

Comprehensive Studies on Supply Chain Contract Selection and Identification of Its Factors Using Meta-Synthesis Method

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Abstract. This study examines the factors influencing the selection of supply chain contracts under uncertain conditions. As organizations increasingly face more complex supply chains affected by unstable market conditions and varying demands from stakeholders, the ability to make informed and reliable decisions becomes of paramount importance. This study combines the existing literature from the years 1395 to 1402 in the Iranian calendar (2016–2024 in the Gregorian calendar) and investigates the criteria and sub-criteria for selecting supply chain contracts, highlighting their applications in various industries, including oil and gas.

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1. Introduction

Supply Chain Management (SCM) is a set of approaches that efficiently integrates suppliers, manufacturers, warehouses, product production, and distribution to ensure that products are delivered in the right quantity, at the right location, and at the right time to meet customer demands while minimizing costs within the system [1]. While there are many elements involved in supply chain management activities, supplier selection holds a significant position as it encompasses a series of activities such as identifying, analyzing, and selecting suppliers to become a part of the supply chain. Since supplier selection is based on multiple criteria, it is not an easy task. It involves extensive comparison of suppliers using a series of common criteria. Two key issues in selecting the best supplier or group of suppliers are: what criteria to use and what method to apply for supplier comparison [2].

The supply chain plays a crucial role in every economy and company. The experience of leading countries and industries has shown that increasing efficiency and productivity in the supply chain is a key strategy for improving the business environment, reducing costs, and enhancing overall efficiency. Given that supply chain costs sometimes account for up to 30% of the final product price, effective supply chain management can positively

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impact operations by reducing inventory, increasing productivity, enhancing agility, improving time management, ensuring precise flow tracking, and improving consumer services [3].

To improve supply chain performance, companies outsource some of their tasks and services to other firms [4]. The growing awareness of the importance of supply chains in recent years has led to more innovations in the logistics sector, both at the national level and among leading global companies [5].

For the concept of outsourcing, evaluating and selecting an appropriate supplier contract model is a critical step in establishing sustainable partnerships in the supply chain [6]. Defining precise criteria and standards for selecting the best outsourcing company and supply chain activities is essential.

Supply chain capabilities have the potential to act as flexible features that either prevent disruptions or help the supply chain resume its normal activities immediately after disruptions [7]. The concept of resilient supply chains has become a globally accepted and recognized agenda due to the common vulnerabilities and complexities of global supply chains. Supply chain capabilities should be structured in a way that not only reduces risks but also ensures the reasonable, reliable, efficient, environmentally friendly, proactively managed, and socially acceptable supply of sufficient petroleum products [8].

The oil and gas industry (O&G) is one of the most critical economic sectors contributing to a country's revenue [9]. The revenue from this sector can further facilitate infrastructure development [10]. Given the costs associated with the extraction and maintenance of O&G, prices also rise in relation to these costs [11]. The supply chain refers to a series of activities related to transferring raw materials from suppliers to final consumers, where cost reduction and improved customer satisfaction are also key concerns. Many companies have attempted to maximize their profits through appropriate contract agreements [12]. The successful implementation of this approach depends on several factors. Therefore, in selecting an appropriate contract, both fixed and variable factors must be considered, such as information, human resources (HR), time required for equipment procurement, time, quality, and more [13,14]. Identifying the right contractor among numerous providers offering different services is challenging. Considering various factors before selecting a contract is essential [15].

This study particularly focuses on the key issue of supplier selection, emphasizing the importance of choosing appropriate methodologies suited to the unique challenges of supply chain management. These methodologies can enhance operational performance and strategic coordination.

Moreover, the study encourages researchers to explore innovative approaches that leverage modern technologies to address the complexities and uncertainties typically associated with supply chain contract selection. It also raises important considerations regarding the environmental impact and sustainable practices in decision-making, aligning with broader corporate social responsibility (CSR) goals and sustainable development objectives.

This meta-synthesis serves as a fundamental resource for both academics and supply chain management professionals, offering insights into effective decision-making strategies under uncertainty to tackle contemporary challenges. Future research will focus on applying advanced analytics and adaptive strategies in contract selection, which may lead to innovative solutions that enhance supply chain resilience and performance.

2. Literature Review

The literature on Supply Chain Management (SCM) has increasingly focused on the application of Multi-Criteria Decision-Making (MCDM) methods, particularly in the context of contract selection under conditions of uncertainty. Various studies have utilized

diverse MCDM techniques to improve decision-making processes in SCM, providing valuable insights into their effectiveness and applicability across different sectors.

Several researchers have systematically examined the application of MCDM methods in different areas of supply chain management. For example, a literature review covering a 13-year period (2005 to 2017) identified 140 published articles that categorized the use of MCDM methods at different decision-making levels and industrial applications [16]. This comprehensive review highlights the importance of selecting appropriate MCDM techniques to address specific challenges in supply chain activities.

One of the prominent areas in the literature is the supplier selection process, where MCDM methods play a crucial role. These methods not only help reduce uncertainty in the selection process but also enhance the overall efficiency and effectiveness of supply chain operations [17,18].

Contract selection in supply chains under uncertainty conditions has been examined through various frameworks that incorporate MCDM methods. For instance, studies have demonstrated that using the Evaluation Based on Area Ranking (EAMR) method alongside SWARA for systematically ranking contracts in the healthcare sector proves the applicability of these methods in critical and sensitive environments [18]. Such research confirms the growing need for robust decision-making frameworks to manage the inherent uncertainties in supply chain contracts.

Supplier selection criteria in the early 1980s were primarily cost-oriented, focusing on the economic aspects of supplier selection [19]. Over time, additional criteria such as cost, quality, delivery, flexibility, technological capability, innovation, and financial factors have become widely used [20-28].

Supplier selection studies exist across nearly all industries, including chemical and pharmaceutical industries [29-31], cosmetic and personal care industry [32], paint industry [33,34], and chemical manufacturing [35,36]. Some studies suggest that supplier selection research can be applied across various industries [22,37,38].

Overall, contract selection in SCM is one of the most common research topics in the SCM domain [39,40] due to its direct impact on company performance [41]. Existing studies have conducted research on this subject across various economic sectors [42-44].

Table 1. Supply chain management contract selection factors

Variable	Description	Reference
Flexibility	The ability to adapt to changing conditions.	[45,46]
Demand Fluctuations	Managing varying demand rather than a fixed demand.	[47,48]
Uncertainty	Changes in all factors related to the contract.	[49,50]
Excess Inventory	The impact of surplus stock on cost and efficiency.	[45,51]
Information Distortion	The bullwhip effect and miscommunication in the supply chain.	[52,53]
Responsiveness	The ability to react efficiently to changes	[54,55]
Cost	Direct and indirect costs associated with the contract.	[56,57]
Quality	Ensuring product/service quality meets standards.	[56,58]
Organization	The company's internal structure and capabilities.	[59,60]

Contract Process	Steps and strategies for contract execution.	[61,62]
Project Characteristics	The unique aspects of each project.	[63,64]
Contract Type	Fixed, flexible, revenue-sharing, etc.	[65,66]
Organizational Structure	How the company is structured and managed.	[60,67]
Company Status	Financial stability, market position, and reputation.	[68,69]
Green Tariffs & Standards	Sustainability and environmental regulations.	[32]

Despite significant advancements in this field, gaps still exist in the literature. Therefore, future studies should explore innovative technological approaches that enhance decision-making in supply chain management.

Additionally, the application of fuzzy logic in MCDM methods presents opportunities for further research, particularly in addressing the complexities and uncertainties commonly found in supply chain environments [70].

3. Methodology

3.1 Using the meta synthesis method to find factors

In many topics, there are numerous qualitative studies that examine a common phenomenon. The abundance of qualitative studies on a single phenomenon makes it possible to synthesize these studies and create a new interpretation of a human or social phenomenon. The meta-synthesis method is an emerging approach in qualitative studies that is increasingly being used in social science research. This method is used to systematically interpret the results of qualitative studies to provide a new explanation of the shared phenomenon under study. The increased use of this method underscores the importance for researchers to become familiar with the role of meta-synthesis, the steps involved, how to validate it, and the common challenges in applying it. This paper, using a variety of methodological literature on meta-synthesis, identifies the similarities and differences between this method and other similar approaches. It proposes the stages of the research process, methods to enhance the credibility of this type of research, and finally, common mistakes made when using this method [71].

3.1.1 step One: Research Questions

In this step researcher should define clear and focused research questions that will guide the synthesis process. These questions should address the specific aspects of the phenomenon under study. Therefore, first, the research questions are stated as in Table 2 along with the parameters.

Table 2. Research parameters and questions

Parameter	Questions
What?	This refers to the research question or objective of the study. What exactly is being investigated or synthesized? In meta-synthesis, this would be the phenomenon or concept from previous qualitative studies that you aim to reinterpret or understand in a new way.
Population under Study	This refers to the specific group or set of studies that your research focuses on. In the case of meta-synthesis, the population typically consists of qualitative research articles, papers, or case studies

	related to the phenomenon being studied. Clearly defining the population ensures the synthesis is based on appropriate sources.
Time Limitations	This is about the time frame within which the studies you include in your synthesis were conducted or published. The limitation helps to clarify the scope of the review. For example, you may choose to review studies published in the last 10 years, depending on your research goals
Methodology	This refers to the methodological approach used in the research. In a meta-synthesis, this would involve the steps you follow for selecting, analyzing, and synthesizing the data from previous studies. The methodology includes the process of reviewing the literature, extracting themes, and drawing conclusions based on the findings.

3.1.2 Step Two: Systematic Literature Review

In this step researcher should conduct a comprehensive and systematic review of the literature, ensuring that all relevant qualitative studies on the phenomenon are included. This step involves identifying key themes and concepts from the existing studies. According to Table 3, keyword searches were conducted in both Persian and English.

Table 3. Keyword search

English	Persian
Contract Selection	انتخاب قرارداد
Supply Chain Management	مدیریت زنجیره تامین
Supply Chain Contract	قرارداد زنجیره تامین
Supply Chain Management Contract Selection	انتخاب قرارداد مدیریت زنجیره تامین
Contract Selection with Multi-Criteria Decision Making Method	انتخاب قرارداد با روش تصمیم‌گیری چند معیاره
Uncertainty in Supply Chain Management Contract Selection	عدم قطعیت در انتخاب قرارداد مدیریت زنجیره تامین
-	ترکیب موارد بالا

3.1.3 Step Three: Search and Select Relevant Articles

In this step researcher should search for and select the most relevant articles or studies based on predefined criteria, such as the quality, relevance, and rigor of the studies. The selection should be purposeful to ensure that the studies chosen provide meaningful data for the synthesis. The scientific sites and databases used in this study were from two groups: Persian and English, as shown in Table 4 and Table 5.

Table 4. Persian databases used

Database	Website Address
Jihad Daneshgahi	https://www.sid.ir/
Mag Iran	https://www.magiran.com/
Civilica	https://civilica.com/
Noor Specialized Magazines Database	https://www.noormags.ir/

Table 5. English databases used

Database	Website Address
Springer	https://www.springer.com/

Emerald	https://www.emerald.com/insight/
scholar.google	https://scholar.google.com/
Science direct	https://www.sciencedirect.com/
Wiley	https://onlinelibrary.wiley.com/
Taylor & Francis	https://taylorandfrancis.com/

We also used the following search string on certain websites:

“ Contract Selection AND Supply Chain Management AND Supply Chain Contract AND Uncertainty AND MCDM “

The time frame for the article search was as follows:

- From 1395 to 1403 in the Persian calendar
- From 2016 to 2024 in the Gregorian calendar

In addition, to ensure precision in the content, the following inclusion criteria were considered for selecting articles:

- Only journals were considered. Conference papers, book chapters, patents, discussions, etc., were not reviewed.
- Only articles in Persian or English were included.

3.1.4 Step Four: Extract Results

In this step researcher should extract key findings, concepts, and themes from the selected studies. This process involves organizing the results systematically, which will then be analyzed and synthesized to form a new understanding or interpretation of the phenomenon. Since the aim of meta-synthesis is to find the most appropriate answers to the research questions by examining the literature review. To achieve this goal, we used the strategy presented in the figure below. The results of the research are influenced by the database and keywords used in the study.

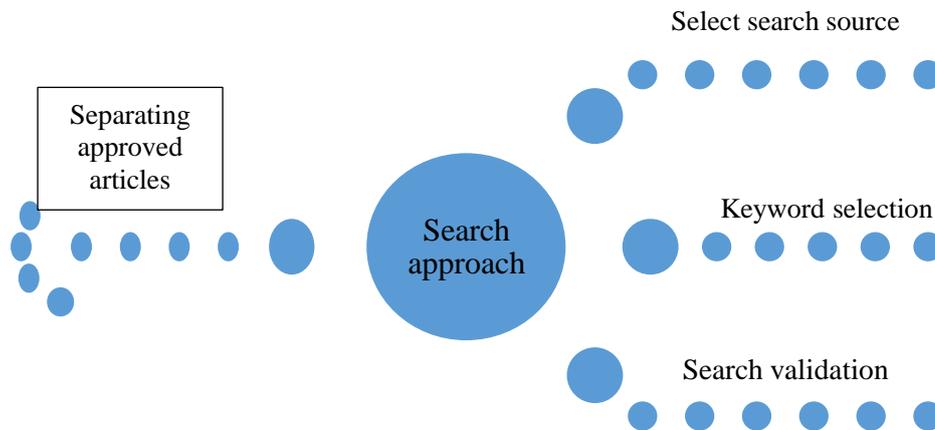


Figure 1 Meta-synthesis search approach.

The desired keywords are extracted from the research questions.

Table 6. English databases used

Database		Number of searches
Jihad Daneshgahi	Searched	26
	Selected	24

Mag Iran	Searched	11
	Selected	11
Civilica	Searched	9
	Selected	4
Noor Specialized Magazines Database	Searched	-
	Selected	-
Springer	Searched	105
	Selected	24
Emerald	Searched	384
	Selected	29
scholar.google	Searched	200
	Selected	46
Science direct	Searched	559
	Selected	48
Wiley	Searched	123
	Selected	10
Taylor & Francis	Searched	167
	Selected	19

The next step is to search for relevant studies in the existing literature that might answer the research question. It is essential to ensure that the text search aligns with what has been previously mentioned and adheres to the inclusion and exclusion criteria for selecting articles. This is a critical step to ensure that your literature review is focused and aligned with your research goals.

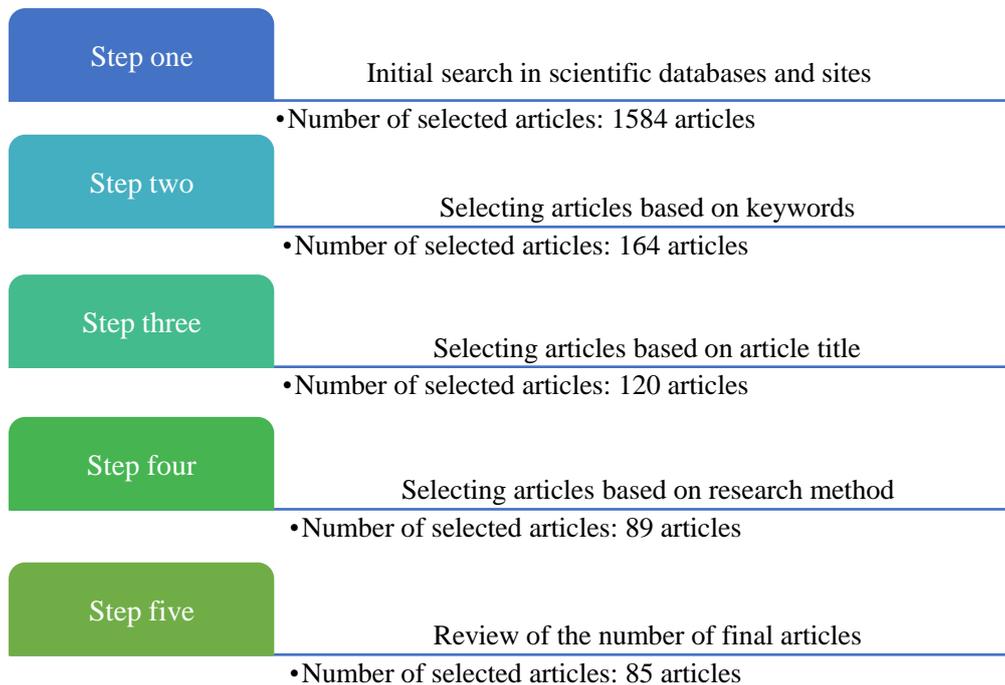


Figure 2 Steps for selecting searched articles

The basis for data extraction can include answering questions such as:

1. Does this article address contract selection in the supply chain?
2. Are the objectives of the article clearly stated?
3. Is the research method of the article clearly defined?

4. Result

Based on these criteria, the data were extracted using specially designed forms, and duplicate articles were excluded. During both the primary and secondary analyses, articles were refined by reviewing the title, abstract, conclusion, and relevant sections of the text.

Table 7. Codes and Sources of Studies

Criteria	Sub-Criteria	Source (Persian / English) research	
		Persian	English
Economic and Financial Factors	Costs	Persian	[72-79]
		English	[34,80-102]
	Supplier Financial Stability	English	[6,100,103]
	Production Capacity	English	[80,92,96,97,102,105]
	Inventory Management	Persian	[74,106,107]
		English	[83,98,108]
Productivity and Efficiency	English	[81,98,102]	
Quality and Innovation	Quality	Persian	[74,76,79,107,109,110]
		English	[6,34,80,88-90,98,99,101,105,108,111-118]
	Research and Development (R&D)	Persian	[76,106,107]
		English	[6,80,88,89,101,105,108,116]
	Technology and Innovation	Persian	[79,106,107,119]
		English	[88,89,105,116]
	Quality Certificates	Persian	[106,107,119]
		English	[88,89,102,118,120]
	Robustness	English	[100,121,122]
	Supplier Performance and Social Responsibility	Supplier Reputation	Persian
English			[99,102,108,123]
Social Responsibility		Persian	[72,78,107]
		English	[86,112,124,125]
Commitment to Continuous Improvement		English	[87,102,103]
Environmental Sustainability		Persian	[72,79,106,119,126,127]
	English	[86-88,90,101-	

			103,105,112,118,120,121,125,128]
	Safety Management	English	[6,102,103]
Management and Logistics	Delivery Time	Persian	[78,106,109,119]
		English	[81,83-86,88,89,99,108,114,129-131]
	Flexibility	Persian	[78,79,109,110,127]
		English	[6,83,88,89,98,99,104,105,108,117,125,132-134]
	Logistics and Transportation	Persian	[78,107,119]
		English	[83,86,88,114]
	Reverse Logistics	Persian	[78,107,119]
		English	[81]
	Risk and Uncertainty Management	Persian	[74,76]
		English	[88,102,118,135]
Communication and Collaboration	Level of relationships and cooperation	Persian	[76,78,107,136]
		English	[81,102,108,114,118]
	Customer satisfaction	Persian	[76,78,119]
		English	[81,101,102,116]
	Advertising and its effectiveness	Persian	[76,78,107,137]
Geographical location	English	[34,88,138]	
Environmental and Social	Green Product Design and Packaging	English	[90,103,111,120,128]
	Green Supply Chain Management	English	[6,84,103]
	Environmental Certification Compliance	English	[6,88,90]

5. Conclusion

Optimizing contract selection in supply chains within environments characterized by uncertainty is of great importance for organizations aiming to maintain a competitive advantage and improve operational efficiency. As organizations increasingly face more complex supply chains, influenced by volatile market conditions and diverse stakeholder demands, the ability to make informed and reliable decisions has become especially critical. This meta-analysis emphasizes the importance of applying Multi-Criteria

Decision-Making (MCDM) methods to manage the complexities involved in contract selection processes. Given the changing market conditions and unpredictable customer demands, the use of MCDM techniques is proposed as a robust strategy for evaluating various contract options based on a set of defined criteria and sub-criteria, extracted from expert perspectives and literature reviews [16,139].

This research emphasizes the necessity of identifying key criteria and their hierarchical relationships to support effective decision-making. In this context, the study proposes a systematic framework for supplier evaluation that includes both qualitative and quantitative factors [18,139]. The use of the meta-synthesis method for refining the criteria ensures that the model is based on expert opinions, thus enhancing its applicability and relevance across various industries, including oil and gas.

Furthermore, the integration of sustainable supply chain management considerations within the MCDM framework highlights the importance of balancing economic objectives with social and environmental responsibilities [18]. This discussion also reveals the challenges associated with contract selection in today's dynamic environments. This study suggests that decision-makers must be skilled in managing uncertainty and risk, especially when traditional decision-making approaches are insufficient. In such cases, adaptive strategies, such as forming rapid response teams, can provide the agility needed to address unforeseen challenges and make informed decisions [70, 140].

This paper, by synthesizing existing literature from 2016 to 2024, explores the criteria and sub-criteria for supply chain contract selection and highlights their applications across various industries, including oil and gas. The importance of selecting the appropriate contract for effective supply chain management operations is emphasized. Key aspects examined in this paper include:

- **Supply Chain Management (SCM):** This concept involves coordinating and integrating suppliers, manufacturers, warehouses, and distribution to ensure that products are delivered in the correct quantity, at the right place, and at the right time to meet customer needs and minimize costs within the system.
- **Supplier Selection:** This decision in SCM is critical, and since supplier selection involves various criteria, choosing the best supplier is not easy. The supplier selection process includes comparing different suppliers using multiple criteria.
- **Contract Selection:** Another significant aspect of SCM is how different types of contracts impact supply chain performance, especially under uncertainty, and the role they play in ensuring sustainable operations.

By employing advanced analytics and data-driven methods, organizations can enhance their ability to evaluate alternative contract options and implement strategic actions aligned with their overall objectives. Ultimately, the findings of this research emphasize the importance of a structured and methodical approach in contract selection and highlight the role of MCDM techniques in facilitating informed decision-making. Future studies should focus more on integrating emerging technologies and data analysis in the contract selection process, which may lead to innovative solutions to challenges arising from uncertainty in supply chains. By doing so, organizations can better prepare for the complexities of modern supply chains and ultimately improve their performance and resilience [16 , 70].

In conclusion, this study highlights the importance of developing robust methods for selecting supply chain contracts in environments with high uncertainty and volatility. The findings indicate that the selection of appropriate criteria and methods for evaluating suppliers can significantly impact the overall performance of supply chains. Given the continuous developments in industries such as oil and gas, aligning these criteria with the specific needs of each industry is crucial. By emphasizing the synthesis of past and current literature, this study provides a comprehensive perspective on how to optimize contract selection in various sectors. Future research could further explore the integration of new technologies and data analytics into these decision-making processes to offer more

accurate and optimized supply chain management strategies.

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