International Journal of Industrial Engineering & Production Research September 2023 Vol. 34, No. 3: 1-33
DOI: 10.22068/ijiepr.34.3.8

RESEARCH PAPER

Directing Future Studies on Contract Optimization in Supply Chain Management: A Review Study

Ahmad Lotfi[1] & Parvaneh Samouei*[2]

Received 14 February 2023; Revised 24 April 2023; Accepted 3 May 2023;

ABSTRACT

As efficient instruments, there have been increasing studies on contract optimization in the supply chain field over the recent two decades. The lack of review papers is one of the gaps in contract optimization studies. Hence, the extent study aimed to provide researchers with an attitude to direct future studies on this topic. Therefore, the collected studies on contract optimization were reviewed and analyzed primarily. Then, papers were classified based on the selected categories and themes. Finally, evaluation and results were presented based on the classified topics. They conducted studies, then achievements and limitations of the literature and future research opportunities were introduced to pave the way for researchers' further studies.

KEYWORDS: *Supply Chain management; Contract optimization; Game theory; Bullwhip effect.*

1. Introduction

A supply chain refers to a network of agents and members that are independent of each other, but cooperate to fulfill the needs of an end customer. Therefore, the total profit of the supply chain approaches the global optimality if chain members perform coordinately. In this case, contracts are one incentive means for the supply chain to match different functions and maximize profit. Contracts have an extensive theory base [1]. Supply management, timely customer lead, minimizing hazards caused by variations between supply and demand, and forecasting production and inventory are important factors within a supply chain that require signing contracts between suppliers and buyers.

Optimizing supply chain contracts in a wide range of applications have different types such as revenue-sharing contracts, wholesale price contracts, option contracts, cost-sharing contracts, buyback contracts, smart contracts, capacity reservation contracts, etc. Also, various techniques are used in this field for optimization, including game theory, probabilistic models, and other optimization methods. Also, the presence of phenomena such as risk, uncertainty, bullwhip effect, and strategic alliances such as 3PL gives a special attraction to this area of the supply chain. In addition, the ability to define new contracts such as smart contracts in the field of blockchain adds to its attractiveness. Therefore, in this article, we will explore the field of contract optimization, related to the stated cases in a regular manner. Also, Table 1 shows some articles in different fields:

Tab. 1. Applications of contract optimization

Row	Scope of application	Articles
1	Agricultural	[2]; [3]; [4]; [5]; [6].
2	Maritime Transportation	[7]
3	Biofuel	[8]
4	Education	[9]
5	Energy	[10]
6	car and aviation industries	[11]

* **Corresponding author:** ***Parvaneh Samouei***
p.samouei@basu.ac.ir

1. *Department of industrial engineering, faculty of engineering, Bu-Ali Sina university, Hamedan, Iran.*
2. *Department of industrial engineering, faculty of engineering, Bu-Ali Sina university, Hamedan, Iran.*

7	New energies	[12]; [13]; [12].
8	Foodstuffs	[14].
9	High-tech industry	[15]; [16].
10	Assembly systems	[17]
11	Communication industry	[18]
12	health sector	[19]
13	Electricity supply chain	[20]; [21]; [22]; [10].
14	fashion industry	[23].
15	Digital industry	[24]
16	Chemicals	[25].
17	transportation industry	[26].
18	integrating building information modeling (BIM) system	[27].
19	Industry 4.0 and emerging DSCP-technologies, cybersecurity, and sustainability relationships with DCSP-technologies	[28].

Considering the essential role of supply chain contracts in the coordination between its different levels, in the optimal state of contracts, it reduces costs of inventory, production, distribution, suppliers, retailers, and customers. Another role of contracts is to create confidence in production, supply, and maintenance for the parties of the supply chain because the parties to the contract will have a lot of information on the demand for goods, the amount of production, the amount of inventory, etc. based on the content of their contract.

Contracts have the ability to accurately determine the amount of product production, the quality of the product, the amount and volume of the periodic order, the price of the product, and in some cases and special conditions, such as the method of sending the product, etc. Contract reduces the risks in supply chains. Therefore, it is one of the important research areas in the supply chain. Also, contracts can be relied upon as a legal document for each of the parties.

Our reviews in section 2.2 indicate an increasing number of studies on this topic. However, we found only five review studies that are reported in Table 2 briefly. Accordingly, there is a gap in the holistic study on supply chain contract optimization, implying the importance of reviewing former studies to provide researchers with an accurate attitude toward the roadmap of future studies.

Tab. 2. The area studied in previous review papers

Row	Title	Ref.	Studied area
1	Overview of Coordination Contracts within forwarding and Reverse Supply Chains	[1]	1. This paper aims to coordinate forward and reverse supply chain contracts
2	Review on Supply Chain Contracts in Reverse Logistics: Supply Chain Structures and Channel Leaderships	[29]	1. Study the effect of contracts on the performance of logistics systems with a focus on environmental sustainability and reverse logistics 2. Classify and examine supply chain structures and channel leadership
3	Revenue-sharing contracts in a supply chain: a literature review	[28]	1. Investigate the revenue-sharing contract within supply chain management for two formats: (1) a wholesale price contract with an added revenue-sharing mechanism, and (2) a consignment contract with revenue-sharing.

The present paper is structured as follows: Section 2 describes the methodology used in literature search, content analysis, and literature classification. Section 3 presents a detailed analysis of the papers. Section 4 discusses the main findings and how to direct future studies.

2. Methodology

The literature review should follow a systematic and clear plan to ensure the validity of the findings. The objective is to identify, evaluate, and classify works in the literature to illustrate the available knowledge in this area and discover gaps

and opportunities for future studies [30] Our review process includes the steps in Figure 1.

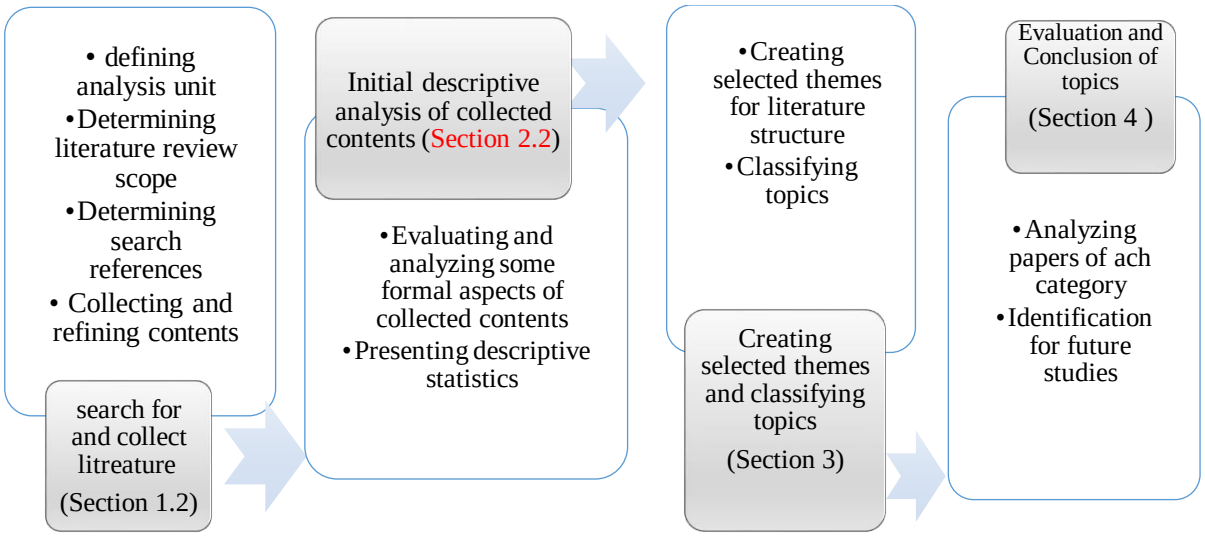

Fig. 1. Steps in the research process

The research steps have been explained herein:

2.1. Search for and collect literature

Setting the searched literature border is an important step in the literature review. Although there are many articles in the field of contract optimization and related topics, such as supply chain management, etc., we are only satisfied with the articles that are within the scope of the research search. We searched relevant literature on contract optimization in the English language published in authoritative scientific journals. We considered papers published in journals and removed books. We searched the structured keywords through the Elsevier database (www.sciencedirect.com) to collect and find relevant works. The following keywords were used: "Supply Chain", "Optimization", "Game", "Coordination", "Contract", and a combination of these terms searched through titles, abstracts, and keywords of papers. Overall, five mixed words were used to search "Supply Chain" besides "Contract" and one of these terms: "Game", "Optimization", or "Coordination". Therefore, the following mixed words were used in the search: Supply Chain + Contract + Game, Supply Chain + Contract + Optimization, and Supply Chain + Coordination + Contract.

2.2. Initial descriptive analysis of collected contents

This part of the study presents the statistical distribution of papers published in each journal during the studied years. According to Figure 2, the identified literature included 373 papers selected is considered research interval. The first and last reviewed papers were published in 2004 and March 2022, respectively. Figure 2 indicates the ascending trend of published papers from 2004 to 2022. However, it should be noted that the extent study was written in the first quarter of 2022, and 52 papers were then identified. This considerable increase in the number of papers compared to previous years implies a higher interest in contract optimization over recent years.

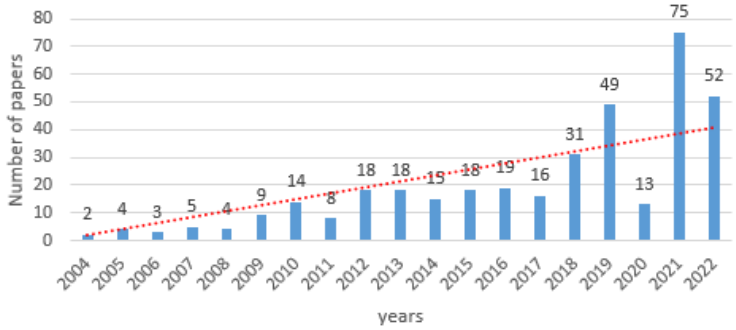

Fig. 2. Distribution of publications per year during the studied period

2.3. Aspects innovations of research

The innovative aspects of this research are related to the extraction of new study gaps in contract optimization research. These new gaps in categories:

1. Examining types of contracts,
2. Symmetry and asymmetry of information,
3. Bullwhip effect in terms of contract optimization,
4. Types of games used,
5. Smart contracts,
6. Combined contracts,
7. Types of non-deterministic methods and used algorithms,
8. Levels of chains used in research,
9. Strategic alliances and issues such as 3PL, VMI, and transportation will be examined.

To achieve this goal, we will follow the methodology suggested in Figure 1.

3. Classification of Research Subjects

This study is one of the first comprehensive reviewing papers about contract optimization in the supply chain, holistically examining all contracts in the supply chain in brief. The papers should be classified due to the dispersion of papers in terms of various aspects. This study attempts to classify subjects, so readers and researchers can find future research directions in each category. Figure 3 illustrates the structure of mentioned points to clarify the topic.

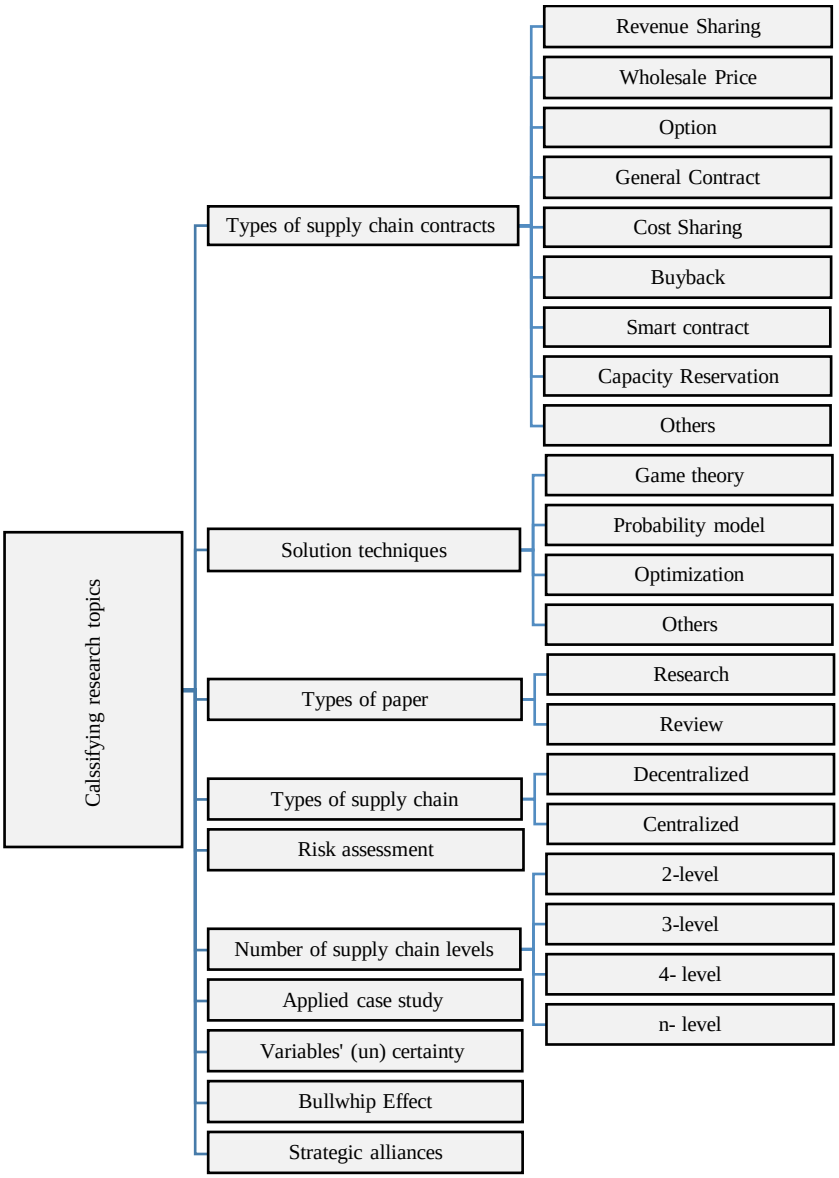

Fig. 3. Selected themes and classification of research topics

3.1. Types of supply chain contracts

According to reviewed studies, 170 papers examined contracts and their effect on supply chain, such as contract design, comparison between contracts, and effect of contracts on supply chain management, transportation, logistics, etc. Table 3 defines some available contracts to clarify the subject. It is worth noting that among the reviewed papers, 67 studies examined other contracts that are fewer than the contracts introduced in Table 3.

Tab. 3. Definition of some popular contracts in the supply chain

Contract name	Contract subject	The regular technique or formula of contract
Revenue-Sharing Contract	This is a coordination mechanism that the distributor provides for the retailer to change the retailer's profit (and the distributor's profit) to encourage the retailer to make a centralized decision for optimizing the total performance of the supply chain. Assume that β represents the distribution of total profit between supplier and retailer. This contract is described with two parameters (α, β) in which the supplier receives wholesale price α that is less than the final cost of entity (c) from the retailer in exchange for 1-β% of the retailer's revenue. Constraint α<c sets channel coordination[31]. $T_r(q,\alpha,\beta)=\alpha q+(\backslash-\beta)CS(q).$ Supply chain profit Suppose that $\alpha=\beta C$, then $\pi_r(q,\alpha,\beta)=\alpha q+(\backslash-\beta)CS(q)=\beta\pi(q).$ Retailer profit $\pi_s(q,\alpha,\beta)=\alpha q+(\backslash-\beta)CS(q)=(\backslash-\beta)\pi(q).$ Supplier profit	Stackelberg
Repurchase Contract	Assume q as the purchase amount in the given period and B (q) as the purchase return at the end of the period. Under a repurchase contract, the supplier receives an amount of money from the retailer (ω) in exchange for per purchased unit but spends (b) a unit to the retailer in exchange for each unit remaining at the end of the period. In this contract $b\le\omega$[32]. $T_b(q,\omega,b)=\omega q-bB(q).$	Stackelberg
Wholesale Price Contracts	In a wholesale price contract, the seller supplies the product (or service) under the wholesale price ω for purchasers, and sellers and buyers negotiate on wholesale price value [11].	Game
Option Contract	In an option contract, the purchaser reserves a product or service under the fixed price or option price over the contract period, and the rest of the demand is determined based on the stock price and dividend [11]	Stackelberg
Discount Contract	Under this contract, the higher the purchase volume, the higher the discount rate [33].	
Capacity Reservation Contract	A Capacity Reservation Contract includes parameters $(\alpha,\beta,\gamma,\lambda)$ λ that represent reservation cost γ and indicates product price during the period; β is the fine paid by the producer if it cannot supply the retailer's order. A shows the purchase price that retailers should pay for partial order that exceeds the reservation volume. In this contract, the retailer reserves Q after paying $\lambda.Q$ [34]. $\pi_R(Q,K)=\mu_p E(D\Lambda K)-p.Q$ Retailer's profit $-E_D\left\{p_e(D\Lambda K\Lambda Q)+\lambda_c\left((D\Lambda K)-Q\right)^+\right\}$ $\pi_M(Q,K)=p.Q$ Supplier profit $+E_D\left\{p_e(D\Lambda K\Lambda Q)+\lambda_c\left((D\Lambda K)-Q\right)^+\right\}-cK$	Stackelberg
Quantity Flexibility Contract	The retailer performs as a leader, and the producer is a follower under this contract. Following steps are taken in this contract: 1) a contract comprising parameters $(\alpha,\beta,\gamma,\lambda)$ (w, αq, βq, d) is proposed. The α represents wholesale price after demand fulfillment. Moreover, the producer must pay a fine (β) if it cannot supply the retailer's order within the allowed interval., In addition, the retailer must pay the	Stackelberg

	fine (γ) if the final order is out of the allowed interval., Parameter $\lambda \epsilon [0,1]$ measures flexibility and allowed range or interval., 2) under this contract, the retailer reserves Q; therefore, the allowed interval equals [34] $\pi_R(Q,K) = \mu_p E(D\Lambda K) - T(Q,K)$ Retailer's profit $\pi_M(Q,K) = T(Q,K) - cK$ Supplier's profit	
Smart Contract	The smart contract is used for online transactions. It is designed to facilitate, confirm or implement negotiations and execute terms of a joint legal contract, including payment, liabilities, and execution without a third party [21].	Qualitative/ Stackelberg
Cost-sharing Contract	Under a cost-sharing contract, suppliers and producers share the cost shortage. In this contract, all supply chain members share the cost of missed sales and the fine of shortage imposed on the producer at the end of the period [35].	Stackelberg
Hybrid Contract	This contract combines two or more contracts considering the problem conditions to achieve better coordination compared to the case of using only one contract.	Expected profit

Table 4 reports the distribution of papers based on the contract type. The first row of this table is titled General Contract. Many papers under the General Contract category in supply chain contracts analyze contracts within the supply chain [36]. The mentioned papers examine the effect of risk and associated factors on contracts, cooperation between members, and the effect of contracts on transportation, inventory, project management, and sustainability. Other papers have addressed some topics, including contract selection, competition, design of contracts under information asymmetry, quantification of contracts' efficiency, etc. This Table includes other contracts that comprise some contracts, such as the combination of several contracts, an agreement under specific supply chain conditions like green conditions, cooperation in investment trajectory, financial contracts, and so forth.

Tab. 4. Key observations of papers based on the contract type

Contract type	percentage	Key observations
General Contract	45%	Topics in this category review the following items: 1. The effect of risk and its related factors on optimal decisions in supply contracts 2. Cooperation between members, examining the impact of contracts on the issue of transportation 3. Cooperation of members through transportation, the role of contracts in inventory control 4. Project contract management for coordination 5. Coordination for sustainability 6. Implementation of coordination contracts 7. Choosing a contract 8. Competition 9. Designing contracts under information asymmetry 10. Quantifying the effectiveness of contracts 11. Coordination and the effect of price supply chains.
Revenue-Sharing Contract	15%	In the articles of this category following items are studied: 1. Income sharing agreement with a joint investment 2. Revenue-sharing contract through bargaining 3. Revenue and cost-sharing contract for pricing policies and services in a two-channel closed-loop supply chain. 4. Monopoly in franchise revenue-sharing contracts 5. The value of information 6. Pricing based on behavior 7. The optimal time to announce the purchase price 8. Social group purchase 9. Competition and coordination, 10. 3PL 11. Circular economy 12. Uncertainty 13. Combination with other contracts 14. Hierarchical subscription contract

		15. Application in the field of improving quality and services 16. Reducing carbon 17. Uncertain supply and demand conditions.
Option Contract	9%	In this type of contract, the following items can be seen: 1. Bilateral option contract 2. Relief resources 3. Risk-adverse suppliers 4. Information asymmetry 5. Prepurchase.
Wholesale Price Contract	9%	This type of contract along with topics like: 1. Incentive mechanisms 2. Constructive advertising and store brand introduction 3. RFID adoption strategy 4. Bank credit financing 5. Two-channel supply chain 6. Market uncertainty, Pareto and Caldor-Hicks improvements 7. Direct fines 8. Mixed contracts 9. Collaborative games 10. Bargaining in asymmetric conditions 11. Innovation in the chain 12. Fixed wholesale contract.
Cost-Sharing Contract	3%	This type of contract along with topics like: 1. Leakage of information 2. Block supply chain 3. Standard and customized products 4. The effect of government subsidies 5. Research and development and advertising 6. Interchangeable products 7. Multilateral coordination 8. Environmental costs 9. Different government intervention policies 10. Cooperative advertising.
Buyback Contract	2%	This type of contract along with topics like: 1. Information sharing 2. Combination with other contracts 3. Random demand, inventory managed by the seller 4. Fuzzy random variable demand.
Smart Contract	2%	This type of contract along with topics like: 1. Recovery strategies 2. Smart contracts based on blockchain 3. Purchase 4. Traceability and payment transactions 5. Smart contracts 6. Game models 7. Intelligent supply chain.
Capacity Reservation Contract	1%	This type of contract along with topics like: 1. Combination with other contracts 2. Bilateral fines 3. Uncertainty in supply 4. Possibility of deduction.
Others	14%	It can be said about the articles on contracts of this group: 1. Some of these contracts of this group are composed of several contracts 2. The contracts of this group are defined in the specific conditions of the supply chain, such as being green, cooperation in the way of investment, financial contracts, etc.

Six reviewed studies on supply chain contracts addressed smart contracts that are based on the newly emerged blockchain technology. Smart contracts aim to reduce transaction costs by actualizing traceable and irreversible transactions using blockchain technology for databases. However, smart contracts' potential is beyond the cost reduction because it facilitates entrepreneurial

cooperation of inter-organizational business processes characteristic of a smart supply chain [21]. Table 5 reports the subjects addressed in papers included in this category.

Tab. 5. Studies on blockchain contracts

Paper	Description
[21]	The effect of smart contracts and blockchain technology to implement joint business projects in entrepreneurial activities
[37]	Investigating how much smart contracts can facilitate blockchain programs economically and operationally
[38]	Effect of contracts on sharing information between smart supply chain members
[39]	Effect of blockchain on supply chain balance using game theory
[40]	Blockchain optimization approach provided for greenhouse system. The proposed approach performs in three steps: forecast, optimization, and control
[41]	Using smart contracts based on blockchain technology to overcome disorders in complicated supply chain

3.2. Solution techniques

Contract parties interact with each other to gain higher profits. Game theory can be used to model contracts. Contract optimization includes issues such as assessment of equilibrium point, optimization of overall profit, etc. In total, 203 papers used game theory to solve the considered problem. Most reviewed papers (n=105) used non-cooperative games, Stackelberg, and Nash equilibrium concepts. The mentioned papers studied issues related to coordination and cooperation through contracts. Table 6 reports the number of techniques used to solve contract optimization problems. However, few studies used cooperative game solution concepts, such as core value and Shapley value [42]. However, these notions are powerful instruments used to analyze the high number of potential contract conditions in which supply chain members can achieve better results through cooperation and collective action. Like cooperative games, dynamic games and games with asymmetric information have also been used to analyze problems pertained to supply chain contracts. The mentioned games can be widely used in this field. Some studies have used other methods, including nonlinear programming, integer programming, simulation, and risk analysis.

Tab. 6. Key observations of contracts' problem solution

Technique		No.	Percentage	Key observations
Game theory	Nash-bargaining	24	55%	In the articles of this topic category: 1- A simple supply chain including a supplier and a retailer, 2- Information symmetry, 3- risk taking, 4- Carbon emissions, 5- Leader and follower of the game, 6- Cooperation and competition, 7- Innovative supplier, 8- Justice and fairness in the decision making of the parties, 9- Disruption in the supply chain (disturbance in the channel, etc.), 10- Green and sustainable supply chain, 11- Nash's asymmetric bargaining, and 12- Combined contracts have been studied
	Stackelberg game	81		This technique in the topic of contract optimization along with topics such as: 1- Collaborative advertising, 2- Two-channel supply chain (online-offline), 3- Financial risk coverage, 4- Risk taking and risk aversion, 5- Discount policy, 6- Product life cycle approach, 7- Symmetric and asymmetric information, 8- Dynamic supply chain,

				9- Carbon reduction policies, 10- Mean-variance analysis, 11- Uncertainty, 12- Social responsibility, and 13- Participation of the third party have been investigated.
	Others	98		1- This group includes dynamic, competitive, evolutionary, and cooperative games, 2- Strategic game, 3- Playing in the presence of a combination of contracts, 4- Delegation strategy, 5- market segmentation, 6- Cloud networking, 7- Advertisements that create a monopoly in the contract, 8- Hidden and open information, 9- Radio frequency identification technology, 10- Uncertainty in supplying resources, 11- Different methods of ordering goods, and 12- Crowd-sourcing production along with the optimization of contracts, have been investigated in this category.
Optimization	Probability model	18	5%	1- Contract farming, 2- Price only contracts, 3- Markov model, 4- Coordination of capacity decisions, 5- Supply chain with multiple suppliers, and 6- Few discount contracts, have been investigated in this group.
	Expected profit	80	35%	In this section, topics such as: 1- Asymmetric information, 2- Social responsibility, 3- Carbon responsibility, 4- Delay in payment, 5- Service contract in the platform era, 6- Standard and customized products with delay, 7- Direct versus indirect fines, 8- Gathering information, 9- Advance purchase and random demand, 10- Bilateral information asymmetry, 11- Currency exchange rate, 12- Under the subsidy contract, 13- Random returns and overconfidence, financing, 14- Improving the quality and maintenance services, 15- Choosing a vertical contract under competition, 16- Carbon emission tax regulations, 17- Performance-based contracts, and 18- endogenous demand information are examined.
	Stochastic programming	14		In this section, topics such as the following items are investigated: 1- Designing a contract for the purchase of humanitarian aid goods considering severe disasters, 2- Optimum inventory allocation for clinical trial supply chains, 3- multi-purpose supply chain, 4- Risk sensitivity analysis, 5- Long-term supply chain partnerships, 6- Delay in payment, 7- Repair contracts, 8- The contract with asymmetric demand information.
	Other methods	39		1- Perishable items 2- Food waste recycling 3- Financing strategies 4- Information asymmetry 5- Uncertainty of the market 6- Result-based contracts 7- Pricing and refilling policy 8- Swelling

			9- Two-part tariff contracts.
Simulation	2		It has been used to simulate a dynamic strategy in the field of income management for perishable items.
P-graph	1		This approach has been used for two-stage decision making in transportation contracts.
Cash flow	1		Purchasing, traceability and cash advance credit payment transactions in the supply chain using blockchain smart contracts.
Non-Technique	15	5%	In this section, topics such as the following items have been examined: 1- Optimal smart contract 2- Digitization of the supply chain 3- Competitive market 4- Commercial credit financing versus bank credit financing 5- Smart contracts for smart supply chain 6- Resale market 7- A review of the contracts.

3.3. Types of papers

The searched papers comprised five review papers. These papers have examined agricultural issues, closed-loop supply chains, supply chain contracts in reverse logistics, revenue-sharing contracts in the supply chain, and digitalization of the construction and procurement supply chain. The rest of the papers verified and addressed different topics related to supply chain contracts.

3.4. Centralized and decentralized supply chain

In a centralized supply chain, suppliers and retailers belong to a single owner; therefore, an entity makes all decisions. In the decentralized type, however, suppliers and retailers have their ownership and make decentralized decisions. In a decentralized system, the retailer usually sends orders to respond to the supplier's contract plan [43]. Of reviewed papers, 69 cases examined centralized and decentralized supply chains simultaneously and evaluated the role of contracts in these two systems. However, the majority of studies considered decentralized supply chains. Figure 4 illustrates this topic.

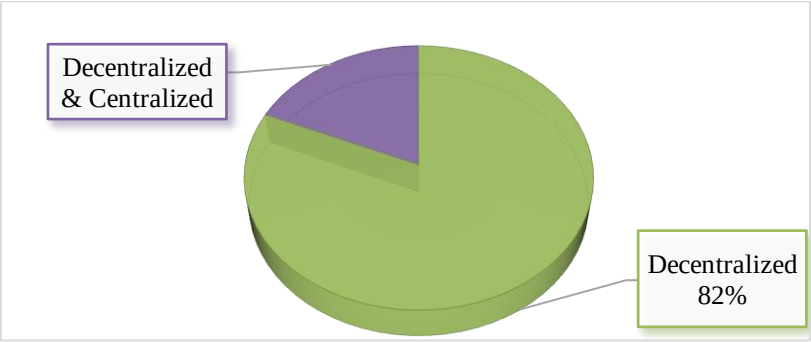

Fig. 4. Distribution of centralized and decentralized supply chains

3.5. Risk assessment

Risks existing in supply chains cause complexity in making investment decisions; therefore, risk assessment is important for supply chain contract parties. Hence, detecting risk factors and evaluating and analyzing risk reduction factors are significant issues that should be considered in supply chain contracts. Figure 5 shows the percentage of papers that used risk assessment in the contracts. It should be noted that some papers used quantification methods (e.g., risk function, statistical variance, etc.) for risk assessment while other papers used qualitative techniques.

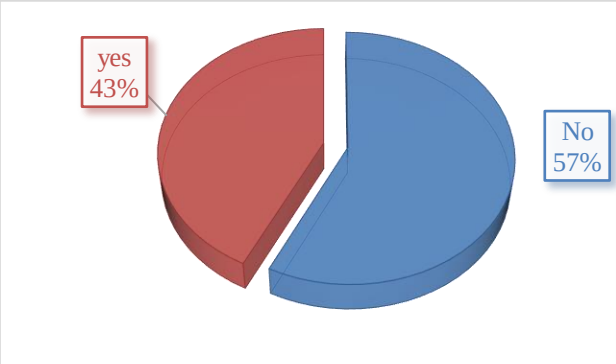

Fig. 5. Risk assessment through searched papers

3.6. Papers' case studies

Among identified papers, 245 studied the problem only using examples and numerical analyses, while the rest investigated case studies. Table 7 reports the papers with case studies. The row of "Others" in this table mainly consists of qualitative studies, the general topic of the supply chain, and other areas such as education, chemicals, store brand, montage system, fashion industry, life, construction industry, and other areas with frequencies less than 4.

Tab. 7. Number of studies based on their examined issues

Scope of study	Papers	No.
Agriculture, food and biofuel sector	[44];[45] ;[46]; [47]; [48]; [49]; [50]; [51]; [13]; [52]; [8]; [14]; [53]; [54] [55].	15
Health field	[56]; [19]; [57].	3
Digital technology	[58]; [20]; [15]; [21]; [24]; [22]; [59].	7
Transportation Industry	[26]; [11]; [60]; [61].	5
Department of energy and electricity industry	[62]; [18]; [12]; [63]; [64];[65].	10
Others	[66]; [67];[68]; [59]; [69]; [70]; ; [43]; [71], [25]; [72];[73], [74], [17]; [58], [40]; [75]; [76].	87

Figure 6 depicts the frequency (%) of papers based on the examined case studies.

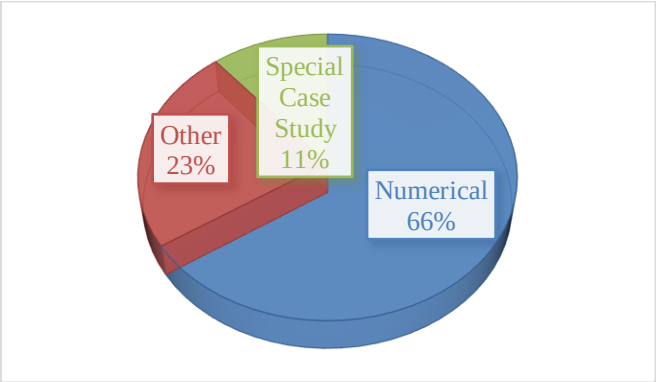

Fig. 6. Number of papers based on the studied issues

3.7. Certainty and uncertainty

Uncertain variables and parameters in a supply chain make the contract more complicated. Determining available parameters and variables allows for discussing contracts' results more simply. Of identified papers, 215 comprised uncertain parameters, such as demand, price, and so forth; Table 8 indicates the distribution of techniques used to examine the behavior of these variables. Topics in 11 cases (None) of the papers were qualitative, so the certainty and uncertainty of variables could not be identified.

Tab. 8. Key observations related to certainty or uncertainty

Row	percentage	Key observation

Certain	41%	1- In the works of this category, a limit is usually considered to face things like risk, uncertain demand, etc. 2- In their article [77] note that competition and coordination in the supply chain of contract organic agricultural products have been investigated. 3- In their article note that the supply contract and process innovation in a dynamic supply chain with information asymmetry has been investigated, which has been modeled in an appropriate way according to the variable conditions of the problem.
Uncertain	59%	1- In their article [41] mentioned that the performance of a multi-layer supply chain network including multiple suppliers, manufacturers, and distributors in the use of blockchain before and after disruption, under different conditions, is studied and expanded the previous works in this field 2- [78] note that the subject of the bilateral agreement of relief resources under the uncertainty of demand, it is particularly attractive in the discussion related to crisis management. 3- Many articles in this section have addressed the modeling of information asymmetry in the chain using the capability of non-deterministic models. 4- In their article, [79] note that one of the new issues of production under the title of crowdsourcing in production is discussed, considering a subcontract.

In 11 cases (None) of the articles, the relevant topics were qualitative and there was no talk about the certainty or uncertainty of the variables of the problem.

Of 224 papers with uncertainty, 6, 142, and 62 used fuzzy, probability, and stochastic techniques, respectively. Table 9 reports some papers that used techniques to eliminate the uncertainty.

Tab. 9. Key observations of techniques that used under uncertainty

Tech.	percentage	Key observation
Fuzzy	3%	1- Competition in the chain in the case of random returns 2- Examining chain contracts in an uncertain mixed environment 3-Examining contracts in stochastic fuzzy supply chain
Stochastic	31%	1- Examining contracts in case of uncertainty in investment 2- Examining the medical care chain 3- Checking the contract in case of random demand 4- Checking the contract in the case of information asymmetry 5- Review of sales discount contracts
Probability	66%	1- Examining factors of risk aversion and risk-taking 2- Debt financing 3- Examining the manufacturers' discount policy 4- Examining contracts in the presence of fines for producers and consumers 5- Examining energy performance contracts 6- Examining contracts in the case of information asymmetry 7- Checking the contract in a random environment 8- Examining multilateral coordination 9- Special capacity investment 10- Decision making and coordination in dynamic mode 11- It is necessary to explain that supply chain contracts are mechanisms that are usually designed to coordinate against various risks in the supply chain environment. Considering probabilistic methods are one of the most efficient methods for modeling these phenomena, it has always attracted the attention of researchers.

3.8. Number of supply chain levels

The number of supply chain levels affects contracts' efficiency. In other words, an increased number of supply chain levels and conflicting objectives lead to the complexity of contracts. According to conducted studies, 333 papers, 19 papers, and two papers used 2-level, 3-level, and 4-level supply chains, respectively. Two studies considered the n-level supply chain. Table 10 shows these details.

Tab. 10: Key observations of supply chain levels

No. of levels	Percentage	Observation key
2-level	93.5%	1- Usually, this type of structure consists of one retailer-one supplier, one retailer-several suppliers, or several retailers-several suppliers. 2- Creates a suitable initial platform for designing contracts in a supply chain. 3- The game theory approach of the leader-follower type has been used in this structure.
3-level	5.5%	1- The three-level game model is used in contract design for this type of chain 2- For this structure, in the state of information asymmetry, has been studied in three very few levels. 3- The topics related to the sub-chain in this structure can be interesting from the point of view of studies.
4-level	0.5%	1- The multi-product, multi-period, and multi-objective model has been studied in this structure. 2- A revenue-sharing agreement is used for this type of structure.
n-level	0.5%	1- The revenue-sharing contract has been studied in this type of structure 2- Studying other types of contracts in this type of structure can be interesting.

3.9. Bullwhip effect

Supply chains use contracts to reduce or remove the bullwhip effect. Contract clarifies the interaction between supply chain members allowing them to share their information and eliminate the bullwhip effect. Of reviewed studies, only three papers examined the bullwhip effect and its role in optimizing supply chain contracts. Table 11 reports these studies briefly.

Tab. 11. Bullwhip effect in searched papers

Paper	Description
[80]	This study examines production rate variance with output sales and producer inventory variance. The research concluded that higher sale in output means higher income, and output sales in the manufacturer site may reduce order fluctuations and production inventories, which improves replenishment. On the other hand, output sales may cause a bullwhip effect.
[81]	This study examined the case in which a supplier's capacity is booked, and a shortage has occurred. The results indicated a weak view of actual customer demand that led to surplus supply or shortage, which characterizes bullwhip effect.
[82]	This study explained the nonlinear theory and dynamic behavior of bullwhip to analyze customer behavior in a competitive economy, expressing that bullwhip cannot completely explain the complicated dynamic behavior of the supply chain system. Moreover, this study pointed to the carbon tax mechanism as a new approach to analyzing supply chain complexity.

3.10. Strategic alliances in contract optimization

Four papers examined strategic alliances and their effects on supply chain contracts. These papers mainly used the Stackelberg type of game theory. Table 12 reports a brief explanation of these papers.

Tab. 12. Strategic alliances in searched topics

Paper	Description
[83]	This paper examined two finance sources (bank and 3PL finance) in which a retailer or 3PL firm determines customized services.
[84]	This study used game theory to analyze the business model to indicate the optimal strategy of participants in the healthcare supply chain, constituting one producer, one 3PL provider, and one retailer.
[38]	In this study, the product provider uses 3PL logistics services for the purchaser. This study suggests a blockchain-based contract for supply chain transactions.
[85]	This study considers an e-channel where an e-retailer has a limited in-house shipping fleet and can hire additional shipping services from a 3PL to encounter demand volatility.

4. Conclusion and Recommendations

4.1. Conclusion

This study provides a systematic review of literature that use contracts to optimize supply chain performance. This paper is the first comprehensive review study on research that has been conducted on contract optimization in the supply chain. Our analysis confirms the rapid expansion of such studies over recent years. The studied literature covers a wide range of SC-related issues. Literature classification allowed us

to find the most frequent issues rather than others and research gaps in supply chain aspects.

Our study shows there are only four articles on capacity reservation contracts with asymmetric information. Furthermore, in a manufacturing supply chain, the capacity reservation contract is used to prevent supply disruptions in a multi-level mode for several products and periods in information symmetry and asymmetry situations under multi-supplier-one-retailer-one-supplier scenarios that multi-retailer can be attractive in a dynamic environment. Moreover, one of the appropriate methods to obtain the optimal state in the capacity reservation contract is parameter adjustment.

Most of the issue of information asymmetry refers to asymmetry in demand and other categories related to the supply chain, such as retail prices, and characteristics of end customers have not been examined yet which in the presence of supply chain contracts can be very attractive, which can be modeled and studied using game theory.

Among all the articles, only three papers have investigated the impact of the contract on the bullwhip effect in the supply chain. Considering the coordination mechanism of contracts in a decentralized supply chain such as the supply chain of food, medicine, and especially perishable items, it is suggested to study the effect of contracts on the phenomenon of bullwhip effect in the state of information symmetry and asymmetry. Also, the following methods are suggested for this type of study 1- methods based on simulation 2- Using appropriate statistical distributions to model the bullwhip effect phenomenon in the presence of contracts 3- Using innovative and meta-heuristic methods to model and study the bullwhip effect and compare the results in two cases with and without a contract. 4- Using data mining methods.

Collaborative games and games with asymmetric information are rare in the existing literature, and only five articles deal with cooperative games. However, one of the reasons for this lies in the dynamic nature of the supply chain variables, which makes the atmosphere governing the supply chain more competitive, and the issue of cooperation is less addressed.

Considering the role of coordination of contracts, cooperation in the chain can be adopted as one of the approaches to achieving coordination in the chain. Therefore, by using this approach and with the capabilities of contracts, design optimal contracts in cooperative approaches in the payment chain. In this regard, we can mention the following:

1- The topic of cooperative games in discussions related to strategic alliances such as contracts in the field of 3PL in the supply chain can have a good appeal, which is trying to achieve win-win results by using game theory.

2- It is suggested to model cooperative advertising contracts using cooperative games.

3- The issue of information cooperation and information leakage in research and development cooperation can be investigated using contracts.

4- Designing partnership contracts in the field of cooperation in forecasting demand, supply, etc.

4.2. Future recommendations

Finally, this study assisted us to emphasize on research gaps and providing some insights for future studies in the following scopes that shown in Table 13:

Tab. 13. Suggestions for directing future studies

	RESEARCH GAP	SUGGESTIONS FOR DIRECTING FUTURE STUDIES
1	UPDATED INFORMATION DURING MULTIPLE TIME PERIODS Very few articles have investigated the issue of updating information in time periods.	The impact of updating information on supply chain contracts can be studied from the following perspectives: 1- The effect of contracts in reducing the bullwhip effect in updating information related to demand and etc. 2- Designing optimal contracts to update the information of the parties in the supply chain. 3-Determining the appropriate times to update the information to reduce phenomena such as the bullwhip effect by using the capabilities of contracts.
2	BLOCKCHAIN EFFECTS ON CONTRACTS Considering the existence of six articles in the field of blockchain technology, which makes it possible to create smart contracts in the context of supply chains, it is interesting that out of this number, 4 are	1- Studying the impact of blockchain technology on all types of supply chain contracts 2- Studying the issue of contracts in the context of this technology at the horizontal and vertical levels of the chain, considering the possibility of non-leakage of information in blockchain technology.

	related to the current year, which shows the attention. researchers in this field.	3-Studying the effects of increasing information asymmetry in the use of blockchain technology and the effect of contracts in reducing its negative effects
3	COMBINED CONTRACTS According to Table 3, the number of articles in the field of combined contracts is less compared to other contracts.	1- The combination of contracts in order to design optimal contracts compared to each and every component of construction contracts 2- Designing subcontracts at different levels of the chain
4	NON-DETERMINISTIC METHODS IN CONTRACT OPTIMIZATION According to the investigations carried out in this article, among the non-deterministic methods of stochastic programming and probabilistic methods, less attention has been paid than other methods, which can be seen in Table 6.	In order to study the uncertainty of information in the amount of inventory, demand, supply, product quality, production, etc., it can be studied.
5	SIMULATION METHOD AND META-HEURISTIC ALGORITHMS The simulation method and meta-heuristic algorithms to face uncertainty have received less attention than other methods, so only one case [41] has been discussed for meta-heuristic algorithms. Therefore, future research in this field can be interesting.	1- In non-deterministic models, these types of algorithms can be used to simulate the results 2- These algorithms can be used in cases related to combining the subject of contracts with other subjects in case of difficult problems.
6	REVIEW ARTICLES IN THE FIELD OF CONTRACT According to Section 3-3, the number of review articles in the field of contracts is very small, so to guide future studies, we can pay attention to these types of articles in future research.	A review of each type of contract with different approaches
7	CENTRALIZED AND DECENTRALIZED SUPPLY CHAINS The simultaneous examination of the supply chain in the centralized and the decentralized mode in the articles in the field of contract optimization can be useful for future research.	Simultaneous examination of concentration or lack of concentration regarding information, inventory, production, etc. in the supply chain along with the issue of contracts in the field of agriculture, arbitration, etc.
8	MULTI-LEVEL SUPPLY CHAINS Examining the supply chain in a multi-level mode in articles can be particularly attractive.	Examining different contracts in the multi-level supply chain and between members of different levels can compare the efficiency of the contracts.
9	STRATEGIC ALLIANCES IN THE SUPPLY CHAIN The introduction of topics such as strategic alliances in the supply chain can be useful for future studies because our review shows that only four articles have addressed the topic of 3PL.	Investigating the issue of strategic alliances in a multi-level supply chain and between different levels is suggested.
10	DUAL-CHANNEL SUPPLY CHAINS Only six articles have investigated the supply chain in dual channel mode, so considering the importance of this issue in the real world, it can be useful for future research.	Considering the expansion of the online channel in exchanges and the need to facilitate network communication and communication security, it is suggested to evaluate the impact of this issue on supply chain contracts and various supply chain phenomena.
11	VMI POLICIES IN SUPPLY CHAINS Very few VMI policies have been used in the reviewed articles, so combining this topic with other topics in contract optimization can be attractive.	Investigating the issue of inventory managed by the manufacturer or supplier in the presence of various supply chain contracts is attractive for studies.
12	PARETO IMPROVEMENT	This approach can be used to conduct qualitative studies, such as:

	In the reviewed cases, a small number of articles (only six articles) have addressed the topic of Pareto improvement.	1- Checking the credit risk of the parties using contracts 2- Examining the behavioral issues of the decision maker in the design of contracts 3- Examining incentive issues, time, and financial discounts in contracts using the Pareto approach 4- Checking the level of satisfaction in the parties of the contracts 5- Designing intellectual property sharing agreements in an innovative supply chain
13	R&D INVESTMENT Optimizing contracts in the field of R&D investment can be useful for future research because few articles have addressed this issue in the reviewed articles.	The design of R&D contracts in innovative supply chains and topics related to open innovation and crowdsourcing is attractive.
14	DYNAMIC AND REPETITIVE GAMES According to Table 5, although the use of game theory in the field of contract optimization has spread well, in the meantime, very few articles have used dynamic games and repetitive games.	The use of dynamic games in dynamic supply chains with flexible structures is attractive 1- Designing optimal contracts for dynamic risk management in supply, demand, inventory, quality, and modeling orders using dynamic games 2- Optimizing contracts in dynamic supply chains 3- Modeling contracts in the field of dynamic chains such as application supply, fashion industry, digital industry, and communication
15	INTELLIGENT TRANSPORTATION SYSTEMS The use of intelligent transportation systems has received little attention in past studies, due to the progress of such systems in recent decades, therefore the urgent need for these types of systems in the real world, can be of great interest in future research.	Topics related to the intelligentization of the supply chain in the presence of various types of supply chain contracts in the field of electronic businesses.
16	MULTI-PRODUCT SUPPLY CHAINS Multi-product supply chains have received little attention in recent research, which of course can be due to the complexity of the issue of optimization in the case of multiple products.	Designing optimal contracts for multi-product supply chains can be attractive for studies.

References

[1] K. Govindan, R. Khodaverdi, and A. Jafarian, "A fuzzy multi criteria approach for measuring sustainability performance of a supplier based on triple bottom line approach," *J Clean Prod*, Vol. 47, (2013), pp. 345-354.

[2] V. Hovelaque, S. Duvaleix-Tréguer, and J. Cordier, "Effects of constrained supply and price contracts on agricultural cooperatives," *Eur J Oper Res*, Vol. 199, No. 3, (2009), pp. 769-780.

[3] B. Yang, X. Fu, N. D. Sidiropoulos, and M. Hong, "Towards k-means-friendly spaces: Simultaneous deep learning and clustering," in *international conference on machine learning*, PMLR, (2017), pp. 3861-3870.

[4] E. Anderson and M. Monjardino, "Contract design in agriculture supply chains with random yield," *Eur J Oper Res*, Vol. 277, No. 3, (2019), pp. 1072-1082.

[5] J. Li, Y. Fang, and J. Yang, "Minimizing carbon emissions of the rice supply chain considering the size of deep tillage lands," *Sustain Prod Consum*, Vol. 29, (2022), pp. 744-760.

[6] H. A. Ba, Y. de Mey, S. Thoron, and M. Demont, "Inclusiveness of contract farming along the vertical coordination continuum: Evidence from the Vietnamese rice sector," *Land use policy*, Vol. 87, (2019), p. 104050.

[7] G. Pedrielli, L. H. Lee, and S. H. Ng, "Optimal bunkering contract in a buyer–seller supply chain under price and consumption uncertainty," *Transp Res E*

Logist Transp Rev, Vol. 77, (2015), pp. 77-94.

[8] S. Huang and G. Hu, "Biomass supply contract pricing and environmental policy analysis: A simulation approach," *Energy*, Vol. 145, (2018), pp. 557-566.

[9] C.-Y. Lee and C.-L. Liang, "Manufacturer's printing forecast, reprinting decision, and contract design in the educational publishing industry," *Comput Ind Eng*, Vol. 125, (2018), pp. 678-687.

[10] Y. Liu, Z. Liu, W. Ren, and J. Y. L. Forrest, "A coordination mechanism through relational contract in a two-echelon supply chain," *Journal of Retailing and Consumer Services*, Vol. 56, (2020), p. 102156.

[11] I. A. Shaban, F. T. S. Chan, S. H. Chung, and T. Qu, "A mixed wholesale-option-contract to fix the demand imbalance between substitutable air cargo routes: A cooperative game approach," *Expert Syst Appl*, Vol. 182, (2021), p. 115300.

[12] R. Qiu, Y. Yu, and M. Sun, "Supply chain coordination by contracts considering dynamic reference quality effect under the O2O environment," *Comput Ind Eng*, Vol. 163, (2022), p. 107802.

[13] K. Fan, X. Li, L. Wang, and M. Wang, "Two-stage supply chain contract coordination of solid biomass fuel involving multiple suppliers," *Comput Ind Eng*, Vol. 135, (2019), pp. 1167-1174.

[14] R. Yang, W. Tang, R. Dai, and J. Zhang, "Contract design in reverse recycling supply chain with waste cooking oil under asymmetric cost information," *J Clean Prod*, Vol. 201, (2018), pp. 61-77.

[15] M. Jin and S. D. Wu, "Capacity reservation contracts for high-tech industry," *Eur J Oper Res*, Vol. 176, No. 3, (2007), pp. 1659-1677.

[16] M. S. Meijer, W. van Jaarsveld, T. de Kok, and C. S. Tang, "Direct versus indirect penalties for supply contracts in high-tech industry," *Eur J Oper Res*, Vol. 301, No. 1, (2022), pp. 203-216.

[17] X. Zou, S. Pokharel, and R. Piplani, "A two-period supply contract model for a decentralized assembly system," *Eur J Oper Res*, Vol. 187, No. 1, (2008), pp. 257-274.

[18] T. Avinadav, T. Chernonog, I. Meilijson, and Y. Perlman, "A consignment contract with revenue sharing between an app developer and a distribution platform," *Int J Prod Econ*, Vol. 243, (2022), p. 108322.

[19] D. Chandra and B. Vipin, "On the vaccine supply chain coordination under subsidy contract," *Vaccine*, Vol. 39, No. 30, (2021), pp. 4039-4045.

[20] H. Golpîra, H. Sadeghi, and S. Bahramara, "Electricity supply chain coordination: Newsvendor model for optimal contract design," *J Clean Prod*, Vol. 278, (2021), p. 123368.

[21] K. Lingcheng, Z. Zhenning, X. Jiaping, L. Jing, and C. Yuping, "Multilateral agreement contract optimization of renewable energy power grid-connecting under uncertain supply and market demand," *Comput Ind Eng*, Vol. 135, (2019), pp. 689-701.

[23] P.-S. Chow, Y. Wang, T.-M. Choi, and B. Shen, "An experimental study on the effects of minimum profit share on supply chains with markdown contract: Risk and profit analysis," *Omega (Westport)*, Vol. 57, (2015), pp. 85-97.

[24] X. Chen, N. Wan, and X. Wang, "Flexibility and coordination in a supply chain with bidirectional option contracts and service requirement," *Int J Prod Econ*, Vol. 193, (2017), pp. 183-192.

[25] S. Patel and C. L. E. Swartz, "Supply chain design with time-limited transportation contracts," *Comput Chem Eng*, Vol. 131, (2019), p. 106579.

[26] A. Nerja, "Exclusivity in concession revenue sharing contracts," *J Air Transp Manag*, Vol. 99, (2022), p. 102158.

[27] B. Liu, N. Liu, and Y. Chen, "Diagnostic test decision for suppliers in cruise-building supply chain with information asymmetry,"

Advanced Engineering Informatics, Vol. 49, (2021), p. 101350.

[28] N. Bart, T. Chernonog, and T. Avinadav, "Revenue sharing contracts in a supply chain: a literature review," *IFAC-PapersOnLine*, Vol. 52, No. 13, (2019), pp. 1578-1583.

[29] S. Guo, B. Shen, T.-M. Choi, and S. Jung, "A review on supply chain contracts in reverse logistics: Supply chain structures and channel leaderships," *J Clean Prod*, Vol. 144, (2017), pp. 387-402.

[30] M. A. N. Agi, S. Faramarzi-Oghani, and Ö. Hazır, "Game theory-based models in green supply chain management: a review of the literature," *Int J Prod Res*, Vol. 59, No. 15, (2021), pp. 4736-4755.

[31] I. Giannoccaro and P. Pontrandolfo, "Negotiation of the revenue sharing contract: An agent-based systems approach," *Int J Prod Econ*, Vol. 122, No. 2, (2009), pp. 558-566.

[32] G. P. Cachon, "Supply chain coordination with contracts," *Handbooks in operations research and management science*, Vol. 11, (2003), pp. 227-339.

[33] W.-K. Wong, J. Qi, and S. Y. S. Leung, "Coordinating supply chains with sales rebate contracts and vendor-managed inventory," *Int J Prod Econ*, Vol. 120, No. 1, (2009), pp. 151-161.

[34] J. Li, X. Luo, Q. Wang, and W. Zhou, "Supply chain coordination through capacity reservation contract and quantity flexibility contract," *Omega (Westport)*, Vol. 99, (2021), p. 102195.

[35] M. Leng and M. Parlar, "Game-theoretic analyses of decentralized assembly supply chains: Non-cooperative equilibria vs. coordination with cost-sharing contracts," *Eur J Oper Res*, Vol. 204, No. 1, (2010), pp. 96-104.

[36] M. Kremer, C. Schneeweiss, and M. Zimmermann, "On the validity of aggregate models in designing supply chain contracts," *Int J Prod Econ*, Vol. 103, No. 2, (2006), pp. 656-666.

[37] P. De Giovanni, "Blockchain and smart contracts in supply chain management: A game theoretic model," *Int J Prod Econ*, Vol. 228, (2020), p. 107855.

[38] P. V. R. P. Raj, S. K. Jauhar, M. Ramkumar, and S. Pratap, "Procurement, traceability and advance cash credit payment transactions in supply chain using blockchain smart contracts," *Comput Ind Eng*, Vol. 167, (2022), p. 108038.

[39] J. Gao, B. Adjei-Arthur, E. B. Sifah, H. Xia, and Q. Xia, "Supply chain equilibrium on a game theory-incentivized blockchain network," *J Ind Inf Integr*, Vol. 26, (2022), p. 100288.

[40] F. Jamil, M. Ibrahim, I. Ullah, S. Kim, H. K. Kahng, and D.-H. Kim, "Optimal smart contract for autonomous greenhouse environment based on IoT blockchain network in agriculture," *Comput Electron Agric*, Vol. 192, (2022), p. 106573.

[41] V. K. Manupati, T. Schoenherr, M. Ramkumar, S. Panigrahi, Y. Sharma, and P. Mishra, "Recovery strategies for a disrupted supply chain network: Leveraging blockchain technology in pre-and post-disruption scenarios," *Int J Prod Econ*, Vol. 245, (2022), p. 108389.

[42] M. Leng and M. Parlar, "Game theoretic applications in supply chain management: a review," *INFOR: Information Systems and Operational Research*, Vol. 43, No. 3, (2005), pp. 187-220.

[43] L. Zhang, S. Song, and C. Wu, "Supply chain coordination of loss-averse newsvendor with contract," *Tsinghua Sci Technol*, Vol. 10, No. 2, (2005), pp. 133-140.

[44] J. Li, Y. Fang, and J. Yang, "Minimizing carbon emissions of the rice supply chain considering the size of deep tillage lands," *Sustain Prod Consum*, Vol. 29, (2022), pp. 744-760.

[45] S. Beheshti, J. Heydari, and Z. Sazvar, "Food waste recycling closed loop supply chain optimization through renting waste

recycling facilities," *Sustain Cities Soc*, Vol. 78, (2022), p. 103644.

[46] R. Yazdanparast, F. Jolai, M. S. Pishvaee, and A. Keramati, "A resilient drop-in biofuel supply chain integrated with existing petroleum infrastructure: Toward more sustainable transport fuel solutions," *Renew Energy*, Vol. 184, (2022), pp. 799-819.

[47] A. C. Sant'Anna, J. S. Bergtold, A. Shanoyan, M. M. Caldas, and G. Granco, "Biofuel feedstock contract attributes, substitutability and tradeoffs in sugarcane production for ethanol in the Brazilian Cerrado: A stated choice approach," *Renew Energy*, Vol. 185, (2022), pp. 665-679.

[48] S. Gao and K. van't Veld, "Pegging input prices to output prices—A special price adjustment clause in long-term CO2 sales contracts," *Energy Econ*, Vol. 104, (2021), p. 105619.

[49] H. Ma, G. Lou, T. Fan, H. K. Chan, and S. H. Chung, "Conventional automotive supply chains under China's dual-credit policy: fuel economy, production and coordination," *Energy Policy*, Vol. 151, (2021), p. 112166.

[50] J.-F. Li and Z.-X. Wang, "Research on coordination of multi-product 'agricultural super-docking' supply chain," *Procedia Manuf*, Vol. 30, (2019), pp. 560-566.

[51] J. A. Castañeda, M. Brennan, and J. Goentzel, "A behavioral investigation of supply chain contracts for a newsvendor problem in a developing economy," *Int J Prod Econ*, Vol. 210, (2019), pp. 72-83.

[52] E. Anderson and M. Monjardino, "Contract design in agriculture supply chains with random yield," *Eur J Oper Res*, Vol. 277, No. 3, (2019), pp. 1072-1082.

[53] L. Yang, R. Tang, and K. Chen, "Call, put and bidirectional option contracts in agricultural supply chains with sales effort," *Appl Math Model*, Vol. 47, (2017), pp. 1-16.

[54] S. Dutta, S. P. Sarmah, and S. K. Goyal, "Evolutionary stability of auction and supply chain contracting: An analysis based on disintermediation in the Indian tea supply chains," *Eur J Oper Res*, Vol. 207, No. 1, (2010), pp. 531-538.

[55] V. Hovelaque, S. Duvaleix-Tréguer, and J. Cordier, "Effects of constrained supply and price contracts on agricultural cooperatives," *Eur J Oper Res*, Vol. 199, No. 3, (2009), pp. 769-780.

[56] C. Ash, C. Diallo, U. Venkatadri, and P. VanBerkel, "Distributionally robust optimization of a Canadian healthcare supply chain to enhance resilience during the COVID-19 pandemic," *Comput Ind Eng*, Vol. 168, (2022), p. 108051.

[57] B. Zheng, J. Chu, and L. Jin, "Recycling channel selection and coordination in dual sales channel closed-loop supply chains," *Appl Math Model*, Vol. 95, (2021), pp. 484-502.

[58] M. E. Arbabian, "Supply chain coordination via additive manufacturing," *Int J Prod Econ*, Vol. 243, (2022), p. 108318.

[59] J. Niemann, S. Seisenberger, A. Schlegel, and M. Putz, "Development of a method to increase flexibility and changeability of supply contracts in the automotive industry," *Procedia CIRP*, Vol. 81, (2019), pp. 258-263.

[60] J. A. Buzacott and H. S. Peng, "Contract design for risk sharing partnerships in manufacturing," *Eur J Oper Res*, Vol. 218, No. 3, (2012), pp. 656-666.

[61] N. Xu and L. Nozick, "Modeling supplier selection and the use of option contracts for global supply chain design," *Comput Oper Res*, Vol. 36, No. 10, (2009), pp. 2786-2800.

[62] C. Feldhaus, J. Lingens, A. Löschel, and G. Zunker, "Encouraging consumer activity through automatic switching of the electricity contract-A field experiment," *Energy Policy*, Vol. 164, (2022), p. 112855.

[63] S. Xu, L. Fang, and K. Govindan, "Energy performance contracting in a supply chain with financially asymmetric manufacturers under carbon tax regulation for climate change mitigation," *Omega (Westport)*, Vol. 106, (2022), p. 102535.

[64] K. Guo, L. Zhang, and T. Wang, "Optimal scheme in energy performance contracting under uncertainty: a real option perspective," *J Clean Prod*, Vol. 231, (2019), pp. 240-253.

[65] T. Avinadav, T. Chernonog, and Y. Perlman, "The effect of risk sensitivity on a supply chain of mobile applications under a consignment contract with revenue sharing and quality investment," *Int J Prod Econ*, Vol. 168, (2015), pp. 31-40.

[66] J.-Y. Chen, "Responsible sourcing and supply chain traceability," *Int J Prod Econ*, Vol. 248, (2022), p. 108462.

[67] Q. Shen, B. He, and Q. Qing, "Interplays between manufacturer advertising and retailer store brand introduction: Agency vs. wholesale contracts," *Journal of Retailing and Consumer Services*, Vol. 64, (2022), p. 102801.

[68] X. Xu and Y. Zhao, "Price-only contracts with backup supply," *Operations research letters*, Vol. 38, No. 3, (2010), pp. 201-206.

[69] P. Zhang, Y. Xiong, Z. Xiong, and W. Yan, "Designing contracts for a closed-loop supply chain under information asymmetry," *Operations Research Letters*, Vol. 42, No. 2, (2014), pp. 150-155.

[70] A. Z. Zeng, J. Hou, and L. Zhao, "Coordination through revenue sharing and bargaining in a two-stage supply chain," in *2007 IEEE International Conference on Service Operations and Logistics, and Informatics*, IEEE, (2007), pp. 1-6.

[71] M. Shafiq and M. M. Savino, "Supply chain coordination to optimize manufacturer's capacity procurement decisions through a new commitment-based model with penalty and revenue-sharing," *Int J Prod Econ*, Vol. 208, (2019), pp. 512-528.

[72] H. Song, H. Chu, H. Yue, and Y. Chen, "Green supply chain coordination with substitutable products under cost sharing contract," *Procedia Comput Sci*, Vol. 199, (2022), pp. 1112-1119.

[73] D. Zhao, M. Chen, and Y. Gong, "Strategic information sharing under revenue-sharing contract: Explicit vs. tacit collusion in retailers," *Comput Ind Eng*, Vol. 131, (2019), pp. 99-114.

[74] M. Shang, H. Li, Y. Wang, Y. Qin, Y. Liu, and Y. Tan, "Optimal decisions in a closed-loop supply chain under different policies of government intervention," *Sustainable Energy Technologies and Assessments*, Vol. 47, (2021), p. 101283.

[75] S. K. Yevu, T. W. Ann, and A. Darko, "Digitalization of construction supply chain and procurement in the built environment: Emerging technologies and opportunities for sustainable processes," *J Clean Prod*, Vol. 322, (2021), p. 129093.

[76] H. Song and X. Gao, "Green supply chain game model and analysis under revenue-sharing contract," *J Clean Prod*, Vol. 170, (2018), pp. 183-192.

[77] M. Nematollahi, A. Tajbakhsh, and B. M. Sedghy, "The reflection of competition and coordination on organic agribusiness supply chains," *Transp Res E Logist Transp Rev*, Vol. 154, (2021), p. 102462.

[78] T. D. P. Patra and J. K. Jha, "Bidirectional option contract for prepositioning of relief supplies under demand uncertainty," *Comput Ind Eng*, Vol. 163, (2022), p. 107861.

[79] J. Wu, G. Du, and R. J. Jiao, "Optimal postponement contracting decisions in crowdsourced manufacturing: A three-level game-theoretic model for product family architecting considering subcontracting," *Eur J Oper Res*, Vol. 291, No. 2, (2021), pp. 722-737.

[80] K. Kogan, "Ship-to-order supplies: Contract breachability and the impact of a manufacturer-owned direct channel," *Eur J Oper Res*, Vol. 218, No. 1, (2012), pp. 113-123.

[81] K. Knoblich, C. Heavey, and P. Williams, "Quantitative analysis of semiconductor supply chain contracts with order flexibility under demand uncertainty: A case study," *Comput Ind Eng*, Vol. 87, (2015), pp. 394-406.

[82] J. Lin, R. Fan, X. Tan, and K. Zhu, "Dynamic decision and coordination in a low-carbon supply chain considering the retailer's social preference," *Socioecon Plann Sci*, Vol. 77, (2021), p. 101010.

[83] X. Dang, G. Bi, C. Liu, and Y. Xu, "Optimal financing strategies with 3PL customized service in a capital-constrained supply chain," *Electron Commer Res Appl*, Vol. 50, (2021), p. 101090.

[84] W. Bian, X. Yang, S. Li, X. Yang, and G. Hua, "Advantages of 3PLs as healthcare supply chain orchestrators," *Comput Ind Eng*, Vol. 161, (2021), p. 107628.

[85] J. Heydari and A. Bakhshi, "Contracts between an e-retailer and a third party logistics provider to expand home delivery capacity," *Comput Ind Eng*, Vol. 163, (2022), p. 107763.

[86] B. Hezarkhani and W. Kubiak, "A coordinating contract for transshipment in a two-company supply chain," *Eur J Oper Res*, Vol. 207, No. 1, (2010), pp. 232-237.

[87] S. Barari, G. Agarwal, W. J. C. Zhang, B. Mahanty, and M. K. Tiwari, "A decision framework for the analysis of green supply chain contracts: An evolutionary game approach," *Expert Syst Appl*, Vol. 39, No. 3, (2012), pp. 2965-2976.

[88] J. Chen, H. Zhang, and Y. Sun, "Implementing coordination contracts in a manufacturer Stackelberg dual-channel supply chain," *Omega (Westport)*, Vol. 40, No. 5, (2012), pp. 571-583.

[89] M. Slikker, J. Fransoo, and M. Wouters, "Cooperation between multiple news-vendors with transshipments," *Eur J Oper Res*, Vol. 167, No. 2, (2005), pp. 370-380.

[90] X. He and M. Khouja, "Pareto analysis of supply chain contracts under satisficing objectives," *Eur J Oper Res*, Vol. 214, No. 1, (2011), pp. 53-66.

[91] Y. Li and S. Gupta, "Strategic capability investments and competition for supply contracts," *Eur J Oper Res*, Vol. 214, No. 2, (2011), pp. 273-283.

[92] K. Govindan, A. Diabat, and M. N. Popiuc, "Contract analysis: A performance measures and profit evaluation within two-echelon supply chains," *Comput Ind Eng*, Vol. 63, No. 1, (2012), pp. 58-74.

[93] V. Babich, H. Li, P. Ritchken, and Y. Wang, "Contracting with asymmetric demand information in supply chains," *Eur J Oper Res*, Vol. 217, No. 2, (2012), pp. 333-341.

[94] A. Amrani, J.-C. Deschamps, and J.-P. Bourrières, "The impact of supply contracts on supply chain product-flow management," *J Manuf Syst*, Vol. 31, No. 2, (2012), pp. 253-266.

[95] K. Jörnsten, S. L. Nonås, L. Sandal, and J. Ubøe, "Transfer of risk in the newsvendor model with discrete demand," *Omega (Westport)*, Vol. 40, No. 3, (2012), pp. 404-414.

[96] L. Bruttel and G. Eisenkopf, "No contract or unfair contract: What's better?," *J Socio Econ*, Vol. 41, No. 4, (2012), pp. 384-390.

[97] S. S. Sana, "Optimal contract strategies for two stage supply chain," *Econ Model*, Vol. 30, (2013), pp. 253-260.

[98] X. Guo, L. Ling, Y. Dong, and L. Liang, "Cooperation contract in tourism supply chains: The optimal pricing strategy of hotels for cooperative third party strategic websites," *Ann Tour Res*, Vol. 41, (2013), pp. 20-41.

[99] E. Cao, Y. Ma, C. Wan, and M. Lai, "Contracting with asymmetric cost information in a dual-channel supply chain," *Operations Research Letters*, Vol. 41, No. 4, (2013), pp. 410-414.

[100] B.-X. Li, Y.-W. Zhou, J. Li, and S. Zhou, "Contract choice game of supply chain competition at both manufacturer and retailer levels," *Int J Prod Econ*, Vol. 143, No. 1, (2013), pp. 188-197.

[101] I. Nosoohi and A. S. Nookabadi, "Designing a supply contract to coordinate supplier's production, considering customer-oriented production," *Comput Ind Eng*, Vol. 74, (2014), pp. 26-36.

[102] M. Seifbarghy, K. Nouhi, and A. Mahmoudi, "Contract design in a supply chain considering price and quality dependent demand with customer segmentation," *Int J Prod Econ*, Vol. 167, (2015), pp. 108-118.

[103] J. Xu, G. Feng, W. Jiang, and S. Wang, "Optimal procurement of long-term contracts in the presence of imperfect spot market," *Omega (Westport)*, Vol. 52, (2015), pp. 42-52.

[104] C.-H. Chiu, T.-M. Choi, G. Hao, and X. Li, "Innovative menu of contracts for coordinating a supply chain with multiple mean-variance retailers," *Eur J Oper Res*, Vol. 246, No. 3, (2015), pp. 815-826.

[105] C. Araneda-Fuentes, L. J. Lustosa, and S. Minner, "A contract for coordinating capacity decisions in a business-to-business (B2B) supply chain," *Int J Prod Econ*, Vol. 165, (2015), pp. 158-171.

[106] L. Gao, "Collaborative forecasting, inventory hedging and contract coordination in dynamic supply risk management," *Eur J Oper Res*, Vol. 245, No. 1, (2015), pp. 133-145.

[107] B. Hu, C. Meng, D. Xu, and Y.-J. Son, "Three-echelon supply chain coordination with a loss-averse retailer and revenue sharing contracts," *Int J Prod Econ*, Vol. 179, (2016), pp. 192-202.

[108] S. Sluis and P. De Giovanni, "The selection of contracts in supply chains: An empirical analysis," *Journal of Operations Management*, Vol. 41, (2016), pp. 1-11.

[109] J. Yan, X. Wang, H. Cheng, and L. Huang, "Study on the coordination contract in supply chain under trade credit based on risk compensation," *Chaos Solitons Fractals*, Vol. 89, (2016), pp. 533-538.

[110] M. S. Altug, "Supply chain contracting for vertically differentiated products," *Int J Prod Econ*, Vol. 171, (2016), pp. 34-45.

[111] I.-H. Hong, J.-F. Dang, and K.-W. Lin, "The equilibrium contract rent and reward money under incomplete information in reverse supply chains: A game theoretical approach and computational study," *Comput Ind Eng*, Vol. 102, (2016), pp. 69-77.

[112] I. Biswas, B. Avittathur, and A. K. Chatterjee, "Impact of structure, market share and information asymmetry on supply contracts for a single supplier multiple buyer network," *Eur J Oper Res*, Vol. 253, No. 3, (2016), pp. 593-601.

[113] J. He, C. Ma, and K. Pan, "Capacity investment in supply chain with risk averse supplier under risk diversification contract," *Transp Res E Logist Transp Rev*, Vol. 106, (2017), pp. 255-275.

[114] Q. Bai, M. Chen, and L. Xu, "Revenue and promotional cost-sharing contract versus two-part tariff contract in coordinating sustainable supply chain systems with deteriorating items," *Int J Prod Econ*, Vol. 187, (2017), pp. 85-101.

[115] J. Xie, L. Liang, L. Liu, and P. Ieromonachou, "Coordination contracts of dual-channel with cooperation advertising in closed-loop supply chains," *Int J Prod Econ*, Vol. 183, (2017), pp. 528-538.

[116] J. Heydari, M. Rastegar, and C. H. Glock, "A two-level delay in payments contract for supply chain coordination: The case of credit-dependent demand," *Int J Prod Econ*, Vol. 191, (2017), pp. 26-36.

[117] X. Fang and F. Yuan, "The coordination and preference of supply chain contracts based on time-sensitivity promotional mechanism," *Journal of Management Science and Engineering*, Vol. 3, No. 3, (2018), pp. 158-178.

[118] A. A. Taleizadeh, N. Alizadeh-Basban, and B. R. Sarker, "Coordinated contracts in a two-echelon green supply chain considering pricing strategy," *Comput Ind Eng*, Vol. 124, (2018), pp. 249-275.

[119] A. Raj, I. Biswas, and S. K. Srivastava, "Designing supply contracts for the sustainable supply chain using game theory," *J Clean Prod*, Vol. 185, (2018), pp. 275-284.

[120] Q. Lin and Y. Xiao, "Retailer credit guarantee in a supply chain with capital

constraint under push & pull contract," *Comput Ind Eng*, Vol. 125, (2018), pp. 245-257.

[121] C. Zhou, W. Tang, and Y. Lan, "Supply chain contract design of procurement and risk-sharing under random yield and asymmetric productivity information," *Comput Ind Eng*, Vol. 126, (2018), pp. 691-704.

[122] S. F. Alamdar, M. Rabbani, and J. Heydari, "Pricing, collection, and effort decisions with coordination contracts in a fuzzy, three-level closed-loop supply chain," *Expert Syst Appl*, Vol. 104, (2018), pp. 261-276.

[123] J.-Y. Lee and R. K. Cho, "Optimal (z, Z)-type contracts for vendor-managed inventory," *Int J Prod Econ*, Vol. 202, (2018), pp. 32-44.

[124] A. Chakraborty, A. Mateen, A. K. Chatterjee, and N. Haldar, "Relative power in supply chains–Impact on channel efficiency & contract design," *Comput Ind Eng*, Vol. 122, (2018), pp. 202-210.

[125] B. C. Giri, C. Mondal, and T. Maiti, "Analysing a closed-loop supply chain with selling price, warranty period and green sensitive consumer demand under revenue sharing contract," *J Clean Prod*, Vol. 190, (2018), pp. 822-837.

[126] Y. S. Lee, D. Ribbink, and S. Eckerd, "Effectiveness of bonus and penalty incentive contracts in supply chain exchanges: Does national culture matter?," *Journal of Operations Management*, Vol. 62, (2018), pp. 5974.

[127] V. K. Dubey, J.-P. Chavas, and D. Veeramani, "Analytical framework for sustainable supply-chain contract management," *Int J Prod Econ*, Vol. 200, (2018), pp. 240-261.

[128] J. Xu, Q. Qi, and Q. Bai, "Coordinating a dual-channel supply chain with price discount contracts under carbon emission capacity regulation," *Appl Math Model*, Vol. 56, (2018), pp. 449-468.

[129] X. Gao and J. Tian, "Multi-period incentive contract design in the agent emergency supplies reservation strategy with asymmetric information," *Comput Ind Eng*, Vol. 120, (2018), pp. 94-102.

[130] Q. Lin and J. He, "Supply chain contract design considering the supplier's asset structure and capital constraints," *Comput Ind Eng*, Vol. 137, (2019), p. 106044.

[131] A. Aslani and J. Heydari, "Transshipment contract for coordination of a green dual-channel supply chain under channel disruption," *J Clean Prod*, Vol. 223, (2019), pp. 596-609.

[132] Z. Mobini, W. van den Heuvel, and A. Wagelmans, "Designing multi-period supply contracts in a two-echelon supply chain with asymmetric information," *Eur J Oper Res*, Vol. 277, No. 2, (2019), pp. 542-560.

[133] K. Chen, H. Zhao, and T. Xiao, "Outsourcing contracts and ordering decisions of a supply chain under multi-dimensional uncertainties," *Comput Ind Eng*, Vol. 130, (2019), pp. 127-141.

[134] Z. Hong and X. Guo, "Green product supply chain contracts considering environmental responsibilities," *Omega (Westport)*, Vol. 83, (2019), pp. 155-166.

[135] J. Cai, X. Hu, F. Jiang, Q. Zhou, X. Zhang, and L. Xuan, "Optimal input quantity decisions considering commitment order contracts under yield uncertainty," *Int J Prod Econ*, Vol. 216, (2019), pp. 398-412.

[136] S.-M. Hosseini-Motlagh, K. Govindan, M. Nematollahi, and A. Jokar, "An adjustable bi-level wholesale price contract for coordinating a supply chain under scenario-based stochastic demand," *Int J Prod Econ*, Vol. 214, (2019), pp. 175-195.

[137] H. Mohammadi, M. Ghazanfari, M. S. Pishvaee, and E. Teimoury, "Fresh-product supply chain coordination and waste reduction using a revenue-and-preservation-technology-investment-sharing contract: A real-life case study," *J Clean Prod*, Vol. 213, (2019), pp. 262-282.

[138] Q. Cui, "Quality investment, and the contract manufacturer's encroachment," *Eur J Oper Res*, Vol. 279, No. 2, (2019), pp. 407-418.

[139] Y.-C. Tsao, "Coordinating contracts under default risk control-based trade credit," *Int J Prod Econ*, Vol. 212, (2019), pp. 168-175.

[140] H. A. Ba, Y. de Mey, S. Thoron, and M. Demont, "Inclusiveness of contract farming along the vertical coordination continuum: Evidence from the Vietnamese rice sector," *Land use policy*, Vol. 87, (2019), p. 104050.

[141] X.-X. Zheng, D.-F. Li, Z. Liu, F. Jia, and J.-B. Sheu, "Coordinating a closed-loop supply chain with fairness concerns through variable-weighted Shapley values," *Transp Res E Logist Transp Rev*, Vol. 126, (2019), pp. 227-253.

[142] T. Avinadav, T. Chernonog, G. E. Fruchter, and A. Prasad, "Contract design when quality is co-created in a supply chain," *Eur J Oper Res*, Vol. 286, No. 3, (2020), pp. 908-918.

[143] D. Wu, J. Chen, P. Li, and R. Zhang, "Contract coordination of dual channel reverse supply chain considering service level," *J Clean Prod*, Vol. 260, (2020), p. 121071.

[144] H. A. Mahdiraji, K. Hafeez, A. Jafarnejad, and A. Rezayar, "An analysis of the impact of negative CSR 'forced labour'parameter on the profitability of supply chain contracts," *J Clean Prod*, Vol. 271, (2020), p. 122274.

[145] G. Lo Nigro, G. Favara, and L. Abbate, "Supply chain finance: The role of credit rating and retailer effort on optimal contracts," *Int J Prod Econ*, Vol. 240, (2021), p. 108235.

[146] G. A. Ogunranti, O. Ceryan, and A. Banerjee, "Buyer-supplier currency exchange rate flexibility contracts in global supply chains," *Eur J Oper Res*, Vol. 288, No. 2, (2021), pp. 420-435.

[147] P. Toktaş-Palut, "An integrated contract for coordinating a three-stage green forward and reverse supply chain under fairness concerns," *J Clean Prod*, Vol. 279, (2021), p. 123735.

[148] M. S. Meijer, W. van Jaarsveld, T. de Kok, and C. S. Tang, "Direct versus indirect penalties for supply contracts in high-tech industry," *Eur J Oper Res*, Vol. 301, No. 1, (2022), pp. 203-216.

[149] Z. Cai, F. Ye, Z. Xie, L. Zhang, and T. Cui, "The choice of cooperation mode in the bioenergy supply chain with random biomass feedstock yield," *J Clean Prod*, Vol. 311, (2021), p. 127587.

[150] Z. Chen and F. Liu, "Multi-outsourcing supply chain coordination under yield and demand uncertainties," *Expert Syst Appl*, Vol. 181, (2021), p. 115177.

[151] P. He, Z. Wang, V. Shi, and Y. Liao, "The direct and cross effects in a supply chain with consumers sensitive to both carbon emissions and delivery time," *Eur J Oper Res*, Vol. 292, No. 1, (2021), pp. 172-183.

[152] C. Mondal and B. C. Giri, "Optimizing price, quality and CSR investment under competing dual recycling channels in a sustainable closed-loop supply chain," *CIRP J Manuf Sci Technol*, Vol. 35, (2021), pp. 193-208.

[153] X. Huang, S. Yang, and Z. Wang, "Optimal pricing and replenishment policy for perishable food supply chain under inflation," *Comput Ind Eng*, Vol. 158, (2021), p. 107433.

[154] A. Barman, R. Das, and P. K. De, "Optimal pricing and greening decision in a manufacturer retailer dual-channel supply chain," *Mater Today Proc*, Vol. 42, (2021), pp. 870-875.

[155] C. H. Lee and B.-D. Rhee, "Retailer-run resale market and supply chain coordination," *Int J Prod Econ*, Vol. 235, (2021), p. 108089.

[156] T. Schaefers, S. Ruffer, and E. Böhm, "Outcome-based contracting from the customers' perspective: A means-end chain analytical exploration," *Industrial Marketing Management*, Vol. 93, (2021), pp. 466-481.

[157] F. Fu and W. Xing, "An agent-based approach for project-driven supply chain problem under information asymmetry and decentralized decision-making," *Comput Ind Eng*, Vol. 158, (2021), p. 107410.

[158] P. Ma and Y. Meng, "Optimal financing strategies of a dual-channel closed-loop supply chain," *Electron Commer Res Appl*, Vol. 53, (2022), p. 101140.

[159] S. Chang, A. Li, X. Wang, and X. Wang, "Joint optimization of e-commerce supply chain financing strategy and channel contract," *Eur J Oper Res*, Vol. 303, No. 2, (2022), pp. 908-927.

[160] S.-M. Hosseini-Motlagh, T.-M. Choi, M. Johari, and M. Nouri-Harzvili, "A profit surplus distribution mechanism for supply chain coordination: An evolutionary game-theoretic analysis," *Eur J Oper Res*, Vol. 301, No. 2, (2022), pp. 561-575.

[161] B. Dong, W. Tang, C. Zhou, and Y. Ren, "Should original equipment manufacturer assist noncompetitive contract manufacturer to expand capacity?," *Omega (Westport)*, Vol. 103, (2021), p. 102420.

[162] D. Ivanov, A. Dolgui, and B. Sokolov, "Cloud supply chain: Integrating industry 4.0 and digital platforms in the 'Supply Chain-as-a-Service,'" *Transp Res E Logist Transp Rev*, Vol. 160, (2022), p. 102676, 2022.

[163] X. Fan, X. Guo, and S. Wang, "Optimal collection delegation strategies in a retail-/dual-channel supply chain with trade-in programs," *Eur J Oper Res*, Vol. 303, No. 2, (2022), pp. 633-649.

[164] G. Dudek and H. Stadtler, "Negotiation-based collaborative planning between supply chains partners," *Eur J Oper Res*, Vol. 163, No. 3, (2005), pp. 668-687.

[165] X. Zou, S. Pokharel, and R. Piplani, "A two-period supply contract model for a decentralized assembly system," *Eur J Oper Res*, Vol. 187, No. 1, (2008), pp. 257-274.

[166] P. Toktaş-Palut, "Analyzing the effects of Industry 4.0 technologies and coordination on the sustainability of supply chains," *Sustain Prod Consum*, Vol. 30, (2022), pp. 341-358.

[167] K. Matsui, "Optimal timing of acquisition price announcement for used products in a dual-recycling channel reverse supply chain," *Eur J Oper Res*, Vol. 300, No. 2, (2022), pp. 615-632.

[168] J. Gao, Z. Xiao, and H. Wei, "Competition and coordination in a dual-channel green supply chain with an eco-label policy," *Comput Ind Eng*, Vol. 153, (2021), p. 107057.

[169] K. Govindan and A. Malomfalean, "A framework for evaluation of supply chain coordination by contracts under O2O environment," *Int J Prod Econ*, Vol. 215, (2019), pp. 11-23.

[170] J. Heydari and M. Ghasemi, "A revenue sharing contract for reverse supply chain coordination under stochastic quality of returned products and uncertain remanufacturing capacity," *J Clean Prod*, Vol. 197, (2018), pp. 607-615.

[171] J. Xie, W. Zhang, L. Liang, Y. Xia, J. Yin, and G. Yang, "The revenue and cost sharing contract of pricing and servicing policies in a dual-channel closed-loop supply chain," *J Clean Prod*, Vol. 191, (2018), pp. 361-383.

[172] S. Xiao, S. P. Sethi, M. Liu, and S. Ma, "Coordinating contracts for a financially constrained supply chain," *Omega (Westport)*, Vol. 72, (2017), pp. 71-86.

[173] B. Hu and Y. Feng, "Optimization and coordination of supply chain with revenue sharing contracts and service requirement under supply and demand uncertainty," *Int J Prod Econ*, Vol. 183, (2017), pp. 185-193.

[174] M. Becker-Peth and U. W. Thonemann, "Reference points in revenue sharing contracts—How to design optimal supply chain contracts," *Eur J Oper Res*, Vol. 249, No. 3, (2016), pp. 1033-1049.

[175] B. van der Rhee, G. Schmidt, J. A. A. van der Veen, and V. Venugopal, "Revenue-sharing contracts across an extended supply chain," *Bus Horiz*, Vol. 57, No. 4, (2014), pp. 473-482.

[176] G. Xu, B. Dan, X. Zhang, and C. Liu, "Coordinating a dual-channel supply chain with risk-averse under a two-way revenue sharing contract," *Int J Prod Econ*, Vol. 147, (2014), pp. 171-179.

[177] G. P. Sarathi, S. P. Sarmah, and M. Jenamani, "An integrated revenue sharing and quantity discounts contract for coordinating a supply chain dealing with short life-cycle products," *Appl Math Model*, Vol. 38, No. 15-16, (2014), pp. 4120-4136.

[178] X. Feng, I. Moon, and K. Ryu, "Revenue-sharing contracts in an N-stage supply chain with reliability considerations," *Int J Prod Econ*, Vol. 147, (2014), pp. 20-29.

[179] K. Govindan and M. N. Popiuc, "Reverse supply chain coordination by revenue sharing contract: A case for the personal computers industry," *Eur J Oper Res*, Vol. 233, No. 2, (2014), pp. 326-336.

[180] I. Giannoccaro and P. Pontrandolfo, "Supply chain coordination by revenue sharing contracts," *Int J Prod Econ*, Vol. 89, No. 2, (2004), pp. 131-139.

[181] C. Kebing, G. Chengxiu, and W. Yan, "Revenue-sharing contract to coordinate independent participants within the supply chain," *Journal of Systems Engineering and Electronics*, Vol. 18, No. 3, (2007), pp. 520-526.

[182] H. Li, P. Ritchken, and Y. Wang, "Option and forward contracting with asymmetric information: Valuation issues in supply chains," *Eur J Oper Res*, Vol. 197, No. 1, (2009), pp. 134-148.

[183] I. Giannoccaro and P. Pontrandolfo, "Negotiation of the revenue sharing contract: An agent-based systems approach," *Int J Prod Econ*, Vol. 122, No. 2, (2009), pp. 558-566.

[184] B. Van Der Rhee, J. A. A. Van Der Veen, V. Venugopal, and V. R. Nalla, "A new revenue sharing mechanism for coordinating multi-echelon supply chains," *Operations research letters*, Vol. 38, No. 4, (2010), pp. 296-301.

[185] X. Wang, F. Li, L. Liang, Z. Huang, and A. Ashley, "Pre-purchasing with option contract and coordination in a relief supply chain," *Int J Prod Econ*, Vol. 167, (2015), pp. 170-176.

[186] B. Hu, Y. Feng, and X. Chen, "Optimization and coordination of supply chains under the retailer's profit margin constraint," *Comput Ind Eng*, Vol. 126, (2018), pp. 569-577.

[187] S. Hua, J. Liu, T. C. E. Cheng, and X. Zhai, "Financing and ordering strategies for a supply chain under the option contract," *Int J Prod Econ*, Vol. 208, (2019), pp. 100-121.

[188] A. Cheaitou and R. Cheaytou, "A two-stage capacity reservation supply contract with risky supplier and forecast updating," *Int J Prod Econ*, Vol. 209, (2019), pp. 42-60.

[189] I. Biswas and B. Avittathur, "Channel coordination using options contract under simultaneous price and inventory competition," *Transp Res E Logist Transp Rev*, Vol. 123, (2019), pp. 45-60.

[190] T. D. P. Patra and J. K. Jha, "Bidirectional option contract for prepositioning of relief supplies under demand uncertainty," *Comput Ind Eng*, Vol. 163, (2022), p. 107861.

[191] C. Van Delft and J.-P. Vial, "A practical implementation of stochastic programming: an application to the evaluation of option contracts in supply chains," *Automatica*, Vol. 40, No. 5, (2004), pp. 743-756.

[192] X. Wang and L. Liu, "Coordination in a retailer-led supply chain through option contract," *Int J Prod Econ*, Vol. 110, No. 1-2, (2007), pp. 115-127.

[193] X. Wang and L. Liu, "Coordination by option contracts in a retailer-led supply chain with demand update," *Tsinghua Sci Technol*, Vol. 13, No. 4, (2008), pp. 570-580.

[194] Y. Zhao, S. Wang, T. C. E. Cheng, X. Yang, and Z. Huang, "Coordination of supply chains by option contracts: A cooperative game theory approach," *Eur J Oper Res*, Vol. 207, No. 2, (2010), pp. 668-675.

[195] H. Xu, "Managing production and procurement through option contracts in supply chains with random yield," *Int J Prod Econ*, Vol. 126, No. 2, (2010), pp. 306-0313.

[196] F. Hu, C.-C. Lim, and Z. Lu, "Optimal production and procurement decisions in a supply chain with an option contract and partial backordering under uncertainties," *Appl Math Comput*, Vol. 232, (2014), pp. 1225-1234.

[197] Y. Chen, Q. Zhao, K. Huang, and X. Xi, "A Bi-objective optimization model for contract design of humanitarian relief goods procurement considering extreme disasters," *Socioecon Plann Sci*, Vol. 81, (2022), p. 101214.

[198] J. Asl-Najafi, S. Yaghoubi, and S. Noori, "Customization of incentive mechanisms based on product life-cycle phases for an efficient product-service supply chain coordination," *Comput Ind*, Vol. 135, (2022), p. 103582.

[199] B.-B. Cao, T.-H. You, C. X. J. Ou, H. Zhu, and C.-Y. Liu, "Optimizing payment schemes in a decentralized supply chain: A Stackelberg game with quality investment and bank credit," *Comput Ind Eng*, Vol. 168, (2022), p. 108077.

[200] H. Yang, W. Zhuo, L. Shao, and S. Talluri, "Mean-variance analysis of wholesale price contracts with a capital-constrained retailer: Trade credit financing vs. bank credit financing," *Eur J Oper Res*, Vol. 294, No. 2, (2021), pp. 525-542.

[201] X. Hou, J. Li, Z. Liu, and Y. Guo, "Pareto and Kaldor–Hicks improvements with revenue-sharing and wholesale-price contracts under manufacturer rebate policy," *Eur J Oper Res*, Vol. 298, No. 1, (2022), pp. 152-168.

[202] G. J. Kyparisis and C. Koulamas, "New structural properties of supply chains with price-only contracts," *Operations Research Letters*, Vol. 44, No. 6, (2016), pp. 831-834.

[203] T.-M. Choi, Y. Chen, and S. H. Chung, "Online-offline fashion franchising supply chains without channel conflicts: choices on postponement and contracts," *Int J Prod Econ*, Vol. 215, (2019), pp. 174-184.

[204] J. A. Niederhoff and P. Kouvelis, "Effective and necessary: Individual supplier behavior in revenue sharing and wholesale contracts," *Eur J Oper Res*, Vol. 277, No. 3, (2019), pp. 1060-1071.

[205] A. Raj, N. M. Modak, P. Kelle, and B. Singh, "Analysis of a dyadic sustainable supply chain under asymmetric information," *Eur J Oper Res*, Vol. 289, No. 2, (2021), pp. 582-594.

[206] A. Shantia, S. Aflaki, and A. Masini, "Contracting for technology improvement: The effect of asymmetric bargaining power and investment uncertainty," *Eur J Oper Res*, Vol. 293, No. 2, (2021), pp. 481-494.

[207] F. El Ouardighi and B. Kim, "Supply quality management with wholesale price and revenue-sharing contracts under horizontal competition," *Eur J Oper Res*, Vol. 206, No. 2, (2010), pp. 329-340.

[208] Q. Li, H. Ji, and Y. Huang, "The information leakage strategies of the supply chain under the block chain technology introduction," *Omega (Westport)*, Vol. 110, (2022), p. 102616.

[209] Y.-J. Cai, T.-M. Choi, and T. Zhang, "Commercial used apparel collection operations in retail supply chains," *Eur J Oper Res*, Vol. 298, No. 1, (2022), pp. 169-181.

[210] P. He, Y. He, C. V. Shi, H. Xu, and L. Zhou, "Cost-sharing contract design in a low-carbon service supply chain," *Comput Ind Eng*, Vol. 139, (2020), p. 106160.

[211] Y. Zhou, M. Bao, X. Chen, and X. Xu, "Co-op advertising and emission reduction cost sharing contracts and coordination in low-carbon supply chain based on fairness concerns," *J Clean Prod*, Vol. 133, (2016), pp. 402-413.

[212] D. Ghosh and J. Shah, "Supply chain analysis under green sensitive consumer demand and cost sharing contract," *Int J Prod Econ*, Vol. 164, (2015), pp. 319-329.

[213] H. Xiong, B. Chen, and J. Xie, "A composite contract based on buy back and quantity flexibility contracts," *Eur J Oper Res*, Vol. 210, No. 3, (2011), pp. 559-567.

[214] J. Hou, A. Z. Zeng, and L. Zhao, "Coordination with a backup supplier through buy-back contract under supply disruption," *Transp Res E Logist Transp Rev*, Vol. 46, No. 6, (2010), pp. 881-895.

[215] P. P. Mathur and J. Shah, "Supply chain contracts with capacity investment decision: Two-way penalties for coordination," *Int J Prod Econ*, Vol. 114, No. 1, (2008), pp. 56-70.

[216] D. A. Serel, "Capacity reservation under supply uncertainty," *Comput Oper Res*, Vol. 34, No. 4, (2007), pp. 1192-1220.

[217] X. Gan, S. P. Sethi, and J. Zhou, "Commitment-penalty contracts in drop-shipping supply chains with asymmetric demand information," *Eur J Oper Res*, Vol. 204, No. 3, (2010), pp. 449-462.

[218] J. Xia and W. Niu, "Carbon-reducing contract design for a supply chain with environmental responsibility under asymmetric information," *Omega (Westport)*, Vol. 102, (2021), p. 102390.

[219] A. Buratto, R. Cesaretto, and P. De Giovanni, "Consignment contracts with cooperative programs and price discount mechanisms in a dynamic supply chain," *Int J Prod Econ*, Vol. 218, (2019), pp. 72-82.

[220] C. Bi, B. Zhang, F. Yang, Y. Wang, and G. Bi, "Selling to the newsvendor through debt-shared bank financing," *Eur J Oper Res*, Vol. 296, No. 1, (2022), pp. 116-130.

[221] M. R. Frascatore and F. Mahmoodi, "Long-term and penalty contracts in a two-stage supply chain with stochastic demand," *Eur J Oper Res*, Vol. 184, No. 1, (2008), pp. 147-156.

[222] T. C. Kwak, J. S. Kim, and C. Moon, "Supplier–buyer models for the bargaining process over a long-term replenishment contract," *Comput Ind Eng*, Vol. 51, No. 2, (2006), pp. 219-228.

[223] B. Marchi, S. Zanoni, and M. Y. Jaber, "Credit-dependent demand in a vendor-buyer model with a two-level delay-in-payments contract under a consignment-stock policy agreement," *Appl Math Model*, Vol. 99, (2021), pp. 585-605.

[224] D. Gao, X. Zhao, and W. Geng, "A delay-in-payment contract for Pareto improvement of a supply chain with stochastic demand," *Omega (Westport)*, Vol. 49, (2014), pp. 60-68.

[225] Y. Cao and Q. Wang, "The informational role of guarantee contracts," *Eur J Oper Res*, Vol. 301, No. 1, (2022), pp. 191-202.

[226] S. Huber and S. Spinler, "Pricing of full-service repair contracts," *Eur J Oper Res*, Vol. 222, No. 1, (2012), pp. 113-121.

[227] R. W. Seifert, R. I. Zequeira, and S. Liao, "A three-echelon supply chain with price-only contracts and sub-supply chain coordination," *Int J Prod Econ*, Vol. 138, No. 2, (2012), pp. 345-353.

[228] X. Fu, H. Tan, E. Tsenina, S. Liu, and G. Han, "Information sharing based on two-way perceptions of trust and supply chain decisions: A simulation based approach," *Chaos Solitons Fractals*, Vol. 157, (2022), p. 111938.

[229] Z. Lin, C. Cai, and B. Xu, "Supply chain coordination with insurance contract," *Eur J Oper Res*, Vol. 205, No. 2, (2010), pp. 339-345.

[230] F. Silaghi and F. Moraux, "Trade credit contracts: Design and regulation," *Eur J Oper Res*, Vol. 296, No. 3, (2022), pp. 980-992.

[231] H. Yue, H. Song, and W. Tian, "Closed-loop supply chain models of lithium-ion battery considering corporate social responsibility," *Procedia Comput Sci*, Vol. 199, (2022), pp. 1260-1267.

[232] J. Asl-Najafi and S. Yaghoubi, "A novel perspective on closed-loop supply chain coordination: Product life-cycle approach," *J Clean Prod*, Vol. 289, (2021), p. 125697.

[233] S. Saha, "Supply chain coordination through rebate induced contracts," *Transp Res E Logist Transp Rev*, Vol. 50, (2013), pp. 120-137.

[234] C.-H. Chiu, T.-M. Choi, and X. Li, "Supply chain coordination with risk sensitive retailer under target sales rebate," *Automatica*, Vol. 47, No. 8, (2011), pp. 1617-1625.

[235] E. Bolandifar and Z. Chen, "Hedging through index-based price contracts in commodity-based supply chains," *Omega (Westport)*, Vol. 90, (2020), p. 101976.

[236] S. Huang, W. Xiao, and J. Yang, "Optimal contracts under endogenous demand information acquisition," *Operations Research Letters*, Vol. 47, No. 3, (2019), pp. 173-177.

[237] T. Nie and S. Du, "Dual-fairness supply chain with quantity discount contracts," *Eur J Oper Res*, Vol. 258, No. 2, (2017), pp. 491-500.

[238] J. Cai, X. Hu, P. R. Tadikamalla, and J. Shang, "Flexible contract design for VMI supply chain with service-sensitive demand: Revenue-sharing and supplier subsidy," *Eur J Oper Res*, Vol. 261, No. 1, (2017), pp. 143-153.

[239] A. Ghadge, S. Dani, R. Ojha, and N. Caldwell, "Using risk sharing contracts for supply chain risk mitigation: A buyer-supplier power and dependence perspective," *Comput Ind Eng*, Vol. 103, (2017), pp. 262-270.

[240] H. Yang, W. Zhuo, Y. Zha, and H. Wan, "Two-period supply chain with flexible trade credit contract," *Expert Syst Appl*, Vol. 66, (2016), pp. 95-105.

[241] D. S. Hochbaum and M. R. Wagner, "Range contracts: Risk sharing and beyond," *Eur J Oper Res*, Vol. 243, No. 3, (2015), pp. 956-963.

[242] Z. Yin and S. Ma, "Incentives to improve the service level in a random yield supply chain: The role of bonus contracts," *Eur J Oper Res*, Vol. 244, No. 3, (2015), pp. 778-791.

[243] W. T. Huh, S. Athanassoglou, and U. Lall, "Contract farming with possible reneging in a developing country: Can it work?," *IIMB Management Review*, Vol. 24, No. 4, (2012), pp. 187-202.

[244] Y. Dong, K. Xu, and P. T. Evers, "Transshipment incentive contracts in a multi-level supply chain," *Eur J Oper Res*, Vol. 223, No. 2, (2012), pp. 430-440.

[245] M. Leng and A. Zhu, "Side-payment contracts in two-person nonzero-sum supply chain games: Review, discussion and applications," *Eur J Oper Res*, Vol. 196, No. 2, (2009), pp. 600-618.

[246] E. Sucky, "A bargaining model with asymmetric information for a single supplier–single buyer problem," *Eur J Oper Res*, Vol. 171, No. 2, (2006), pp. 516-535.

[247] H. V. Arani, M. Rabbani, and H. Rafiei, "A revenue-sharing option contract toward coordination of supply chains," *Int J Prod Econ*, Vol. 178, (2016), pp. 42-56.

[248] J.-Y. Lee and S. Choi, "Supply chain investment and contracting for carbon emissions reduction: A social planner's perspective," *Int J Prod Econ*, Vol. 231, (2021), p. 107873.

[249] T. Li, R. Zhang, S. Zhao, and B. Liu, "Low carbon strategy analysis under revenue-sharing and cost-sharing contracts," *J Clean Prod*, Vol. 212, (2019), pp. 1462-1477.

[250] T. Avinadav and P. Levy, "Value of information in a mobile app supply chain under hidden or known information superiority," *Int J Prod Econ*, Vol. 248, (2022), p. 108467.

[251] B. Dong, W. Tang, C. Zhou, and Y. Ren, "Is dual sourcing a better choice? The impact of reliability improvement and contract manufacturer encroachment," *Transp Res E Logist Transp Rev*, Vol. 149, (2021), p. 102275.

[252] A. Sainathan and H. Groenevelt, "Vendor managed inventory contracts–coordinating the supply chain while looking from the

vendor's perspective," *Eur J Oper Res*, Vol. 272, No. 1, (2019), pp. 249-260.

[253] C.-F. Hsueh, "Improving corporate social responsibility in a supply chain through a new revenue sharing contract," *Int J Prod Econ*, Vol. 151, (2014), pp. 214-222.

[254] W. Li, Y. Liu, and Y. Chen, "Modeling a two-stage supply contract problem in a hybrid uncertain environment," *Comput Ind Eng*, Vol. 123, (2018), pp. 289-302.

[255] S. S. Chauhan and J.-M. Proth, "Analysis of a supply chain partnership with revenue sharing," *Int J Prod Econ*, Vol. 97, No. 1, (2005), pp. 44-51.

[256] P. Toktaş-Palut and F. Ülengin, "Coordination in a two-stage capacitated supply chain with multiple suppliers," *Eur J Oper Res*, Vol. 212, No. 1, (2011), pp. 43-53.

[257] M. Ferguson, V. D. R. Guide Jr, and G. C. Souza, "Supply chain coordination for false failure returns," *Manufacturing & Service Operations Management*, Vol. 8, No. 4, (2006), pp. 376-393.

[258] T. Dong, Z. Xu, Q. Luo, Y. Yin, J. Wang, and J. Ye, "Optimal contract design for ride-sourcing services under dual sourcing," *Transportation Research Part B: Methodological*, Vol. 146, (2021), pp. 289-313.

[259] B. Hu, C. Meng, D. Xu, and Y.-J. Son, "Supply chain coordination under vendor managed inventory-consignment stocking contracts with wholesale price constraint and fairness," *Int J Prod Econ*, Vol. 202, (2018), pp. 21-31.

[260] M. Chen, Q. Hu, and H. Wei, "Interaction of after-sales service provider and contract type in a supply chain," *Int J Prod Econ*, Vol. 193, (2017), pp. 514-527.

[261] J. Heydari and A. Bakhshi, "Contracts between an e-retailer and a third-party logistics provider to expand home delivery capacity," *Compute Ind Eng*, Vol. 163, (2022), p. 107763.

[262] N. Yan, B. Sun, H. Zhang, and C. Liu, "A partial credit guarantee contract in a capital-constrained supply chain: Financing equilibrium and coordinating strategy," *Int J Prod Econ*, Vol. 173, (2016), pp. 122-133.

Appendix:

Tab. 14. Distribution of papers based on the contract type

Contract type	Papers
General Contract	[86]; [87]; [88]; [89]; [36]; [90]; [91]; [92]; [93] ; [87]; [94]; [95] ;[12]; [96]; [97]; [98]; [99] [1]; [100]; [100];[69]; [101]; [102]; [103]; [104]; [105]; [106]; [107]; [108]; [109]; [110]; [111]; [112]; [29]; [113]; [114]; [115]; [116]; [117]; [118]; [119]; [120]; [121]; [122]; [14]; [123]; [124]; [125]; [126]; [127]; [128] ; [129]; [8]; [9]; [130]; [52] [13]; [131]; [132]; [133]; [25]; ; [134]; [51]; [135]; [136]; [137]; [59]; [138]; [71]; [139]; [64]; [140]; [141]; [142]; [143]; [10]; [144]; [145]; [20]; [19]; [57]; [146]; [147]; [148]; [77]; [84]; [149]; [150]; [151]; [57]; [152]; [49]; [153] [154]; [155]; [57] [156]; [63]; [56]; [157] [34]; [150]; [158]; [159]; [160]; [161]; [75]; [62] [47]; [46]; [162]; [58]; [44]; [163], [164]; [165]; [147].
Revenue-Sharing Contract	[166]; [26]; [18]; [44]; [10]; [167];[168]; [83]; [27]; [10]; [73]; [22]; [50];[169] [28]; [170]; [171]; [172]; [173]; [107]; [174]; [65]; [175]; [176]; [177]; [178]; [179]; [180]; [163]; [181]; [182]; [70]; [183]; [184].
Option Contract	[185]; [53]; [24]; [186]; [187]; [188]; [189]; [27]; [85]; [190]; [191]; [192]; [193]; [61]; [194]; [195]; [196]; [197].
Wholesale Price Contract	[198]; [199]; [67]; [27]; [200];[201]; [11]; [202]; [24]; [186]; [117]; [203]; [204]; [205]; [206]; [207].
Cost-Sharing Contract	[208]; [12]; [209]; [72];[74]; [210]; [211] [212]; [35].
Buyback Contract	[69];[213]; [214]; [43].
Smart Contract	[41]; [40]; [39]; [38]; [37]; [21].
Capacity Reservation Contract	[34]; [215];[216]; [15].

Others	Penalty ([66]; [217]), Quantity Flexibility [45], Carbon reducing ([218]), Consignment ([18]; [219]), Debt-shared Contract ([220]), Long-term ([48];[221];[222]), Delay-in-payments ([223]; [224]), Guarantee ([225]), Service contract ([226]; [76]), Price Contract ([227] [68]; [55]), Price discount Contract ([228]), Insurance ([229]), Financial ([230]), Profit sharing Contract([231]), Side-payment self-executing Contract ([82]), Hybrid contract ([232]), Rebate Contract ([233]; [234]; [33]),Index-based price Contract ([235]), Quantity discount Contract ([236]; [237]), Flexible Contract ([238]), Risk sharing Contract ([239], Flexible trade credit ([240]), Range contract ([241]), Semiconductor supply chain ([81]), Bonus([242]), Markdown contract ([23]), Farming contract ([243]), Incentive ([244]), Ship-to-order contract ([80]), Side-payment ([245]).

Tab. 15. Techniques used in contracts' problem solution

Technique		No.	Papers
Game theory	Nash-bargaining	24	[246]; [182]; [70]; [86]; [247]; [113]; [173]; [118]; [131]; [248] ; [230]; [44].
	Stackelberg game	81	[198]; [199]; [58]; [85]; [220]; [12]; [228];[201]; [63] ; [74]; [232]; [149]; [83]; [77]; [34];[144]; [235]; [142]; [249]; [137]; [136]; [219] ;[249];[73]; [125]; [119]; [115]; [233]; [100]; [99]; [98];[182]; [193]; .
	Others	98	[66]; [44]; [18]; [67]; [26]; [250]; [251]; [160]; [225]; [39] ; [34];[231];[209]; [72]; [11]; [200]; [161];[82]; [154]; [48];[49]; [57]; [150]; [84];[147];[37]; [204]; [189]; [22]; [186]; [122]; [186]; [24]; [111]; [110]; [211] ;[212]; [176]; [96]; [80]; [87]; [91]; [15]; [222]; [245].
Probability model		18	[46]; [47]; [140]; ; [105].
Optimization	Expected profit	80	[62]; [223]; [76];[148];[19]; [10]; [71]; [236]; [50] ; [203]; [51]; [252]; [13]; [52]; [9]; [126];[186]; [114]; [238]; [173]; [24]; [53]; [174]; [241]; [104]; [23]; [185]; [179]; [178]; [253]; [69]; [175]; [243]; [244]; [227]; [92]; [234]; [90]; [214]; [54]; [217].
	Stochastic programming	14	[197]; [57]; [65]; [224]; [93];[229];[61]; [191].
	Other methods	39	[44]; [45]; [158]; [157]; [20]; [64]; [59]; [25]; [8]; [254]; [239]; [112]; [69]; [215]; [221]; [216]; [36]; [255]; [164]; [180]; [43].
Simulation		2	[48]; .
P-graph		1	
Cash flow		1	[38].
Non-Technique		15	[40]; [75]; [150]; [200]; [155]; [28]; [21]; [29]; [1]; [110]

Tab. 16. Techniques used under uncertainty

Tech.	Papers
Fuzzy	[254]; [122];[69].
Stochastic	[206]; [84]; [19]; [71]; [189];[136];[169]; [25]; [13]; [141]; [125]; [247];[107]; [241]; [65];[176]; [253]; [224]; [196]; [243]; [226]; [110]; [256];[90]; [257]; [214]; [195]; [217]; [194];[183]; [55]; [61]; [182]; [182]; [193]; [215]; [221]; [216]; [89]; [191]; [180]; [43].
Probability	[41]; [45]; [40]; [46]; [47] [18]; [85]; [250]; [258]; [197]; [48]; [159]; [200]; [220]; [209]; [201]; [56][11]; [161]; ; [57]; [27]; [82];[150] [148]; [218]; [20]; [145]; [10]; [37]; [64]; [204]; [73]; [22]; [50]; [203]; [51]; [132]; [52]; [129]; [259]; [186]; [260]; [237]; [24]; [53]; [111]; [110]; [202];[105]; [242]; [104]; [133]; [80]; [244]; [93]; [227]; [213]; [234]; [91].

Tab. 17. Number of supply chain levels in reviewed papers

	Papers
2-level	[166]; [26]; [250]; [44]; [167]; [48]; [83]; [34]; [27];[73]; [249]; [22]; [50]; [169]; [28];[170]; [171]; [172]; [107]; [174]; [65]; [176]; [177]; [178]; [179]; [181]; [182]; [70]; [183] [184]; [185]; [53]; [24]; [186]; [188]; [189]; [85]; [192]; [193]; [182]; [194]; [195] ; [196];[197]; ; [198]; [199]; [67]; ;[27]; [200]; [148]; [11]; ; [202]; [24]; [259]; [186]; [203]; [204]; [205]; [44]; [12]; [209]; [72]; [74]; [210]; [211]; [212]; [35];[252];[69]; [213]; [214]; [43].
3-level	[261] ;[262]
4-level	[44]; [175].
n-level	[178]; [184].