Game-theoretic models for sustainable supply chains with asymmetric information a review

Wu, Kailan; Tavasszy, Lóránt; Rezaei, Jafar; De Schutter, Bart

DOI
10.1080/23302674.2025.2520619

Publication date
2025

Document Version
Final published version

Published in
International Journal of Systems Science: Operations and Logistics

International Journal of Systems Science: Operations & Logistics

ISSN: 2330-2674 (Print) 2330-2682 (Online) Journal homepage: www.tandfonline.com/journals/tsyb20

Game-theoretic models for sustainable supply chains with asymmetric information: a review

Kailan Wu, Lóránt Tavasszy, Jafar Rezaei & Bart De Schutter

To cite this article: Kailan Wu, Lóránt Tavasszy, Jafar Rezaei & Bart De Schutter (2025) Game-theoretic models for sustainable supply chains with asymmetric information: a review, International Journal of Systems Science: Operations & Logistics, 12:1, 2520619, DOI: 10.1080/23302674.2025.2520619

To link to this article: https://doi.org/10.1080/23302674.2025.2520619

INTERNATIONAL JOURNAL OF SYSTEMS SCIENCE: OPERATIONS & LOGISTICS
2025, VOL. 12, NO. 1, 2520619
https://doi.org/10.1080/23302674.2025.2520619

Game-theoretic models for sustainable supply chains with asymmetric information: a review

Kailan Wu [a], Lóránt Tavasszy [a], Jafar Rezaei [a] and Bart De Schutter [b]

[a]Faculty of Technology, Policy and Management, Delft University of Technology, Delft, The Netherlands; [b]Faculty of Mechanical Engineering, Delft University of Technology, Delft, The Netherlands

ABSTRACT

Game-theoretic models are frequently used to analyse the effects of information availability and quality on supply chain decision-making. Although information asymmetry plays a vital role in shaping sustainable supply chains, a comprehensive review of these models within this context remains lacking. This study conducts a systematic literature review and performs an in-depth content-based analysis of 73 peer-reviewed journal articles, categorising them based on their assumptions regarding supply chain structure, information structure, and interaction among supply chain members. We find that researchers are extending traditional supply chain models to address emerging challenges and opportunities driven by sustainable practices under asymmetric information. However, the research remains in a preliminary phase, with most models relying on simplified settings – typically dyadic, single-product, and single-period frameworks – and focusing primarily on demand and cost information asymmetries. Multilateral information structures and non-contractual coordination mechanisms remain largely unexplored. Theoretical advancements have considerably outpaced empirical validation, revealing a critical gap in the integration of real-world practices. Our findings highlight the importance of information sharing and coordination mechanisms in achieving sustainability outcomes and improving supply chain performance. These insights enrich the theoretical discourse on information asymmetry in sustainable supply chains.

Abbreviations: SSC: sustainable supply chain; GSC: green supply chain; CLSC: closed-loop supply chain; SCM: supply chain management; CSR: corporate social responsibility; GT: game theory; SLR: systematic literature review

ARTICLE HISTORY
Received 23 November 2023
Accepted 10 June 2025

KEYWORDS
Green and sustainable supply chain management; supply chain coordination; game theory; information asymmetry; systematic literature review

1. Introduction

Sustainable supply chain management (SSCM) has emerged as a critical approach to addressing intensifying environmental, social, and economic pressures in contemporary supply chains. Consistent with Ahi and Searcy (2013), we define SSCM as the coordinated integration of these three dimensions across material, information, and capital flows among supply chain partners. Achieving effective SSCM requires close coordination among diverse stakeholders, including suppliers, manufacturers, retailers, and customers. However, the presence of information asymmetry – defined as disparities in access to critical information among these stakeholders – often leads to suboptimal decisions, thereby hindering coordination effectiveness and negatively affecting supply chain sustainability performance (Shen et al., 2019; Vosooghidizaji et al., 2020).

Real-life industry incidents vividly demonstrate the practical relevance and significant impact of information asymmetry on SSCM. Volkswagen's (VW) emissions scandal (Dieselgate)[1] serves as a prominent example, wherein VW deliberately installed deceptive devices in 11 million vehicles globally, causing significantly higher pollutant emissions than reported, extensive litigation, substantial reputational damage, and financial penalties exceeding €30 billion. The fallout from this incident has continued into recent years, highlighting ongoing challenges in rebuilding stakeholder trust. Another illustrative example is Schaeffler's critical supply disruption,[2] caused by its sole supplier of vital components being shut down due to environmental violations. This disruption threatened the operations of more than 200 vehicle models from 49 automakers, risking economic losses estimated at approximately 300 billion RMB. Despite

CONTACT Kailan Wu kailanwu92@gmail.com Faculty of Technology, Policy and Management, Delft University of Technology, Delft, The Netherlands

Supplemental data for this article can be accessed online at https://doi.org/10.1080/23302674.2025.2520619.

repeated environmental compliance warnings, Schaeffler failed to adequately share and act upon critical information. This incident highlights that enhanced communication and proactive management of environmental compliance among supply chain stakeholders could have mitigated substantial sustainability risks. These cases collectively underscore the urgency and importance of effectively addressing information asymmetry challenges within SSCM from both practical and theoretical perspectives.

These examples demonstrate how information asymmetry can have far-reaching consequences in green and sustainable supply chains. They have generated widespread attention in industry and academia. The proliferation of research since the 2010s (Schäfer, 2022; Zhou et al., 2021b), exploring the implementation and development of SSCM through practices such as corporate social responsibility (CSR) (Inês et al., 2023) and closed-loop supply chain (CLSC) (Asghari et al., 2022; Taleizadeh et al., 2019), underscores the significance of continuously integrating recent theoretical insights. The literature also emphasises the importance of understanding how the balance of power and information asymmetry influence decision-making in supply chains, particularly under conditions of uncertainty (Nurhayati et al., 2023; Wu et al., 2020a). These factors highlight the complexity and strategic implications associated with such decisions. Analytical modelling research is a general approach to investigating supply chains with information considerations (Shen et al., 2019). It has been increasingly used to study the impacts of information asymmetry on SSCM. However, current studies in this field have not yet been thoroughly evaluated. A systematic literature review can fill this void and provide insights into how sustainability goals can be achieved in the presence of information asymmetry challenges. This research, therefore, systematically reviews game-theoretic modelling research on sustainable supply chains with asymmetric information, and identifies promising areas for future investigation. We narrow down the scope of our review to models based on game theory (GT) due to their widespread and successful applications in SCM literature.

Game theory is an effective tool for modelling and analysing scenarios where decisions of multiple stakeholders influence each other's payoffs (Cachon & Netessine, 2006; Shekarian, 2020; Yin et al., 2016). As the decisions of some players may convey private information that is relevant and useful for the decisions of other players, asymmetric information plays an important role in game theory, especially in dynamic games. Traditional SCM literature reviews have well documented the application of game theory (see Cachon & Netessine, 2006; Leng & Parlar, 2005; Nagarajan & Sošić, 2008) and the impact of information asymmetry on supply chain decisions and coordination (see Shen et al., 2019; Vosooghidizaji et al., 2020). However, the adoption of sustainable practices complicates the situation as it covers more influencing elements and involves multiple stakeholders (Siems et al., 2023; Taleizadeh et al., 2022). In contrast to general optimisation approaches that often consider centralised decision-making or individual firm objectives, game-theoretic models are well-suited to capturing the decentralised interactions, strategic behaviour, and incentive misalignments that characterise sustainable supply chain practices. Findings and insights obtained in SSCs with symmetric information or traditional supply chains with asymmetric information do not necessarily carry over to SSCs with asymmetric information. For example, while information asymmetry typically negatively affects economic performance in traditional supply chains, in sustainable supply chains, these negative impacts can be mitigated or even reversed through factors such as CSR cost considerations (Ma et al., 2017), demand uncertainty (Yu & Cao, 2019), and stakeholder concerns (Wu et al., 2020b; Zhou et al., 2021a). It is because supply chain firms' cost and demand structures are influenced by sustainable practices (Modak et al., 2024; Taleizadeh et al., 2019), and practices like CSR can usually be used as a proxy for signalling their information, such as product greenness (Uyar et al., 2020; Wu et al., 2020b). Coordination mechanisms like screening contracts (Kim & Netessine, 2013; Liu et al., 2019b; Zhang et al., 2021) also evolve significantly due to altered incentives within SSC contexts. Despite increased scholarly interest, no review to date has provided a systematic understanding of how game-theoretic models address the complexities introduced by sustainable practices and asymmetric information in supply chain decision-making. Existing reviews either focus on quantitative models of forward green or closed-loop supply chains under symmetric information – offering only cursory attention to game-theoretic work – or examine asymmetric information in conventional, non-sustainable supply chains (e.g. Agi et al., 2021; Chauhan & Singh, 2018; Chelly et al., 2019). By comprehensively mapping both forward and reverse supply chain studies and classifying them according to supply chain structure, information structure, and interaction form, our review fills this gap and identifies clear opportunities for future research. Accordingly, we synthesise the relevant literature to address the following main research questions:

(1) What sustainable practices have been incorporated and investigated by supply chain models based on game theory with information considerations?

(2) Which members possess which types of asymmetric information in the sustainable supply chain?
(3) What are the impacts of information asymmetry on sustainability performance?
(4) What types of games have been applied to characterise and manage information asymmetry within SSCM contexts?

The remainder of the paper is organised as follows. Section 2 introduces essential background concepts and positions our contribution within existing literature reviews. Section 3 details our systematic review methodology, explicitly articulating the criteria and processes used for literature selection and analysis. Section 4 presents the in-depth content-based analysis results, identifies existing gaps, and proposes potential directions for future research. Section 5 concludes the paper by summarising the findings and discussing their implications. Detailed content analysis and synthesis of the reviewed literature are provided in the Appendix.

2. Background

This paper contributes to the stream of literature reviewing solution methodologies, specifically focusing on game-theoretic models addressing asymmetric information issues within sustainable supply chains. Accordingly, this research is closely connected to two key areas: sustainable supply chain management (SSCM), including sustainable practices, and asymmetric information within supply chains. Each of these areas is discussed in detail below. Moreover, a brief review of previous literature reviews is provided to clearly position our study and underline its unique contributions.

2.1. Sustainable supply chain management and sustainable practices

Supply chain management (SCM) is an effective strategy for firms to support sustainable development. Ahi and Searcy (2013) propose a comprehensive definition for sustainable SCM (SSCM) as

> the creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organisational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organisation over the short- and long-term.

Conceptually, Sauer and Seuring (2017) grouped the core practices of SSCM based on their links to supply chain strategy, structure, and processes into six categories: orientation, continuity, collaboration, risk management, proactivity, and government intervention. Knowledge of prominent practices can inspire researchers and practitioners to develop a suitable mapping for an effective shift to SSCM. Players can differentiate themselves within traditional supply chains through the implementation of sustainable practices while pursuing sustainability goals (Beske & Seuring, 2014). Empirically, Mathivathanan et al. (2018) presented specific practices from managerial, governmental, and societal perspectives. Practices identified in the literature to help sustainability transformation include but are not limited to regulation and monitoring, corporate social responsibility (CSR) practices, carbon-reducing activities, green product development, adoption of green technologies, and closed-loop supply chain (CLSC) practices.

For a better understanding of how firms can become sustainable and the impact of integrating sustainability, this paper summarises the main forms of sustainable practices through an operations management lens, using the modelling literature. To distinguish from traditional supply chain management, we require that at least one player in the SSC needs to engage in at least one type of practice linking with the environmental and/or social dimension of sustainability. This requirement also indicates that we do not restrict our concerns to the realisation of all three dimensions of sustainability, truly or fully sustainable (Markman & Krause, 2016), because few players achieve this goal. Literature reviews verify that the social dimension lags behind the economic and environmental dimensions due to the challenge of quantifying relevant indicators (Ahmadi et al., 2017; Barbosa-Póvoa et al., 2018; Moreno-Camacho et al., 2019; Qorri et al., 2018). However, these dimensions of SSCM are all included in this review to provide insights into the practices covered in current academic research.

2.2. Asymmetric information

Effective information sharing among supply chain players is crucial for implementing sustainable practices and for constructing sustainable supply chains (SSCs). Sustainability-related information not only facilitates and coordinates decision-making, but also influences the sustainable choices in production and consumption of other players while building a sustainable reputation and trust. However, supply chain management is severely challenged by the phenomenon of information asymmetry, when different supply chain players possess varying levels of information about the same decision variables, and one party has more or better information than the other for decision-making (Rasmusen, 1989).

Compared to traditional supply chain management, information asymmetry is more prevalent in sustainable supply chains, for several reasons. Firstly, there can be a mismatch of sustainable incentives among supply chain members. Autonomous members with individual sustainable transformation capabilities and resources face varying stakeholder demands and regulations. They have different preferences and objectives in attaining sustainability, e.g. some members aim to maximise profits while others prioritise environmental and social benefits. These different sustainable values and objectives may lead some players to keep certain information private to align with their preferences and maintain competitive advantage. Secondly, the lack of information transparency which is typical in sustainable supply chains, significantly contributes to information asymmetry. Sustainable transformations influence what information the decision-makers require from other stakeholders and how they communicate it. Supply chain members demand more trustworthy information regarding sustainable manufacturing and distribution of the product to make informed decisions. However, the implementation of sustainable practices introduces considerable changes, complexities, and uncertainties to the business operations and decision-making of supply chain firms and consumers (Chelly et al., 2019), making it impossible or too costly for them to obtain complete information. Thirdly, stakeholders may adopt different information signals, such as eco-labelling schemes, to inform and motivate sustainable practices. The overwhelming amount of sustainability-related information without a standardised and comparable framework complicates the decision-making process further, as it may bring out varying perceptions and interpretations of the same information among decision-makers (Nikolaou & Kazantzidis, 2016). Finally, some private sustainability-related information is challenging to observe, monitor, and verify, allowing opportunistic members to strategically withhold or misreport their private information to secure individual interests and a more favourable bargaining position (Kerrigan & Kulasooriya, 2020; Kim, 2021). Consequently, insufficient or ineffectual information exchange causes some critical information being unknown to all supply chain stakeholders, exacerbating information asymmetry in sustainable supply chains.

2.3. Previous literature reviews and positioning of this paper

There are numerous review papers that synthesise the evolution of green and sustainable supply chains. The existing literature reviews cover various issues, such as supply chain practices, drivers and barriers, performance measures, and dimensions of sustainability in GSCM/SSCM. Overviews of the topics studied in the literature reviews are available in Rajeev et al. (2017) and Barbosa-Póvoa et al. (2018). Moreover, Carter and Washispack (2018) and Martins and Pato (2019) conduct tertiary studies on SSCM and provide comprehensive reviews of the literature reviews in this area. Based on the focus of the reviews, Moreno-Camacho et al. (2019) identify five types of reviews, namely, general reviews, theory-building reviews, reviews on solution methodologies, reviews on specific supply chain functions, and reviews on sustainability performance metrics. Our current review paper belongs to the solution methodologies stream, specifically, game-theoretic models used to address asymmetric information problems in sustainable supply chains.

For general literature reviews on GSCM/SSCM, readers are referred to de Oliveira et al. (2018); Fahimnia et al. (2015); Maditati et al. (2018); Malviya and Kant (2015); Panigrahi et al. (2019); Rajeev et al. (2017); Tseng et al. (2019). In those wide-ranging topics reviews, research methods, especially modelling approaches, have not been the main focus but rather discussed briefly in subsections in the results. The authors find that although qualitative research approaches like surveys, case studies, and conceptual models are predominant, quantitative modelling has become an increasingly important area for investigating SSCM problems. As Carter and Washispack (2018) point out, general reviews have reached a point of saturation; further systematic literature reviews need to focus on quantitative models for SSCM. However, few reviews of modelling papers have been published.

Chelly et al. (2019) provide a most recent overview of six literature reviews on modelling-based GSCM published over the period of 2007–2016. We update the list and present details of another eight reviews in Table 1. These reviews on modelling-based research have demonstrated various methods and approaches, ranging from optimisation techniques to operational research methods (see Brandenburg et al., 2014 for an analytic categorisation), that have been applied extensively in diverse areas of GSCM/SSCM. Among the investigated methods, game theory is used prominently in the literature. Chauhan and Singh (2018) study 87 mathematical model-based papers in GSCM and find that only five out of 87 articles include quantitative models other than based on game theory. Game theory-based models in the literature are systematically reviewed by Agi et al. (2021) and Shekarian (2020), focusing on forward GSCM and CLSCM, respectively. Although the reviews identify seven and sixteen papers with information considerations, notably, neither of them

explicitly discusses the specific features of these models regarding information asymmetry, which is known to complicate decision-making considerably. Including both forward and reverse supply chains, our main contribution, therefore, is a systematic literature review of SSCM models based on game theory and considering information asymmetry. This sets the foundation for the subsequent sections, where we elaborate on the synthesis of the literature and identify opportunities for further research based on these findings.

3. Methodology

Systematic literature review (SLR) is a structured methodology that identifies and analyses critical scientific contributions to a specific field or question (Tranfield et al., 2003). Drawing on general SLR guidelines, Durach et al. (2017) adapted this methodology to the SCM field. We follow their six-step process:

(1) **Develop a theoretical framework**. An initial theoretical framework is developed for subsequent selection, coding, synthesis, and discussion. The framework defines the review scope by specifying analysis units, research settings, and construct definitions.
(2) **Establish selection criteria for primary studies**. Inclusion and exclusion criteria are devised to define the required characteristics of the potential articles and assess their relevance and the initially developed framework.
(3) **Retrieve a baseline literature sample**. Potentially pertinent publications are retrieved by keyword searches in databases.
(4) **Select relevant literature**. The selection criteria are applied in titles, abstracts, and full texts to refine the baseline sample to a concise synthesis sample.
(5) **Synthesise literature**. The theoretical framework is refined to analyse and integrate the results from the synthesis sample.
(6) **Report the results of the review**. The results are presented with different levels of detail.

Table 2 clearly outlines each step, summarising the key actions performed and providing references to relevant sections, figures, and tables for complete transparency and reproducibility.

3.1. Theoretical framework

The analysis framework provided in Figure 1 is constructed based on the model setup and analysis. With different analysis units, we emphasise the characterisation of asymmetric information, game models, and the operational context of the supply chain. We explain these analysis units below.

3.1.1. Supply chain structure

In this paper, the analysis of supply chain structure comprises research context, players, products, and time horizon.

(1) **Research context**. The research context relates to diverse questions such as: What sustainable practices have the supply chain members implemented? Who does incur the related costs? How do these practices impact the demand and the cost functions?
(2) **Players**. The position and the number of players in the supply chain can affect the complexity of the supply chain structure and the game sequence. Moreover, the operation of SSCs usually faces uncertainty and risk in terms of demand and cost. Players may show different preferences towards these risks (e.g. risk-averse, risk-taker), affecting their decisions and utilities.
(3) **Products**. Firms in SSCs usually promote new products to the market. Ordinary and innovative green products may coexist in the market. The consideration of single or multiple products has a leading role in shaping supply chain competition.
(4) **Time horizon**. Considering a single period, multiple periods, or infinite periods can affect the choice of games.

3.1.2. Information structure

Players possess different information about the same decision variables when making decisions owing to an absence of information exchange. We analyse the asymmetric information from the types and characteristics angles:

(1) **Types**. Most studies focus on asymmetric demand and cost information in the SCM literature. The coordination of SSCs copes with more information, such as sustainability efforts and capabilities.
(2) **Characteristics**. Typically, there are two main fashions to model asymmetric information: binary opposite values and continuous distribution (Ma et al., 2018).

3.1.3. Interaction

Interactions between players in decentralised supply chains are characterised by games, decisions, objectives, and coordination mechanisms.

(1) **Games**. Generally, game-theoretic models can be categorised into non-cooperative and cooperative

Table 1. Literature reviews on quantitative models for SSCM.

No.	Authors	Scope	Method-ology	Database	Time range	No. of papers	Main findings
1	Brandenburg and Rebs (2015)	quantitative models in forward SSCM	CAM	publications assessed in previous reviews, journal-specific search	1994–2014	185	• Formal SSCM models are increasingly important, but currently, they are underrepresented. • Most existing models concentrate on deterministic methods and the environmental aspect, overlooking stochastic modelling and social sustainability.
2	Barbosa-Póvoa et al. (2018)	OR methods in SSCM	SLR	Thomson Reuters Web of Knowledge (TR), Science Direct (SD)	NA	220	• The study of social aspects of sustainability has been left behind in economic and environmental aspects. • Optimisation models are predominant in current studies. Comprehensive models on SSC, considering uncertainty, need to be developed. • Conflicting objectives in SSC can be tackled by using game theory approaches.
3	Chauhan and Singh (2018)	mathematical models in GSCM	SLR	Google Scholar, Ebsco, ProQuest, Scopus	NA	87	• About 90% of the research articles on GSCC apply GT, which mostly considers contract coordination and assumes complete information.
4	Xu et al. (2019)	quantitative models in GSCM under carbon policies	CAM	Science Direct, Emerald Insight, Taylor and Francis, Inderscience	NA	85	• Most studies consider the cap-and-trade scheme, with the carbon tax and the carbon cap following behind. • The design of GSCs should not solely consider carbon policies. The choice of a quantitative model should be based primarily on the stakeholders involved and the decisions to be made.
5	Chelly et al. (2019)	mathematical models for LCSCM	NA	NA	2007–2016	83	• The task of modelling carbon emissions is challenging in LCSCM. • Stochastic approaches are more appropriate for developing uncertain and realistic models and need to be more investigated in future research.
6	De Giovanni and Zaccour (2019)	GT models for CLSCM	selective survey	journal-specific search	NA	73	• Dynamic games are needed to study issues such as pricing, product quality over time, and stochastic returns. • More coordination mechanisms, rather than common cost- and revenue-sharing contracts, should be developed in CLSC.
7	Shekarian (2020)	GT models for CLSCM	SLR	WoS	2004–2018	215	• Sharing mechanisms, such as sharing on revenue, cost, and collection process, have received considerable attention, while information sharing among the game players still needs to be examined.
8	Agi et al. (2021)	GT models for forward GSCM	SLR	Scopus	2001–2019	108	• Simple deterministic and two-echelon SC models dominate the current literature. There is a need to extend the models to consider uncertainty related to greening, evolutionary nature, and more intricate multi-echelon structures. • Most reviewed literature deals with non-cooperative games under complete information. Models considering information asymmetry are required to analyse more complicated and realistic GSCs.

Note: NA: not available; SLR: systematic literature review; CAM: content analysis method.

Table 2. Systematic literature review process.

SLR stage	Key actions and references in manuscript
Research questions	Stated in the *Introduction* (Section 1).
Step 1: Develop framework	Classification framework (Figure 1).
Step 2: Define eligibility criteria	Exclusion / Inclusion criteria (Table 3).
Step 3: Identify records	**3.1 Database selection** – Scopus and Web of Science Core Collection. **3.2 Keyword search** – three sets of keywords (Table 4). **3.3 Duplicate removal** – automated and manual.
Step 4: Screen records	**4.1 Title & abstract screening** – apply eligibility criteria. **4.2 Full-text screening** – confirm relevance; add papers via snowballing. Figure 3 reports numbers at each stage (initial hits → duplicates removed → screened → snowballed → final $n = 73$).
Step 5: Synthesise literature	**5.1 Descriptive mapping** – journals (Figure 4), keyword clusters (Figure 5), citation network (Figure 6). **5.2 Content analysis** – apply framework to classify by supply chain, information, and interaction structures.
Step 6: Report findings	Results, gaps, and future research directions (Sections 4).

Table 3. Paper selection criteria.

Criteria	Rationale
Exclusion criteria	
Performance measurement; supplier evaluation and selection	Consider the relevance of articles to the topic
Papers only involving simulation or role-play games, e.g. beer game, trading agent competition (TAC) SCM game	
Application of information and communication technologies	
Conference papers, editorials, and books	
Inclusion criteria	
English papers published in peer-reviewed journals	To ensure high-quality publications; This study focuses on the game-theoretic models in SSCs with asymmetric information.
Supply chain players should get involved in at least one form of sustainable practices	
Papers based on game-theoretic approaches with information considerations	

games based on the interaction between the decision makers (Leng & Parlar, 2005). In non-cooperative games, the Nash game is applied when players make decisions simultaneously as they have equal power or cannot communicate. The Stackelberg game applies when players make decisions sequentially in a leader-follower environment. The presence of information asymmetry prompts players to engage in signalling or screening games depending on the power balance (Chen, 2003). In signalling games, the informed player offers a contract revealing the private information credibly, while in screening games, the uninformed player offers the contract (Lee & Yang, 2013; Voigt, 2011). Following Cachon and Netessine (2006) and Leng and Parlar (2005), we summarise the taxonomy of GT in traditional SCM in Figure 2.

(2) **Objectives**. Objective functions related to the environmental and social dimensions can be formulated apart from predominant profit functions (economic dimension).

(3) **Decisions**. In addition to the typical pricing and ordering (production) decisions, decision variables related to sustainability (e.g. greening of products) are introduced in SSCs.

(4) **Coordination mechanisms**. From the game-theoretic and supply chain perspectives, the definition of coordination in the literature can be classified into four streams (Albrecht, 2010; Stadtler, 2009). The most stringent one defines a supply chain as coordinated if and only if mechanisms result in a supply chain optimum and a unique Nash equilibrium (Cachon, 2003). A weaker alternative only requires a supply chain optimum. A third and even weaker definition results if implementing coordination mechanisms contributes to an enhanced supply chain profit compared to the default solution where no coordination exists. The default solution is considered the loosest coordination definition. Since the first two definitions can be regarded as special cases of the third alternative and the last definition ignores looking at improvement feasibility, we adopt the third definition as the general starting point of our review. Contracting is an extensively employed coordination mechanism, as the majority of transactions within supply chains are managed through contracts.

3.2. Characteristics of the primary studies

Table 3 shows the selection criteria applied in this study.

3.3. Baseline sample

Scopus and Web of Science (WoS) Core Collection were employed for the keyword search. Scopus was suggested as a reliable source of supply chain peer-reviewed papers (Fahimnia et al., 2015). WoS was selected as a complementary database because it provided interdisciplinary coverage in high-quality articles (Tseng et al., 2019). It is noteworthy that the operator AND has higher precedence than OR in WoS, while Scopus applies the order of precedence conversely. Parentheses can be used to group compound operators and override operator precedence.

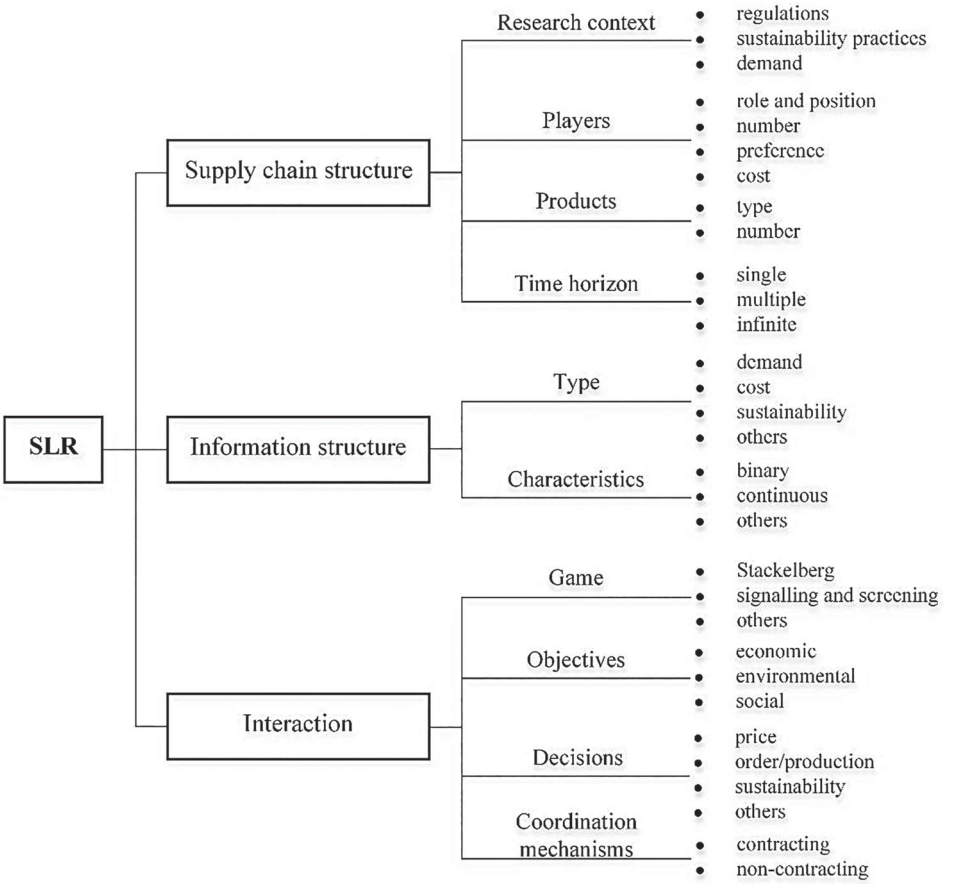

Figure 1. SLR analysis framework.

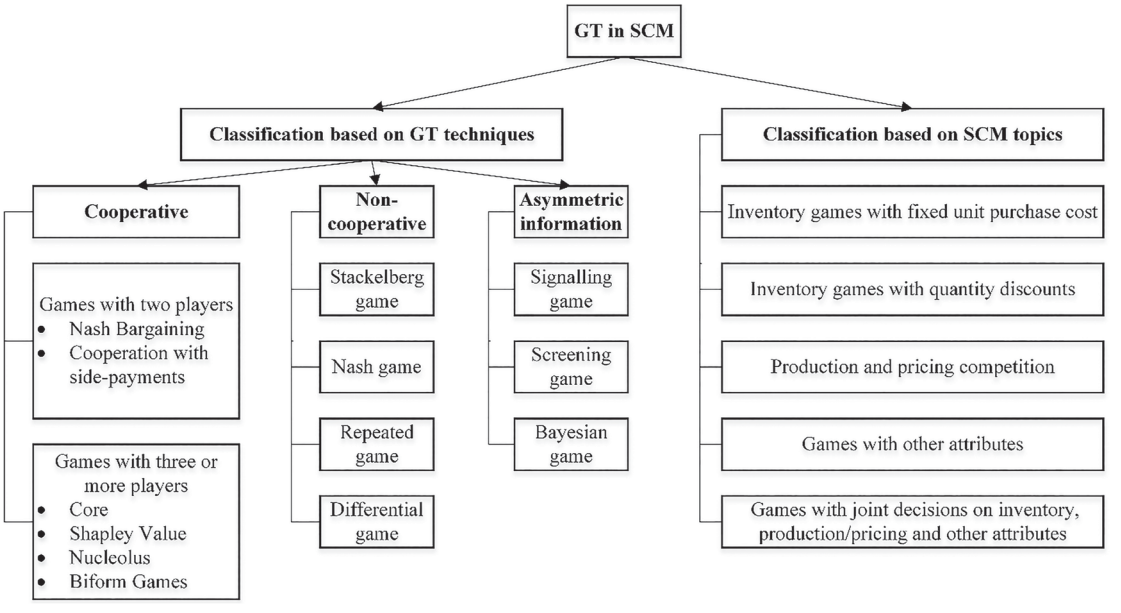

Figure 2. Taxonomy of GT in traditional SCM.

Table 4. Keyword search in the database.

Search strings	Databases	Results	Unique results	Synthesis available
K1	Scopus	23, 827		
	WoS	21, 423		
K1 AND K2	Scopus	1, 744	377	1854
	WoS	1, 817	450	
K1 AND K2 AND K3	Scopus	168	40	250
	WoS	214	86	

Also, double quotation marks in WoS (curly brackets in Scopus) turn off lemmatisation, an automatic processing that helps to find variations such as plurals and spelling variations. Wildcards can be used to account for variations when lemmatisation is turned off, e.g. the dollar sign ($) is used in WoS search to find the British and American spelling of the same word.

The keyword search strategy is the most common approach to acquire papers for SLR. We defined three sets of keywords after rigorous trials and test searches to ensure the selected papers were relevant to the topic. The first set of keywords (K1) combined supply chain with sustainability to retrieve the literature in the domain of SSCM: 'supply chain' AND ('sustainab*' OR 'green*' OR 'environment*' OR 'carbon' OR 'corporate social responsibility' OR 'closed-loop' OR 'reverse' OR 'remanufacturing' OR 'recycl*'). The second set of keywords (K2) sought to narrow the search scope to the papers concerning game-theoretic models: 'game' OR 'game theor*' OR 'equilibri*' OR 'bargaining' OR 'screening' OR 'signal$ing'. The last set of keywords (K3) was defined to identify papers that dealt with information structure: ('asymmetr*' OR 'part*' OR 'shar*' OR 'private' OR 'incomplete' OR 'imperfect') AND 'information'. Consequently, the search string used for the database search was a combination of all sets of keywords through Boolean operators.[3]

The initial search was performed in the topic field, including article title, abstract, and keywords. The publication was limited to English articles and reviews. Publication time was not specified, but the final update of the retrieval data was compiled in June 2021. The identification of duplicated papers was completed in Endnote. In the end, 250 synthesis available papers were obtained after eliminating duplicates. The keyword search process and results are presented in Table 4.

3.4. Synthesis sample and descriptive analysis

The inclusion and exclusion criteria were employed to reduce the number of articles to 135 for a full-text review after reading all the titles and abstracts. Subsequently, the review process was continued by a full-text reading, resulting in 66 articles included in the synthesis sample. To complement the database search, we used snowballing techniques (Jalali & Wohlin, 2012) and located another seven relevant articles with the help of the bibliometric software HistCite^{TM}.[4] Thus, a total of 73 papers were included for a detailed review. Figure 3 provides the paper screening methodology and results.

As a first result, almost all the articles were published during the past five years in a total of 35 journals. Figure 4 shows the journals that published at least three articles, covering 42 out of 73 reviewed papers. *Journal of Cleaner Production* (JCP) is the largest contributor to the sample, with nine publications. The little difference in publication numbers between each journal suggests that there is no authoritative journal at present. In addition, Chinese scholars contribute the most publications (79%) in this field.

Network analysis is useful for exploring relationships between various factors. Using a bibliographic database file from Scopus as an input, we employ VOSviewer software developed by van Eck and Waltman (2010) to generate a visual network relationship between the keywords of the reviewed papers. Figure 5 provides the greatest set of connected keywords, with 480 author and index keywords. The size of the corresponding circle and label represents the occurrences of keywords. It is found that 'supply chains' and 'supply chain management' are the two most common keywords with a total of 53 occurrences, which is followed by 'game theory' and 'asymmetric information', both occur 25 times. Synonyms of and related phrases to 'asymmetric information' such as 'information sharing', 'information asymmetry', and 'private information' also have relatively high occurrences. Regarding sustainability, keywords related to 'green supply chain', 'closed-loop supply chain', 'corporate social responsibility', and 'carbon emissions' occur frequently. There is a high concentration of keywords related to the research scope.

We engage HistCite^{TM} to identify important papers in the synthesis sample using a bibliographic database file from WoS as an input. Figure 6 shows the mapping of local citations ordered by the local citation score (LCS) indicator. The size of each circle indicates the occurrence of citations received by the paper pointed out. The larger the circle is, the more citations the paper receives. The arrow represents the citation relationship. There are six representative papers. Three out of these six papers model CLSCs; among them, Zhang et al. (2014) (Circle 4) and Wang et al. (2017) (Circle 13) design information screening contracts where the retailer's information on collection effort is asymmetric; Wei et al. (2015) (Circle 16) analyse pricing and collection decisions with symmetric and dual asymmetric information between the two supply chain members. Considering upstream firms'

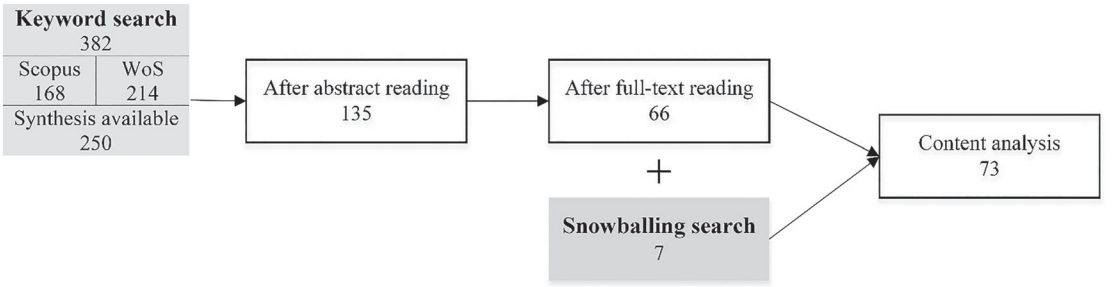

Figure 3. Paper screening methodology and results.

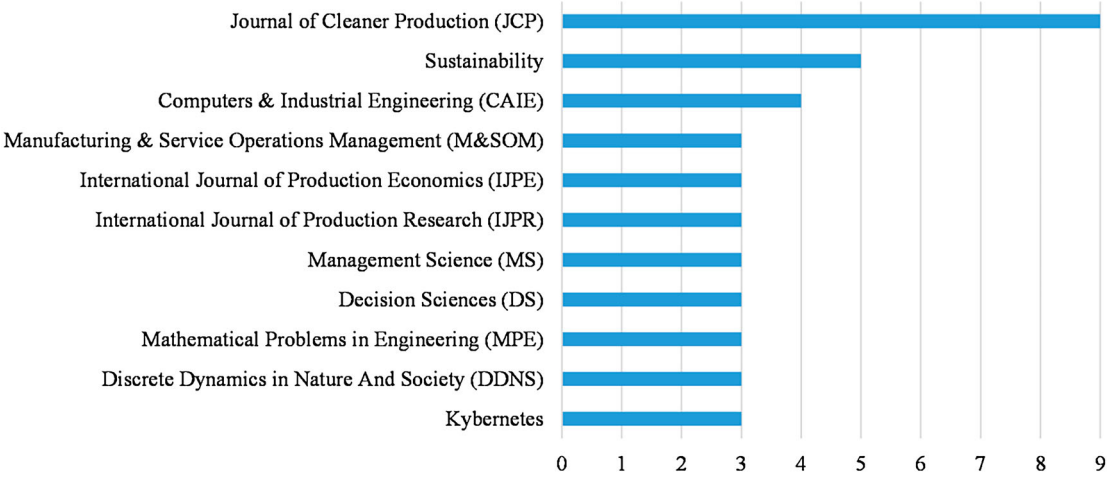

Figure 4. Journals where three or more reviewed papers are published.

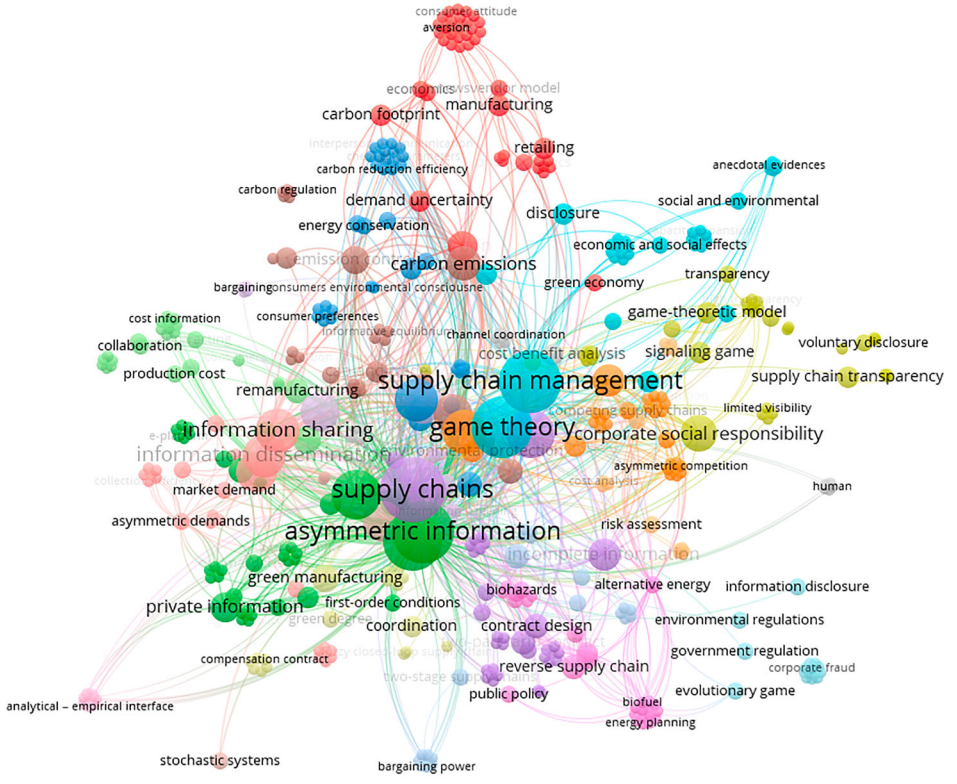

Figure 5. Co-occurrence of keywords clusters.

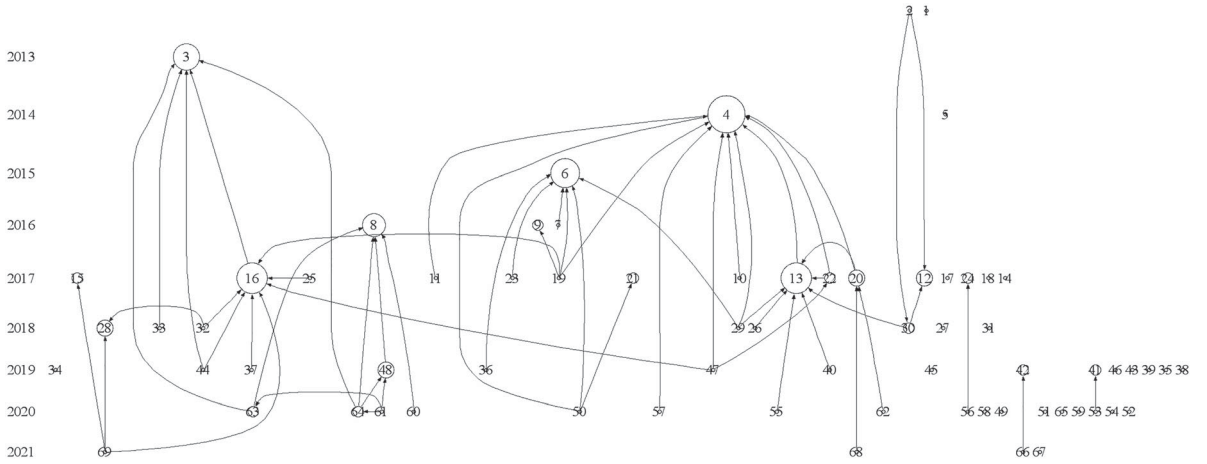

Figure 6. Mapping of local citations inside the synthesis sample.

cost information asymmetry, Kim and Netessine (2013) (Circle 3) explore how screening contracts with different commitment strategies affect supply chain members' new product development collaboration, while Ma et al. (2017) (Circle 6) develop two-part tariff contracts (TPTC) to improve the CSR level. Plambeck and Taylor (2016) (Circle 8) examine how a supplier's effort to hide information about unsafe practices or environmental problems impacts a buyer's auditing policies.

4. Results and discussion

The reviewed papers were assigned numbers and classified according to the framework and corresponding results in Figure 1. All analyses refer to the synthesis sample of 73 papers on sustainable supply chain analysis based on game-theoretic models under information asymmetry. Appendix A1, A2, and A3 present the details and statistics in full lists. To ensure clarity and facilitate understanding, the results are presented using a refined analysis framework that directly links the findings to our initial research questions. This section first reports the review results using this framework to increase readability. Subsequently, we highlight key research gaps and propose potential future directions for research in sustainable supply chain management.

4.1. Supply chain structure

We mainly focus on the sustainable practices studied by supply chain models and their impacts on cost and demand. Table 5 summarises an overview of the studied sustainable practices and Figure 7 illustrates the distribution of relevant factors according to the frequency of occurrence.

We observe that most game-theoretic models with asymmetric information consider government interventions (26%), followed by closed-loop supply chain management (CLSCM, 23%). The government engages in SCM through policy regulations and financial incentives to monitor and improve sustainability performance. Out of the 27 papers that consider government interventions, 16 papers analyse regulations on manufacturers (e.g. Chen & Li, 2021; Liu & Chen, 2019; Ma et al., 2018; Xia & Niu, 2021). These government regulations are mainly carbon policies and reward-penalty mechanisms (RPM). Only seven papers consider the regulation applicable to all supply chain firms, mainly via subsidies (e.g. Qu & Zhou, 2017; Wu et al., 2019; Zhang et al., 2020). Accordingly, manufacturers are the most active members (45%) in taking green initiatives and incurring relevant costs. CLSCM has been developed into a self-contained subdiscipline in the supply chain and sustainability research domain. Developing models with asymmetric information is an area of increasing importance for CLSCM. CLSCs integrate information flows in both forward and reverse activities. On top of the information in forward chains such as demand forecast (e.g. Huang & Wang, 2017a, 2017b), models in this area also address asymmetric information related to reverse activities, e.g. recycling and remanufacturing of returned products (Sane-Zerang et al., 2020; Wang et al., 2017; Wei et al., 2015; Zhang et al., 2020). Carbon emission-dependent activities (14%) and forward GSCM (13%) are also two of the most commonly investigated sustainable practices in the reviewed papers. The former usually considers carbon price, low-carbon R&D cooperation, and carbon reduction efficiency under governmental carbon regulations (e.g. Liu & Song, 2017; Wang & He, 2018; Xia & Niu, 2021; Yang et al., 2016). The latter usually considers innovation and production costs, selling efforts, willingness-to-pay, and market demand in

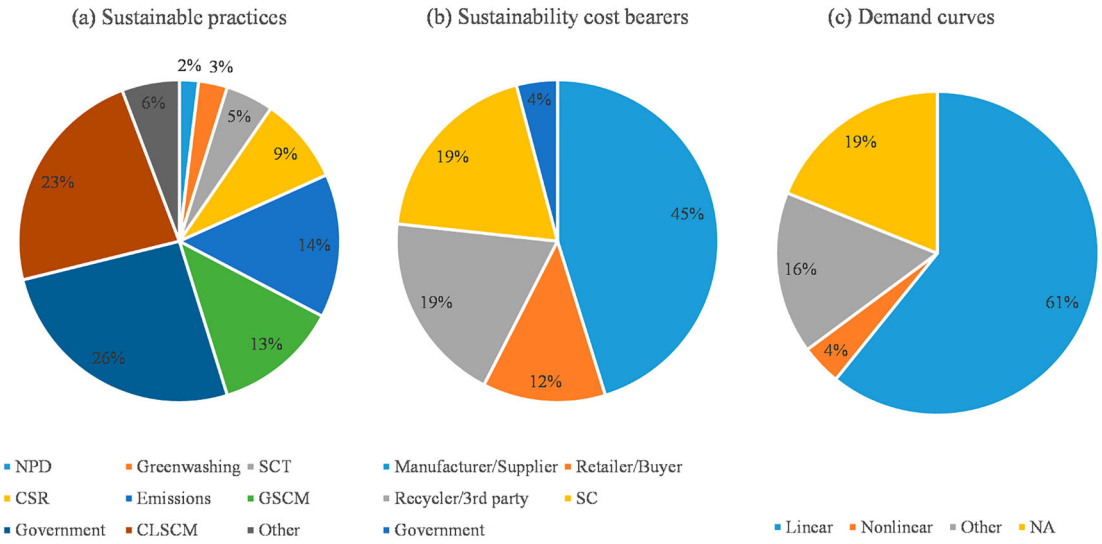

Figure 7. Distribution of sustainable practices.

Table 5. Sustainable practices studied in the reviewed papers.

Practices	Articles	Brief explanations
NPD	1, 11	A set of activities that transfer 'a market opportunity into a differentiated product or service for sale' (Krishnan & Ulrich, 2001)
Greenwashing; corporate fraudulent behaviours	24, 39, 62	'the act of misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service' (Lee et al., 2018)
SCT	32, 52, 53, 54, 60	A firm voluntarily discloses its supplier lists to the public.
CSR activities	6, 12, 14, 21, 24, 37, 38, 54, 62	In addition to focusing on economic interests, firms also integrate public concerns related to the environment and society into their operations, such as improving product quality, environmental friendliness, employee welfare, and work environment (Dahlsrud, 2008; Liu et al., 2019c)
Carbon emission-dependent activities	7, 13, 15, 16, 25, 27, 30, 42, 44, 45, 52, 59, 61, 63, 64	Carbon emission reduction by means of governmental carbon regulations, firms' investment in carbon-reducing initiatives including low-carbon technologies and energy-efficient projects, and contracting and cooperation in supply chains.
GSCM/SSCM	35, 36, 43, 46, 50, 56, 57, 66, 68, 69, 70, 72, 73	The supply chain does not focus on the above-mentioned specific activities, just on manufacturing and distributing green products with investment in green technologies and green marketing.
Government interventions	7, 15, 16, 17, 19, 21, 25, 28, 30, 31, 33, 35, 39, 43, 44, 45, 47, 49, 55, 58, 59, 61, 63, 64, 65, 66, 67	Low-carbon policies: cap-and-trade, carbon tax, etc. RPM: combining government rewards with penalties for recycling, remanufacturing, and carbon emissions. The government prescribes a target rate and reward-penalty intensity. The regulated firm will be rewarded or punished when its performance is better or worse than the target rate (Zhang et al., 2020). Subsidies for green products and technologies Monitoring and inspection of firms' related information and actions
CLSC/RSC: recycling, remanufacturing, etc.	3, 4, 5, 8, 9, 10, 13, 17, 18, 19, 20, 22, 23, 28, 29, 31, 33, 34, 40, 41, 48, 51, 65, 67	'A CSLC integrates forward and reverse activities into a single system.' Reverse activities refer to product acquisition, reverse logistics, recycling, remanufacturing, reselling, etc. (De Giovanni & Zaccour, 2022)
Other	2, 26, 32, 58, 60, 71	quality testing; green consumption; safety production; responsible sourcing; dual channels

green products' manufacturing and distribution process (e.g. Liu et al., 2019a; Raj et al., 2021; Zhang et al., 2021).

Regarding demand curves, the gap between the deterministic demand (36%) and stochastic demand (31%) settings is not significant as other reviews have found, e.g. Barbosa-Póvoa et al. (2018) and Vosooghidizaji et al. (2020). With different research scopes, we focus on the game-theoretic models for SSCs with asymmetric information. Also, the implementation of sustainable practices introduces uncertainty factors to supply chain operations. Stochastic modelling techniques are more appropriate to characterise these configuration features than deterministic ones. Therefore, their adoption increases in this stream of literature.

The apparent difference exists in the linear versus nonlinear demand curves. For tractable modelling and analysis, 61% of the papers employ the assumption that demand has a linear relationship with the selling price or sustainability attributes (e.g. De Giovanni, 2017; Raj et al., 2021; Sane-Zerang et al., 2020). Only three papers

(Wan et al., 2019; Wang et al., 2018a; Yang et al., 2016) adopt nonlinear demand curves that are either iso-elastic or exponential. Moreover, there are two common ways to model demand uncertainty: additive or multiplicative forms (Petruzzi & Dada, 1999). Out of 23 papers that have considered random demand, 18 apply additive forms (e.g. Jha et al., 2017; Liu & Chen, 2019; Nie et al., 2020; Wei et al., 2021b) and only one uses a multiplicative form (Wan et al., 2019). The remaining papers assume the demand as a random variable. Other forms of demand functions are also presented in the literature, e.g. market demand based on consumers' willingness-to-pay (WTP) and utility from green products and services (Kraft et al., 2020; Lee et al., 2018; Li et al., 2017; Wu et al., 2020b; Zhang & Wang, 2019), and fuzzy variables (Gao et al., 2019; Zhao et al., 2017).

Most models operate under the assumption that decision makers are rational and risk-neutral. These models often construct a dyadic one-to-one structure with a single product in a single-period setting, i.e. one upstream firm (like a supplier or a manufacturer) and one downstream firm (like a retailer or a buyer) in the supply chain. Limited consideration has been given to studying other supply chain configurations, especially the supply chain members' behavioural preferences that can significantly affect their decisions and performance (Wei et al., 2021a).

After reviewing the preceding observations, we identify potential areas for further investigation regarding the supply chain structure as follows:

(1) Supply chain transparency (SCT): Researchers use and define SCT differently based on their own viewpoints and research objectives. Generally, two perspectives are prevalent: information visibility and disclosure (Montecchi et al., 2021; Schäfer, 2022). In this review, SCT specifically refers to a type of sustainable practice in which a firm voluntarily discloses its supplier lists to the public. The adoption of this definition is based on the reviewed paper where information asymmetry is a consequence of the lack of transparency. This stream of research is mainly concerned with the social aspect of sustainability. SCT and associated phenomena like greenwashing are widely observed in practice and significantly impact the decisions and performance of leading firms like Apple, H&M, and Nike (Chen & Duan, 2023). Despite their practical relevance, these topics remain underrepresented in existing literature. SCT is considered a relatively recent information-sharing development and an effective tool for enhancing sustainability performance (Chen et al., 2019). More transparency facilitates the reduction of information asymmetry (Shao et al., 2020). Moreover, independent third parties such as non-governmental organisations (NGOs) play a critical role in enhancing SCT, e.g. the Institute of Public and Environmental Affairs (IPE)[5] monitors and publicises supply chain firms' environmental performance through websites, apps, and reports. Only a few papers have investigated the impact of NGOs and SCT on information sharing and sustainability within supply chains (Chen et al., 2019; Chen & Duan, 2023; Kraft et al., 2020; Plambeck & Taylor, 2016). Future research could explore the strategic motivations, potential barriers, and economic implications underlying firms' SCT initiatives, as well as empirically investigate the specific role and effectiveness of independent third-party organisations in driving these initiatives.

(2) Analyses from the perspective of consumers: The demand for sustainable products and services is largely driven by consumers' willingness to pay for sustainable options. As a result, consumers play a critical role in promoting sustainability throughout the supply chain. The influence of information on customers' behaviour shift toward more sustainable choices is receiving increased attention, e.g. firms launch eco-labelling schemes and green marketing campaigns to inform and educate conscious consumers (Nikolaou & Kazantzidis, 2016; Singh & Pandey, 2012). Governments issues environmental subsidies to stimulate consumer adoption of green products (Bian et al., 2020). These actions broaden consumers' knowledge about sustainable practices and products and improve consumer welfare. However, existing GSCM/SSCM research has insufficiently captured how different types of information influence consumers' decision-making. Future studies should employ utility-based, willingness-to-pay models to rigorously examine how various forms of sustainability-related information – such as product greenness, environmental impacts, or social responsibility claims – affect consumer preferences, purchasing behaviour, and broader market dynamics (Huang et al., 2013).

(3) Supply chain competition and dynamics: Multiple players and products compete in multiple periods. Facing sustainability and economic globalisation issues, a focal firm usually interacts with multiple suppliers or retailers within an extended time frame to source, produce, and sell products to satisfy consumers' demands. Therefore, one-to-many, many-to-one, or many-to-many supply chain structures, as well as chain-to-chain competition, are common in practice (Lee & Yang, 2013). The information sharing in those structures is more complicated than in

the simple one-to-one structure. There is still a need for more research on how multiple firms collaborate and compete with each other (Cachon, 2003), including the impact of information sharing. Firms in SSCs usually promote new products to the market. In modelling-based studies, many scholars assume that the launch of new products immediately makes older products obsolete, so the research is limited to a single product in a single period. According to the European Commission (2013, 2018), green products and ordinary products possess the same or similar functionality and address the same consumer demand. Multiple products coexist in the market for a certain time. Competition between homogeneous and substitutable products needs to be considered.

(4) Dual-channel supply chains (offline/online sales patterns of green products): The accelerating advancement in e-commerce enables more consumers to purchase online. Numerous firms, such as Haier, Lenovo, and Nike, build dual-channel supply chains by broadening sales patterns from traditional retail channels to direct selling through the Internet or live-streamed selling to distribute green products (Jamali & Rasti-Barzoki, 2018). E-commerce can also be developed as a tool for improving sustainability performance through, e.g. smart logistics with the application of artificial intelligence (Issaoui et al., 2021). More importantly, the big data about consumers' preferences and demands acquired on e-platforms enables firms to minimise the adverse effects of information asymmetry and optimise their sustainable practices (Wei et al., 2021b). For example, Alibaba Group uses its big data to analyse consumers' green purchasing behaviours and predict the demand more precisely, which increases green product sales and nurtures more green consumers (Alibaba Group, 2016). The introduction of online direct selling channels and the information advantage of e-tailers may reshape the competition in the supply chains by employing different information sharing strategies.

4.2. Information structure

Figure 8 shows the distribution of information structure in the synthesis sample. Similar as in the previous reviews by Shen et al. (2019) and Vosooghidizaji et al. (2020), demand and cost information asymmetries are still among the most often investigated types of asymmetric information in the SSCM literature, wherein the demand and the cost are usually sensitive to the actions or outcomes of sustainable practices such as greenness, emission reduction investment, and CSR efforts.

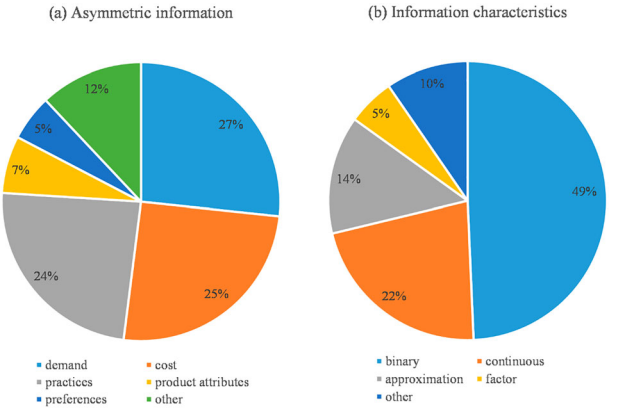

Figure 8. Distribution of information structure.

The asymmetric demand information mainly concerns downstream firms' demand forecast when they face a stochastic demand (e.g. Huang & Wang, 2017b; Jha et al., 2017; Nie et al., 2020; Qu & Zhou, 2017; Wei et al., 2021b; Xia & Niu, 2021; Yu & Cao, 2020; Yu & Li, 2018; Zhou et al., 2021a). Nevertheless, the cost asymmetry ranges from upstream firms or the third parties' production, green R&D investment, or remanufacturing costs (e.g. Arya et al., 2014; Gao et al., 2019; Kim & Netessine, 2013; Liu et al., 2019c; Liu & Song, 2017; Wei et al., 2015; Zhang et al., 2021) to downstream firms' selling or collection costs (e.g. Raj et al., 2021; Sane-Zerang et al., 2020; Wang & He, 2018; Zhang et al., 2014; Zhang et al., 2018; Zhang et al., 2020; Zhao et al., 2017).

Asymmetric information on sustainable practices has received significant attention, though researchers have modelled a limited number of practices. For example, the CLSC models usually consider asymmetric information on the collection effort (e.g. Hu et al., 2019; Wang et al., 2017; Wang et al., 2018b; Yan & Cao, 2017; Zheng et al., 2017; Zhu & Yu, 2019). A handful of SCT literature investigates buyers' strategy of revealing their suppliers based on the information about the suppliers' sustainability compliance capabilities or environmental impacts (Chen et al., 2019; Kalkanci & Plambeck, 2020a, 2020b; Kraft et al., 2020; Shao et al., 2020). Plambeck and Taylor (2016) and Mei et al. (2020) examine a supplier's attempt to conceal information about possible safety issues from a buyer. Wu et al. (2020b) study a firm's greenwashing strategies considering the transparency of CSR information. Xia and Niu (2020) propose a carbon contractual policy to address the carbon-reducing information asymmetry between the government and the manufacturer.

Comparatively, the study of asymmetric information on product attributes of quality and greenness alike (Hong et al., 2016; Lee et al., 2018; Li et al., 2017; Ma et al., 2018; Zhang & Wang, 2017) and supply chain players' preferences like altruism and fairness (Shu et al., 2019;

Wan et al., 2019; Wei et al., 2021a; Zhao & Chen, 2019) have attracted less attention. It is probably because evaluating and quantifying product attributes and preferences takes tremendous effort. Significantly, preference information asymmetry is an emerging topic. Researchers face the challenge of borrowing from other theories, such as prospect theory (Kahneman & Tversky, 2013; Liu & Chen, 2019), to model and explain the phenomena of interest.

Some papers investigate how information asymmetry affects supply chain performance through comparative analyses. Compared to the case with symmetric information settings, most studies found that information asymmetry is profitable for the informed player with higher prices. In contrast, it may be detrimental to the profit of the uninformed player and the supply chain (Ding & Wang, 2020; Huang & Wang, 2017a, 2017b; Jha et al., 2017; Wang et al., 2018a; Wu & Kung, 2020; Zhang et al., 2014). Nevertheless, various factors can affect the value of information and then cause different relationships between symmetric and asymmetric information cases. Investigated factors in the reviewed papers include but are not limited to governmental policies (Li et al., 2020; Nie et al., 2020; Yang et al., 2016), contract types (Liu et al., 2019b; Wang & He, 2018; Zhang et al., 2021), market demand states (Lee et al., 2018; Li et al., 2020; Li et al., 2021; Yu & Cao, 2019, 2020; Yu & Li, 2018), innovation cost efficiency (Jha et al., 2017; Li et al., 2017; Wei et al., 2021b), firms' altruism preference and risk-aversion degree (Wan et al., 2019; Xia & Niu, 2020), dimensions of information asymmetry (Qin et al., 2017; Xia & Niu, 2020; Zhang & Xiong, 2017), and competition (Lee et al., 2018; Yu & Cao, 2019, 2020; Yu & Li, 2018). With the influence of these factors, information asymmetry could even exert beneficial effects on sustainability performance under certain conditions. For instance, Zhang and Xiong (2017) report that the retailer and the supply chain could gain larger profits in the non-information sharing case if the collection efficiency is low. Lee et al. (2018) and Wu et al. (2020b) reveal positive aspects of greenwashing: it can incentivise firms to contribute to higher environmental quality or socially beneficial investment and promote green consumption if customers are sufficiently informed. Chen et al. (2019) demonstrate that buyers are more inclined to disclose their supplier list in the asymmetric information case compared to those in the symmetric information case. Increased transparency would be beneficial to enhance suppliers' social and environmental sustainability performance. Zhang et al. (2021) identify cases wherein information asymmetry improves sales channel efficiency by alleviating the double marginalisation effect and inducing higher environmental innovation. As aforementioned studies indicated, the impacts of information asymmetry on environmental and social performance depend on complicated factors. A handful of papers have compared and showed that information asymmetry may decrease firms' sustainability effort and lower product environmental innovation, greenness, carbon reduction, or CSR level (Ding & Wang, 2020; Jha et al., 2017; Kalkanci & Plambeck, 2020b; Kraft et al., 2020; Liu et al., 2019b; Liu & Chen, 2019; Wang & He, 2018; Wei et al., 2021b; Zhang et al., 2021; Zhou et al., 2021a). Noticeably, the analysis of social sustainability performance is rare.

Regarding the treatment for information asymmetry, about half of the reviewed papers assume that the asymmetric information belongs to two specific types, i.e. the uninformed party knows that an independent binary random variable takes one type with probability ρ and $1-\rho$ otherwise (e.g. Chen et al., 2019; Huang et al., 2019; Kalkanci & Plambeck, 2020a; Lee et al., 2018; Liu & Song, 2017; Shao et al., 2020; Wu et al., 2020b; Xia & Niu, 2021). Fewer researchers relax the assumption and process the asymmetric information as following a continuous distribution with its density function (e.g. Arya et al., 2014; Kim & Netessine, 2013; Kraft et al., 2020; Ma et al., 2017; Ma et al., 2018; Raj et al., 2021). Additionally, a couple of papers assume that the uninformed party treats the asymmetric information as a subjective estimator (e.g. Jha et al., 2017; Liu & Chen, 2019; Nie et al., 2020) or a misreporting factor (e.g. Liu et al., 2019c; Plambeck & Taylor, 2016; Qu & Zhou, 2017).

After reviewing the preceding observations, we identify potential areas for further investigation regarding the information structure as follows:

(1) Fitting more sustainability-related asymmetric information types into SSC models: The issue of demand and cost information asymmetries has been widely recognised for both traditional and sustainable supply chains. There are also other types of information related to sustainability that can be highly influential in the decisions and performance of SSCs, for example, carbon emissions and carbon prices (Yang et al., 2016), consumers' attitudes and willingness-to-pay for product greenness (Zhang & Wang, 2019), and supply chain members' behavioural preferences (Wei et al., 2021a; Wu et al., 2020b; Zhao & Chen, 2019). Identifying and studying asymmetric information can support the development of SSCM.
(2) Extending the model to study bilateral or multilateral information asymmetry: unilateral and single information asymmetry, i.e. only one party is more knowledgeable about a single type of information,

is predominant in current models. Very few papers study unilateral and two-dimensional information asymmetry (Liu et al., 2019a; Xia & Niu, 2020; Zhang & Wang, 2019; Zheng et al., 2017; Zhu & Yu, 2019), bilateral and single information asymmetry (Qin et al., 2017; Wang et al., 2018b; Zhang & Xiong, 2017), and bilateral and two-dimensional information asymmetry (Sane-Zerang et al., 2020; Wei et al., 2015; Yang et al., 2016). There is no paper model multilateral information asymmetry with more than two parties and two types of information, which is more likely to present in real supply chains (Vosooghidizaji et al., 2020).

(3) Exploring other characteristics of asymmetric information: Current models primarily rely on the known discrete or continuous probability of parameters to characterise the type of information asymmetry. However, probability theory may be inappropriate when the observed data is unavailable for the estimate, which is common in practice. In this case, researchers like Gao et al. (2019) and Ma et al. (2020) resort to using fuzzy theory and uncertainty theory to characterise information asymmetry. It could be helpful to consider such characteristics to expand the view of information asymmetry.

(4) Integrating new data-related technologies and their implications for information sharing and sustainability to SSCM: There is an increasing prevalence and interest of firms in adopting emerging technologies like blockchain, Internet of Things (IoT), artificial intelligence (AI), and eco-labelling to inform sustainability performance and improve SCT (Ashraf & Ali, 2023; Bai & Sarkis, 2020; Dong et al., 2023; Liu et al., 2020; Manavalan & Jayakrishna, 2019). These innovative technologies alter supply chain firms' sustainable operations and coordination modes, which may bring about new decision-making models with information considerations (Shao et al., 2020). Despite the prevalence of new technologies and their strategic roles in SSCs, research directly addressing and modelling new technologies' impacts is relatively scarce in the literature (Shen et al., 2019).

4.3. Interaction

As shown in Figure 9, the majority of papers use Stackelberg games to model relationships or sequential decision-making in sustainable supply chains. Papers featuring upstream firms as Stackelberg leaders significantly outnumber those with downstream leadership by approximately threefold. An overview of these applications can

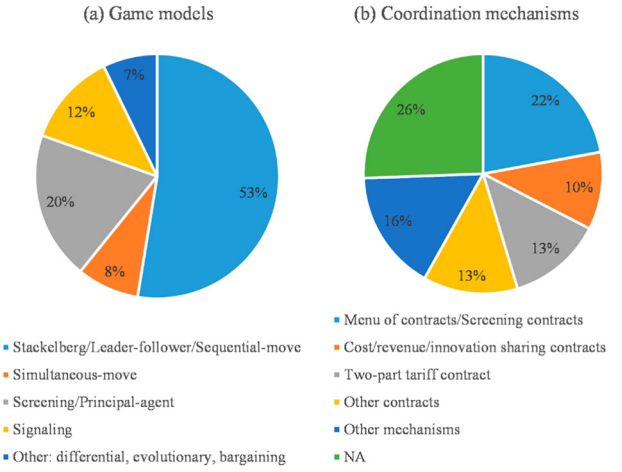

Figure 9. Distribution of games and coordination mechanisms.

be found in Table 6, outlining the sustainable practices explored and the types of asymmetric information addressed across different game-theoretic models. Most of the modelling papers are located in the manufacturing industry, where manufacturers typically engage more actively in sustainability initiatives than downstream firms. Only Wei et al. (2015) investigate optimal pricing and collection decisions in a CLSC with symmetric and asymmetric information considering the influence of power structure. The authors report that the leading firm has an advantage of obtaining a higher profit in both symmetric and asymmetric information settings. In comparison, the follower earns a higher profit in the asymmetric information case than in the symmetric information case.

Moreover, if the government is a player in the game, it usually acts as a leader (e.g. Yang et al., 2021; Zhang & Wang, 2017). The simultaneous-move Nash game is applicable when supply chain players have comparable bargaining power or cannot observe partners' actions and information. It is the least examined model among the three game models.

Signalling and screening game models based on the principal-agent theory are recognised as reasonable and effective methods to deal with information asymmetry problems (Cachon & Netessine, 2006; Voigt, 2011). There typically exist two players in signalling games; the player who owns the private information acts as a sender, and the uninformed player acts as a receiver (Connelly et al., 2011). The sender can signal its private information to the receiver directly through information sharing (e.g. Yu & Cao, 2019, 2020) or indirectly through observable practices. For example, Li et al. (2017) regard supplier CSR activities as signals of product quality. Chen et al. (2019) argue that buyers can employ the revelation strategy to signal suppliers' compliance capability to NGOs. Lee et al. (2018) and Wu et al. (2020b) report that the price or

Table 6. Overview of game-theoretic models in SSCM under asymmetric information.

Game models	Articles	Practices	Asymmetric information
Stackelberg (Leader-follower/Sequential-move)	4, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 20, 21, 22, 23, 25, 26, 27, 28, 29, 31, 33, 34, 35, 36, 37, 38, 40, 41, 42, 44, 45, 46, 48, 50, 51, 52, 53, 54, 55, 56, 57, 59, 63, 65, 66, 67, 68, 69, 70, 71	Government interventions, CLSC, Carbon emission-dependent activities, CSR activities, GSCM, SSCM, SCT, NPD	Demand, Cost, Practices (e.g. collection/recycling efforts, product return rate, social responsibility level, carbon emission), Product attributes (product greenness), Preferences (fairness concerns, altruism preference)
Simultaneous-move	1, 6, 24, 32, 43, 44, 51, 67	Government interventions, CLSC, Carbon emission-dependent activities, CSR activities, GSCM, SSCM, SCT, Greenwashing, NPD	Demand, Cost, Practices (unsafe practices, compliance capability), Product attributes (product greenness)
Screening, Principal-agent	1, 3, 13, 17, 25, 26, 28, 29, 31, 33, 47, 48, 49, 64, 65, 66, 67, 72, 73	Government interventions, CLSC, Carbon emission-dependent activities, GSCM, SSCM, NPD	Demand, Cost, Practices (carbon-reducing effort/capacity, selling effort), Product attributes (product greenness), Preferences (investment preference)
Signalling	2, 5, 12, 24, 27, 30, 32, 44, 45, 58, 60, 62	Government interventions, CLSC, Carbon emission-dependent activities, CSR activities, SCT, Greenwashing	Demand, Cost, Practices (compliance capability, safe production level, sourcing decision, CSR investment), Product attributes (product greenness, quality, homogeneity degree)
Other: differential, evolutionary, bargaining, competition	8, 19, 39, 43, 46, 51, 61	Government interventions, CLSC, Carbon emission-dependent activities, GSCM, SSCM, Greenwashing	Cost, profit sharing parameter, corporate environmental monitoring data, outcome of loan application, consumers' WTP etc.

CSR investments can signal the consumer regarding the firm's environmental quality or greenwashing behaviour. Shao et al. (2020) investigate both price signalling and direct disclosure mechanisms that a firm can use to publicise its responsible sourcing practices. They found that disclosure can increase the responsible sourcing degree under asymmetric information situations compared to signalling.

In screening games, the uninformed party usually offers a contract menu to induce the informed party to disclose its real private information. Screening contract menus could be a menu of price-quantity contracts (Kim & Netessine, 2013; Ma et al., 2018; Zhou et al., 2021a), effort requirement contracts (Zhang et al., 2014; Zhang et al., 2021), and two-part contracts including a unit price or lump-sum payment and a factor such as effort, carbon reduction, revenue sharing ratio, and government subsidy (Hu et al., 2019; Liu & Song, 2017; Xia & Niu, 2020; Yang et al., 2018; Yang et al., 2021; Yuan et al., 2020; Zhang et al., 2018; Zhang et al., 2020; Zhu & Yu, 2019).

From the above observations, it is evident that game-theoretic models have significantly evolved to integrate sustainable practices within supply chains. However, when extending these models to address asymmetric information issues, they still face challenges regarding their underlying assumptions, practical realism, and applicability. For example, while signalling models can reveal hidden information, they often overlook real-world complexities such as incomplete disclosure, limiting their practical relevance. Similarly, screening contracts effectively induce truthful disclosure but rely on assumptions of complete rationality and perfect compliance – conditions seldom encountered in practice (Chatterjee & Samuelson, 2014). Collectively, these limitations highlight significant opportunities to enhance the robustness and realism of game-theoretic models in sustainable supply chains.

In the overwhelming majority of papers, the objective of the decision-makers is profit maximisation. It is not surprising as these papers model and analyse from rational firms' perspective, and firms are profit-driven. Ensuring profitability is fundamental for firms to undertake sustainable practices. Only some papers formulate other sustainability objective functions, such as maximising social welfare or minimising environmental impacts (Hu et al., 2019; Xia & Niu, 2020; Yang et al., 2021; Zhang & Wang, 2017; Zhao & Chen, 2019). The objective of supply chain members with different preferences is to achieve maximal utilities (Shu et al., 2019; Wan et al., 2019; Wei et al., 2021a; Xia & Niu, 2020; Zhou et al., 2021a; Zhu & Yu, 2019).

There are four coordination mechanisms extensively discussed in the literature: contracts, information technology, information sharing, and joint decision-making (Arshinder et al., 2008). Coordination through contracts is predominantly used in both practice and literature. Except for the aforementioned screening contracts, two-part tariff contracts and sharing contracts are also widely applied in the synthesis sample. Other contracts such as bargaining and rebate are relatively scarce in the literature. Apart from common coordination contract design under information asymmetry, a handful of papers explore non-contracting coordination mechanisms, e.g. information sharing (Kalkanci & Plambeck, 2020b; Kraft et al., 2020; Nie et al., 2020; Yu & Cao, 2019, 2020), commitments and auditing (Kim & Netessine,

2013; Plambeck & Taylor, 2016), and governmental financial incentives (Wu et al., 2019; Wu & Kung, 2020; Zhao & Chen, 2019). For a thorough understanding of supply chain coordination, readers are referred to Cachon (2003) and Govindan et al. (2013) for contracts under complete information and Voigt (2011) for information sharing and contracting under asymmetric information.

It is noteworthy that there is no universal contract for supply chain coordination. The application and study of coordination contracts are context-dependent and are affected by diverse factors, e.g. demand uncertainty, information structure, and power structure. Only under certain conditions will the coordination contract take effect. However, deriving a contract that leads to coordination in a specific setting is often not an enormous contribution anymore. There are already so many papers like that, and it does not reflect how firms actually work with each other. Contracts in practice are almost always less precise, multi-dimensional, dynamic, and often not rigorously enforced as assumed in current literature. Instead, the question is how the sustainability context leads to different objective functions and results than the usual context. Models that reflect actual contracting and sustainable coordination practices more accurately would be worthwhile.

After reviewing the preceding observations, we identify potential areas for further investigation regarding the interaction in the supply chains as follows:

(1) Developing game-theoretic models in dynamic or cooperative settings: From the classification of GT techniques in Figure 2, we can see that so far, game theory has only been applied to a limited extent (Agi et al., 2021; De Giovanni & Zaccour, 2022; Geisler, 2014). Primarily simple single-period Stackelberg games are presented. Complex game-theoretic models in dynamic or cooperative settings still need to be further exploited to provide more realistic views (Asghari et al., 2022), e.g. differential games (De Giovanni, 2017), evolutionary games (Peng et al., 2019; Zhang et al., 2017), and bargaining games (Wu et al., 2019; Wu & Kung, 2020; Zhang & Wang, 2019). It is noted that, while Stackelberg games effectively capture sequential decision-making and power dynamics, they often rely on simplified assumptions and overlook cooperative or dynamic interactions. In reality, supply chain members' decisions do not always follow a specific sequence as the leader-follower relationship assumed in most papers (Chen et al., 2019). Further, the informed players' informational advantage does not give complete leverage to the leading informed players (Kim & Netessine, 2013). Therefore, the simultaneous-move game offers a critical opportunity when private information is not directly observable or when power conditions are more balanced.

(2) Understanding how information revelation strategies work in practice: As discussed in the signalling and screening games, the uninformed players do not know the true information, but they may infer it via other observed actions in practice (Kalkanci & Plambeck, 2020b; Wu et al., 2020b). For instance, they can use observable carbon abatement and relevant investment as a proxy for unobservable environmental innovation (Yalabik & Fairchild, 2011). However, they can hardly observe all the innovative actions. The informed players can take advantage of this partial observability and engage in greenwashing, which may bring different results compared to games with perfectly observable actions. Getting into the details of how informed players reveal private information through observed actions contributes to a better understanding of SCT and coordination.

(3) Evaluating sustainability performance and impacts of information asymmetry from broader perspectives of the triple bottom line: In the reviewed literature, prices, sales, costs, and profits have been generally used as metrics to analyse economic performance and impacts of information asymmetry. The generic metrics for the environmental dimension include energy savings, carbon emission reductions, CSR efforts, product greenness, innovation, and collection of used products. In contrast with economic and environmental dimensions, social performance, primarily related to employee welfare and working conditions, is less studied as relevant information is challenging to access and quantify. Recent research proposes some approaches to address this issue (Qorri et al., 2018). Evaluation of social sustainability or integration of three sustainability dimensions would enable stakeholders to gain a broader perspective and a thorough understanding of sustainability-related decisions and concomitant performance effects. For the success of SSCM, it would be helpful to apply broader metrics to analyse sustainability performance and the impacts of information asymmetry.

(4) Exploring coordination failure and non-contracting coordination mechanisms: Given the impact of asymmetric information, coordination failure is common in both practice and literature because of complicated decision-making situations and imperfect execution. For example, in the models developed by Ma et al. (2017) and Raj et al. (2021), two-part tariff contracts, usually effective in coordinating

SSCs under symmetric information, can still achieve coordination under asymmetric information. However, it cannot coordinate in Zhang et al. (2014) and Li et al. (2021)'s asymmetric information settings. Existing literature in GSCM/SSCM seldom investigates the issue of imperfect contract execution (Liu et al., 2019a) and the rationale and insights behind the coordination failure. Moreover, while information asymmetry makes coordination more challenging, the benefits are not as significant as they would be with symmetric information (Sane-Zerang et al., 2020; Voigt, 2011). With the development of information technology, non-contracting coordination mechanisms are worth exploring in future work considering asymmetric information.

4.4. Summary of the results and future research agenda

In this subsection, we revisit the research questions that guide our systematic literature review, focusing primarily on the research status of information asymmetry presented in the reviewed papers. This helps contextualise the findings and their implications. We endeavour to discern the types of information asymmetry and the application of game theory-based modelling within this context. Building on this review, we offer a further discussion of the future research agenda.

(1) What sustainable practices have been incorporated and investigated by supply chain models based on game theory with information considerations?

This study marks the inaugural comprehensive review dedicated to a systematic exploration of prevailing sustainable practices within the domain. The findings indicate that government interventions, CLSCM, activities contingent upon carbon emissions, and forward GSCM for the production and distribution of green products are the most frequently investigated sustainable practices.

Not all core sustainable practices have been well established in the literature sample. Significantly, the insufficient presentation in literature but accelerating development in practice suggest further potential for incorporating sustainable practices such as SCT and e-commerce dual-channel supply chains into the study of SSCM with information considerations.

(2) 2 Which members possess which types of asymmetric information in the sustainable supply chain?

Similar to the reviews on traditional supply chain coordination under information asymmetry by Shen et al. (2019) and Vosooghidizaji et al. (2020), unilateral demand and cost information asymmetries continue to receive the most attention in the SSCM literature with two subtle differences. Firstly, the demand and the cost are usually sensitive to the actions or outcomes of sustainable practices such as greenness, emission reduction investment, and CSR efforts. Asymmetric information types have been extended from common market demand and production cost information to those related to sustainable practices, e.g. e-tailer's demand forecast, quality testing cost, and recycling cost. Secondly, the position and manner of informed and uninformed members vary. For instance, not only downstream retailers but also upstream manufacturers can get access to the demand forecast due to the development of various information-sharing formats. The uninformed member can also infer some private information by looking at the public information revealed by the monitor of the third-party organisations or the participation in the cap-and-trade scheme. Consequently, bilateral or multilateral information asymmetry stimulates significant interest and calls for further research.

(3) 3 What are the impacts of information asymmetry on sustainability performance?

In contrast to the findings by Shen et al. (2019), information asymmetry may not consistently have detrimental impacts on sustainability performance within the SSCM context. With the implementation of sustainable practices, information asymmetry may even potentially incentivise some firms to go genuinely green and enhance SSC efficiency under certain conditions. Moreover, the transformative influence of emerging technologies, such as blockchain and AI, on reshaping sustainability within supply chains is increasingly apparent. Further research incorporating the effects of these advanced technologies on information sharing and coordination in SSCs holds significant potential for advancing the field. Such endeavours can substantially contribute to the development of innovative decision-making models with information considerations. This can provide fresh perspectives and profound insights into the intricate relationship between information asymmetry and sustainability performance.

(4) 4 What types of games have been applied to characterise and treat information asymmetry in this field?

Similar to the review on GT models in forward GSCM without information consideration by Agi et al. (2021), Stackelberg game models are still the most often applied approach to describe the power structure in the SSCM

with asymmetric information literature. With information consideration, signalling and screening game models are adopted frequently to deal with information asymmetry problems. They are advanced in SSCM by incorporating some factors affected by sustainable practices. To better understand how information asymmetry impacts SSC decision-making and performance, complex game-theoretic models in dynamic or cooperative settings need to be further exploited to provide more insights.

It is noted that the future research opportunities we suggest mainly lie in modelling more closely to reality to address practical problems. There is a trend in recent research towards extending existing models; however, such extensions remain limited, primarily due to the mathematical difficulties involved in solving increasingly complex formulations. As a result, researchers often sacrifice attempts to address real-world problems to maintain analytical tractability. Nevertheless, the reviewed studies demonstrate rigorous applications of game-theoretic approaches that explicitly incorporate sustainable practices under asymmetric information, offering valuable insights into how information asymmetries and incentive misalignments shape sustainability-related decisions and performance. These dynamics are clearly reflected in real-world cases such as Volkswagen's emissions scandal and Schaeffler's supply disruption.

Despite these valuable contributions, a significant limitation in the current literature lies in its continued reliance on simplified assumptions regarding supply chain structures, market conditions, and information distribution. As noted earlier, most studies adopt dyadic, single-product, single-period frameworks with linear demand and cost assumptions, which risk oversimplifying the complexities of real-world supply chains. Moreover, dynamic and cooperative interactions among multiple stakeholders remain underexplored, leaving important strategic and behavioural nuances insufficiently addressed.

Key controversies and unresolved issues further characterise the literature. Empirical evidence on the effectiveness of transparency initiatives, such as voluntary disclosure programmes and NGO-led monitoring, in reducing information asymmetry remains inconclusive. Furthermore, debates persist regarding the extent to which findings from simplified theoretical models can be generalised to complex, multi-tier supply chains in practice. Questions also remain about the practical applicability of contracts developed under stylised assumptions of perfect rationality, compliance, and complete information disclosure.

These gaps highlight important avenues for future research aimed at bridging theoretical insights and empirical validation. Future studies could rigorously test theoretical predictions with real-world data, extend analytical frameworks to address multi-tier and cooperative supply chain interactions, and investigate nuanced scenarios involving complex consumer behaviour and dynamic sustainability considerations. It is important to note that researchers do not always need to derive optimal closed-form solutions; alternative solution methodologies, such as simulations or numerical analyses based on real data, are equally valuable and deserve further exploration. Researchers could strive to balance analytical and non-analytical solutions, and theoretical rigour with practical relevance, prioritising solutions to real-world sustainability challenges over merely filling theoretical gaps.

Additionally, this research provides valuable insights for practitioners by expanding their comprehension of how information asymmetry affects decision-making in sustainable supply chains. Understanding potential ramifications, such as the exacerbation of information asymmetry through unclear product labelling, or recognising that greenwashing may not universally undermine sustainability performance, can help practitioners formulate more effective production and marketing strategies. Analytical models and coordination mechanisms developed in academic modelling literature offer practitioners practical insights into addressing these challenges. Finally, our study emphasises the critical importance of information sharing and coordination in promoting sustainability. However, extensive analytical modelling research lacks applicable cases and data support from real-world practices. Bridging theoretical study and practical application requires concerted collaboration between practitioners and academic researchers. Such partnerships can significantly enhance the integration of theoretical findings with practical knowledge, ultimately advancing effective sustainability solutions.

5. Conclusion

Sustainable supply chain coordination under conditions of information asymmetry remains a critical issue of interest in both practical and academic contexts. We have conducted a systematic literature review specifically focusing on the applications of game theory-based models in sustainable supply chain management under asymmetric information. Our review demonstrates that although researchers are increasingly extending traditional supply chain models to address emerging sustainability challenges and opportunities under asymmetric information, the field remains at a preliminary stage. Our findings reinforce the theoretical importance of coordination and information sharing, while also underscoring their practical relevance – evident in real-world cases

where a lack of transparency has led to notable sustainability failures. However, theoretical developments have largely outpaced validation in real-world applications, highlighting a crucial gap regarding empirical integration and practical applicability.

Existing research primarily investigates limited sustainable practices within relatively simple scenarios – typically dyadic structures involving a single product, single-period frameworks, and tractable linear demand curves. Several opportunities thus emerge for future studies related to supply chain structures: (1) exploration of additional sustainable practices, such as supply chain transparency and e-commerce dual-channel supply chains; (2) development of new demand models from consumer perspectives; and (3) extension of models to complex supply chain structures with competition and time dynamics.

Concerning information structures, demand and cost information asymmetries are among the most commonly investigated types, typically through binary opposite values. A significant gap remains regarding models that incorporate bilateral or multilateral sustainability-related asymmetric information. Moreover, the exploration of additional characteristics of asymmetric information and the application of new data-driven technologies represent promising research directions. Although information asymmetry generally has adverse impacts in traditional supply chain contexts, our analysis reveals mixed and nuanced effects in sustainable contexts, significantly influenced by factors such as costs associated with sustainability initiatives, demand uncertainties, and stakeholder concerns. Therefore, future studies would benefit from deeper investigations into these complexities, ideally supported by empirical evidence and real-world practices.

Concerning interactions, a large number of models have been developed based on Stackelberg, signalling, and screening non-cooperative games in pursuit of profit maximisation. Supply chain coordination under asymmetric information settings is dominated by screening contracts, two-part tariff contracts, and sharing contracts. Comprehensive evaluations of three-dimensional sustainability performance and non-contracting coordination mechanisms remain lacking. Researchers are encouraged to further investigate how contracting and information revelation operate in practice, and to extend game-theoretic models to dynamic or cooperative settings.

In sum, our review contributes a systematic and critical synthesis of existing theoretical insights, shedding light on the key complexities and opportunities introduced by information asymmetry in sustainable supply chain management. One limitation of this study is its exclusive focus on the application of game-theoretic approaches, without delving into the technical methods for model construction and equilibrium derivation. Future studies could expand the scope to address these methodological aspects comprehensively.

Notes

1. https://www.bbc.com/news/business-61581251.
2. https://autonews.gasgoo.com/70010051.html.
3. Adding an asterisk (∗) to the root word helps identify all derivative words, e.g., 'green∗' will search for green, greening, greenness, etc.
4. Note that HistCite is no longer officially updated by Clarivate Analytics, the present analysis is based on its 12.3.17 version. Installer is available in https://support.clarivate.com/ScientificandAcademicResearch/s/article/HistCite-No-longer-in-active-development-or-officially-supported?language=en_US.
5. http://www.ipe.org.cn/.

Acknowledgements

The authors are thankful to the anonymous reviewers for their valuable comments, which have improved the overall quality of this paper.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by China Scholarship Council [grant number 201708500097].

Data availability statement

Data sharing is not applicable to this article as no new data were generated in this study. All content-based analyses of the reviewed papers are available within the article and its supplementary materials.

ORCID

Kailan Wu http://orcid.org/0000-0001-7465-4152
Lóránt Tavasszy http://orcid.org/0000-0002-5164-2164
Jafar Rezaei http://orcid.org/0000-0002-7407-9255
Bart De Schutter http://orcid.org/0000-0001-9867-6196

References

Agi, M. A. N., Faramarzi-Oghani, S., & Hazır, Ö. (2021). Game theory-based models in green supply chain management: A review of the literature. *International Journal of Production Research*, *59*(15), 4736–4755. https://doi.org/10.1080/00207543.2020.1770893

Ahi, P., & Searcy, C. (2013). A comparative literature analysis of definitions for green and sustainable supply chain management. *Journal of Cleaner Production*, *52*, 329–341. https://doi.org/10.1016/j.jclepro.2013.02.018

Ahmadi, H. B., Kusi-Sarpong, S., & Rezaei, J. (2017). Assessing the social sustainability of supply chains using best worst method. *Resources, Conservation and Recycling*, *126*, 99–106. https://doi.org/10.1016/j.resconrec.2017.07.020

Albrecht, M. (2010). Supply chain planning and coordination. In M. Albrecht (Ed.), *Supply chain coordination mechanisms: New approaches for collaborative planning* (pp. 5–34). Springer.

Alibaba Group. (2016). *Chinese green consumer report 2016*. Ali Research Institute.

Arshinder, S., Kanda, A., & Deshmukh, S. G. (2008). Supply chain coordination: Perspectives, empirical studies and research directions. *International Journal of Production Economics*, *115*(2), 316–335. https://doi.org/10.1016/j.ijpe.2008.05.011

Arya, A., Gong, N., & Ramanan, R. N. V. (2014). Quality testing and product rationing by input suppliers. *Production and Operations Management*, *23*(11), 1835–1844. https://doi.org/10.1111/poms.12186

Asghari, T., Taleizadeh, A. A., Jolai, F., & Moshtagh, M. S. (2022). Cooperative game for coordination of a green closed-loop supply chain. *Journal of Cleaner Production*, *363*, 132371. https://doi.org/10.1016/j.jclepro.2022.132371

Ashraf, M., & Ali, I. (2023). Evaluation of project completion time prediction accuracy in a disrupted blockchain-enabled project-based supply chain. *International Journal of Systems Science: Operations & Logistics*, *10*(1), 2152296. https://doi.org/10.1080/23302674.2022.2152296

Bai, C. G., & Sarkis, J. (2020). A supply chain transparency and sustainability technology appraisal model for blockchain technology. *International Journal of Production Research*, *58*(7), 2142–2162. https://doi.org/10.1080/00207543.2019.1708989

Barbosa-Póvoa, A. P., da Silva, C., & Carvalho, A. (2018). Opportunities and challenges in sustainable supply chain: An operations research perspective. *European Journal of Operational Research*, *268*(2), 399–431. https://doi.org/10.1016/j.ejor.2017.10.036

Beske, P., & Seuring, S. (2014). Putting sustainability into supply chain management. *Supply Chain Management: An International Journal*, *19*(3), 322–331. https://doi.org/10.1108/SCM-12-2013-0432

Bian, J. S., Zhang, G. Q., & Zhou, G. H. (2020). Manufacturer vs. consumer subsidy with green technology investment and environmental concern. *European Journal of Operational Research*, *287*(3), 832–843. https://doi.org/10.1016/j.ejor.2020.05.014

Brandenburg, M., Govindan, K., Sarkis, J., & Seuring, S. (2014). Quantitative models for sustainable supply chain management: Developments and directions. *European Journal of Operational Research*, *233*(2), 299–312. https://doi.org/10.1016/j.ejor.2013.09.032

Brandenburg, M., & Rebs, T. (2015). Sustainable supply chain management: A modeling perspective. *Annals of Operations Research*, *229*(1), 213–252. https://doi.org/10.1007/s10479-015-1853-1

Cachon, G. P. (2003). Supply chain coordination with contracts. In S.C. Graves & A.G. de Kok (Eds.), *Handbooks in operations research and management science* (Vol. 11, pp. 227–339). Elsevier.

Cachon, G. P., & Netessine, S. (2006). Game theory in supply chain analysis. In M.P. Johnson, B. Norman, & N. Secomandi (Eds.), *Models, methods, and applications for innovative decision making* (pp. 200-233). INFORMS.

Carter, C. R., & Washispack, S. (2018). Mapping the path forward for sustainable supply chain management: A review of reviews. *Journal of Business Logistics*, *39*(4), 242–247. https://doi.org/10.1111/jbl.12196

Chatterjee, K., & Samuelson, W. (2014). *Game theory and business applications*. Springer.

Chauhan, C., & Singh, A. (2018). Modeling green supply chain coordination: Current research and future prospects. *Benchmarking: An International Journal*, *25*(9), 3767–3788. https://doi.org/10.1108/BIJ-10-2017-0275

Chelly, A., Nouira, I., Frein, Y., & Hadj-Alouane, A. B. (2019). On The consideration of carbon emissions in modelling-based supply chain literature: The state of the art, relevant features and research gaps. *International Journal of Production Research*, *57*(15-16), 4977–5004. https://doi.org/10.1080/00207543.2018.1497310

Chen, F. (2003). Information sharing and supply chain coordination. In S.C. Graves & A.G. de Kok (Eds.), *Handbooks in operations research and management science* (Vol. 11, pp. 341–421). Elsevier.

Chen, Q., & Duan, Y. (2023). Impact of information disclosure on global supply chain greenwashing: Is more information transparency always better? *Transportation Research Part E: Logistics and Transportation Review*, *178*, 103288. https://doi.org/10.1016/j.tre.2023.103288

Chen, W. D., & Li, L. M. (2021). Incentive contracts for green building production with asymmetric information. *International Journal of Production Research*, *59*(6), 1860–1874. https://doi.org/10.1080/00207543.2020.1727047

Chen, S., Zhang, Q. Q., & Zhou, Y. P. (2019). Impact of supply chain transparency on sustainability under NGO scrutiny. *Production and Operations Management*, *28*(12), 3002–3022. https://doi.org/10.1111/poms.12973

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management*, *37*(1), 39–67. https://doi.org/10.1177/0149206310388419

Dahlsrud, A. (2008). How corporate social responsibility is defined: An analysis of 37 definitions. *Corporate Social Responsibility and Environmental Management*, *15*(1), 1–13. https://doi.org/10.1002/csr.132

De Giovanni, P. (2017). Closed-loop supply chain coordination through incentives with asymmetric information. *Annals of Operations Research*, *253*(1), 133–167. https://doi.org/10.1007/s10479-016-2334-x

De Giovanni, P., & Zaccour, G. (2019). A selective survey of game-theoretic models of closed-loop supply chains. *4OR*, *17*(1), 1–44. https://doi.org/10.1007/s10288-019-00399-w

De Giovanni, P., & Zaccour, G. (2022). A selective survey of game-theoretic models of closed-loop supply chains. *Annals of Operations Research*, *314*(1), 77–116. https://doi.org/10.1007/s10479-021-04483-5

de Oliveira, U. R., Espindola, L. S., da Silva, I. R., da Silva, I. N., & Rocha, H. M. (2018). A systematic literature review on green supply chain management: Research implications and future perspectives. *Journal of Cleaner Production*, *187*, 537–561. https://doi.org/10.1016/j.jclepro.2018.03.083

Ding, J. F., & Wang, W. B. (2020). Information sharing in a green supply chain with promotional effort. *Kybernetes*, *49*(11), 2683–2712. https://doi.org/10.1108/K-09-2019-0625

Dong, C. W., Huang, Q. Z., Pan, Y. Q., Ng, C. T., & Liu, R. J. (2023). Logistics outsourcing: Effects of greenwashing and blockchain technology. *Transportation Research Part E: Logistics and Transportation Review*, *170*, 103015. https://doi.org/10.1016/j.tre.2023.103015

Durach, C. F., Kembro, J., & Wieland, A. (2017). A new paradigm for systematic literature reviews in supply chain management. *Journal of Supply Chain Management*, *53*(4), 67–85. https://doi.org/10.1111/jscm.12145

European Commission. (2013). Attitudes of Europeans towards building the single market for green products. Flash Eurobarometer 367.

European Commission. (2018). SMEs, resource efficiency and green markets (Flash Eurobarometer 456), Flash Eurobarometer 456.

Fahimnia, B., Sarkis, J., & Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. *International Journal of Production Economics*, *162*, 101–114. https://doi.org/10.1016/j.ijpe.2015.01.003

Gao, J., Liang, Z. L., Shang, J., & Xu, Z. S. (2019). Remanufacturing with patented technique royalty under asymmetric information and uncertain markets. *Technological and Economic Development of Economy*, *26*(3), 599–620. https://doi.org/10.3846/tede.2019.10287

Geisler, M. (2014). *The impact of the game theory in supply chain management*. University of Twente.

Govindan, K., Popiuc, M. N., & Diabat, A. (2013). Overview of coordination contracts within forward and reverse supply chains. *Journal of Cleaner Production*, *47*, 319–334. https://doi.org/10.1016/j.jclepro.2013.02.001

Hong, I. H., Dang, J. F., & Lin, K. W. (2016). The equilibrium contract rent and reward money under incomplete information in reverse supply chains: A game theoretical approach and computational study. *Computers & Industrial Engineering*, *102*, 69–77. https://doi.org/10.1016/j.cie.2016.10.002

Hu, Q. D., Peng, Y., Guo, C. X., Cai, D., & Su, P. Y. (2019). Dynamic incentive mechanism design for recycling construction and demolition waste under dual information asymmetry. *Sustainability*, *11*(10), 2943. https://doi.org/10.3390/su11102943

Huang, J., Leng, M., & Parlar, M. (2013). Demand functions in decision modeling: A comprehensive survey and research directions. *Decision Sciences*, *44*(3), 557–609. https://doi.org/10.1111/deci.12021

Huang, H., Meng, Q. L., Xu, H. Y., & Zhou, Y. (2019). Cost information sharing under competition in remanufacturing. *International Journal of Production Research*, *57*(21), 6579–6592. https://doi.org/10.1080/00207543.2019.1567952

Huang, Y. T., & Wang, Z. J. (2017a). Information sharing in a closed-loop supply chain with technology licensing. *International Journal of Production Economics*, *191*, 113–127. https://doi.org/10.1016/j.ijpe.2017.06.008

Huang, Y. T., & Wang, Z. J. (2017b). Values of information sharing: A comparison of supplier-remanufacturing and manufacturer-remanufacturing scenarios. *Transportation Research Part E: Logistics and Transportation Review*, *106*, 20–44. https://doi.org/10.1016/j.tre.2017.07.015

Inês, A., Diniz, A., & Moreira, A. C. (2023). A review of greenwashing and supply chain management: Challenges ahead. *Cleaner Environmental Systems*, *11*, 100136. https://doi.org/10.1016/j.cesys.2023.100136

Issaoui, Y., Khiat, A., Bahnasse, A., & Ouajji, H. (2021). Toward smart logistics: Engineering insights and emerging trends. *Archives of Computational Methods in Engineering*, *28*(4), 3183–3210. https://doi.org/10.1007/s11831-020-09494-2

Jalali, S., & Wohlin, C. (2012). *Systematic literature studies: Database searches vs. backward snowballing*. 6th ACM-IEEE International Symposium on Empirical Software Engineering and Measurement, ESEM, pp. 29–38.

Jamali, M. B., & Rasti-Barzoki, M. (2018). A game theoretic approach for green and non-green product pricing in chain-to-chain competitive sustainable and regular dual-channel supply chains. *Journal of Cleaner Production*, *170*, 1029–1043. https://doi.org/10.1016/j.jclepro.2017.09.181

Jha, A., Fernandes, K., Xiong, Y., Nie, J. J., Agarwal, N., & Tiwari, M. K. (2017). Effects of demand forecast and resource sharing on collaborative new product development in supply chain. *International Journal of Production Economics*, *193*, 207–221. https://doi.org/10.1016/j.ijpe.2017.07.012

Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In L.C. MacLean & W.T. Ziemba (Eds.), *Handbook of the fundamentals of financial decision making: Part I* (pp. 99–127). World Scientific.

Kalkanci, B., & Plambeck, E. L. (2020a). Managing supplier social and environmental impacts with voluntary versus mandatory disclosure to investors. *Management Science*, *66*(8), 3311–3328. https://doi.org/10.1287/mnsc.2019.3382

Kalkanci, B., & Plambeck, E. L. (2020b). Reveal the supplier list? A trade-off in capacity vs. responsibility. *Manufacturing & Service Operations Management*, *22*(6), 1251–1267. https://doi.org/10.1287/msom.2019.0795

Kerrigan, S., & Kulasooriya, D. (2020). The sustainability transformation: Look ahead, look inside, and look around. *Deloitte Review*, 126–139.

Kim, Y. (2021). Retailers' endogenous sequencing game and information acquisition game in the presence of information leakage. *International Transactions in Operational Research*, *28*(2), 809–838. https://doi.org/10.1111/itor.12844

Kim, S. H., & Netessine, S. (2013). Collaborative cost reduction and component procurement under information asymmetry. *Management Science*, *59*(1), 189–206. https://doi.org/10.1287/mnsc.1120.1573

Kraft, T., Valdes, L., & Zheng, Y. C. (2020). Motivating supplier social responsibility under incomplete visibility. *Manufacturing & Service Operations Management*, *22*(6), 1268–1286. https://doi.org/10.1287/msom.2019.0809

Krishnan, V., & Ulrich, K. T. (2001). Product development decisions: A review of the literature. *Management Science*, *47*(1), 1–21. https://doi.org/10.1287/mnsc.47.1.1.10668

Lee, H. C. B., Cruz, J. M., & Shankar, R. (2018). Corporate social responsibility (CSR) issues in supply chain competition: Should greenwashing be regulated? *Decision Sciences*, *49*(6), 1088–1115. https://doi.org/10.1111/deci.12307

Lee, C.-Y., & Yang, R. (2013). Supply chain contracting with competing suppliers under asymmetric information. *IIE Transactions*, *45*(1), 25–52. https://doi.org/10.1080/0740817X.2012.662308

Leng, M., & Parlar, M. (2005). Game theoretic applications in supply chain management: A review. *INFOR: Information Systems and Operational Research*, *43*(3), 187–220. https://doi.org/10.1080/03155986.2005.11732725

Li, Y. H., Ni, D. B., Xiao, Z., & Tang, X. W. (2017). Signaling product quality information in supply chains via corporate social responsibility choices. *Sustainability*, *9*(11), 2113. https://doi.org/10.3390/su9112113

Li, P., Rao, C., Goh, M., & Yang, Z. (2021). Pricing strategies and profit coordination under a double echelon green supply chain. *Journal of Cleaner Production*, *278*, 123694. https://doi.org/10.1016/j.jclepro.2020.123694

Li, J. X., Yi, Y. Y., & Yang, H. S. (2020). Information investment and sharing in a two-echelon supply chain under government subsidy and consumer preference for energy-saving products. *Mathematical Problems in Engineering*, *2020*, 1–18.

Liu, C., & Chen, W. D. (2019). Decision making in green supply chains under the impact of the stochastic and multiple-variable dependent reference point. *Transportation Research Part E: Logistics and Transportation Review*, *128*, 443–469. https://doi.org/10.1016/j.tre.2019.06.011

Liu, C., Chen, W. D., & Mu, J. (2019a). Retailer's multi-tier green procurement contract in the presence of suppliers' reference point effect. *Computers & Industrial Engineering*, *131*, 242–258. https://doi.org/10.1016/j.cie.2019.03.013

Liu, Y., Li, J., Quan, B. T., & Yang, J. B. (2019c). Decision analysis and coordination of two-stage supply chain considering cost information asymmetry of corporate social responsibility. *Journal of Cleaner Production*, *228*, 1073–1087. https://doi.org/10.1016/j.jclepro.2019.04.247

Liu, K. N., & Song, H. M. (2017). Contract and incentive mechanism in low-carbon R&D cooperation. *Supply Chain Management: An International Journal*, *22*(3), 270–283. https://doi.org/10.1108/SCM-11-2015-0422

Liu, W. H., Wei, W. Y., Yan, X. Y., & Wang, D. (2019b). Supply contract design with asymmetric corporate social responsibility cost information in service supply chain. *Sustainability*, *11*(5), 1408. https://doi.org/10.3390/su11051408

Liu, Y., Zhu, Q. H., & Seuring, S. (2020). New technologies in operations and supply chains: Implications for sustainability. *International Journal of Production Economics*, *229*, 107889. https://doi.org/10.1016/j.ijpe.2020.107889

Ma, N. N., Gao, R., Wang, X. B., & Li, P. (2020). Green supply chain analysis under cost sharing contract with uncertain information based on confidence level. *Soft Computing*, *24*(4), 2617–2635. https://doi.org/10.1007/s00500-019-03801-1

Ma, X., Ho, W., Ji, P., & Talluri, S. (2018). Contract design with information asymmetry in a supply chain under an emissions trading mechanism. *Decision Sciences*, *49*(1), 121–153. https://doi.org/10.1111/deci.12265

Ma, P., Shang, J., & Wang, H. Y. (2017). Enhancing corporate social responsibility: Contract design under information asymmetry. *Omega-International Journal of Management Science*, *67*, 19–30. https://doi.org/10.1016/j.omega.2016.03.004

Maditati, D. R., Munim, Z. H., Schramm, H. J., & Kummer, S. (2018). A review of green supply chain management: From bibliometric analysis to a conceptual framework and future research directions. *Resources, Conservation and Recycling*, *139*, 150–162. https://doi.org/10.1016/j.resconrec.2018.08.004

Malviya, R. K., & Kant, R. (2015). Green supply chain management (GSCM): A structured literature review and research implications. *Benchmarking: An International Journal*, *22*(7), 1360–1394. https://doi.org/10.1108/BIJ-01-2014-0001

Manavalan, E., & Jayakrishna, K. (2019). A review of internet of things (IoT) embedded sustainable supply chain for industry 4.0 requirements. *Computers & Industrial Engineering*, *127*, 925–953. https://doi.org/10.1016/j.cie.2018.11.030

Markman, G. D., & Krause, D. (2016). Theory building surrounding sustainable supply chain management: Assessing what we know, exploring where to go. *Journal of Supply Chain Management*, *52*(2), 3–10. https://doi.org/10.1111/jscm.12105

Martins, C. L., & Pato, M. V. (2019). Supply chain sustainability: A tertiary literature review. *Journal of Cleaner Production*, *225*, 995–1016. https://doi.org/10.1016/j.jclepro.2019.03.250

Mathivathanan, D., Kannan, D., & Hag, A. N. (2018). Sustainable supply chain management practices in Indian automotive industry: A multi-stakeholder view. *Resources, Conservation and Recycling*, *128*, 284–305. https://doi.org/10.1016/j.resconrec.2017.01.003

Mei, Q., Zhou, Q. M., Liu, S. X., & Wang, Q. W. (2020). A safety signaling game for small and medium-sized manufacturing enterprises in the supply chain. *International Journal of Information Systems and Supply Chain Management*, *13*(1), 118–135. https://doi.org/10.4018/IJISSCM.2020010106

Modak, N. M., Sinha, S., Senapati, T., Simic, V., & Pamucar, D. (2024). Game theoretical analysis in two-echelon sustainable supply chains to manage and coordinate strategic decisions. *Computers & Industrial Engineering*, *192*, 110204. https://doi.org/10.1016/j.cie.2024.110204

Montecchi, M., Plangger, K., & West, D. C. (2021). Supply chain transparency: A bibliometric review and research agenda. *International Journal of Production Economics*, *238*, 108152. https://doi.org/10.1016/j.ijpe.2021.108152

Moreno-Camacho, C. A., Montoya-Torres, J. R., Jaegler, A., & Gondran, N. (2019). Sustainability metrics for real case applications of the supply chain network design problem: A systematic literature review. *Journal of Cleaner Production*, *231*, 600–618. https://doi.org/10.1016/j.jclepro.2019.05.278

Nagarajan, M., & Sošić, G. (2008). Game-theoretic analysis of cooperation among supply chain agents: Review and extensions. *European Journal of Operational Research*, *187*(3), 719–745. https://doi.org/10.1016/j.ejor.2006.05.045

Nie, J. J., Shi, C. L., Xiong, Y., Xia, S. M., & Liang, J. M. (2020). Downside of a carbon tax for environment: Impact of information sharing. *Advances in Climate Change Research*, *11*(2), 92–101. https://doi.org/10.1016/j.accre.2020.06.006

Nikolaou, I. E., & Kazantzidis, L. (2016). A sustainable consumption index/label to reduce information asymmetry among consumers and producers. *Sustainable Production and Consumption*, *6*, 51–61. https://doi.org/10.1016/j.spc.2016.01.001

Nurhayati, K., Tavasszy, L., & Rezaei, J. (2023). Joint B2B supply chain decision-making: Drivers, facilitators and barriers. *International Journal of Production Economics*, *256*, 108721. https://doi.org/10.1016/j.ijpe.2022.108721

Panigrahi, S. S., Bahinipati, B., & Jain, V. (2019). Sustainable supply chain management: A review of literature and implications for future research. *Management of Environmental Quality: An International Journal*, *30*(5), 1001–1049. https://doi.org/10.1108/MEQ-01-2018-0003

Peng, J., Tu, G. P., Liu, Y. H., Zhang, H., & Leng, B. B. (2019). The integration role of governmental information disclosure platform: An evolutionary game analysis of corporate

environmental monitoring data fraud. *Kybernetes*, *49*(5), 1347–1379. https://doi.org/10.1108/K-02-2019-0125

Petruzzi, N. C., & Dada, M. (1999). Pricing and the newsvendor problem: A review with extensions. *Operations Research*, *47*(2), 183–194. https://doi.org/10.1287/opre.47.2.183

Plambeck, E. L., & Taylor, T. A. (2016). Supplier evasion of a buyer's audit: Implications for motivating supplier social and environmental responsibility. *Manufacturing & Service Operations Management*, *18*(2), 184–197. https://doi.org/10.1287/msom.2015.0550

Qin, J. J., Ren, L. G., & Xia, L. J. (2017). Carbon emission reduction and pricing strategies of supply chain under various demand forecasting scenarios. *Asia-Pacific Journal of Operational Research*, *34*((01|1)), 1740005. https://doi.org/10.1142/S021759591740005X

Qorri, A., Mujkić, Z., & Kraslawski, A. (2018). A conceptual framework for measuring sustainability performance of supply chains. *Journal of Cleaner Production*, *189*, 570–584. https://doi.org/10.1016/j.jclepro.2018.04.073

Qu, S. J., & Zhou, Y. Y. (2017). A study of the effect of demand uncertainty for low-carbon products using a newsvendor model. *International Journal of Environmental Research and Public Health*, *14*(11), 1276. https://doi.org/10.3390/ijerph14111276

Raj, A., Modak, N. M., Kelle, P., & Singh, B. (2021). Analysis of a dyadic sustainable supply chain under asymmetric information. *European Journal of Operational Research*, *289*(2), 582–594. https://doi.org/10.1016/j.ejor.2020.07.042

Rajeev, A., Pati, R. K., Padhi, S. S., & Govindan, K. (2017). Evolution of sustainability in supply chain management: A literature review. *Journal of Cleaner Production*, *162*, 299–314. https://doi.org/10.1016/j.jclepro.2017.05.026

Rasmusen, E. (1989). *Games and information: An introduction to game theory*. Blackwell.

Sane-Zerang, E., Razmi, J., & Taleizadeh, A. A. (2020). Coordination in a closed-loop supply chain under asymmetric and symmetric information with sales effort-dependent demand. *Journal of Business Economics*, *90*(2), 303–334. https://doi.org/10.1007/s11573-019-00955-0

Sauer, P. C., & Seuring, S. (2017). Sustainable supply chain management for minerals. *Journal of Cleaner Production*, *151*, 235–249. https://doi.org/10.1016/j.jclepro.2017.03.049

Schäfer, N. (2022). Making transparency transparent: A systematic literature review to define and frame supply chain transparency in the context of sustainability. *Management Review Quarterly*, 1–26.

Shao, L. S., Ryan, J. K., & Sun, D. (2020). Responsible sourcing under asymmetric information: Price signaling versus supplier disclosure. *Decision Sciences*, *51*(5), 1082–1109. https://doi.org/10.1111/deci.12482

Shekarian, E. (2020). A review of factors affecting closed-loop supply chain models. *Journal of Cleaner Production*, *253*, 119823. https://doi.org/10.1016/j.jclepro.2019.119823

Shen, B., Choi, T.-M., & Minner, S. (2019). A review on supply chain contracting with information considerations: Information updating and information asymmetry. *International Journal of Production Research*, *57*(15-16), 4898–4936. https://doi.org/10.1080/00207543.2018.1467062

Shu, Y. D., Dai, Y., & Ma, Z. J. (2019). Pricing decisions in closed-loop supply chains with peer-induced fairness concerns. *Sustainability*, *11*(18), 5071. https://doi.org/10.3390/su11185071

Siems, E., Seuring, S., & Schilling, L. (2023). Stakeholder roles in sustainable supply chain management: A literature review. *Journal of Business Economics*, *93*(4), 747–775. https://doi.org/10.1007/s11573-022-01117-5

Singh, P., & Pandey, K. K. (2012). Green marketing: Policies and practices for sustainable development. *Integral Review*, *5*, 22–30.

Stadtler, H. (2009). A framework for collaborative planning and state-of-the-art. *Or Spectrum*, *31*(1), 5–30. https://doi.org/10.1007/s00291-007-0104-5

Taleizadeh, A. A., Ahmadzadeh, K., Sarker, B. R., & Ghavamifar, A. (2022). Designing an optimal sustainable supply chain system considering pricing decisions and resilience factors. *Journal of Cleaner Production*, *332*, 129895. https://doi.org/10.1016/j.jclepro.2021.129895

Taleizadeh, A. A., Haghighi, F., & Niaki, S. T. A. (2019). Modeling and solving a sustainable closed loop supply chain problem with pricing decisions and discounts on returned products. *Journal of Cleaner Production*, *207*, 163–181. https://doi.org/10.1016/j.jclepro.2018.09.198

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, *14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375

Tseng, M.-L., Islam, M. S., Karia, N., Fauzi, F. A., & Afrin, S. (2019). A literature review on green supply chain management: Trends and future challenges. *Resources, Conservation and Recycling*, *141*, 145–162. https://doi.org/10.1016/j.resconrec.2018.10.009

Uyar, A., Karaman, A. S., & Kilic, M. (2020). Is corporate social responsibility reporting a tool of signaling or greenwashing? Evidence from the worldwide logistics sector. *Journal of Cleaner Production*, *253*, 119997. https://doi.org/10.1016/j.jclepro.2020.119997

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Voigt, G. (2011). *Supply chain coordination in case of asymmetric information*. Springer.

Vosooghidizaji, M., Taghipour, A., & Canel-Depitre, B. (2020). Supply chain coordination under information asymmetry: A review. *International Journal of Production Research*, *58*(6), 1805–1834. https://doi.org/10.1080/00207543.2019.1685702

Wan, X. L., Jiang, B. C., Qin, M., & Du, Y. W. (2019). Pricing decision and coordination contract in low-carbon tourism supply chains based on altruism preference. *Environmental Engineering and Management Journal*, *18*(11), 2501–2518. https://doi.org/10.30638/eemj.2019.237

Wang, Q. P., & He, L. F. (2018). Incentive strategies for low-carbon supply chains with asymmetric information of carbon reduction efficiency. *International Journal of Environmental Research and Public Health*, *15*(12), 2736. https://doi.org/10.3390/ijerph15122736

Wang, W. B., Zhang, Y., Li, Y. Y., Zhao, X. J., & Cheng, M. B. (2017). Closed-loop supply chains under reward-penalty mechanism: Retailer collection and asymmetric information. *Journal of Cleaner Production*, *142*, 3938–3955. https://doi.org/10.1016/j.jclepro.2016.10.063

Wang, K., Zhao, R. Q., & Chen, H. R. (2018a). Optimal credit period and green consumption policies with cash-credit

payments under asymmetric information. *Journal of Cleaner Production*, *205*, 706–720. https://doi.org/10.1016/j.jclepro.2018.09.081

Wang, W. B., Zhou, S. Y., Zhang, M., Sun, H., & He, L. Y. (2018b). A closed-loop supply chain with competitive dual collection channel under asymmetric information and reward-penalty mechanism. *Sustainability*, *10*(7), 2131. https://doi.org/10.3390/su10072131

Wei, G. X., Chen, X., & Qin, X. H. (2021a). Product greenness and pricing strategy of supply chain incorporating asymmetric heterogeneous preferences. *IEEE Access*, *9*, 11563–11584. https://doi.org/10.1109/ACCESS.2021.3050550

Wei, J., Govindan, K., Li, Y. J., & Zhao, J. (2015). Pricing and collecting decisions in a closed-loop supply chain with symmetric and asymmetric information. *Computers & Operations Research*, *54*, 257–265. https://doi.org/10.1016/j.cor.2013.11.021

Wei, J., Wang, Y., & Lu, J. (2021b). Information sharing and sales patterns choice in a supply chain with product's greening improvement. *Journal of Cleaner Production*, *278*, 123704. https://doi.org/10.1016/j.jclepro.2020.123704

Wu, T., & Kung, C. C. (2020). Carbon emissions, technology upgradation and financing risk of the green supply chain competition. *Technological Forecasting and Social Change*, *152*, 119884. https://doi.org/10.1016/j.techfore.2019.119884

Wu, K., Liu, M., & Xu, M. (2020a). Misreporting strategies and coordination with supplier's carbon emission reduction investment under different market powers. *Journal of Systems & Management*, *29*, 782–793.

Wu, T., Zhang, L. G., & Ge, T. (2019). Managing financing risk in capacity investment under green supply chain competition. *Technological Forecasting and Social Change*, *143*, 37–44. https://doi.org/10.1016/j.techfore.2019.03.005

Wu, Y., Zhang, K. F., & Xie, J. H. (2020b). Bad greenwashing, good greenwashing: Corporate social responsibility and information transparency. *Management Science*, *66*(7), 3095–3112. https://doi.org/10.1287/mnsc.2019.3340

Xia, J., & Niu, W. J. (2020). Pushing carbon footprint reduction along environment with carbon-reducing information asymmetry. *Journal of Cleaner Production*, *249*, 119376. https://doi.org/10.1016/j.jclepro.2019.119376

Xia, J., & Niu, W. (2021). Carbon-reducing contract design for a supply chain with environmental responsibility under asymmetric information. *Omega-International Journal of Management Science*, *102*, 102390. https://doi.org/10.1016/j.omega.2020.102390

Xu, Z. T., Elomri, A., Pokharel, S., & Mutlu, F. (2019). The design of green supply chains under carbon policies: A literature review of quantitative models. *Sustainability*, *11*(11), 3094. https://doi.org/10.3390/su11113094

Yalabik, B., & Fairchild, R. J. (2011). Customer, regulatory, and competitive pressure as drivers of environmental innovation. *International Journal of Production Economics*, *131*(2), 519–527. https://doi.org/10.1016/j.ijpe.2011.01.020

Yan, R. L., & Cao, Z. X. (2017). Product returns, asymmetric information, and firm performance. *International Journal of Production Economics*, *185*, 211–222. https://doi.org/10.1016/j.ijpe.2017.01.001

Yang, L., Ji, J. N., & Zheng, C. S. (2016). Impact of asymmetric carbon information on supply chain decisions under low-carbon policies. *Discrete Dynamics in Nature and Society*, *2016*, 1–16.

Yang, R., Tang, W. S., Dai, R., & Zhang, J. X. (2018). Contract design in reverse recycling supply chain with waste cooking oil under asymmetric cost information. *Journal of Cleaner Production*, *201*, 61–77. https://doi.org/10.1016/j.jclepro.2018.07.329

Yang, R., Tang, W. S., & Zhang, J. X. (2021). Implications of government subsidies for waste cooking oil considering asymmetric information. *Kybernetes*, *50*(2), 588–615. https://doi.org/10.1108/K-10-2019-0708

Yin, S., Nishi, T., & Zhang, G. (2016). A game theoretic model for coordination of single manufacturer and multiple suppliers with quality variations under uncertain demands. *International Journal of Systems Science: Operations & Logistics*, *3*(2), 79–91. https://doi.org/10.1080/23302674.2015.1050079

Yu, M., & Cao, E. B. (2019). Strategic information sharing and competition under cap-and-trade regulation. *Industrial Management & Data Systems*, *119*(3), 639–655. https://doi.org/10.1108/IMDS-03-2018-0124

Yu, M., & Cao, E. B. (2020). Information sharing format and carbon emission abatement in a supply chain with competition. *International Journal of Production Research*, *58*(22), 6775–6790. https://doi.org/10.1080/00207543.2019.1685704

Yu, M., & Li, T. (2018). Information sharing in a supply chain under cap-and-trade regulation. *Mathematical Problems in Engineering*, *2018*, 1–18.

Yuan, X. G., Zhang, X. Q., & Zhang, D. L. (2020). Research on the dynamics game model in a green supply chain: Government subsidy strategies under the retailer's selling effort level. *Complexity*, *2020*, 1–15.

Zhang, X. Q., Su, Y. S., & Yuan, X. G. (2018). Government reward-penalty mechanism in closed-loop supply chain based on dynamics game theory. *Discrete Dynamics in Nature and Society*, *2018*, 1–10.

Zhang, Y. H., & Wang, Y. (2017). The impact of government incentive on the two competing supply chains under the perspective of corporation social responsibility: A case study of photovoltaic industry. *Journal of Cleaner Production*, *154*, 102–113. https://doi.org/10.1016/j.jclepro.2017.03.127

Zhang, Y. H., & Wang, Y. (2019). Supply chain decisions considering heterogeneous consumer greenness preference and reservation utilities. *International Journal of Information Systems and Supply Chain Management*, *12*(1), 1–21. https://doi.org/10.4018/IJISSCM.2019010101

Zhang, P., & Xiong, Z. K. (2017). Information sharing in a closed-loop supply chain with asymmetric demand forecasts. *Mathematical Problems in Engineering*, *2017*, 1–12.

Zhang, P., Xiong, Y., Xiong, Z. K., & Yan, W. (2014). Designing contracts for a closed-loop supply chain under information asymmetry. *Operations Research Letters*, *42*(2), 150–155. https://doi.org/10.1016/j.orl.2014.01.004

Zhang, P., Xiong, Y., & Zhou, Y. (2021). The dark sides of environmental requirement in a supply chain with information asymmetry. *Computers & Industrial Engineering*, *153*, 107087. https://doi.org/10.1016/j.cie.2020.107087

Zhang, H. M., Xu, Z. D., Zhou, D. Q., & Cao, J. (2017). Waste cooking oil-to-energy under incomplete information: Identifying policy options through an evolutionary game. *Applied Energy*, *185*, 547–555. https://doi.org/10.1016/j.apenergy.2016.10.133

Zhang, X. Q., Yuan, X. G., & Zhang, D. L. (2020). Research on closed-loop supply chain with competing retailers under government reward-penalty mechanism and asymmetric information. *Discrete Dynamics in Nature and Society*, *2020*, 1–20.

Zhao, L. M., & Chen, Y. Q. (2019). Optimal subsidies for green products: A maximal policy benefit perspective. *Symmetry*, *11*(1), 63. https://doi.org/10.3390/sym11010063

Zhao, J., Wei, J., & Sun, X. C. (2017). Coordination of fuzzy closed-loop supply chain with price dependent demand under symmetric and asymmetric information conditions. *Annals of Operations Research*, *257*(1-2), 469–489. https://doi.org/10.1007/s10479-016-2123-6

Zheng, B. R., Yang, C., Yang, J., & Zhang, M. (2017). Pricing, collecting and contract design in a reverse supply chain with incomplete information. *Computers & Industrial Engineering*, *111*, 109–122. https://doi.org/10.1016/j.cie.2017.07.004

Zhou, Q., Li, Q., Hu, X., Yang, W., & Chen, W. (2021a). Optimal contract design problem considering the retailer's fairness concern with asymmetric demand information. *Journal of Cleaner Production*, *287*, 125407. https://doi.org/10.1016/j.jclepro.2020.125407

Zhou, X. Y., Li, T. C., & Ma, X. Q. (2021b). A bibliometric analysis of comparative research on the evolution of international and Chinese green supply chain research hotspots and frontiers. *Environmental Science and Pollution Research*, *28*(6), 6302–6323. https://doi.org/10.1007/s11356-020-11947-x

Zhu, X. D., & Yu, L. F. (2019). Screening contract excitation models involving closed-loop supply chains under asymmetric information games: A case study with new energy vehicle power battery. *Applied Sciences*, *9*(1), 146. https://doi.org/10.3390/app9010146