issues that enable Senior Management to be confident in taking decisions.

On the other hand, the contribution of the finance department is being a collaborator and partner for each department rather than safeguarding the budget. Moreover, applying the EVA approach leads to a deeper assessment of the financial health, filling the heavy lack of S&OP of not considering the C2C cycle and NOWC in the outcome of the plan.

The Product and Portfolio management perspectives are at the core of the first step of the IBP cycle. As mentioned above, the whole structure of the IBP process should be tailored to the Product and Portfolio Management strategies that the organization would like to follow. In particular, ABC analyses should be performed to ensure that the effort is well-balanced among all the items (Hozack 2020). Moreover, companies should introduce a parallel process for NPIs, as the level of uncertainty around those activities is higher compared to the one of all the other products tackled by the standard IBP process.

As mentioned for the RQ1, once companies achieve a high level of internal integration, they should focus on expanding their process to the Key External Stakeholders, by adopting the CPFR practice and linking it to the process. In this way, a long-term commitment is established with key partners, that can benefit from a more structured way in the exchange of information (Ireland and Crum 2020).

After IBP is up and running, companies should focus on the constant monitoring of its performance and embrace a comprehensive scorecard that provides a concise and complete overview of the performance of the process. The understanding of the functional decisions on the totality of the process would increase the awareness of each department. Moreover, constant monitoring of KPIs would make sure to perform a Gap analysis, identifying eventual criticalities in the alignment between strategy and operations.

Figure 51 resumes the steps companies should take when designing an IBP process.

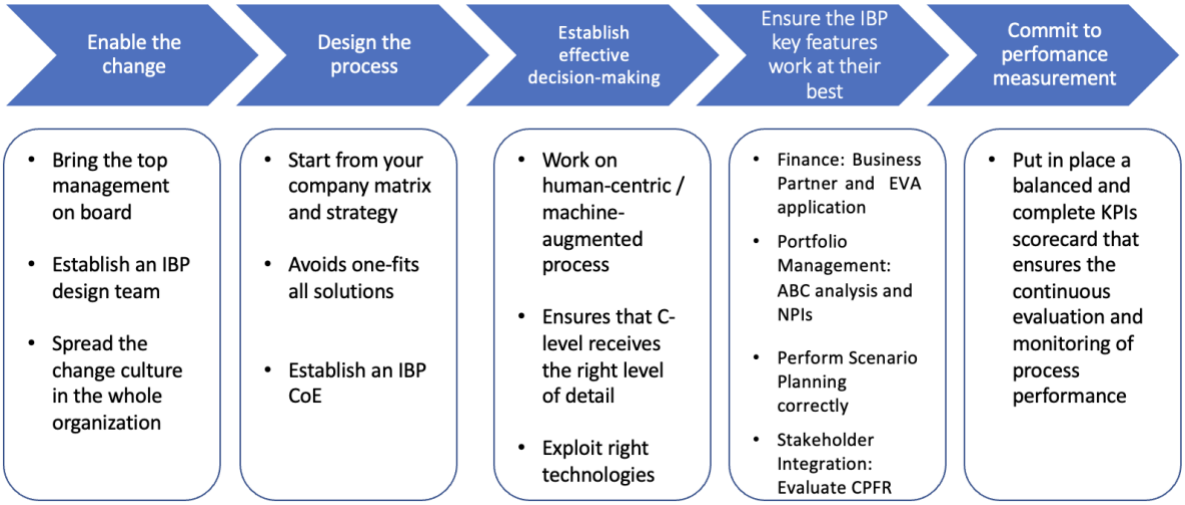

Figure 51: Journey path for a successful Integrated Business Planning

The results of this thesis highlight a clear path that companies should follow when embracing the transition from S&OP to IBP. As for most innovations, working on people and ensuring a smooth change management process is the first key issue to be addressed. Followingly, companies should ensure the process to be designed with a tailored approach by therefore ensuring its compliance with corporate goals and objectives. Once the general structure of the process is designed, companies delve in detail into structuring the information flow runs as smoothly as possible, as well as designing in detail each step of the process, by focusing in the key areas mentioned for the RQ1. Once the whole process is up and running, constant performance monitoring should be performed through a comprehensive scorecard of KPIs.

9. Conclusion

The purpose of this Systematic Literature Review is to provide clarity on the emerging topic of Integrated Business Planning. Sales and Operations Planning has long been recognized as a successful process that promotes cross-functional collaboration between revenue (Sales & Marketing) and cost-oriented functions (Supply Chain & Operations), replacing the limited siloed approach and improving company performance. As companies became more aware of the potential of S&OP, they sought to expand or raise the process, identified as Integrated Business Planning. The existing literature identifies that this tactical process should be raised into a more strategic one, but it does not provide a clear discussion about the pattern of this evolution. However, the recent and emerging trend of IBP has not been deeply investigated yet. Therefore, it is outlined the need to address this gap through an SLR. This thesis provides a comprehensive analysis of the transition from S&OP to IBP, and it aims to identify the key differences between the two processes.

The available scientific literature, or white literature, provides limited information on the topic and mainly shows examples of potential improvements or practices, without defining the direction of the evolution of S&OP into IBP. Therefore, it would not have been sufficient to run a systematic literature review. Conversely, the grey literature, or practitioner's publications, presents a more pragmatic but fragmented discussion that does not provide a complete view of the context.

Therefore, the first contribution of this work is the integration of the theoretical and rigorous approach of the white literature with valuable insights deriving from the real-world practices, experiences and challenges faced by practitioners. In this way, it was possible to compare if the idealistic and optimistic viewpoint of practitioners matches the actual implementations of companies documented in official papers of the scientific domain.

The second contribution of this work is being the first systematic literature review that attempts to shed light on the key differences between S&OP and IBP to distinguish them. First, it has been clarified the suggested perspective to have about IBP, stating that it represents a formalization of the highest stage of maturity of S&OP. In this way, it is reconciled the two different streams of those who think that IBP is just the same as a re-branded S&OP with those who claim that IBP is an innovative solution in comparison to its predecessor. Then, we propose a list of requirements that a mature and advanced S&OP should own to claim to be called IBP. The added value of this work is to analyze and group all the dispersed features that differentiate the two processes to state that an S&OP process can be re-called Integrated Business Planning.

The third contribution is the proposal of a theoretical framework that supports the steps of the transition from S&OP toward IBP. In this direction, this work presents a unique process of ordering the studies performed before and suggests a clear path that

can be followed by both practitioners and academics when addressing IBP implementations.

9.1 Managerial Implication

The results of this thesis confirm that Sales and Operations Planning (S&OP) is a highly effective supply chain practice. Manufacturing companies that have yet to implement S&OP should consider adopting it, as it promises to deliver superior performance and serve as a foundation for managing the entire business, ultimately leading to Integrated Business Planning (IBP).

Companies should become more aware that IBP is not an unreachable finish line, especially for a well-established S&OP. Although it is a complex and long transition, managers should realize that the transition starts from the organization's mindset and be prepared to face an important change and redefinition of the process.

Furthermore, if the S&OP process is mature enough and meets the essential requirements for IBP, companies should develop the idea of adopting the term Integrated Business Planning to elevate it to a more strategic and complete process. It would indirectly raise the awareness of the people involved to something more valuable to the business rather than executing a tactical plan.

The findings should sensibilize consulting companies that are convinced to propose an innovative solution by simply renaming it to sound more appealing. S&OP is inevitably evolving into more complete and strategic process, but they should take into account the set of minimum requirements that we propose to state that the transition is accomplished.

9.2 Limitations

The work is not without limitations. A Scientific Literature Review has a limited scope of including only the material that has been selected. The time window analyzed ranges from 2003 to 2022, but the emerging trend of IBP suggests that the most recent publications in progress may not have been included in the research.

A SLR is affected by a publication bias where studies with positive results are more likely to be published compared to those with negative results. Generally, the Grey Literature is expected to counterbalance this positivity, but the material found tends to support the potentiality of moving from S&OP to IBP. In addition, this work might be influenced by our subjectivity and interpretation.

The proposed theoretical framework lacks empirical evidence because it has not been tested or validated through surveys or case studies. Indeed, most of the companies did not reach a maturity level sufficient to be ambitious to establish an IBP process, whose

examination would not lead to relevant insights or information. In addition, the transition toward IBP is a long phenomenon that can't be analyzed in the narrowed time span available for a master thesis. This limited depth of analysis might lead to a generalization of the conclusions, while S&OP and IBP should be contextualized based on the type of industry, company size and market.

9.3 Future directions of research

The results of this SLR should be contextualized based on the company case and it leaves space for a case-by-case approach for the IBP implementation. As a matter of fact, the general principles of the process are necessary to be readapted and tailored in function of the specific market and the unique characteristics of each industry.

The dynamic and ongoing evolution in IBP motivates further research, trying to identify a shared and common framework to accomplish the transition. Moreover, it will be a starting point to investigate which challenges and opportunities can arise when reaching a fully mature Integrated Business Planning, leading to the development of a maturity model. It would be interesting to discuss if it might become a proper tool for managing the whole enterprise, also at C-level suit.

IBP still preserves a sequential approach between the demand and supply phase. Although concurrent planning is considered a suggested practice of a fully mature S&OP/IBP, companies still struggle to drastically change their process in the parallelism of the two plans. An interesting field of investigation would be the application of successful concurrent planning.

S&OP and IBP originate from the manufacturing sector since the planning structure perfectly fits with this type of industry. A future implication would be the application of the IBP process in a non-manufacturing environment, such as retail, adjusting its structure based on the different approaches in balancing supply and demand.

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List of acronyms

AP = Accounts Payable

APS = Advanced Planning Schedule

AR = Accounts Receivable

BDA(C) = Big Data Analytics (Capabilities)

C2C Cycle = Cash-to-Cash Cycle

COGS = Cost of Goods Sold

CoE = Center of Expertise

CSL = Customer Service Level

EBIT = Earnings Before Interest and Taxes

EBITDA = Earnings Before Interest, Taxes, Depreciation and Amortization

ERP = Enterprise Resource Planning

EVA = Earned Value Added

FMCG = Fast Moving Consumer Goods

IBP = Integrated Business Planning

KBI = Key Behavioral Indicator

KPI = Key Performance Indicator

MBR = Management Business Review

NOA = Net Operating Asset

NOPAT = Net Operating Profit After Taxes

NOWC = Net Operating Working Capital

MRP = Material Resource Planning

NPI = New Product Introduction

RM = Revenue Management

S&OP = Sales & Operations Plan

SC = Supply Chain

SKU = Stock Keeping Unit

SS = Safety Stocks

SME = Small Medium Enterprise

WACC = Weighted Average Cost of Capital

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