

REQUIREMENTS FOR PERFORMANCE MANAGEMENT IN OFFSHORE DRILLING SUPPLY CHAINS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Highlights: Despite the relevance of performance management and measurement for supply chains, the studies will mainly focus on manufacturing, with few applications in other sectors, such as oil and gas. Among the companies that comprise supply chains in the oil and gas industry, those engaged in drilling are frequently the most impacted by supply chain-related issues. The target company of this research, which belongs to this segment, is an example of this reality. The organization does not have a system or model developed for managing and measuring performance, and the indicators used do not reflect the organizational strategy and do not result in perceptible financial or performance gains. **Aim:** Identify through a Systematic Literature Review the requirements that must be met by a supply chain performance management model to be applied to offshore drilling companies in the oil and gas market. **Methodology:** This study's methodology is based on the Systematic Literature Review method. **Results:** No studies applied to the context of offshore drilling were found in the literature analysis; however, relevant publications were identified that deal with the topics of interest to the research, some of which are in the oil and gas area. After analyzing these publications, it was possible to extract the most relevant requirements to be observed by companies when implementing a performance management model in their supply chain. **Research limitations:** The study's main limitation is the failure to apply or test the requirements in real-life situations, an aspect that could be addressed in future work. **Practical implications:** The research results are significant from a practical point of view, as they provide organizations with a specification of which requirements must be met to achieve better supply chain management. **Originality/Value:** It is also relevant in the academic field, as it fills a knowledge gap pointed out by publications over the last few decades and suggested by the Systematic Literature Review results.

Keywords: Supply chain; Requirements for Performance Management; Oil and gas; Offshore Drilling; Systematic Literature Review.

INTRODUCTION

Over the last century, global markets have undergone profound changes. The world economy has entered a new reality, environmental requirements have been established, and society's demands have been completely transformed. Companies have thus had to adapt to these changes, as markets have become extremely globalized and competitive (Qualharini et al., 2016). The oil and gas market is an example of this reality. As one of the most complex and significant markets worldwide, the oil industry has transcended political barriers and reached the center of the world's economy and geopolitics (Ahmad et al., 2017).

Organizations operating in the oil and gas market have evolved towards automation, digitalization, and implementation of new technologies. However, the management models used seem to remain far behind this development, still displaying characteristics such as low efficiency, high costs, and high risks (Lu et al., 2019). According to Chima (2007), the management models used gain importance in markets with little room for product or service differentiation. In this type of environment, supply chain management is a major source of competitive advantage. Alhosani et al. (2019) state that due to the dynamic nature of the market and the challenges inherent in the oil industry, good supply chain management has become crucial for an organization to sustain itself in this scenario.

The integration of performance management and measurement systems with supply chains can generate benefits for organizations, such as identifying opportunities for improvement and greater team motivation. However, the literature on the subject applied to supply chain management is still scarce (Chan et al., 2006). Laihonen and Pekkola (2016) point out that, despite the perceived advantages of performance management, supply chains have historically failed to take advantage of this potential.

Gopal and Thakkar (2012) state that several gaps exist in the literature when relating performance management systems to supply chain management. The authors also point out that many indicators are available, but it is difficult to find the right metrics for each specific scenario. Maestrini et al. (2017) reinforce that performance management in the supply chain is a topic of growing importance in recent years, but studies are still incomplete.

Yusuf et al. (2018) point out that studies in this area focus mainly on manufacturing chains, with few applications in the oil and gas sector. Varma et al. (2008) also corroborated the scarcity of studies carried out in this industry. According to the authors, oil companies have

unique characteristics that make the application of traditional performance management models complex. In a recent study, Rodrigues et al. (2020) also addressed the abovementioned lack in the literature, suggesting a possible gap regarding performance management and measurement in the supply chain related to the oil and gas industry.

The situation is considerably more complex in the case of offshore drilling organizations in the oil industry. According to Yusuf et al. (2014), all organizations are heavily dependent on their suppliers; however, this characteristic is accentuated in companies located at the extremes of their chains, such as those operating in offshore drilling. The fact that the services provided by these organizations are miles from the coast and their location varies constantly implies even greater difficulties than those inherent in traditional supply chains.

According to Chima (2007), each drilling rig can be compared to a small town. Purchases range from the simplest products to highly complex equipment and come from several sources, from resellers to manufacturers. The author mentions that few industries have to work in global markets with this volume and variety of materials and services. The importance of good supply chain management in this context is evident.

Based on the arguments cited above, organizations operating in the offshore drilling sector tend to find it difficult to adapt or develop a model for performance management in their supply chain. The target company of this research, operating in the Brazilian offshore drilling segment, is an example of this reality. The impacts of the shortcomings detected in the organization regarding performance management in the supply chain prompted the beginning of this work. The organization does not have a system or model developed for managing and measuring performance, which ends up causing internal communication problems, constant upheaval concerning suppliers' performance, and even internal problems linked to the sectors operating the supply chain. The indicators used today do not reflect the organizational strategy and do not result in perceptible financial or performance gains.

Based on the information described regarding the target company of the research and the oil and gas market, particularly the offshore drilling industry, there is a gap in practical knowledge regarding the adaptation or development of models for managing and measuring performance in the supply chain. According to the research cited, there are indications that this gap is not only in the practical sphere but also in the academic sphere. Therefore, the question this research aims to answer is: What requirements should be met by a supply chain performan-

ce management model to be applied to offshore drilling companies in the oil and gas market?

Thus, this study aims to carry out a systematic literature review (SLR) to answer this question. The SRL was chosen as the research methodology because it meets this objective. Through a rigorous set of steps, the methodology allows the integration of the results of previous research, presenting the current state of knowledge on the topics of interest and contributing to raising questions that may still be unexplored (Cooper, 2017).

This paper's next section will present the methodology that served as the basis for the study. The results are detailed below, and the last section presents the conclusions.

METHODOLOGY

The methodology used in this work is based preliminarily on the systematic literature review method proposed by Cooper (2017). According to the author, RSL uses a rigorous set of specific steps and techniques, making the process transparent and the results more consistent. Dresch et al. (2015, p. 142) reiterate that the SRL seeks to "map, find, critically evaluate, consolidate, and aggregate results from relevant primary studies on a research question or topic." The authors also highlight the importance of identifying gaps to be filled since the RSL provides a comprehensive and robust view of the topic studied. Thus, this research used the stages proposed by Cooper (2017) as a basis for developing the RSL, as shown in **Figure 1**.

The following topics detail the products of stages 1 to 4. For better text organization, it was considered coherent for the products of stages 5 to 7 to be presented together in the next section of the research, entitled Results.

SYSTEMATIC LITERATURE REVIEW

Formulating the problem

Dresch et al. (2015) state that it is essential to establish the scope to be covered in a literature review. Considering that the scope of the work and its objective were presented in the "Introduction" section, it has been established that this work aims to answer which requirements should be met by a supply chain performance management model to be applied in offshore drilling companies.

Literature search

A literature review requires the management of a large amount of information, so it is essential that this activity be carried out strategically (Dresch et al., 2015). The search and analysis for the initial management of information can be done through bibliometrics, enabling a more efficient search for data and the evaluation of productivity and the quality of research related to the topic (Machado Junior et al., 2016).

Currently, there are several recognized publication databases, including Web of Science, Scopus, and Google Scholar (Lopes et al., 2012; Adriaanse and Rensleigh, 2012; Harzing and Alakangas, 2015; Delafenestre, 2019). The Web of Science and Scopus are well-established databases and two of the most prestigious in scientific research. Both offer statistical analysis tools and have many publications from the most relevant journals in various fields (Chadegani et al., 2013). Google Scholar, on the other hand, does not have the same strict quality control as the other two and also has many duplicate results in its searches (Adriaanse and Rensleigh, 2012; Harzing and Alakangas, 2015). For these reasons, Web of Science and Scopus were defined as the research bases for this study. Both are mostly made up of articles published in journals, which are the main source of this research.

1. Problem formulation	2. Literature search	3. Collecting information from publications	4. Assessing the quality of publications	5. Analysis and integration of results	6. Interpreting the evidence	7. Presentation of results
Defining the central question, goals, variables, and relationships of interest to the research	Identifying search sources and keywords	Collecting and coding publications from the sources	Applying inclusion and exclusion criteria and assessing the quality of the studies	Combining the results, applying qualitative analysis, and identifying possible discrepancies	Interpreting the information from the publications studied	Synthesis of the results achieved

Figure 1. Stages of the systematic literature review.

Source: Adapted from Cooper (2017).

A total of five searches were carried out on the publication databases. In the first three, the intention was to start with a broad search with unspecific keywords until arriving at a focused search, which would return results strongly linked to the research topic. The fourth search was performed because of the results of the first three, in which there was a sharp drop in the number of publications. Search 4 then returned the keywords from Search 1, but with a different organization of quotation marks and connectors. Search 5 added words to the terms of Search 4 to make the results restricted to the research scope again.

All the searches took place in April 2020, and the following fields were always selected: title, abstract, and keywords. In order to avoid restricting the results, it was decided that no acronyms would be used in the searches. Prior reading of articles related to the topic was carried out to define the keywords and the consultations with professionals in the field. To facilitate understanding of the text, the keywords are presented in the next topic, along with the details of each search carried out.

Collecting information from publications

In literature, the stage of searching and analyzing the literature is often referred to as bibliometrics. This part of the review consists of a quantitative study aimed at measuring indices of production and knowledge dissemination, as well as monitoring patterns of authorship, citations, and results in scientific publications (Araújo, 2006; Lopes et al., 2012; Machado Júnior et al., 2016). According to Machado Júnior et al. (2016), bibliometric techniques play a significant role in mapping information of interest to researchers, not only enabling a more efficient search for data but also an assessment of the productivity and quality of research related to the topic.

The first search aimed to get an overview of the research's central themes. To do this, the following terms were used: "supply chain" AND ("performance" AND "measur*") OR "performance management." The distribution of publications over time in the last 20 years has been very similar in both databases and spread across many journals. **Figure 2** shows the graph extracted from the Scopus database, showing considerable growth over the period.

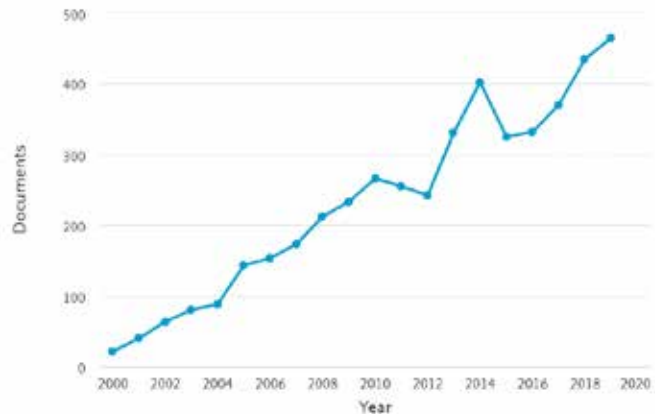


Figure 2. Distribution of publications resulting from the first search over time

Source: SCOPUS database.

When analyzing the results in terms of area of knowledge, the databases also showed similar results. Business and management were the areas with the highest number of publications in both databases: 24.2% in Scopus and 45.57% in Web of Science. The engineering area also stood out, being among the main areas in the results of both databases. **Figure 3** shows the distribution in the Scopus database.

The second search kept the same keywords as the first, adding the terms "oil" and "petroleum," linked by the connective "or." The search term was "supply chain" AND (("performance" AND "measur*") OR "performance management") AND ("oil" OR "petroleum"). The intention was to have a cross-section of publications dealing with performance management models in supply chains, focusing on the oil and gas area. Compared to the previous search, there was a sharp drop in the number of results when terms linking them to the oil and gas area were added. Over the last 20 years, despite the upward trend, the increase in the number of publications has been proportionally lower in Search 2, as shown in **Figure 4**.

The results of Searches 1 and 2 showed that the available literature on performance management models in supply chains tends to be too restricted when the topic of "oil and gas" is included. In addition, the results showed that there were many publications that dealt with the topics separately. Therefore, in the third search, we opted for a different use of quotation marks and connectors: "supply chain performance management" OR "supply chain performance measur*," aiming to obtain not only publications that deal with supply chain and performance management but also articles that connect the themes. However, the number of results was lower than expected, with only nine in Scopus and two in Web of Science. This small number of publications is in line with the conclu-

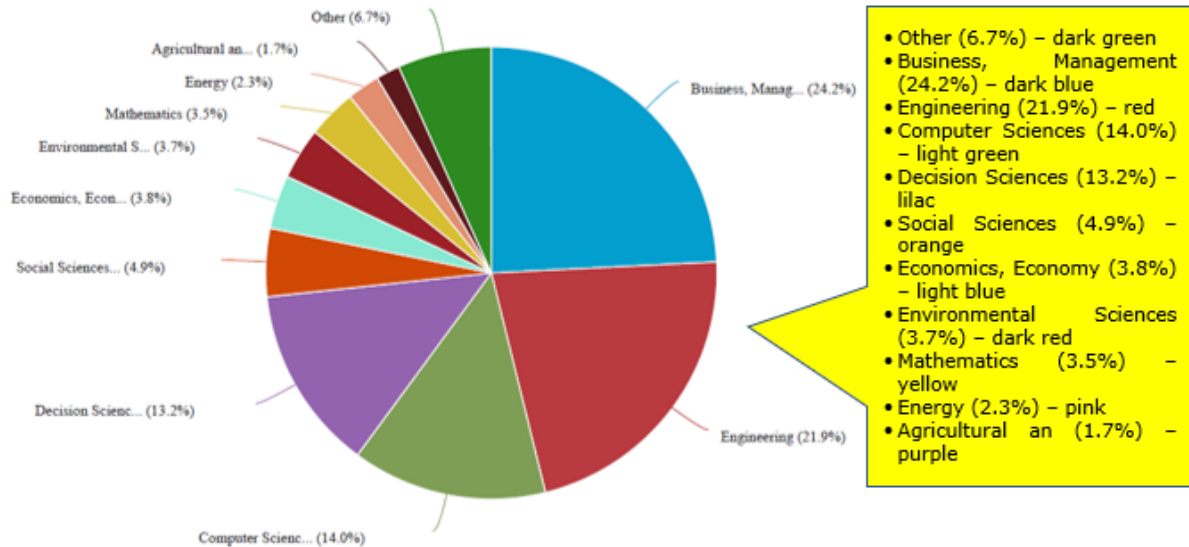


Figure 3. Distribution of publications in the first search by area of knowledge

Source: SCOPUS database.

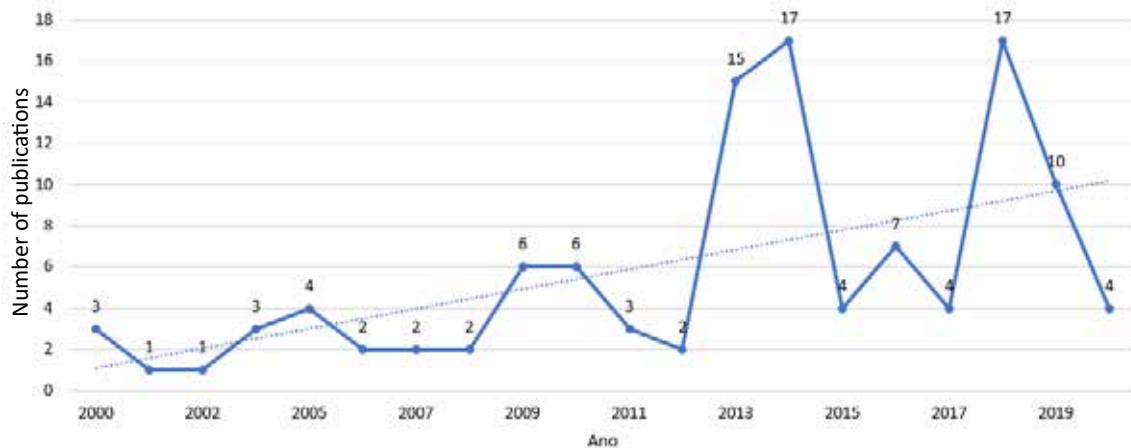


Figure 4. Distribution of publications resulting from the second search over time

Source: The authors based on data from the Scopus and Web of Science databases.

sions presented by the authors cited in the Introduction, highlighting a possible gap in the literature on the subject.

The results of Searches 2 and 3 showed that the available literature on supply chain performance management tends to be too restricted to the oil and gas sector, and especially the drilling sector. Therefore, in the fourth search, it was decided to look for more comprehensive references. Here, the same keywords were used, but organized differently: "supply chain performance management" OR "supply chain performance measur*". The aim is for the results to not only bring up publications dealing with supply chain and performance management but also articles that connect the themes.

We analyzed the keyword map generated by the VOS-Viewer tool, shown in **Figure 5**, based on Scopus and Web of Science data. A minimum of ten occurrences of each keyword were set. The software divides the map into groups identified by different colors, according to the co-occurrences of each term in the publications analyzed.

The group marked in green contains general terms linking performance measurement and supply chain management, while the red and blue groups contain terms specific to the topic. The blue group links performance measurement and supply chain management from a strategic planning perspective, while the red group focuses on models and tools applied to the subject (SCOR, Balanced Scorecard, Fuzzy Logic, and Analytical Hierarchy Pro-

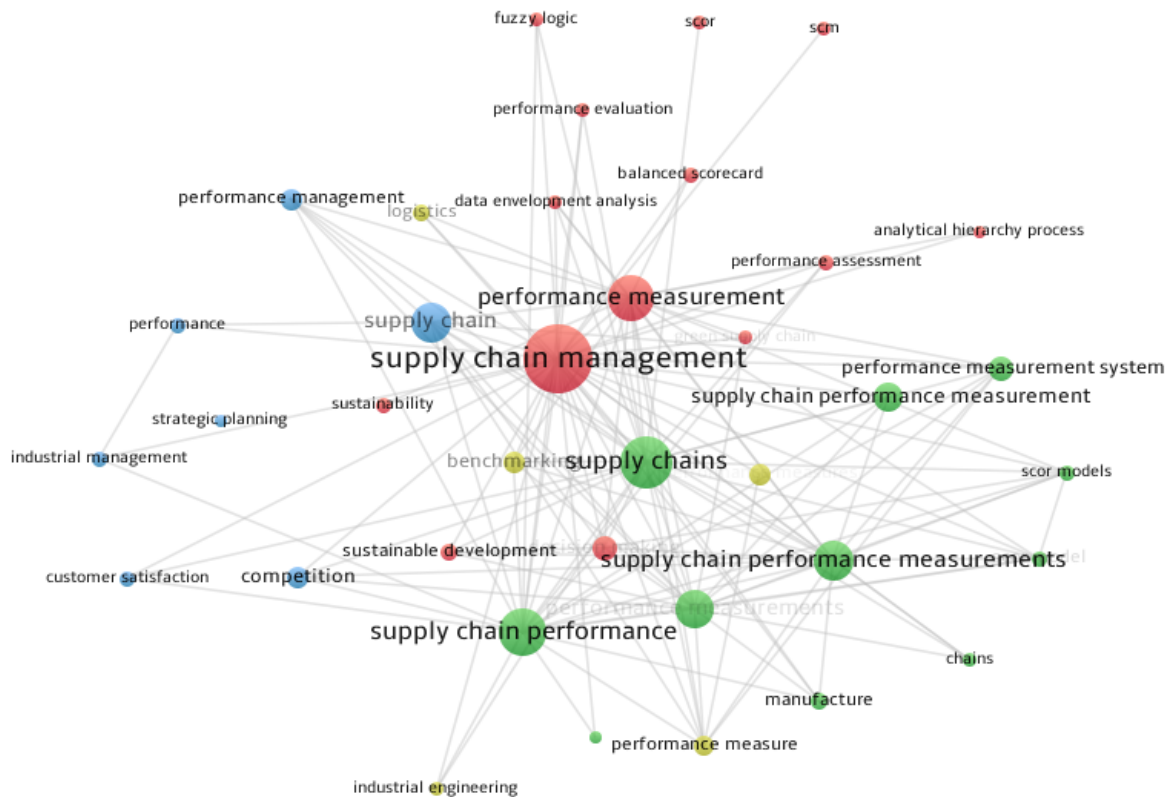


Figure 5. Keyword map of publications from Search 4

Source: The authors based on data from the Scopus and Web of Science databases using the VOSViewer tool.

cess). A more isolated group, in yellow, seems to focus on the industrial and logistical aspects of the supply chain, which are not the focus of the research.

The fifth search was based on Search 4, but an attempt was made to bring the results closer to the central goal of the work by adding the terms “oil” and “petroleum.” The search terms were: (“supply chain performance management” OR “supply chain performance measur*”) AND (“oil” OR “petroleum”). As with Search 3, where these terms were present, this one returned very few results. There were only six publications in Scopus and two in Web of Science.

Assessing the quality of publications

Once the searches had been carried out, the results were screened. Three selection criteria were applied, as shown in **Figure 6**.

After applying the selection criteria, duplicate articles were discarded from the results of each search. Search 1, for example, returned 100 publications with 28 duplicates, bringing the final number down to 72. The ten articles duplicated between the searches were also discarded in the next stage.

The result was 191 articles to be analyzed based on their titles and abstracts. Most of these publications were discarded after reading the title and abstract, reducing the number to 46. Despite passing the selection criteria and being related to the keywords, the discarded articles did not show the potential to add knowledge to this research, mostly because they dealt with the topics superficially or because they were developed in contexts very

Selection criteria		Description
1	Year of publication	Only articles with a publication year equal to or greater than 2000 were selected.
2	Area of knowledge	Only articles with research areas related to this study's themes (Engineering, Management, and Energy) were selected.
3	Number of citations	The following selection criteria were adopted to include the most-cited articles in each search: a) 50 first publications with search results sorted in order of citations if the search returns more than 200 publications. b) 25 first publications with search results sorted in order of citations if the search returns between 50 and 200 publications. c) If there are fewer than 50 results, all should be included.

Figure 6. Selection criteria applied at the publication analysis stage

Source: The authors.

different from the area studied here. **Table 1** shows the results in quantitative terms.

When reading the 46 selected articles in the previous stage, a careful analysis was made of the content covered by each one. A check of the titles and abstracts indicated that all of them were related to the research themes; however, it is only by reading them in their entirety that it is possible to understand the ideas they address and confirm this fact.

According to Dresch et al. (2015), three criteria should be considered when assessing the quality of publications. First, the publications must have a good quality level in their execution. The studies must have been conducted to adequate standards, and their conclusions must be based on facts and data. All the articles analyzed in their entirety showed satisfactory levels in this regard.

The second criterion is suitability for the review questions, seeking to assess whether the publications really do address the subjects intended in the RSL. It can be seen that most of the publications deal with the application of PMMSs to the supply chain, which is in line with the search strategy used. However, most of the research was conducted in the manufacturing industry. Only four publications linked PMMSs to the oil and gas industry, and none of them were applied to offshore drilling. **Figure 7** illustrates this distribution.

These results lead to the last evaluation criterion proposed by Dresch et al. (2015) for assessing quality: suitability for the focus on the review. The authors suggest that the studies found should have been conducted in identical or at least similar contexts to the research. This aspect was answered in the analysis of the review questions, and only four publications took place in contexts similar to the research, none in an identical context. This fact indicates the low quality of the publications found in this respect; on the other hand, it reinforces the indication proposed of a possible knowledge gap in some pa-

pers when management and performance measurement in the supply chain are related to the oil and gas industry.

The Literature Review allowed for the identification of relevant publications related to the topics of interest to the research. This survey was used in the analysis that will be presented in the next topic of the research. The aim was to identify the main requirements to be met by a performance management model applied to the supply chain management of a company involved in offshore drilling. The 46 articles selected after the RSL and analyzed in their entirety are listed in Appendix I of this paper.

RESULTS

After assessing the publications from the Systematic Literature Review, the survey that is the final goal of the research can be performed. Based on the selected studies, we sought to identify which requirements should be met by a supply chain performance management model to be applied to offshore drilling companies in the oil and gas market. To this end, the method proposed by Simon (1996) and Hevner et al. (2004) was chosen, alongside the contributions of Hevner (2007) and Alturki et al. (2011).

Following the logic structured by Hevner (2007), two perspectives must be analyzed to achieve these requirements. The author states that the first perspective is the literature knowledge base, from which theoretical requirements are extracted to be met by the research product (rigor cycle). As mentioned above, the input for analyzing this perspective was the RSL result.

The second perspective is the research environment, which includes the target company's characteristics, the work, and the external environment (relevance cycle). At this point, two main data sources can be highlighted: in addition to the contribution of publications from RSL, already mentioned in the previous paragraphs, the information gathered from the target company was vital in

Table 1. Summary of search results and number of articles selected.

Search	Base	Total publications	No. after 1st selection criterion	No. after 2nd selection criterion	No. after 3rd selection criterion	No. after eliminating duplicates between bases
1	Scopus	4818	4756	3929	50	72
	WoS	3770	3742	949	50	
2	Scopus	126	125	104	25	40
	WoS	52	52	23	23	
3	Scopus	9	9	8	8	9
	WoS	2	2	2	2	
4	Scopus	339	337	294	50	74
	WoS	173	171	121	50	
5	Scopus	6	6	6	6	6
	WoS	2	2	2	2	
Duplicates						10
Total articles evaluated in terms of title and abstract						191
Total articles selected to be analyzed in full						46

Source: The authors.

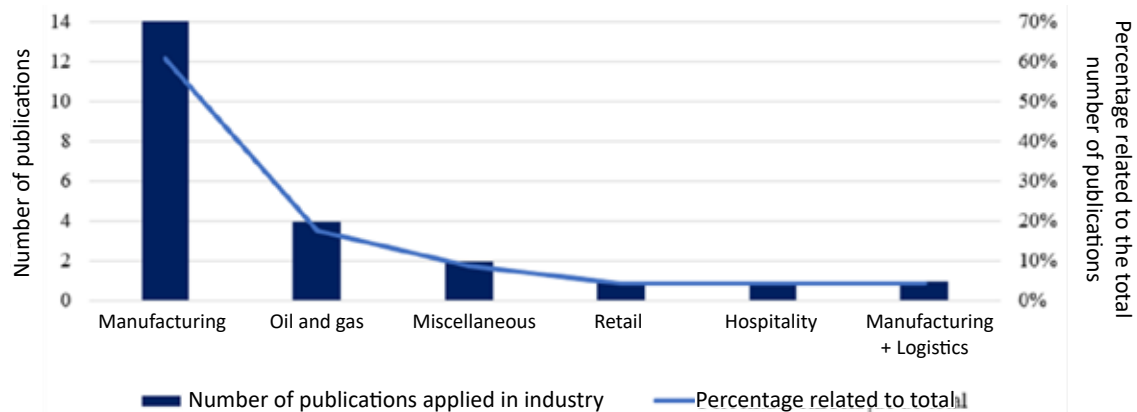


Figure 7. Distribution of articles by industry type

Source: The authors.

this part of the analysis. The following subtopics respectively deal with considerations about the rigor cycle, the relevance cycle, the requirements' specification, and the study results.

Theoretical knowledge base

In addition to the factors inherent to the environment in which drilling companies operate and the particularities of the organizations, there are other aspects to be considered. Requirements relating to the theories and the methods used to build models for managing and measuring performance should be part of the analysis.

Thakkar et al. (2009) highlight three fundamental aspects when developing an artifact for measuring performance in the supply chain: 1) The metrics must be aligned with the organizational strategy, becoming a clear link between operations and the company's strategic objectives; 2) The indicators must be well defined, relevant, and simple enough to be maintained, understood, and used by users; 3) The human factor must be considered, as motivated and well-trained teams are essential for measuring the performance of any process. Therefore, the artifact must be easily communicable, and the organization must make an effort to ensure that its employees fully understand it.

Gunasekaran and Kobu (2007) set out some requirements: 1) practicality and ease of use; 2) reliability of the indicators used; 3) possibility of comparison with the systems used by other organizations; 4) low-cost operation. Gopal and Thakkar (2012) also contribute to this topic by listing the following requirements: 1) The artifact must be connected to the organizational strategy; 2) there must be a balance between financial and non-financial indicators; 3) operations in the supply chain must be focused on, applying systemic thinking, thus avoiding improvements that are only specific.

In addition to the above, the following requirements can be found in the literature: a balanced structure encompassing financial and non-financial indicators that cover the main areas of the supply chain (Gunasekaran et al., 2001; Lohman et al., 2004; Chan et al., 2006; Shepherd and Günter, 2006; Bhagwat and Sharma, 2007; Akyuz and Erkan, 2010); adaptation of the system to the organizational goals and strategies (Chan et al., 2006; Shepherd, 2006; Akyuz and Erkan, 2010); categorization of the indicators to make the system operational and adapt it to the reality of the company and the market where it operates (Gunasekaran et al., 2001; Bhagwat and Sharma, 2007); the creation of systems that are dynamic compared to the context in which they operate, being constantly reassessed so that they always align with the company's needs, strategies, and objectives (Cai et al., 2009).

Characteristics of the organization and relationship with the environment

Organizations operating in the offshore drilling industry and the oil and gas market in general face some unique challenges concerning supply chain management. From the characteristics of this market and the organizations themselves, it is possible to extract some requirements.

The first relevant point is the constantly changing environment in which offshore drilling companies operate. In addition to being affected by the profound transformations that the world economy has undergone in recent decades (Kellogg, 2014; Qualharini et al., 2016; Ahmad et al., 2017; Alhosani et al., 2019), the oil and gas market is considered to be particularly dynamic (Varma and Deshmukh, 2009). As in the case of the latest crises the sector has experienced, fluctuations in the oil barrel price, for example, can have serious consequences (Ledenko et al., 2018). Supply chain management must be able to adapt to such changes. Therefore, it is essential that the model used for managing and measuring performance be directly linked to the organization's strategic goals and the market analysis carried out by its managers.

Another noticeable and relevant factor when analyzing the artifacts available in the literature is the use of a process-based structure strongly grounded in the manufacturing industry. This is due to the predominance of this type of industry in the literature dealing with supply chain management and performance measurement, a fact highlighted by some authors (Varma et al., 2008; Yusuf et al., 2018; Alhosani et al., 2019) and confirmed in the Systematic Literature Review.

When applying a management and performance measurement model to an offshore drilling organization, it is essential that the artifact's structure allows for this adaptation of processes. In the case of this research's target company, processes such as production and return, for example, are not present. Building an inflexible model in this respect could hinder its use.

It is worth understanding that the performance of the supply chains dealt with in this research depends on the internal processes of the drilling companies and on their material and service suppliers. As cited by Yusuf et al. (2014), this dependence is especially marked in this industry. Oil and gas companies, such as the target enterprise in this study, can have thousands of different suppliers (Chima, 2007), many of which are considered strategic for the organization. Therefore, the model's structure should include internal aspects of the company applying it and external aspects linked to its suppliers of materials and services.

The large number of suppliers with different characteristics means that the model used to measure performance needs to be easy to understand. It is vital that it be disseminated among the different agents working in the company's supply chain, including the various suppliers spread around the world. Moreover, an easily understandable structure can benefit the relationship with the company's customers and for internal communication between the departments that interface with the supply chain.

Since offshore drilling organizations act as service providers, the role of their customers in their supply chains is peculiar (Zhu et al., 2019). The flow of materials ends at the company, and what goes on to customers is an intangible product. The indicators used to manage this part of the process thus distance themselves from those traditionally used in the supply chain.

Despite this characteristic, given the considerable bargaining power of customers in this market, the requirements they stipulate can influence the supply chain management. Therefore, it is relevant to include a comparison of these requirements with the strategic objec-

tives used as the basis for the model by means of a gap analysis. This will ensure that the model's characteristics are aligned with customer expectations.

Requirements specification

Therefore, considering the theoretical aspects and the context of the research, it is possible to list the requirements to be met by a supply chain performance management model to be applied to offshore drilling companies. **Figure 8** shows the requirements and their respective references.

Requirements		Literature references
1	Linking the organization's strategic objectives to market requirements	Chan <i>et al.</i> (2006); Shepherd (2006); Akyuz e Erkan (2010); Thakkar <i>et al.</i> (2009); Gopal e Thakkar (2012)
2	Flexibility regarding the processes that make up the supply chain	Cai <i>et al.</i> (2009); Gopal e Thakkar (2012)
3	Internal and external (supplier) performance evaluation	Chima (2007); Yusuf <i>et al.</i> (2014)
4	Balance between financial and non-financial aspects	Gunasekaran <i>et al.</i> (2001); Lohman <i>et al.</i> (2004); Chan <i>et al.</i> (2006); Shepherd e Günter (2006), Bhagwat e Sharma (2007); Akyuz e Erkan (2010); Gopal e Thakkar (2012)
5	Categorization of performance indicators into hierarchical levels	Gunasekaran <i>et al.</i> (2001); Bhagwat e Sharma (2007)
6	Easy to understand and disseminate structure	Gunasekaran e Kobu (2007); Thakkar <i>et al.</i> (2009)
7	Confirmation of compliance with customer requirements	Zhu <i>et al.</i> (2019)

Figure 8. Selection criteria applied at the publication analysis stage.

Source: The authors.

It should be noted that, in addition to the references cited and extracted from the literature, all the requirements listed had interviews with representatives of the target company as a significant reference. As mentioned at the beginning of this topic, both cycles (rigor and relevance) need to be explored together to achieve a consistent result. None of the requirements would have been included without proper confirmation of their coherence in the company's practice.

Figure 6 shows the study results; however, the evaluation carried out cannot be considered exhaustive. It is believed that the requirements selected can fulfill the objective and support the development of a model aimed at performance management in the offshore drilling industry supply chain; nevertheless, more robust evaluations can still be carried out. This aspect will be discussed in the following section.

FINAL CONSIDERATIONS

The research proposal was to identify, through a Systematic Literature Review, which requirements should be met by a supply chain performance management model to be applied to offshore drilling companies in the oil and gas market. As the previous topics show, this objective has been achieved. Based on various contributions from the literature, this research has developed a list of requirements that fulfills this purpose.

By achieving the intended objective, the research has made some relevant contributions to the academic sphere and industry. Its results can provide organizations with a specification of which requirements should be met in the search for better supply chain management and contribute to scientific progress in an area where there is a possible gap in the literature, as suggested in other works and the RSL stage.

The main opportunity for continuing the work developed here lies in the possible application of the requirements in real-life situations. It is understood that this practical stage, which was not carried out in this study, of using the requirements to create a model for performance management in supply chains could contribute to further refining the research.

REFERENCES

Adriaanse, L.S., Rensleigh C. (2012), "Web of Science, Scopus and Google Scholar: a content comprehensiveness comparison", *The Electronic Library*, Vol. 31, No. 6, pp. 727-744.

Ahmad, N.K.W., Brito, M.P., Rezaei, J., Tavasszy, L.A. (2017), "An integrative framework for sustainable supply chain management practices in the oil and gas industry", *Journal of Environmental Planning and Management*, Vol. 60, No. 4, pp. 577-601.

Akyuz, G.A., Erkan, T. E. (2010), "Supply chain performance measurement: a literature review", *International Journal of Production Research*, Vol. 48, No. 17, pp. 5137-5155.

Alhosani, A., Zabri, S.M., Aljaberi, F., Almansoori, A. (2019), "Supply chain management concepts applied in the oil &

- gas industry: a review of literature”, *International Journal of Supply Chain Management*, Vol. 8, No. 1.
- Alturki, A., Gable, G., Bandara, W. (2011), “A design science research roadmap”, artigo apresentado em International Conference of Service-Oriented Perspectives in Design Science Research, Milwaukee, EUA, 2011.
- Araújo, C.A. (2006), “Bibliometria: evolução histórica e questões atuais”, *Revista Em questão*, Vol. 12, No. 1, pp. 11-32.
- Bhagwat, R., Sharma, M.K. (2007), “Performance measurement of supply chain management: a balanced scorecard approach”, *Computers & Industrial Engineering*, Vol. 53, pp. 43–62.
- Cai, J., Liu, X., Xiao, Z., Liu, J. (2009), “Improving supply chain performance management: a systematic approach to analyzing iterative KPI accomplishment”, *Decision Support Systems*, Vol. 46, pp. 512–521.
- Chadegani, A.A., Salehi, H., Yunus, M.M., Farhadi, H., Foadi, M., Farhadi, M., Ebrahim, N.A. (2013), “A Comparison between Two Main Academic Literature Collections: Web of Science and Scopus databases”, *Asian Social Science*, Vol. 9, No. 5, pp. 18-26.
- Chan, F.T.S., Chan, H.K., Qi, H.J. (2006), “A review of performance measurement systems for supply chain management”, *International Journal of Business Performance Management*, Vol. 8, No. 2 e 3, pp. 110-130.
- Chima, C.M. (2007), “Supply-Chain management issues in the oil and gas industry”, *Journal of Business & Economics Research*, Vol. 5, No. 6, pp. 27-36.
- Cooper, H.M. (2017), *Research Synthesis and Meta-analysis: A step-by-step approach*, 5th ed., Sage Publications, Los Angeles.
- Delafenestre, R. (2019), “New business models in supply chains: a bibliometric study”, *International Journal of Retail & Distribution Management*, Vol. 47, No. 12, pp. 1283-1299.
- Dresch, A., Lacerda, D.P., Antunes, J.A.V. (2015), *Design Science Research: método de pesquisa para avanço da ciência e tecnologia*, Bookman, Porto Alegre.
- Gopal, P.R.C., Thakkar, J. (2012), “A review on supply chain performance measures and metrics: 2000-2011”, *International Journal of Productivity and Performance Management*, Vol. 61, No. 5, pp. 518–547.
- Gunasekaran, A., Kobu, B. (2007), “Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995–2004) for research and applications”, *International Journal of Production Research*, Vol. 45, No. 12, pp. 2819–2840.
- Gunasekaran, A., Patel, C., Tirtiroglu, E. (2001), “Performance measures and metrics in a supply chain environment”, *International Journal of Operations and Production Management*, Vol. 21, No. 1/2, pp. 71-87.
- Harzing, A., Alakangas, S. (2015), “Google Scholar, Scopus and the Web of Science: a longitudinal and cross-disciplinary comparison”, *Scientometrics*, Vol. 106, pp. 787-804.
- Hevner, A.R. (2007), “A three cycle view of Design Science Research”, *Scandinavian Journal of Information Systems*, Vol. 19, No. 2, pp. 87-92.
- Hevner, A.R., March, S.T., Park, J. (2004), “Design Research in Information Systems Research”, *Management Information Systems Quarterly*, Vol. 28, No. 1, pp. 75-105.
- Kellogg, R. (2014), “The effect of uncertainty on investment: evidence from Texas oil drilling”, *American Economic Review*, Vol. 106, No. 6, pp. 1698-1734.
- Laihonen, H., Pekkola, S. (2016), “Impacts of using a performance measurement system in supply chain management: a case study”, *International Journal of Production Research*, Vol. 54, No. 18, pp. 1-11.
- Ledenko, M., Velic, J., Sedlar, D.K. (2018), “Analysis of oil reserves, production and oil price trends in 1995, 2005, 2015”, *The Mining-Geology-Petroleum Engineering Bulletin*, pp. 105-116.
- Lohman, C., Fortuin, L., Wouters, M. (2004), “Designing a performance measurement system: a case study”, *European Journal of Operational Research*, Vol. 156, pp. 267-296.
- Lopes, S., Costa, T., Llimós, F., Amante, M.J., Lopes, P. (2012), “A Bibliometria e a avaliação da produção científica: indicadores e ferramentas”, *Actas dos Congressos Nacionais de Bibliotecários, Arquivistas e Documentalistas*, No. 11, disponível em: <http://www.bad.pt/publicacoes/index.php/congressos-bad/issue/view/10> (acesso em: 09 mar. 2020).
- Lu, H., Guo, L., Azimi, M., Huang, K. (2019), “Oil and gas 4.0 era: a systematic review and outlook”, *Computers in Industry*, Vol. 111, pp. 68–90.
- Machado Junior, C., Souza, M.T. S., Parisotto, I.R.S., Palmisano, A. (2016), “As leis da Bibliometria em diferentes bases de dados científicos”, *Revista de Ciências da Administração*, Vol. 18, No. 44, pp. 111-123.
- Maestrini, V., Luzzini, D., Maccarrone, P., Caniato, F. (2017), “Supply chain performance measurement systems: a systematic review and research agenda”, *International Journal of Production Economics*, Vol. 183, pp. 299-315.
- Qualharini, E.L., Fernandes, J.L., Fernandes, A.S.C., Santos, L.A. (2016), “A liderança como fator de mudanças no mercado de óleo e gás”, *Revista Augustus*, Vol. 21, No. 41, pp. 25-39.
- Rodrigues, F.M.S., Tammela, I., Narcizo, R.B. (2020), “Gestão de desempenho em cadeias de suprimentos de óleo e gás: uma revisão sistemática de literatura”, artigo apresentado no SIMPEP 2020: Simpósio de Engenharia de Produção, Bauru, São Paulo, 11-13 de nov. 2020.

Shepherd, C., Günter, H. (2006), "Measuring supply chain performance: current research and future directions", *International Journal of Productivity and Performance Management*, Vol. 55, No. 3, pp. 242-258.

Simon, H.A. (1996), *The sciences of the artificial*, 3rd ed., MIT Press, Cambridge.

Thakkar, J., Kanda, A., Deshmukh, S.G. (2009), "Supply chain performance measurement framework for small and medium scale enterprises", *Benchmarking: An International Journal*, Vol. 16, No. 5, pp. 702-723.

Varma, S., Deshmukh, S.G. (2009), "Evaluating petroleum supply chain performance: overcoming shortcomings of balanced scorecard", *Global Journal of Flexible Systems Management*, Vol. 10, No. 4, pp. 11-22.

Varma, S., Wadhwa, S., Deshmukh, S.G. (2008), "Evaluating petroleum supply chain performance: application of analyti-

cal hierarchy process to balanced scorecard", *Asia Pacific Journal of Marketing and Logistics*, Vol. 20, No. 3, pp. 343-356.

Yusuf, Y., Gunasekaran, A., Papadopoulos, T., Auchterlounie, W., Hollomah, D., Menhat, M. (2018), "Performance measurement in the natural gas industry: a case study of Ghana's natural gas supply chain", *Benchmarking: An International Journal*, Vol. 25, No. 4, pp. 1-28.

Yusuf, Y., Gunasekaran, A., Musa, A., Dauda, M., El-Berishy, N.M., Cang, S. (2014), "A relational study of supply chain agility, competitiveness and business performance in the oil and gas industry", *International Journal of Production Economics*, Vol. 147, pp. 531-543.

Zhu, T., Balakrishnan, J., Silveira, G. (2019), "Bullwhip effect in the oil and gas supply chain: a multiple-case study", *International Journal of Production Economics*, Vol. 224.

APPENDIX I - ARTICLES SELECTED AFTER SYSTEMATIC LITERATURE REVIEW

Table 1. Selected publications and connections with review questions.

	Title	Authors and Year
1	Modeling the metrics of lean, agile and leagile supply chain: An ANP-based approach	Agarwal, A., Shankar, R., Tiwari, M.K. (2006)
2	Measuring retail supply chain performance: Theoretical model using key performance indicators (KPIs)	Anand, N., Grover, N. (2015)
3	Lean supply chain performance measurement	Arif-Uz-Zaman, K., Ahsan, A.M.M.N. (2014)
4	Supply chain performance measurement: A literature review	Arzu Akyuz, G., Erman Erkan, T. (2010)
5	Review of supply chain performance measurement systems: 1998–2015	Balfaqih, H., Nopiah, Z.M., Saibani, N., Al-Nory, M.T. (2016)
6	Performance measurement of supply chain management: A balanced scorecard approach	Bhagwat, R., Sharma, M.K. (2007)
7	Performance Measurement: Challenges for Tomorrow	Bititci, U; Garengo, P; Dorfler, V; Nudurupati, S (2012)
8	Improving supply chain performance management: A systematic approach to analyzing iterative KPI accomplishment	Cai, J., Liu, X., Xiao, Z., Liu, J. (2009)
9	Developing key performance indicators for supply chain: An industry perspective	Chae, B. (2009)
10	Performance measurement in a supply chain	Chan, F.T.S. (2003)
11	A review of performance measurement systems for supply chain management	Chan, F.T.S., Chan, H.K., Qi, H.J. (2006)
12	An innovative performance measurement method for supply chain management	Chan, F.T.S., Qi, H.J. (2003)
13	Towards a theory of supply chain management: the constructs and measurements	Chen, J; Paulraj, A (2004)
14	A framework for measuring the performance of service supply chain management	Cho, D.W., Lee, Y.H., Ahn, S.H., Hwang, M.K. (2012)
15	Performance measurement systems in supply chains: A framework for contextual analysis	Cuthbertson, R., Piotrowicz, W. (2011)
16	A Review of Performance Metrics for Supply Chain Management	Elrod, C; Murray, S; Bande, S (2013)
17	Benefits, barriers, and bridges to effective supply chain management	Fawcett, SE; Magnan, GM; McCarter, MW (2008)
18	An environmental balanced scorecard for supply chain performance measurement (Env_BSC_4_SCPM)	Ferreira, LMD; Silva, C; Azevedo, SG (2016)
19	A review of performance measurement: Towards performance management	Folan, P., Browne, J. (2005)
20	Arcs of integration: An international study of supply chain strategies	Frohlich, M.T., Westbrook, R. (2001)
21	A review on supply chain performance measures and metrics: 2000-2011	Gopal, P.R.C., Thakkar, J. (2012)
22	Performance measures and metrics in logistics and supply chain management: A review of recent literature (1995-2004) for research and applications	Gunasekaran, A., Kobu, B. (2007)

23	A framework for supply chain performance measurement	Gunasekaran, A., Patel, C., McGaughey, R.E. (2004)
24	Performance measures and metrics in a supply chain environment	Gunasekaran, A., Patel, C., Tirtiroglu, E. (2001)
25	The role of coherent supply chain strategy and performance management in achieving competitive advantage: An international survey	Harrison, A., New, C. (2002)
26	Performance measurement for green supply chain management	Hervani, A.A., Helms, M.M., Sarkis, J. (2005)
27	A systems perspective on supply chain measurements	Holmberg, S. (2000)
28	Impacts of using a performance measurement system in supply chain management: a case study	Laihonen, H; Pekkola, S (2016)
29	Development and validation of a measurement instrument for studying supply chain management practices	Li, S., Rao, S.S., Ragu-Nathan, T.S., Ragu-Nathan, B. (2005)
30	An integrated framework for supply chain performance measurement using six-sigma metrics	Lin, L.-C., Li, T.-S. (2010)
31	Linking SCOR planning practices to supply chain performance: An exploratory study	Lockamy III, A., McCormack, K. (2004)
32	Designing a performance measurement system: A case study	Lohman, C., Fortuin, L., Wouters, M. (2004)
33	Supply chain performance measurement systems: A systematic review and research agenda	Maestrini, V., Luzzini, D., Maccarrone, P., Caniato, F. (2017)
34	Measurement and Proposed Improved Supply Chain Performance Approach with PDCA framework	Matondang, N; Sitompul, FR (2019)
35	Supply chain performance measures and metrics: a bibliometric study	Mishra, D; Gunasekaran, A; Papadopoulos, T; Dubey, R (2018)
36	State of the art literature review on performance measurement	Nudurupati, SS; Bititci, US; Kumar, V; Chan, FTS (2011)
37	Measurement challenges of supply chain performance in complex shipping environments	Panayides, P; Borch, OJ; Henk, A (2018)
38	An investigation of supply chain performance measurement in the Indian automotive sector	Saad, M., Patel, B. (2006)
39	A SCOR-based model for supply chain performance measurement: Application in the footwear industry	Sellitto, M.A., Pereira, G.M., Borchardt, M., Da Silva, R.I., Viegas, C.V. (2015)
40	Measuring supply chain performance: Current research and future directions	Shepherd, C., Günter, H. (2006)
41	Empirical study of measuring supply chain performance	Sillanpaa, I (2015)
42	Supply chain performance measurement framework for small and medium scale enterprises	Thakkar, J., Kanda, A., Deshmukh, S.G. (2009)
43	Evaluating petroleum supply chain performance: Overcoming shortcomings of balanced scorecard	Varma, S., Deshmukh, S.G. (2009)
44	Evaluating petroleum supply chain performance: Application of analytical hierarchy process to balanced scorecard	Varma, S., Wadhwa, S., Deshmukh, S.G. (2008)
45	Supply chain performance measurement system using DEA modeling	Wong, W.P., Wong, K.Y. (2007)
46	Performance measurement in the natural gas industry A case study of Ghana's natural gas supply chain	Yusuf, Y; Gunasekaran, A; Papadopoulos, T; Auchterlounie, W; Hollomah, D; Menhat, M (2018)

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