

Sales and Operations Planning: A Business Practice to Align Supply Chains

José Mario Valadez Cedillo, Juan Carlos Pérez García

Popular Autonomous University of the State of Puebla, Puebla, Mexico.

Abstract— Purpose: To summarize the existing knowledge in the scientific literature about the relationship between Sales and Operation Planning (S&OP) and alignment of the stakeholder in the supply chains.

Design/methodology/approach: Bibliometric research using text mining over 37 selected papers, Scimago Journal Rank Q4 or better.

Findings: Our findings suggest that the relationship between S&OP and alignment has rarely been studied in the academic literature.

Research limitations: These results indicate the need for more studies to build a theory for alignment based in Sales in Operations Planning practice.

Practical implications: This paper presents a research agenda to close the gap between practice and promise in supply chain management.

Paper type: Literature review.

Originality/value: This paper makes two specific contributions to the literature. First, It provides an agenda for research in functional alignment in the Supply Chain; and next, promotes the need to capitalize on the advantages offered by text mining in the operations planning field.

Keywords— Sales and Operations Planning; S&OP; alignment; tactical planning; supply chain.

I. INTRODUCTION

To successfully face the current competitive environment, companies need to adjust and detail frequently their operational plans, and S&OP can perform coordination of the supply chain for a competitive performance (Wang, Hsieh, & Hsu, 2012).

S&OP is a process that integrates tactical plans of different organizational functions such as sales, marketing, product development, supplies, manufacturing and the financial plan

(Hulthen et al., 2016; Thomé, Scavarda, Fernandez, & Scavarda, 2012). S&OP is also defined as the process of developing “tactical plans that assist management in strategically directing the business to achieve continuous competitive advantage” (APICS, 2011)-53). Researchers suggest that S&OP is a good practice to make decisions that respond to frequent changes in demand, cost, or other characteristics of market delivery (Coker & Helo, 2016).

S&OP process does not have a consensus definition among researchers and practitioners. However scientific literature agrees that its main purpose is to align functional plans – even those part of the supply chain – seeking positive impacts in the use of resources, operating costs and response to the market (de Almeida, Marins, Salgado, Santos, & da Silva, 2015; Hollmann, Scavarda, & Thomé, 2015; Kjellsdotter Ivert & Jonsson, 2010; Kristensen & Jonsson, 2018; Moon & Allw, 2015; Sombultawee & Boonitt, 2018; Steinrücke & Jahr, 2012).

Recent literature considers the vertical and horizontal alignment of functional plans a key element of S&OP in different industrial sectors and companies. This is even extended to the external functions of the supply chain (Wagner, Ullrich, & Transchel, 2014).

The purpose of this article is to summarize the existing knowledge in the scientific literature about the relation between S&OP and alignment of the stakeholder in the supply chains. This research is a bibliometric study on selected academic papers. It finds that the S&OP seeks horizontal and vertical alignment in the supply chain, but it doesn't describe detailed specifications of the way in which the alignment takes place, because, despite the wide literature on S&OP, little has been published on how to enable functional alignment through S&OP practice.

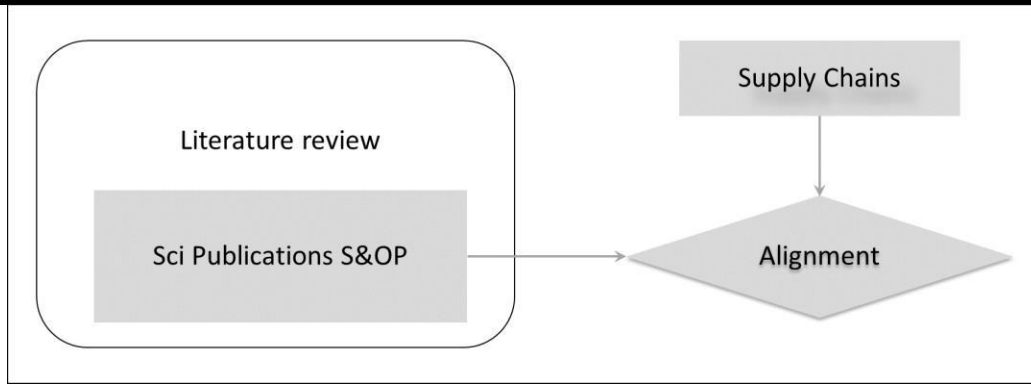


Fig.1: Conceptualization of the construct

Source: Own elaboration, 2018.

Literature makes clear that alignment is mandatory and a quality difficult to achieve in the practice, even if it might seem simple at first sight (Wagner et al., 2014). A better understanding of how alignment occurs would allow managers to react quickly to changes in the competitive environment.

II. LITERATURE REVIEW

The S&OP is part of the disciplines of operations planning (Olhager, 2013), and its first references in the scientific literature date from the end of the last century (Thomé et al., 2012). The selected literature does not refer to a single S&OP model, but to its different interpretations

according to the context in which it is applied (Thomé et al., 2012). The characteristic that is shared between the different interpretations, is that it produces alignment among the business stakeholders (Wagner et al., 2014).

2.1- Operations Planning

The focal point in operations planning has evolved from a basic level to a more complex one; from Shop Floor Control in the 1960s, to Supply Chain Planning in 2000s, S&OP practice was the focal point during the 1990s (Figure 2). In their search for greater competitiveness, organizations have increasingly incorporated a greater number of criteria to make the most of their operating resources (Olhager, 2013).

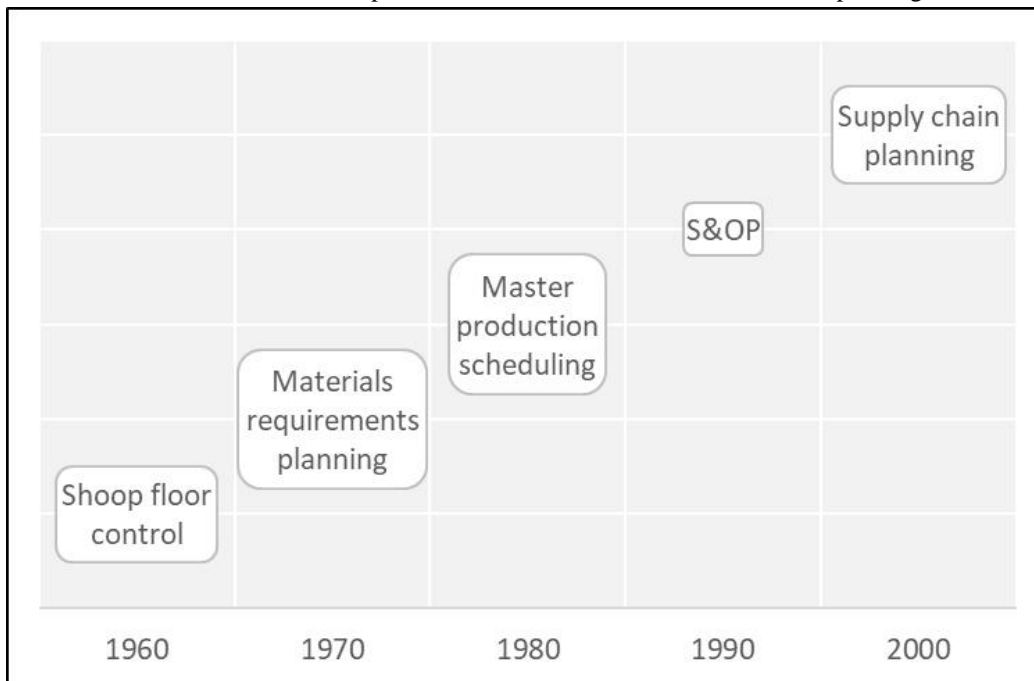


Fig.2: Evolution of the focal point in planning operations

Source: Olhager, 2013.

2.2 Sales and Operations Planning

The Council of Supply Chain Management Professionals –a leading professional association for supply chain and operations–, defines S&OP as a process that "reconciles conflicted business objectives"(Vitasek, 2013). In the same way, Tuomikangas and Kaipia (2014) point out that S&OP is a valuable process for achieving business’ strategic objectives. The alignment of tactical plans in different departments of the organization allows establishing a link

between the short-term goals and the strategic objectives of the company to maximize results(Wagner et al., 2014).

The practice of S&OP has its background during the 1950s decade, specifically at Holt, Modigliani, Muth and Simon's work on operations management (Noroozi & Wikner, 2012). S&OP literature started in 1998 (Thomé et al., 2012)at an upward in from 1998 to 2010 (Figure 3).

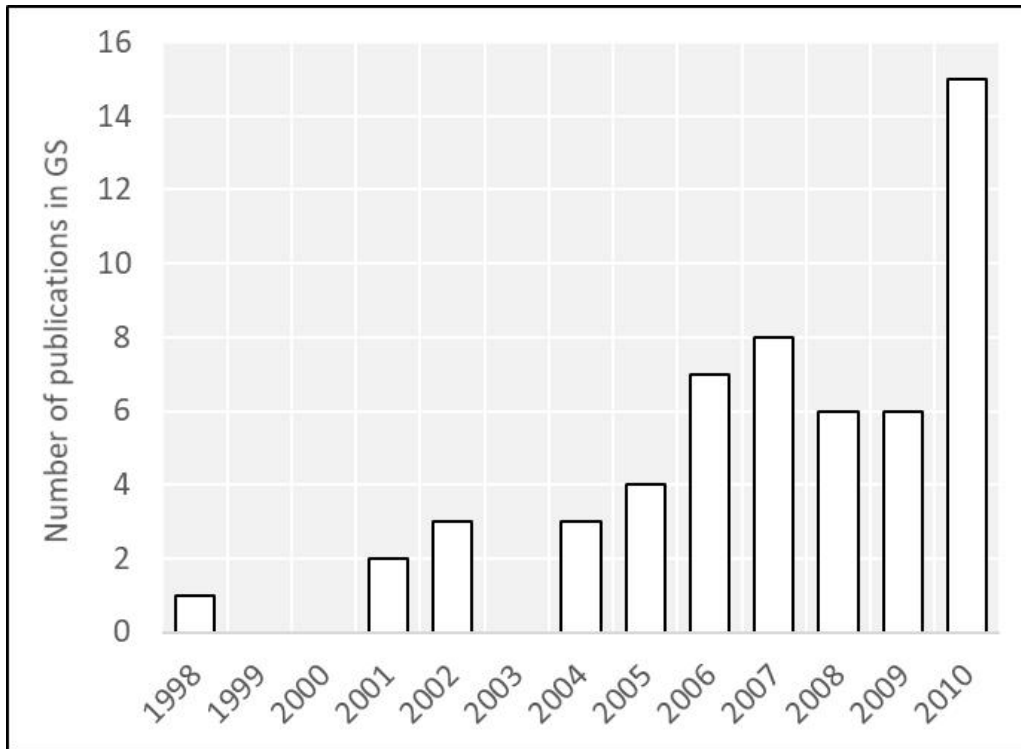


Fig.3: Number of publications on S&OP per year in Google Scholar

Source: Thomé et al, 2012.

2.3 Contextual design

Has been established that S&OP can have different objectives in different companies; and that the process and its activities are also changeable, especially when they respond to the conditions of the industrial sector and the company's strategy(Thomé et al., 2012). The investigation of operational planning and S&OP has been carried out on different industrial sectors (Table 1).

Table 1: Papers by Sector

Automotive	(Lim, Alpan, & Penz, 2014; Plank & Hooker, 2014; Scarvada et al., 2014)
Food	(Christopher & Ryals, 2014; Ivert, Dukovska-Popovska, Fredriksson, Dreyer, & Kaipia, 2015; Ivert et al., 2014)

Dairy	(Nemati, Madhoshi, & Ghadikolaie, 2017)
Cosmetics	(Hulthen et al., 2016; Rojas & Hazin, 2014)
Discrete Manufacturing	(Noroozi, 2017; Noroozi & Wikner, 2016)
Process Industry	(Noroozi & Kumar, R. and Srivastava, 2014; Noroozi & Wikner, 2012, 2017)
Paper	(Naslund & Williamson, 2017)
Reverse Clothing Supply Chain	(Sandberg, Pal, & Hemilä, 2018)
Grocery Retailing	(Dreyer, Kiil, Dukovska-Popovska, & Kaipia, 2018)

Source: Own elaboration, 2018.

Due to the nature of its context-based design(Kristensen & Jonsson, 2018), in literature,S&OP practice is named in various ways through literature (table 2).

Table 2: Names used to refer practice of S&OP

SIOP	Sales operations and inventory planning
IBP	Integrated business planning; profit, sales, and operations planning;
	Supply chain sales and operations planning
	Sales/production sales and operations planning
	Global sales and operations planning
	Executive sales and operations planning
DSI	Demand and supply integration

Source: Own elaboration with information of Kristensen and Jonsson, 2018.

2.4 Alignment

Alignment, together with agility and adaptability, allows organizations to deal favorably with changes in the competitive environment (Dubey, Altay, Gunasekaran, Papadopoulos, & Childe, 2017), linking the long-term strategic goals with the planning of short-term operations (Danese, Molinaro, & Romano, 2017). Alignment is favored by management's commitment to establish incentives (Panahifar, Heavey, Byrne, & Fazlollahab, 2015), to provide connectivity to the supply chain and exchange information (Dubey et al., 2017).

The alignment of organizations occurs at three levels: strategic, tactical and operational (Sombultawee & Boon-itt, 2018). Top management must establish an adequate governance structure for executing the customer value creation strategy, by aligning the stakeholders with the clients. There is no generalized theory about alignment that can be applied (Sombultawee & Boon-itt, 2018), it is a non-unidirectional process, involving work and learning (Selviaridis, Spring, & Authors, 2018). Alignment is a complex result, although literature points out that the alignment between stakeholders is important to improve business performance, there are other types of alignment that must be considered (Skipworth, Godsell, Wong, Saghiri, & Julien, 2015) and on which it is necessary to deepen the current knowledge.

Collaboration for alignment in practice planning is affected by different variables (Table 3) on their own reach and

depth(Hollmann et al., 2015; Kristensen & Jonsson, 2018; Nabil, El Barkany, & El Khalfi, 2018).

Table 3: Factors affecting collaboration in planning

<ul style="list-style-type: none"> • Demand elasticity. • Market uncertainty and lead times. • Goals of the process: responsiveness vs efficiency. • Supply uncertainty. • Supply Chain spatial complexity: number of partners and geographical distance. • Company complexity; firm size. • Hierarchical planning framework: linking strategic planning with tactical planning or tactical planning with the operational plan. • The maturity of planning framework. • Organizational characteristics: human, technological and characteristics of the organization: external and internal integration. • A number of products: same or different products.
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Source: Own elaboration, with information ofHollmann et al., (2015); Kristensen & Jonsson,(2018); Nabil et al., (2018); Wagner et al., (2014).

III. RESEARCH METHODOLOGY

The methodology applied is a bibliometric study in 4 steps (Figure 4).In the first step, 37 documents of ProQuest and EBSCOhost Research Databases were selected with the search terms "Sales and Operations Planning"; "Sales &Operations Planning"; "S&OP" and "Supply Chain Alignment". The search was also limited to articles published from the year 2014 onwards and to journals ranked inScimago Journal Rank on Q4 or better.

For steps 2 to 3 the text mining system "Enterprise Miner 14.1"Advanced Analytics Software | SAS <https://www.sas.com/>was used processing summary, author, year of publication, journal,and ranking of the journal of selected research.

The second step wasText Parsing and Filter, to quantify selected information about the terms that are contained in abstracts. The third step was Clustering data, classifying and establishing relationships between the concepts contained in the selected documents.

The fourth step was the analysis of the processed information.

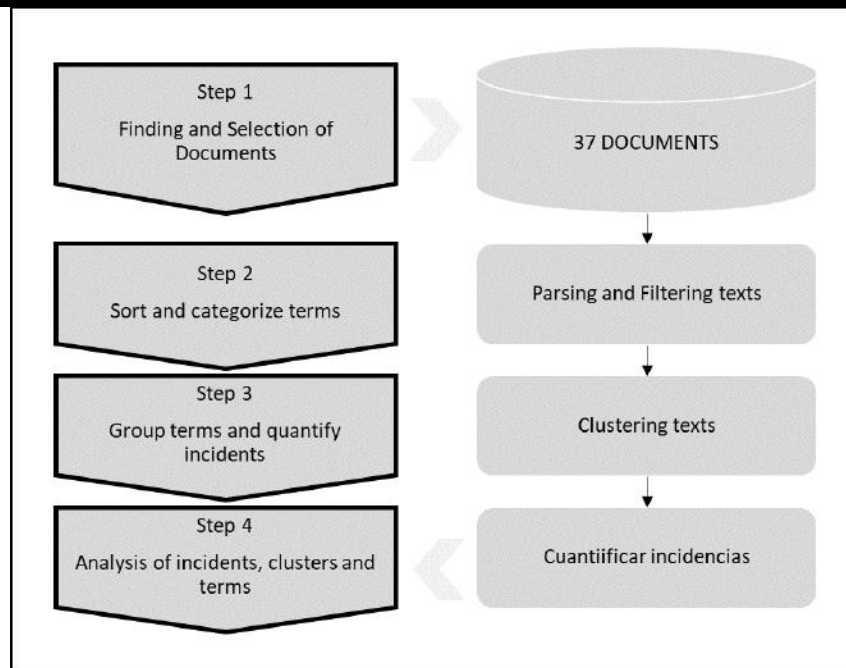


Fig.4: Research Methodology

Resource: Own elaboration, 2018.

IV. RESULTS

The number of papers from 2013 to 2017 is between 6 and 9, the data from 2018 is partial to March (figure 4).

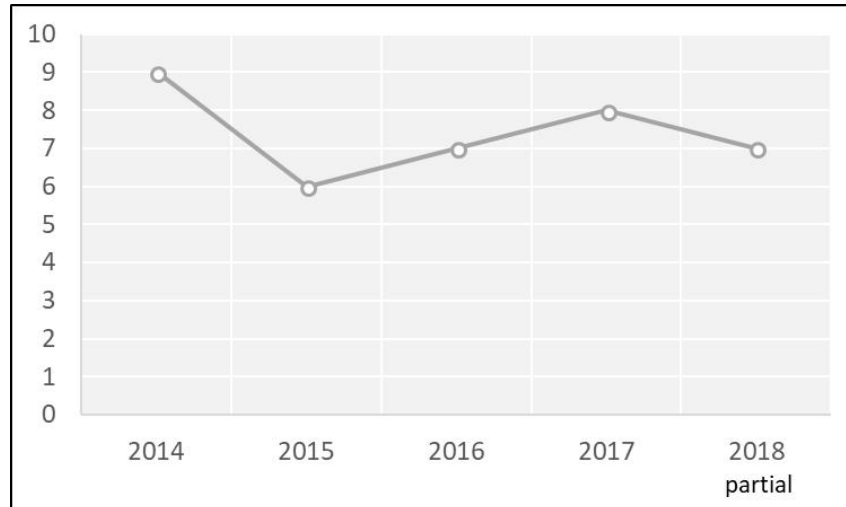


Fig.4: Number of research publications for the year

Source: Own elaboration, 2018.

The documents were selected from 22 journals, 1 of them contributed with 5 papers (International Journal of Physical Distribution and Logistics Management), 16 of them with only 1 (Appendix 1). 14 journals and 28 papers belong to the rank Q1 (Figure 5).

The authors of the papers are 104 and they are in 20 countries (Appendix 2). Most of the contributions are from Sweden (14%), and the USA:(13%) while 66% of the authorship is covered in 6 countries: USA, United Kingdom, Finland, Brazil and Denmark (Figure 6).

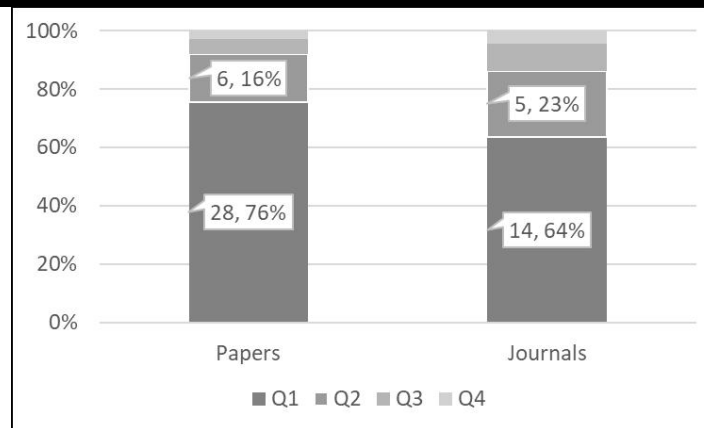


Fig.5: Distribution of papers and journals by SJR Rank

Source: Own elaboration, 2018

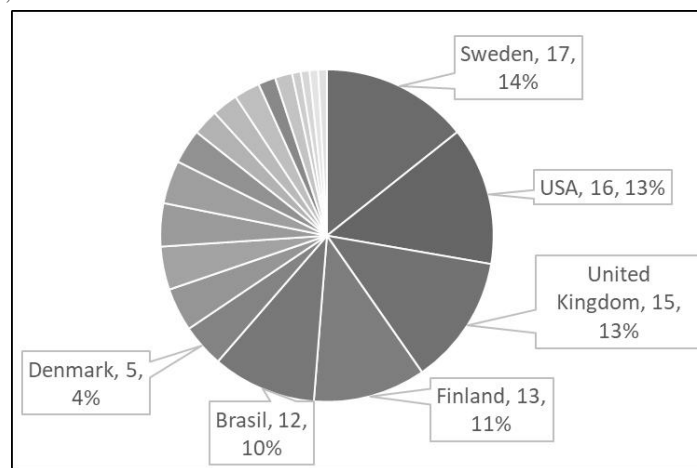


Fig.6: Authorship by Country

Source: Own elaboration, 2018

The term “Sales and Operations Planning” appears with a frequency of 147 in 20 papers; the term ‘alignment’ appears with a frequency of 41 in 11 papers and the term ‘supply chain’ appears 51 times in 19 papers (Figure 7).

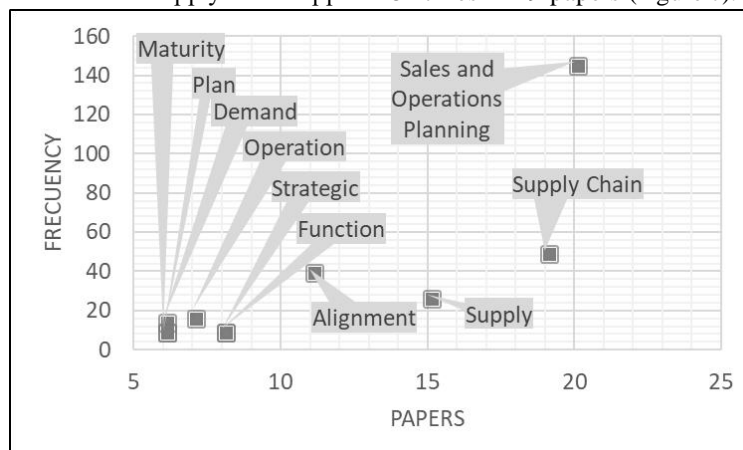


Fig.7: Number of Papers by Frequency of Terms

Source: Own elaboration, 2018

The relationship analysis of concepts, shows that the term ‘supply chain’ is directly related to the terms ‘Sales and Operations Planning’ and ‘alignment’, while these only have an indirect relation to each other (Figure 8).

Cluster analysis, obtained with the Expectation-Maximization clustering algorithm with using a Hierarchical clustering algorithm, with 4 descriptive terms, produced 5 clusters (Table 4).

The relationship of the frequency and quality of the grouping measured with the Root Mean Square Standardized (RMS Std.) is shown in Figure 9, and in

Figure 10 the frequency of the clusters in the analyzed documents is shown.

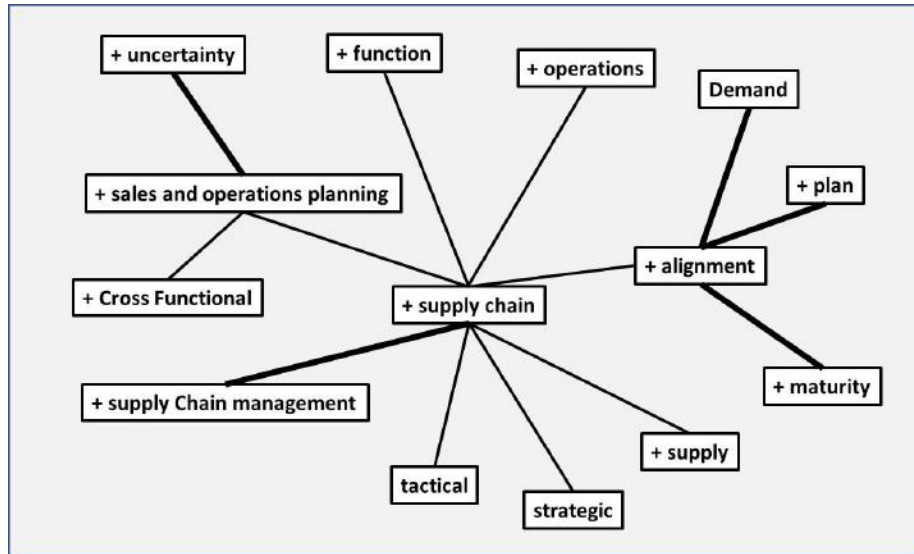


Fig.8: Concept linking between S&OP, Supply Chain and Alignment

Source: Own elaboration, 2018

Table 4: Clusters

Cluster	Descriptive terms	Frequency	RMS Std.
1	[strategic] [tactical] [alignment] [coordination]	8	0.18565
2	[maturity] [Sales and Operations Planning] [plan] [market]	11	0.191357
3	[operations] [function] [Croos Functional] [demand]	4	0.194552
4	[Tactical planning] [integration mechanism] [Supply Chain Management] [supply chain]	9	0.301199
5	[Operations Planning] [contextual] [uncertainty] [Supply Chain Management']	5	0.22495

Source: Own elaboration, 2018.

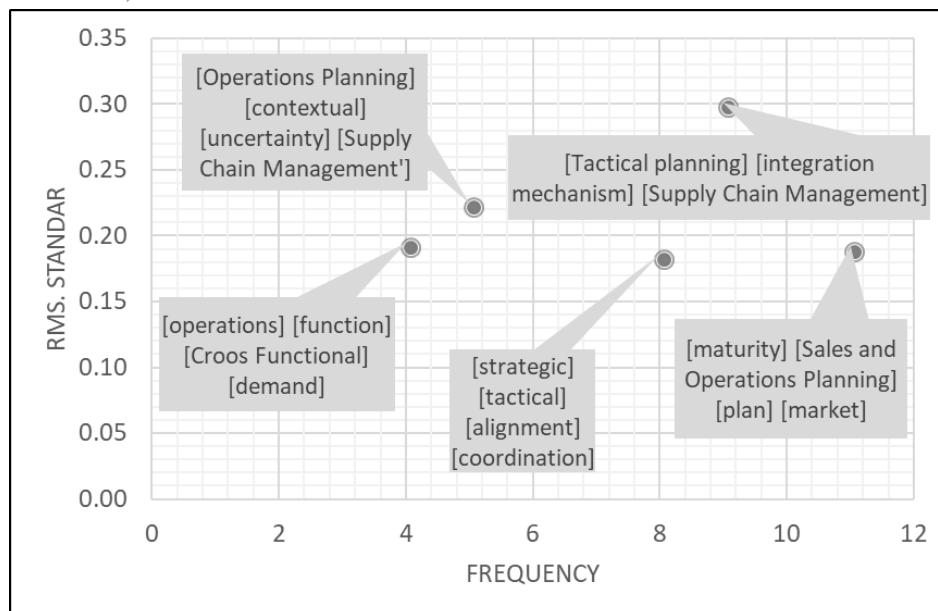


Fig.9: Relationship of the frequency and quality of the clustering

Source: Own elaboration, 2018.

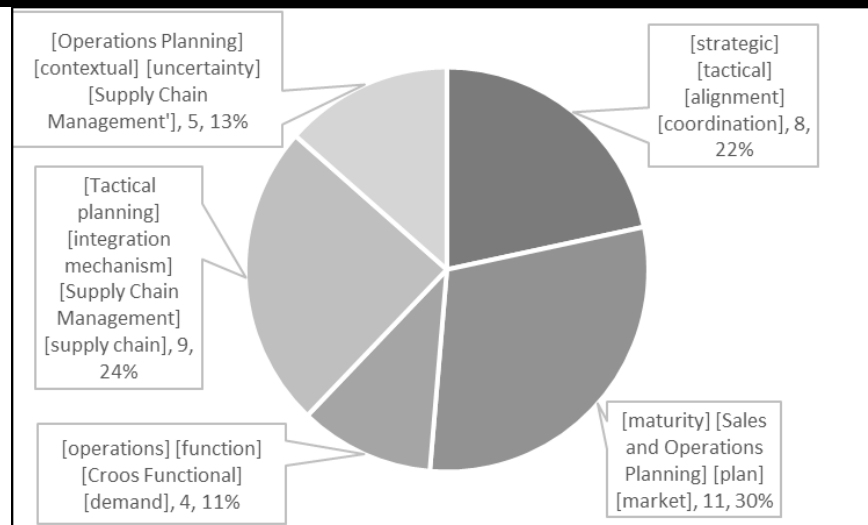


Fig.10: Frequency of clusters

Source: Own elaboration, 2018.

V. DISCUSSION

Through the analysis of text mining, it was not possible to find a direct relationship between the terms: "alignment" and "S&OP" (figure 8). "Alignment" appears in clusters analysis in the relationship with terms: "Strategic", "Tactic" and "Collaboration", which reveals the areas of interest that academics have related with the term alignment in their researches.

S&OP forms the cluster most frequently with 'maturity', 'plan' and 'market': 30% (figure 10). Maturity is one of the factors that affect collaboration (Table 3), so we can suspect that the research in S&OP has an important orientation to the maturity of the planning process and its relationship with the market.

VI. CONCLUSION

This manuscript establishes a broad field of research because the alignment of the stakeholders is an important factor for the maintenance and development of competitiveness. The construction of a theory about how the alignment is achieved will allow practitioners to improve the performance of their businesses. This manuscript also opens the way to the use of text mining technology in the field; sparingly used to date. In future researches, it is convenient to consider a greater number of articles, to expand the amount of text considered in each document, not to limit it to the summaries and to extend the range of years considered to identify trends with greater clarity; and above all: to make a deeper use of the text mining tool.

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Appendix 1

Journals, SJR Rank and papers

SJR Rank	Journal	No. Docs.
Q1	International Journal of Physical Distribution and Logistics Management	6
Q1	Journal of Business Logistics	3
Q1	International Journal of Production Research	3
Q1	International Journal of Operations and Production Management	3
Q1	International Journal of Production Economics	3
Q1	International Journal of Logistics Management	2
Q1	Production Planning and Control	1
Q1	Computers in Industry	1
Q1	Business Horizons	1
Q1	Journal of Operations Management	1

Q1	Computers and Chemical Engineering	1
Q1	Supply Chain Management	1
Q1	International Journal of Advanced Manufacturing Technology	1
Q1	International Journal of Productivity and Performance Management	1
Q2	Benchmarking	2
Q2	Operations Research Perspectives	1
Q2	Production and Manufacturing Research	1
Q2	Dyna	1
Q2	Journal of Research in Interactive Marketing	1
Q3	International Journal of Supply Chain Management	1
Q3	Academy of Marketing Studies Journal	1
Q4	International Journal of Engineering Research in Africa	1

Source: Own elaboration, 2018.

Appendix 2

Authors, country papersorted by number of papers, country and name)

Author	Country	Total	Author	Country	Total
Kaipia, Riikka	Finland/Sweden	5	Nabil, Lahloua	Morocco	1
Dukovska-Popovska, Iskra	Denmark	3	El Barkany, Abdellah	Morocco	1
Dreyer, Heidi Carin	Norway	3	El Khalfi, Ahmed	Morocco	1
Thomé, Antônio Márcio Tavares	Brasil	2	Chabada, Lukas	Norway	1
Holmström, Jan	Finland	2	Kiil, Kasper	Norway	1
Tuomikangas, Nina	Finland	2	Sousa, Rui Soucasaux	Portugal	1
Fredriksson, Anna	Sweden	2	Sandberg, Erik	Sweden	1
Ivert, Linea Kjellsdotter	Sweden	2	Norrmann, Andreas	Sweden	1
Da Silva, Andrea Lago	Brasil	1	Näslund, Dag	Sweden	1
da Silva, Sérgio Luis	Brasil	1	Noroozi, Sayeh	Sweden	1
de Almeida, Marly MizueKaibara	Brasil	1	Pal, Rudrajeet	Sweden	1
Do Carmo, Luiz Felipe Roris	Brasil	1	Hulthen, Hana	Sweden	1
Rodriguez Scavarda	Brasil	1	Johansson, Mats I.	Sweden	1
Salgado, Andréia Maria Pedro	Brasil	1	Kjellsdotter Ivert, Linea	Sweden	1
Scavarda, Luiz Felipe	Brasil	1	Kristensen, Jesper	Sweden	1
Pedroso, Carolina Belotti	Brasil	1	Wikner, Joakim	Sweden	1
Hollmann, Roberto Luis	Brasil	1	Wagner, Stephan M.	Switzerland	1
Santos, Fernando César Almada	Brasil	1	Boon-itt, Sakun	Thailand	1
Marins, Fernando Augusto Silva	Brasil	1	Sombultawee, Kedwadee	Thailand	1
Gaudreault, Jonathan	Canada	1	Childe, Stephen J.	United Kingdom	1
Thomas, André	Canada	1	Christopher, Martin	United Kingdom	1
Wery, Jean	Canada	1	Selviaridis, Kostas	United Kingdom	1
Damgaard, Cecilie Maria	Denmark	1	Wong, Chee Yew	United Kingdom	1
Sablón Cossío, Neyfe	Ecuador	1	Papadopoulos, Thanos	United Kingdom	1
Coker, Joakim	Finland	1	Eldrige, Stephen	United Kingdom	1
Helo, Petri	Finland	1	Godsell, Janet	United Kingdom	1
Rajala, Risto	Finland	1	Goh, Shao Hung	United Kingdom	1
Hemilä, Jukka	Finland	1	Blome, Constantin	United Kingdom	1
Småros, Johanna	Finland	1			

Appendix 2

Authors, country papers sorted by number of papers, country and name)

Author	Country	Total	Author	Country	Total
Dubey, Rameshwar	France	1	Ryals, Lynette J.	United Kingdom	1
Penz, Bernard	France	1	Saghiri, Soroosh	United Kingdom	1
Laurent Lim, Lãm	France	1	Spring, Martin	United Kingdom	1
Marier, Philippe	France	1	Skipworth, Heather	United Kingdom	1
Alpan, Gülgün	France	1	Julien, Denyse	United Kingdom	1
Ullrich, Kristoph K R	Germany	1	Tarafdar, Monideepa	United Kingdom	1
Transchel, Sandra	Germany	1	Qrunfleh, Sufian	USA	1
Nemati, Yaser	Iran	1	Roh, Joseph	USA	1
Ghadikolaei, AbdolhamidSafaei	Iran	1	Tate, Wendy Lea	USA	1
Madhoshi, Mehrdad	Iran	1	Ralston, Peter M.	USA	1
Turkulainen, Virpi	Ireland	1	Rutherford, Brian N.	USA	1
Danese, Pamela	Italy	1	Esper, Terry L.	USA	1
Chiarini, Andrea	Italy	1	Whipple, Judith M.	USA	1
Romano, Pietro	Italy	1	Murfield, Monique L.U.	USA	1
Vagnoni, Emidia	Italy	1	Grawe, Scott J.	USA	1
Molinaro, Margherita	Italy	1	Gunasekaran, Angappa	USA	1
Bakar, Abu	Malaysia	1	Plank, Richard E.	USA	1
Hamid, Abdul	Malaysia	1	Richey, R. Glenn	USA	1
Talib, Ab	Malaysia	1	Hooker, Robert	USA	1
Syazwan, Mohamed	Malaysia	1	Scott C. Ambrose	USA	1
Bautista Santos, Horacio	México	1	Swink, Morgan	USA	1
Fernández Lambert, Gregorio	México	1	Stolze, Hannah J.	USA	1
Bernabé Loranca, María Beatriz	México	1			
Sánchez Galván, Fabiola	México	1			
Martínez Flores, José Luis	México	1			

Source: Own elaboration, 2018.