

Behavioral operations management and supply chain coordination mechanisms: a systematic review and classification of the literature

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Abstract

Purpose – The recent surge in behavioral studies on the coordination mechanisms in supply chains (SCs) and advanced methods highlights the role of SC coordination (SCC) and behavioral issues associated with improving the performance of the operations. This study aims to critically review the behavioral aspect of channel coordination mechanisms.

Design/methodology/approach – Following a systematic literature review methodology, the authors adopt a combination of bibliometric (to reflect the current state of the field), content (using Leximancer data mining software to develop thematic maps) and theory-oriented qualitative analyzes that provide a holistic conceptual framework to unify the literature's critical concepts.

Findings – The analysis confirms the plethora of risk-oriented publications, demonstrating that the second largest category of studies is concerned with social preferences theory. Most studies were based on experiments, followed by analytical modeling, revealing the impact of heuristics and individual preferences in SC decisions and suggesting promising managerial and theoretical avenues for future research.

Originality/value – The study sheds light on behavioral decision theories applied to SC coordination by categorizing the literature based on the adopted theories. The methodological contributions include using automated content analysis and validating the outcome by interviewing leading scholars conducting active research on "behavioral operations management and SC contracts." The authors also propose several directions for future research based on the research gaps.

Keywords Supply chain coordination, Behavioral operations management, Supply chain contracts, Behavioral decision theories, Systematic literature review, Operations management, decision-making, Supply-chain management, Coordination

Paper type Literature review

1. Introduction

Improvement in the supply chain (SC) performance relies heavily on the efficiency of SC member interactions (Cachon, 2003; Tang, 2006; Davis *et al.*, 2014; Choi, 2015) and the intensification of globalization, has led to multiplied interactions/transactions among firms across the world. With well-established coordinating policies, agents order close to optimal quantities, enhancing performance (Choi *et al.*, 2008). Yet, conflicts arise (e.g. misaligned incentives, imperfect information and self-serving behaviors by SC players), emphasizing the need to deploy coordination mechanisms to deliver robust performance. Reconciling theoretical rationale assumptions with real-world human behaviors is the driving force that has shaped a new trend in operations management (OM) and behavioral operations management (BOM). The latter aims to study the impact of potentially "non-hyper-rational" human decisions in operations and SC management to enhance the operating systems (Gino and Pisano, 2008). A variety of behavioral factors have been investigated and their impact tested under various operational themes in BOM studies, using a range of methods

(Bendoly *et al.*, 2006; Gans and Croson, 2008; Schorsch *et al.*, 2017; Fahimnia *et al.*, 2019).

Early primary research on BOM investigated the impact of human behaviors in the OM discipline as an emerging field (Donohue *et al.*, 2018) and literature reviews broadly reflected on the scope and history of the field (Schorsch *et al.*, 2017; Fahimnia *et al.*, 2019). Although these reviews drew upon human factors in different operational contexts, SC coordination mechanisms (SCCM) was only one of the reviewed topics in their studies and no exclusive analysis has been conducted to systematically explore this field. While two recent literature reviews (Arvan *et al.*, 2019; Perera *et al.*, 2019) explored BOM in a more granular fashion in fields other than SCCM (e.g. forecasting), three prior literature reviews on SCCM focused on operational aspects, without exploring the behavioral aspects. Arshinder *et al.* (2011) studied the theoretical aspects of SCC; Li and Wang (2007) solely investigated the SCCM and the models used to improve SC

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Supply Chain Management: An International Journal
28/1 (2023) 140–161
© Emerald Publishing Limited [ISSN 1359-8546]
[DOI 10.1108/SCM-03-2021-0111]

In conducting this review, we received feedback on the Leximancer conceptual map from several scholars in the field—including professors Suresh Sethi, Andrew Davis, Tsan-Ming Choi, Shaofu Du, and Edwin Cheng—whom we would like to thank for their invaluable contributions to this study. We also thank the two anonymous reviewers and the editor for their careful reading and insightful comments/suggestions that helped improve this manuscript.

Received 6 March 2021

Revised 18 June 2021

4 September 2021

Accepted 7 September 2021

performance considering demand and governance decision structure and [Chauhan and Singh \(2018\)](#) focused on coordination in green SC; yet, none examined the behavioral aspects of SCCM. We aim to exclusively investigate influential human factors in the decision-making process to reveal the critical points related to the integration of human factors into SCCM, as presented in the literature.

Therefore, the objective of this systematic literature review (SLR) is to focus on the intersection of BOM with SCCM. We adopt a combination of bibliometric (to reflect the current position of the field), content (to develop thematic maps representing the literature corpus) and theory-oriented qualitative analyzes. The content analysis is followed by a *post hoc* assessment, for which we contacted the top nine leading experts in the field to evaluate the accuracy of the developed conceptual map. This combination of different approaches revealed latent concepts and research gaps. Our study makes three main contributions:

- 1 It interprets behavioral decision theories and their use in the SCCM context by categorizing the literature based on the adopted theories.
- 2 It identifies literature gaps in the applied behavioral theories, less-addressed behavioral aspects and potential real-world issues to provide future research directions.
- 3 Methodologically, it reveals the use of automated content analysis to develop text-to-data metrics to analyze our literature corpus and support our traditional qualitative analysis; we validated our automated content analysis by interviewing leading scholars conducting active research in the field of “behavioral operations management and supply chain contracts.”

The remainder of the paper is organized as follows. Section 2 explains the review methodology. Section 3 analyzes the data via the following three subsections – 3.1, the current state of the research literature using bibliometric analysis; 3.2, the results of content analysis and a discussion about research domain clusters identified by *Leximancer*; 3.3, a conceptual framework along with a theory-oriented classification of the literature. Finally, we conclude the paper in Section 4 by highlighting research gaps and addressing potential research avenues.

2. Review methodology

In this study, we applied the SLR methodology to capture all the relevant papers related to SCCM associated with BOM. SLR is an efficient and rigorous method of selecting and analyzing a corpus of literature and investigating potential research gaps. It can offer new insights or identify further advancements in primary studies, create new knowledge and allow for replication by synthesizing the current evidence ([Durach et al., 2017](#)).

Despite several guidelines on conducting SLRs, [Durach et al. \(2017\)](#) drew upon key SLR publications ([Denyer and Tranfield, 2009](#)) and proposed the following stages to reflect the ontological and epistemological idiosyncrasies of supply chain management (SCM):

- identifying the research objectives and crafting inclusion/exclusion criteria;
- identifying the data sources, selection criteria and keywords relevant to the study;
- applying the inclusion/exclusion criteria and refining the body of literature by filtering studies; and

- synthesizing the literature, conducting qualitative and quantitative analysis on data produced from the literature and reporting the results.

2.1 Research objectives

Following the proposed framework by [Durach et al. \(2017\)](#), we started by defining the review purpose, adopting the BOM lens on coordination mechanisms in SC contracting. The behavioral perspective has been increasingly incorporated in various operational contexts such as service operations ([Shunko et al., 2018](#)), project management ([Kwon et al., 2010](#); [Lippman et al., 2013](#); [Palit and Brint, 2020](#)), revenue management ([Kremer et al., 2017](#)), procurement and auction ([Leider and Lovejoy, 2016](#)) and trust in collaboration ([Brinkhoff et al., 2015](#)). Among all 12 operations fields categorized by [Fahimnia et al. \(2019\)](#), several manuscripts addressed SC issues (such as contracting and supplier-buyer relationships); thus, conducting a dedicated literature review in this field is worthwhile. We limited the scope of our research to the individual unit of analysis, rather than the firm level. For a comprehensive review of overcoming coordination issues related to organizational level in SC projects, the reader is referred to [Favilla and Fearn \(2005\)](#).

The research objectives of this SLR are to:

- analyze and synthesize the extant literature on BOM and SCC in contracting and supplier-buyer relationships;
- provide a bibliometric analysis;
- identify core behavioral theories and assess trends in behavioral SCCM developed over the years; and
- identify limitations and current research gaps.

2.2 Identifying relevant data sources

The analysis of SLRs in an SCM-related discipline revealed 1 to 9 databases (median = 2) that were used to extract articles ([Carter and Washipack, 2018](#)). To capture the most relevant articles, we used a search process with broad coverage across 10 databases: *Scopus*, *ABI/INFORM Complete (ProQuest)*, *Taylor and Francis Online*, *Wiley Online Library*, *Emerald Plus*, *EBSCOhost*, *Web of Knowledge*, *Springer Link*, *SAGE* and *Science Direct journals*. Search results were restricted to peer-reviewed English language publications from top-tier journals (Scimago Quartile 1). The search fields included: *title*, *abstract* and *keywords* provided by the authors.

Designing a relevant and comprehensive set of keywords is key to the quality of the SLR. Search strings should be based on research objectives and inclusion/exclusion criteria ([Durach et al., 2017](#)). To fulfill this requirement, we enriched the set of keywords over three rounds by reviewing the contents of the obtained results and adding alternative keywords to the evolving library in each round. We constituted a series of search strings and Boolean operators (e.g. AND and OR) to extract relevant articles related to the intersection between BOM and SCC in contracting and supplier-buyer relationships (see [Table A1](#) in the Appendix). The first search round included broad behavioral operations and SCC terms that yielded 37 articles:

Round 1: supply chain coordination, channel coordination AND behavioral/behavioral operations.

To access the targeted articles with a higher precision rate, a preliminary examination of the first search round's findings was

conducted by reading a dozen articles. This helped us realize that salient methodologies (e.g. experiment) and commonly studied theories in this context (e.g. *bounded rationality*) could also represent the initially targeted keywords (e.g. SCC and BOM). We also included various forms of our initial keywords (e.g. behavior and behavioral), which yielded 252 articles in total. The search strings were as follows:

Round 2: supply chain coordination, channel coordination, collaboration, cooperation AND behavior/behavior, behavioral/behavioral [supply management, economics, experiment, supply], experiment, laboratory, risk/loss averse/seek, fairness, anchoring, bounded rationality, bias, reference dependence.

In the final step, we honed down the set of keywords by including a list of similar terminologies and words that could address the key phrase “supply chain coordination” (e.g. contract, information-sharing, bullwhip as in bullwhip effect). We extracted 569 articles after performing the last search round with the new strings:

Round 3: information/information-sharing, knowledge/knowledge-sharing, information technology, sharing benefits, joint decision-making, bullwhip, align, contract AND behavioral/behavioral [operations, supply management, economics, experiment, supply], experiment, laboratory, risk/loss averse/seek, fairness, anchoring, bounded rationality, bias, reference dependence AND supply chain.

2.3 Refinement of relevant studies

To shape the final corpus of literature, each paper was independently reviewed by the authors. The appraisal criteria for an eligible paper to be included in the SCCM literature pool was as follows:

- The main idea of the paper had to be grounded in behavioral operations; and

- The research questions and findings had to be relevant to SCCM.

For the first criterion, we included articles delineating that:

- a behavioral perspective is incorporated in the research; and
- the discipline relates to SC and OM. For the second criterion, we considered articles within SCM including “contracting” and “supplier-buyer relationships.”

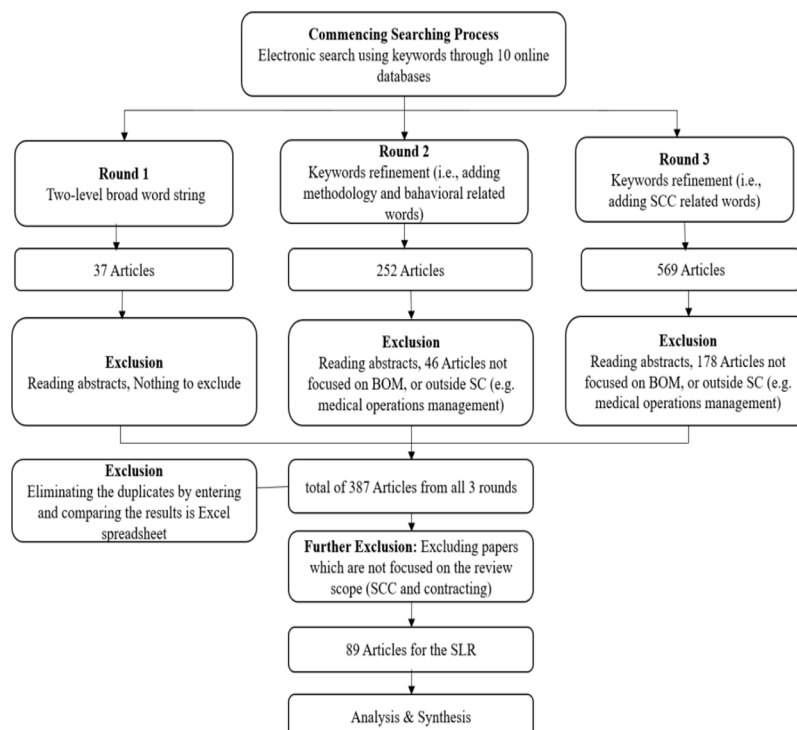
Authors’ contrasting opinions were jointly discussed as a team until a consensus was reached. After excluding irrelevant papers and eliminating duplicates, 89 journal articles remained (a complete list of the final article pool is in [Table A3](#) of the [Appendix](#)). [Figure 1](#) illustrates the document collection process for the SLR.

From all the search rounds, we observed that the most relevant papers were found in two databases, *Scopus* and *Web of Knowledge*, confirming a finding previously presented in SCM/BOM SLRs ([Fahimnia et al., 2015](#); [Fahimnia et al., 2019](#)). *SAGE* and *Springer Link* journals included the fewest articles in this review field. The search process was completed on October 6, 9 and 11, 2019. To ensure the reliability of the search process, it was repeated on October 16 and 17, 2019. As the acquisition of new publications is a common process in databases, an alert was set for all search terms in all the databases two months from the initial search date to cover a whole year.

3. Data statistics

To understand the research trends, the final paper pool was analyzed in terms of the contributing journals and institutes, publication year and key researchers.

Figure 1 Collection and appraisal process



3.1 Descriptive results

The analysis of the number of publications indicates a surge in this topic in the past six years: the number of annual publications peaked in 2014 (13), then declined and then rose again in 2018 (13), showing that the BOM context *vis-à-vis* SCCM was attracting scholars' attention. Publications from 2014 to 2019 represent about 67% of the papers related to the scope of this study (see [Figure A1](#) in the [Appendix](#)).

The highest number of papers were published in *Production and Operations Management* (18), *European Journal of Operational Research* (14), *Management Science* (12) and *International Journal of Production Economics* (12). Although the articles were published in 21 journals, only half of the journals published more than one paper in this field. The time dimension analysis of publications shows a substantial contribution of two journals – *Production and Operations Management* and *Management Science* – in supporting the field in the seminal years of the emergence of this topic (2003–2014). However, publications within other disciplinary outlets such as *Computers and Industrial Engineering* and the *Journal of Cleaner Production*, demonstrate the importance of behavioral SCC in new fields of study in recent years.

The frequency analysis highlighted the following key contributing authors: Tsan-Ming Choi (13), Elena Katok (10) Andrew M. Davis (6), Karen Donohue and Suresh P. Sethi (5), Edwin Cheng, Shaofu Du, Tengfei Nie and Dian Wu (4 each). The most prolific pair of authors are Karen Donohue and Rachel Croson, as well as Shaofu Du and Tengfei Nie, with three shared publications.

Institutional affiliation and the country where the institute is located were also analyzed. Affiliation analysis does not double count authors from the same institute and only considers one paper toward the total of a given institution. The leading contributing organizations were *The Hong Kong Polytechnic University* and *The University of Texas at Dallas* with 13 and 12 papers, respectively. They were followed by *Penn State University*, with eight and the *University of Minnesota*, with six, publications. Another classification was based on the country of origin of the contributing organizations, with the USA (54), China (21), Hong Kong (19), Germany (6) and France (4) being the top five ranked countries. The US had the greatest proportion of US-only affiliations, with 35 out of the 89 studies. Statistics show that several papers are produced through national collaboration, with only 30 of the extracted studies being international collaborations. The USA and China have the most international collaborations, contributing 19 and 15 studies, respectively. Receiving academic qualifications from US universities, collaborating with scholars from English-speaking countries and boosting networks for newly qualified researchers (including experienced scholars) are some reasons for international collaborations. However, additional exploration and research are required to confirm these surmises.

Our analysis of the papers' authorship confirms that only about 7% of the articles are sole-authored. This is consistent with the authorship trend in the broad field of OM ([Koufteros et al., 2021](#)). Many studies (62%) are conducted with three or more authors (maximum of five authors); the average number of authors per paper is 2.74 and the average number of unique institutions per paper is 2.01. This shows the attention scholars

pay to social networks that create information, expertise and resource synergy.

We also analyzed the Google Scholar citation index of the papers, discovering that the average citation of the corpus of literature is 104.11, with averages of 121.5 and 110.8 of analytical modeling and experimental studies, respectively. The top four cited papers are [Cui et al. \(2007\)](#), [Croson and Donohue \(2006\)](#), [Gan et al. \(2005\)](#) and [Gan et al. \(2004\)](#). However, the citation analysis should be carefully considered, given that earlier publications have more time to develop the citation than do recent articles. We also analyzed the journals' productivity based on the total citations of their publications and the h-index ([Cronin and Meho, 2006](#); [Coombes and Nicholson, 2013](#)). *Production and Operations Management*, *European Journal of Operational Research*, *Management Science* and *International Journal of Production Economics* had the highest h-indices of 14, 12, 12 and 11, respectively (see [Table A2](#) in the [Appendix](#)).

3.2 Literature content clusters

The use of the content analysis method to visualize the essence of a stack of documents is common, with some studies using “word clouds” to depict dominant concepts in the literature ([Fahimnia et al., 2019](#)). Studies show that conducting SLRs is a costly mechanism involving significant manual effort; consequently, researchers have called for investigating automated solutions ([Michelson and Reuter, 2019](#)). A computer-assisted qualitative data analysis (CAQDA) automated tool (*Leximancer*) was applied to facilitate the identification of sub-streams in a paper pool.

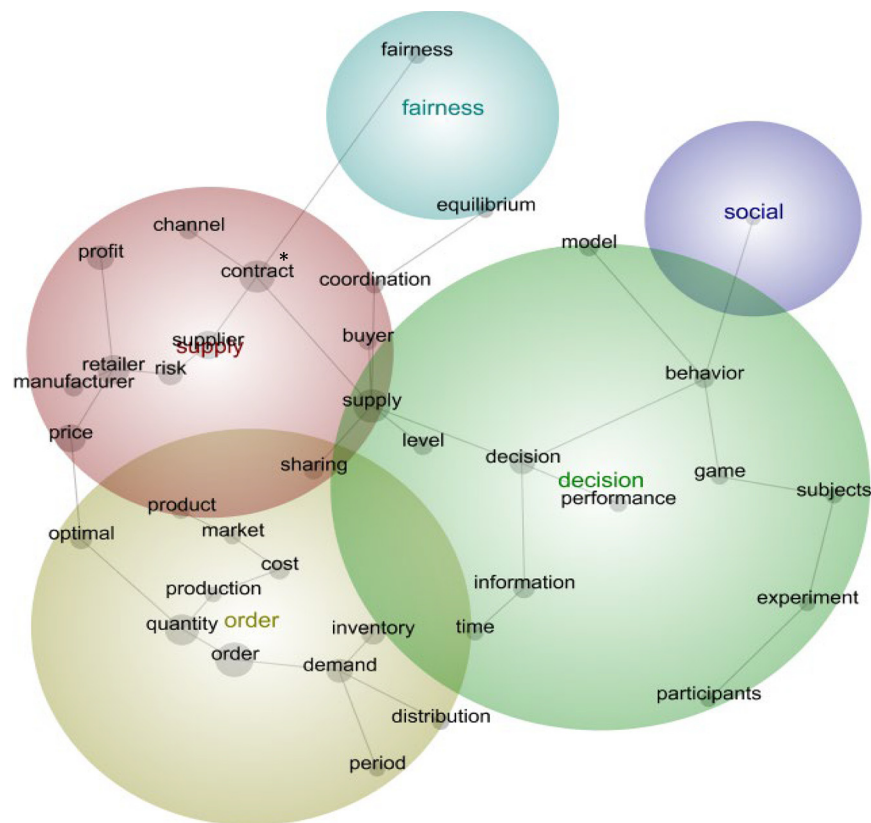
We used the rigorous text mining software *Leximancer* that follows natural language processing algorithms to extract common ideas in the text, allowing scholars to mitigate the issues of sample size, duration of analysis and possible biases. Compared to other CAQDA tools such as *NVivo*, *Leximancer* provides a wider range of “potentially useful keywords,” avoiding a narrow focus on specific anecdotal evidence ([Sotiriadou et al., 2014](#), p. 229).

By iteratively analyzing word frequencies and their relationships (applying a machine-learning protocol), *Leximancer* produces a conceptual map. The visual presentation is akin to a heat-map that portrays color-coded themes with smaller grey dots as nested concepts within the dominant theme ([Leximancer, 2018](#)). This rendering occurs when another keyword is frequently used in close proximity to a major theme. The circle size indicates the number of clustered concepts and the proximity of circles and concepts showcases the strength of semantic relationships (i.e. distant circles for weak semantic relationships). To mitigate the impact of repetitive text in the analysis, a two-stage process was applied, which involved excluding meaningless or irrelevant words (e.g. figure and table) and compounding variations of terms (e.g. supplier/suppliers); and deleting the abstracts, keywords and references of articles because they simply reword and summarize the content or include information on other sources.

3.2.1 Primary content analysis observations

The *Leximancer* conceptual map ([Figure 2](#)) suggests that contract parties (i.e. *buyer*, *supplier*, *retailer* and *manufacturer*) are frequently nested concepts in the *supply* theme (in red).

Figure 2 Conceptual map



Note: *Including push and pull contracts

The connections between “manufacturer, retailer, contract,” and “retailer, supplier, contract” show that dyadic relationships are a popular type of SC structure. *Sharing* is a highly ranked concept at the intersection of *supply* and *order* themes. By following the spanning tree, we arrive at the word combinations *information sharing* and *cost-sharing*, which suggest that the purpose of using *contracts* is for *sharing* the conflict issues, balancing the *profit* share and coordinating the *channel*. Similarly, the presence of *risk* delineates the role of *contracts* in *sharing* the *risk*, which stems from the lack of *information* about *production cost* and *demand distribution* (connected concepts). This concept can also address a “revenue-sharing” contract. Despite several contracts studied in the literature, our qualitative analysis shows that the focus was primarily on price-only, buyback and revenue-sharing contracts, given their widespread use and the simplicity of modeling. Notably, *push* contracts (in which the upstream party pushes the product to a downstream party) are the most common type (Cachon, 2003). They are most prevalent in SCs that are strategically designed to support cost efficiency (at the expense of flexibility) and “build-to-stock” strategy (upstream of the *push-pull* boundary in most SCs). However, few studies analyzed *pull* contracts, where the upstream agent holds the inventory and incurs the cost of unsold goods (Davis, 2015; Davis et al., 2014; Yang et al., 2018). *Pull* contracts are most prevalent in SCs that are strategically designed to support flexibility (at the expense of cost minimization) and a “build-to-order” strategy.

Making the *price* and *order quantity optimal*, enhances the performance of SC. The conceptual map also shows that *risk* is directly connected to the *retailer*, suggesting two approaches:

- 1 emphasis on the *risk* attitude of the retailer, as a behavioral implication; and
- 2 *risk-taking* of the retailer, as a result of contract structure (e.g. taking the inventory risk).

Following the pathways between nested concepts in themes shows that when moving from *supply* to *decision* (green theme), the focus of studies is on *supply chain decisions* while analyzing *behaviors* through *games*. Connected dots within the *decision* theme indicate the role of *behavior* in the decision-making process. Regarding BOM, the presence of *behavior* and its impact on *performance* is identified as an expected driver. An explanation for the impact of *information* on the decision-making process is the imperfect/asymmetric nature of the *information*. This shows that besides misaligned incentives, achieving coordination among SC members despite imperfect information needs to be considered. The connection between *time*, *information*, *decision* and *performance* implies that *time* and *information* are key drivers of *decision performance* (i.e. the ability to make optimal decisions). The conceptual map reflects the wide utilization of *game theory* to investigate *performance* via *experiments* in this theme.

The connection between *behavior* and *experiment* suggests that methodologies were designed to assess human behavior. The literature analysis confirms that most studies adopted

experiments as a part of their modeling toolkit (49%), followed by analytical approaches (mathematical optimization, 38%) and mixed methods (13%). The utilization of analytical modeling grew remarkably in 2018 and 2019, with 46% and 50% of studies using this method, respectively. Yet, acknowledging the inherent limitations of mathematical and analytical models, some scholars have taken advantage of interviews combined with experiments or analytical modeling to draw richer conclusions. The mixed-method category comprises several combinations: analytical modeling and experiment (6%), analytical modeling and sensitivity analysis (3%), analytical modeling and numerical experiment (2%), analytical modeling and interview (1%) and experiment and interview (1%) (see [Figure A2](#) in the [Appendix](#)).

The third key theme, *order* (in yellow), is connected to *quantity*, which reflects the focus of the literature on determining the *optimal order quantity*. A component that influences decision-making about *optimal order quantity* is the wholesale *price* (edge of *supply* theme). The lower part of this pathway within the *order* theme illustrates that *demand distribution* and *inventory* are two components that influence decision-making about *order quantity*. The pathways between *order* and *supply* themes reveal that the *retailer's profit* is mostly determined by *decisions* that attempt to achieve the *optimal order quantity*. Concepts connected to *quantity* delineate the role of *production cost*, *product type* and *market strategies*.

The fourth key theme, *social* (in purple), is connected to *decision* through *behavior* (as a concept). *Leximancer* queries indicate that the *social* theme primarily addresses *social preferences* as the most studied aspects affecting the *decision*. The connection between *coordination* and *equilibrium* shows that the goal of this concept pairing is achieving *equilibrium* in a *supply chain*.

The last highlighted theme, *fairness* (in blue) draws attention to the concept of *equilibrium*. This may suggest that a Nash *equilibrium* point is considered a “fair” solution to the problem of channel *coordination*. The pathway between *fairness* and *contract* themes indicates the impact of *fairness* on *channel profit*.

3.2.2 Checking the accuracy of the Leximancer map

We approached top contributing authors in this field for their views on how accurately the conceptual map reflects the research field. To improve engagement and for a specific understanding of *Leximancer's* performance, we provided these scholars with personalized conceptual maps of their studies and received their comments through online meetings and written feedback. The result of five scholars' feedback shows that they agreed that both conceptual maps captured the critical concepts (see [Table A4](#) in the [Appendix](#)). They suggested that some terms, namely, *retailer*, *agents* and *seller*, could be represented in other ways. However, they contended that the connection between *retailer* and *supplier* is informative, as it reflects the commonly used SC structure in the literature (i.e. dyadic SC). The other common feedback referred to the absence of some concepts such as *double marginalization* and *prospect theory*. However, the *query* function of *Leximancer* showed that these hidden terms are nested in other concepts. Besides, some concepts are addressed along with their components (e.g. risk attitudes represent prospect theory).

3.3 Theoretical and behavioral classifiers

To develop a more detailed understanding of coordination mechanisms that is consistent with the content analysis, which shows that the largest theme is a *decision* ([Figure 2](#)), we further split the corpus of papers into schools of thought and theories. The behavioral SCCM literature reflects two categories of behavioral approaches:

- 1 diverse preferences of decision-makers; and
- 2 decision heuristics.

The “bucket” of diverse preferences captures details regarding the attributes that decision-makers care about such as loss-aversion, risk-aversion and social preferences. Heuristics capture items such as anchoring, reference dependence and bounded rationality. The SLR conducted by [Kwon and Silva \(2020\)](#) on behavioral theories suggests that prospect theory ([Tversky and Kahneman, 1974](#)) and the theory of bounded rationality ([Simon, 1972](#)) appear in the literature more often than do other theories.

Our analysis confirms that prospect theory (40%) is the most dominant, followed by social preference theory (29%) and anchoring/reference dependence (22%). Bounded rationality (13%), mental accounting (2%) and others (2%) constitute the remaining proportion of categories (see [Figure A3](#) in the [Appendix](#)).

Our analysis shows that the research on *social preferences* grew from 17% between 2003 and 2013 to 35% of all publications between 2014 and 2019. Research on prospect theory (i.e. risk-aversion and loss-aversion) has undergone a small decline from 48% in the early years (between 2003 and 2013) to 37% between 2014 and 2019. The trend of studies on other behavioral biases remained steady over the reviewed years. Our finding indicated that “social preferences” is the broadest domain in BOM studies.

These theories have been tested in different settings, highlighting four driving factors affecting decision-maker perceptions: contractual (e.g. complexity and level of risk-sharing), environmental (e.g. demand fluctuation or supply disruptions), structural (e.g. competition in SC and long-term relationships) and individual (heterogeneity in circumstances and preferences) factors. They influence the decision-making process and the channel ends up deviating from theoretical predictions in terms of actual outcomes. Based on this analysis, a conceptual framework is illustrated in [Appendix \(Figure A4\)](#).

3.3.1 Diverse preferences

3.3.1.1 Prospect theory. Prospect theory not only explains how individual risk attitude depends on the decision context ([Tversky and Kahneman, 1974](#)) but also shows that people exhibit different preferences, systematically deviating from rational predictions. The notions underpinning prospect theory are *reference dependence* – which discusses the utility perception of the distance from a reference point, rather than the absolute utility of outcomes – and *likelihood dependence* – which refers to non-linear probability distortion by decision-makers. Achieving channel coordination is negatively impacted if the risk sensitivity of SC members is not considered in contractual settings because of the propensity of ordering less than the optimal level ([Chiu et al., 2011](#); [Wu et al., 2010](#); [Xu et al., 2014](#); [Avinadav et al., 2015a, 2015b](#)). Consequently, some studies designed contracts incorporating the risk attitudes of SC parties

(Zhao and Zhu, 2018; Lu *et al.*, 2019). Including coordinating policies will enhance channel performance by inducing risk-averse agents to order close to the optimal quantity. Some of the proposed policies are coupling contracts with a coordinating return policy (Gan *et al.*, 2005; Choi *et al.*, 2008) and two-way revenue sharing (i.e. a traditional revenue-sharing contract with a reverse one) (Xu *et al.*, 2014). Ohmura and Matsuo (2016) found that, in a dyadic SC, if both agents, manufacturer and retailer, are highly risk-averse, a full-return policy is preferred over a no-return one.

The literature demonstrates that an amalgamation of SC members' risk-aversion with non-contractual conditions (e.g. cost uncertainty and product margin) may influence channel efficiency (Chow *et al.*, 2014; Zhao *et al.*, 2017; Wuttke *et al.*, 2018).

Besides, the level of risk-aversion impacts contract performance by increasing the order quantity in a *push* more than in a *pull* contract (Davis *et al.*, 2014; Yang *et al.*, 2018). Choi *et al.* (2008) indicated that a channel can be more efficiently coordinated if agents display a similar level of risk preferences, while Wang *et al.* (2017) showed that contract coordination can be affected by private information regarding the retailer's risk-aversion and the manufacturer's production cost. Studies indicate that channel coordination is likely to be achieved if the least risk-averse agent takes the channel risk (Gan *et al.*, 2004, 2005; Chen *et al.*, 2014; Choi *et al.*, 2018). Wei and Choi (2010) showed that the retailer can gain better profit by exhibiting a less risk-averse attitude, as the manufacturer offers a lower wholesale price. Conversely, a more risk-averse retailer makes the manufacturer demand a higher wholesale price (Choi *et al.*, 2018, 2019). Shen *et al.* (2013) showed that the retailer will receive a higher optimal markdown offer when the supplier is less risk-averse.

SC agents may demonstrate different aversion attitudes toward the cost of leftovers and stock-out costs, with a greater perception of loss attributed to the former (Becker-Peth *et al.*, 2013). Overweighting losses cause ordering bias and order inflation (Shen *et al.*, 2011; Becker-Peth *et al.*, 2013), demonstrating that loss-aversion and loss-averse mitigating provisions should be considered in contract design (Wang and Webster, 2007; Villa and Castañeda, 2018). Moreover, SC agents view other contract elements, besides overstock or shortfalls such as fixed fees, bonuses or payback amounts, as losses (Wang and Webster, 2007; Katok and Wu, 2009; Shen *et al.*, 2011; Davis *et al.*, 2014; Davis, 2015). Villa and Castañeda (2018) showed that although participants exhibit aversion to the cost of leftovers, they also prefer leftovers to shortage (to avoid unsatisfied customers). Davis (2015) showed that although, theoretically, the coordinating contracts (service-level agreement or payback) outperform non-coordinating contracts (wholesale price), the increase in profit is significantly lower than the theoretical predictions because agents view the payment for the coordinating parameters as a loss.

Zhang *et al.* (2016) showed that, despite a mathematically equivalent performance (i.e. profit) of revenue-sharing and buyback contracts, a higher newsvendor critical ratio impacts loss perception; in these conditions, a revenue-sharing contract can outperform a buyback contract. The preference between these two contracts is also affected by market demand

(Katok and Wu, 2009), as a low-demand market induces the loss-averse retailer to select revenue-sharing contracts, while, for higher demands, a buyback contract is preferred. Under a simple wholesale price contract and in an environment with uncertain demand and spot purchase prices, a loss-averse manufacturer will order a larger quantity as the uncertainty increases (Shen *et al.*, 2011). Research demonstrates that in line with the theoretical prediction, a *pull* contract outperforms a *push* contract in terms of channel efficiency. However, the order quantity is far from the predictions, due to loss-aversion (Davis *et al.*, 2014).

3.3.1.2 Social preferences theory. One of the underlying theories in the BOM context is that of *social preferences*, which shows the intrinsic concern of SC members toward their counterparts' payoffs (Fehr and Fischbacher, 2002). Although it is believed that people pursue their self-interests, empirical results (Kahneman *et al.*, 1986) demonstrate sensitivity toward positive or negative inequity considerations. Social preferences act as much as economic motives, such that salient relationships lead to better collaboration and channel performance improvements (Loch and Wu, 2007; Kirshner and Shao, 2018). There are different types of social preferences:

- Preference for reciprocity refers to responding to the perceived behavior of a reference agent in the same way (exhibited regardless of retaliation or any exception for material gain in future interactions; Fehr and Fischbacher, 2002). Studies show that it can positively impact the SCC (Du *et al.*, 2014b; Katok *et al.*, 2014; Wu, 2013), while lack of reciprocity can be detrimental (Qin *et al.*, 2016). Regarding product quality, reciprocity between channel echelons can enhance relation-specific investment (Haruvy *et al.*, 2019). Croson *et al.* (2014) showed that uncertainty/lack of trust regarding the actions of other SC parties causes coordination risk, which leads to ordering oscillation and the bullwhip effect. Channel performance is also enhanced in a multi-period relationship and by repeated interactions due to reputation-building behaviors (Wu, 2013; Choi and Messinger, 2016). Davis and Hyndman (2018) suggested that relational incentives (the credible threat of future punishment, e.g. terminating the purchase) improve product quality and SC efficiency.
- Inequity aversion refers to the tendency of individuals to compare their status with other SC parties, particularly regarding payoffs (Bolton and Ockenfels, 2000). The driver of this behavior is "altruism" or "envy" when attempting to achieve an equitable distribution of payoffs. "Pure altruism" refers to kind behavior, irrespective of the received/perceived behavior. On the other hand, spiteful attitudes made participants value the payoff allocated to their counterparts negatively (Fehr and Fischbacher, 2002). The envious behavior may be translated into a willingness to reduce the counterpart's payoff even at a personal cost. As inequality aversion exists even in interactions between a human and a computerized SC member (Kalkanci *et al.*, 2014), studies suggest that SC contract designers should take into account fair outcomes, rather than structure SC contracts according to financial payoffs (Caliskan-Demirag *et al.*, 2010; Haruvy *et al.*, 2019). Distributional fairness examines the sensitivity of fairness-concerned agents toward their counterparts' profit

(Caliskan-Demirag *et al.*, 2010; Nie and Du, 2017). Johnsen *et al.* (2019) showed that knowing the suppliers' production costs provokes inequity aversion among retailers, who may use strategic inventory to increase their fair profit share and limit the suppliers' power by reducing the average price (Hartwig *et al.*, 2015). Studies show that an upstream party with incomplete information about the retailer's inequality aversion negatively impacts channel coordination (Katok and Pavlov, 2013). However, under a price contract, social preferences may lead to an equitable split of profit distribution due to the generosity of the supplier (Niederhoff and Kouvelis, 2016).

In addition, competition among peers in a horizontal SC level (e.g. multiple retailers/suppliers interacting with a counterpart agent) introduces peer-induced fairness, which can sometimes be even more significant than distributional inequity aversion. In other words, among two competitive retailers, the second is more concerned about the peer's payoff than of a counterpart's (supplier) (Ho *et al.*, 2014). However, Nie and Du (2017) demonstrated that under the quantity discount contract, the impact of distributional fairness is greater than that of peer-induced fairness on retailers' decisions. Chen *et al.* (2015) showed that although using a backup supplier can mitigate yield uncertainty, the backup supplier's horizontal fairness concern may negatively affect the manufacturer's profit.

Besides *self-centered fairness* (i.e. distributional and peer-induced fairness), there is *peer-regarding fairness* (Du *et al.*, 2018). A few studies investigated detailed layers of fairness concern. Cui *et al.* (2007) investigated two types – advantageous and disadvantageous – of inequality aversion. Du *et al.* (2018) posited that the two perspectives of peer-regarding fairness are sympathy (empathy for a peer's negative outcome) and *schadenfreude* (reveling in a peer's misfortune). If the retailer exhibits *schadenfreude* fairness, it could reduce the channel and the retailers' profit; but, showing strong sympathy fairness may increase the retailers' share of the channel surplus.

Researchers showed that different levels of fairness among SC members also influence channel performance. Agents' relatively high fairness concern obliges their counterparts to favor their claim (Du *et al.*, 2014a; Sharma *et al.*, 2019). Some studies designed contracts that are robust to fairness concerns, using different solutions such as higher profit differences between contract alternatives under a “menu of contracts” by the supplier (Voigt, 2015) or eliminating the disadvantage by equally distributing the minimum profit share rate (Chow *et al.*, 2015).

3.3.2 Heuristics

Decision heuristics represent an intuitive, rapid system (Shiloh *et al.*, 2002) that attempts to accelerate the decision-making process and make the judgment operation simpler (Tversky and Kahneman, 1974) by reducing the effort through:

- incorporating less information;
- testing fewer signals;
- testing fewer alternatives;
- simplifying the storage and retrieval of signal values; and
- simplifying the signals' weighting (Shah and Oppenheimer, 2008).

The underlying mental process of this category is reactive. A review of studies across various disciplines (Gigerenzer and Gaissmaier, 2011) indicated that using decision-making heuristics may be more accurate than using complex rational strategies. Cantor and Macdonald (2009) showed that under limited (local) information, abstract thinkers can outperform concrete thinkers. However, when exposed to system-wide information, both groups find it overwhelming and the difference in their performance is negligible. Studies show that the higher the cognitive profile of a decision-maker (i.e. tendency to allow “structured problem-solving processes to monitor an intuitive answer,”), the lower the order variability and bullwhip effect (Narayanan and Moritz, 2015, p. 1216). Grounded theories supporting these heuristics include bounded rationality, anchoring, reference dependence and mental accounting.

3.3.2.1 Bounded rationality theory. Bounded rationality refers to “making rational decisions within the limits of the available information and mental capabilities” (Simon, 1972, p. 162). It can be the result of complex, incomplete information about the alternatives, risk and uncertainty, which compound the cognitive burden. Consequently, when complexity increases, decision-makers rely more on heuristics and, as such, simple contracts can perform better in practice (Kalkanci *et al.*, 2011, 2014; Johnsen *et al.*, 2019). The level of uncertainty also amplifies the bounded rationality bias, which diminishes the supplier's decision-making efficiency (Katok and Pavlov, 2013). Ancarani *et al.* (2013) showed that the level of uncertainty (e.g. coupling two uncertainties such as lead time and demand) increases the ambiguity of decision-making; moreover, SC echelons hold less inventory in response to supply uncertainty. *Reinforcement* (i.e. inertia and favoring past decisions) and *memory biases* (i.e. short-sighted calculations influencing decision-making) are some of the reasons for this preference (Kalkanci *et al.*, 2011; Wu and Chen, 2014). Hartwig *et al.* (2015) demonstrated that a boundedly rational supplier prefers simpler contracts over nonlinear contract schemes due to the possible strategic risk of the retailer. Besides, bounded rationality increases the possibility of suboptimal decisions in setting contractual parameters, which leads to relatively poor SC performance (Katok and Pavlov, 2013; Qin *et al.*, 2016).

Bounded rationality's impact also manifests in channel coordination when information-sharing is used as a risk mitigation strategy to alleviate the bullwhip effect (Tang, 2006). Despite the presence of rich information and relaxing/controlling all the operational causes of the bullwhip effect, this phenomenon still exists, causing decision-makers to depart from optimal order quantity (Croson and Donohue, 2006; Zhao and Zhao, 2015). SC owners need to be careful about sharing information, as overloading decision-makers with information may lead to poor performance (Steckel *et al.*, 2004; Cantor and Macdonald, 2009; Tokar *et al.*, 2012). Although sharing point-of-sale information alleviates the bullwhip effect in a stable demand setting by reducing the order oscillation in environments with more dynamic demand, particularly at the channel's higher echelons (Steckel *et al.*, 2004), it can dampen the channel efficiency (Croson and Donohue, 2003). They suggested that under a non-stationary demand setting, providing additional information may bias the demand

estimation of upstream parties. Kalakbandi (2018) demonstrated that under- or over-reporting costs in revenue-sharing or buyback contracts, respectively, increases the value of these contracts. Currently, the impact of obtaining information through social media has become significant. In a fashion quick response program, the value of quick response has been affected by social media comments and moderated by the attitude of the agents (optimistic, pessimistic or neutral) about the future market demand of the product (Choi, 2015).

Experimental studies suggest that the gain of SC parties (i.e. downstream vs upstream) from sharing information is not necessarily equal (Croson and Donohue, 2006; Sarkar and Kumar, 2015). Sharing disruption information of a downstream echelon does not significantly improve the SC performance (Sarkar and Kumar, 2015), however, sharing inventory information helps upstream echelons to anticipate the demand fluctuations in downstream echelons (Croson and Donohue, 2006).

Haines *et al.* (2017) showed that incorporating pieces of information in decision-making depends on how well the decision-makers understand cause-effect relationships in the SC. The higher the perception of “analyzability,” the better the use of demand information and the better the performance. Higher procedural rationality (i.e. the extent of including relevant information in the decision-making process) results in lower inventory management costs (Haines *et al.*, 2010). Decision-makers also select information based on their perceptions of its relevance to performance (Haines *et al.*, 2017). This can be a cost-saving strategy, highlighting the importance of learning and training in SC. Wu and Katok (2006) indicated that SC performance is enhanced when training is coupled with communication among SC members, eliminating instances of bounded rationality and even more remarkable if training is not limited to one member’s role but includes system-thinking and knowledge of the whole SC. Tokar *et al.* (2012) confirmed that providing declarative knowledge (i.e. descriptive, conscious knowledge that can be verbalized) through instructional training enhances inventory management.

3.3.2.2 Reference dependence and anchoring. Reference dependence and anchoring are key cognitive aspects of prospect theory. Reference points can emerge from many different sources such as salient counterfactuals (Kahneman and Miller, 1986), expectations (Mellers *et al.*, 1997) and the status quo (Kahneman *et al.*, 1991). Reference dependence demonstrates how people frame outcomes, based on a reference state, to evaluate the cost and benefits of a decision. Anchoring refers to relying heavily on initial information in making decisions and failing to adequately adjust for subsequent information. It comprises two focal points:

- 1 contractual parameters; and
- 2 outcome-dependent anchoring, which stems from a partial computation (Tversky and Kahneman, 1974).

Our analysis shows that in the newsvendor setting, the market demand is a source of uncertainty that influences channel members *vis-a-vis* their order quantity decisions. Due to outcome-dependent anchoring bias, SC agents tend to set the order quantities near the mean demand, one of the most provided pieces of information to newsvendors (Katok and Wu, 2009; Becker-Peth *et al.*, 2013; Kalkanchi *et al.*, 2014; Davis, 2015; Villa and Castañeda, 2018; Castañeda *et al.*, 2019).

Davis and Hyndman (2019) demonstrated that channel parties do not exploit their bargaining power due to anchoring bias; they suggested that under a simple wholesale price contract, including negotiation of both order quantity and wholesale price leads to higher channel efficiency. Wu and Chen (2014) highlighted recency bias, reinforcement and chasing the most recent demand as the causes of deviation from theoretical predictions. Embedded thresholds in a contract (such as fixed-fee) may also act as alternative anchoring points (Ho and Zhang, 2008). Consequently, a loss-averse decision-maker, who considers fixed-fee as a loss, may choose a quantity discount contract with a less salient discount, which outperforms the mathematically equivalent two-part tariff contract. Option contracts and service-level agreements can effectively induce first-best investment rates, while intensifying “superficial fairness.” That is, channel parties narrowly focus on the wholesale price, rather than any secondary parameter associated with contracts (Davis and Leider, 2018).

Katok *et al.* (2008) observed a forward-looking bias that incorporates the expected profit in decision-making. They showed that in a service-level agreement contract with a high and medium-size bonus, longer review periods induce higher order quantities by reducing demand chasing, decreasing the variability of feedback and helping decision-makers focus on bonuses. Kirshner and Shao (2018) studied the impact of an internal reference point that stems from the disutility caused by an ex-post inventory error. A fully informed supplier with the retailer’s bias can increase the wholesale price, leading to higher-order quantity and channel coordination for low-profit margin products. Davis (2015) also showed that decision-makers consider a psychological cost for over- and under-stock by setting the demand as the reference point.

SC agents (generally downstream parties) are also subject to systematic underweighting of the supply line (i.e. on-order inventory) by following anchoring and adjustment policies (Sterman, 1989). This will cause over-ordering, which will significantly increase the bullwhip effect (Croson and Donohue, 2003, 2006; Croson *et al.*, 2014; Narayanan and Moritz, 2015). Under stochastic demand, channel performance is adversely influenced by underestimating the supply line. Seasonal demand and costly order changes due to production capacity constraints induce order smoothing behavior (Cantor and Katok, 2012). Although order smoothing is used to eliminate the “bullwhip effect,” the presence of demand shocks can question the positive impact of this policy (Udenio *et al.*, 2017). On the other hand, agents deal with inventory mismatches (i.e. desired vs actual inventory) by overreacting and ordering more. Although this may be beneficial in cases of demand shocks, its excessive level degrades channel performance. Rong *et al.* (2008) showed that supply disruptions can cause a reverse bullwhip effect (i.e. order quantity variability as we move down the channel) due to overweighting the supply line and overreacting to capacity shocks.

A solution to anchoring bias is to provide complete information to SC parties, which improves downstream echelons’ stock-out costs by alleviating the supply underestimation bias. However, it cannot enhance SC performance, as it may increase supply expectations and any deviation from which will lead to repeated severe irrational orders (Zhao and Zhao, 2015). As one of the triggers of anchoring bias is the limited attention span of decision-makers, improving the

learning trend and weakening demand chasing by providing collective feedback such as total profit, can reduce this bias (Elahi *et al.*, 2013; Kalkanci *et al.*, 2014; Wu and Chen, 2014). However, Li *et al.* (2015) demonstrated that the manufacturers may not be willing to increase the learning rate significantly (a consequent lower production cost is expected) because it will lead to lower wholesale prices that will negatively impact their profitability.

3.3.2.3 Mental accounting theory. Mental accounting gives rise to a novel evaluation of different income streams and financial transactions. Despite the outcome-oriented belief in normative theory, people evaluate materially equivalent outcomes/events differently, based on their perception of how they are obtained, following a source-dependence effect. Mental accounting refers to coding, categorizing and evaluating the processing of financial decisions following a specific framework (Thaler, 1985). People who engage in mental accounting categorize their activities into “mental accounts,” rather than accumulating all the activities needed to make a decision.

As an aspect of mental accounting, contract-specific reference points were investigated by Becker-Peth *et al.* (2013), who suggested that people apply source-dependent valuations of income in their decisions (e.g. sale income vs returned items' income under buyback contract) which leads to decision biases. Becker-Peth and Thonemann (2016) designed a customized revenue-sharing contract to influence the inventory decision-making behavior and offer robust solutions to potential reference points in contracts.

4. Conclusion and avenues for future research

Despite increasing globalization and international interactions, investigations on the impact of cultural background on contract design have remained largely unaddressed. Empirical research confirms the effect of culture on contract performance and on undertaking different strategies to reduce the bullwhip effect (Shan *et al.*, 2014; Lee *et al.*, 2018). Thus, uncovering the role of cultural impact and considering the impact of collectivistic and individualistic cultures on decision-making will shed light on the performance of international organizations. The endogenous membership process and the costly protocol (i.e. entry fee) for channel membership (Fan *et al.*, 2018) should be the focus of further studies in the future.

Considering prospect theory, several effects deserve further attention, namely, the *fourfold pattern of risk preferences* that discusses situations in which people are prone to be risk-averse and risk-seeking versus the probability and the perceived loss/gain. Another aspect scarcely discussed is the *diminishing sensitivity* to gains and losses. The *framing effect* can also be explored to show how the perception of loss/gain of an option counters its constant prospects following the way it is presented. Analysis of social preferences shows that studies on *reciprocity* are fewer than those on *inequality aversion*, perhaps, due to simpler modeling of the latter; yet, the impact of reciprocity is stronger than inequity aversion (Fehr and Fischbacher, 2002). Therefore, it is worth addressing this prediction by simultaneously studying different social preferences and their interactions.

Heuristic-related theories require further exploration. Advancements in big data and high-tech tools, platforms and devices necessitate incorporating the effect of these advanced complexities on decision-making. Despite our analysis on

different reference dependence types, some, especially status quo or forward-looking biases such as expectation-oriented bias, have received little consideration in the literature.

In terms of methodology, vignette-based methodology and field experiments are suggested for future research. Although experiments can portray a real-world setting, combining field experiments with qualitative interviews and adding external validation to findings can be a new contribution to the current body of literature. However, the lack of sufficient control over influential factors and their resource-intensive nature may prevent scholars from adopting a broader strategy for field experiments. Human-to-human experiments have advanced the negotiation and bargaining protocol and the concept of contract breach and utilization of *renegotiation process* in SC parties' interactions has been overlooked in BOM (Sloof *et al.*, 2006).

Considering the global impact of the recent COVID-19 pandemic, supply disruptions have illuminated the crucial need for robust manufacturing and distribution (medical equipment and pharmaceuticals in particular) of SC contract redesign and reconfiguration. Thus, contracts that explicitly incorporate remedies for supply disruptions and limited production capacity on the upstream side (imperfect information) would be a fruitful direction for future research. An insufficiently explored area in SC structure is the multi-period SC that investigates the impact of sequential iterations of decisions on SCC outcomes. This area can be a successful avenue for future research. Although modeling complex environments are challenging, including asymmetric information and supplier reliability would help SC managers alleviate the impact of associated risk in a contractual setting.

Traditionally, research on SC contracts and BOM aimed at maximizing the economic value of the SC as its single goal. Yet, economic development needs to consider social and environmental perspectives for long-term sustainability. With the increase in popularity of closed-loop SC (Zhao and Zhu, 2018) and the growth of green SC, examining the BOM in a reverse SC is a promising research area. Scholars can assist in the efficient implementation of the United Nations sustainable development goals (i.e. responsible consumption and production, economic growth and reducing inequality) by considering new behavioral constructs.

The growing concern about uncertain lead-time, unpredictable stock-outs and scarce resources are some of the triggers of ordering biases. Brittle SCs are prone to supply disruptions and behave differently when interacting with different product types. Based upon Krajlic's matrix for procurement (1983), we anticipate that contracts designed to take behavioral factors into account will affect the “strategic and bottleneck items” the most because of the relatively limited number of suppliers in the overall procurement portfolio of the buyer. The incorporation of *product* and *supplier* types will also shed light on decision-maker's behavioral biases and their impact on channel coordination. In addition, the most common SC structure is a simple serial or dyadic SC. However, global interactions among different tiers of an SC require extending the number of associations within SC. Moreover, the authors call for literature reviews of the operational fields such as project, service and revenue management to unpack the evolution of BOM across different disciplines and provide a holistic view for scholars and practitioners.

Even though behavioral issues and SCCM are well-established concepts in the academic field, from the business perspective, their real-world importance is still valid. Investigating behavioral factors that potentially influence the critical operational decisions of SC practitioners will help design more efficient SCCM and more effective contracts, ultimately leading to a richer decision-making process.

Learning about the behavioral drivers of decisions and quantifying the behavioral influences will provide:

- a deeper understanding of the deviations from normative decision theories;
- lead to a higher precision rate for predictive models of the actual decision in an operational setting; and
- can potentially act as a proactive mechanism to prescribe optimal decisions.

More specifically, this research field ultimately helps organizations enhance performance through robust and well-designed systems by taking relevant behavioral factors that guide practitioners' decisions in times of uncertainty into account.

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Appendix

Figure A1 Number of publications over the time span (2003–2019)

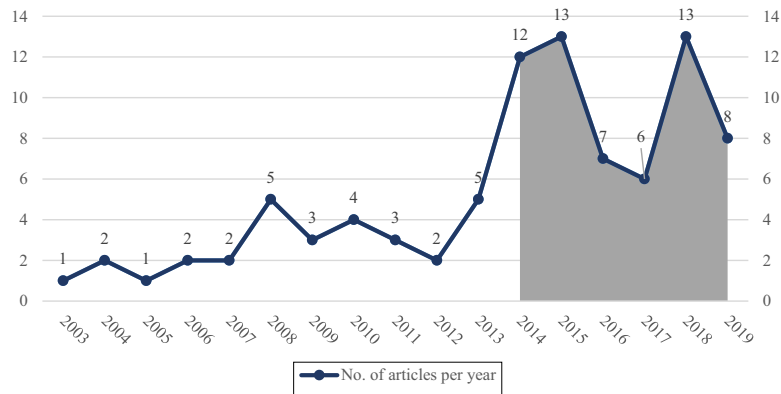


Figure A2 Distribution of methods in the field

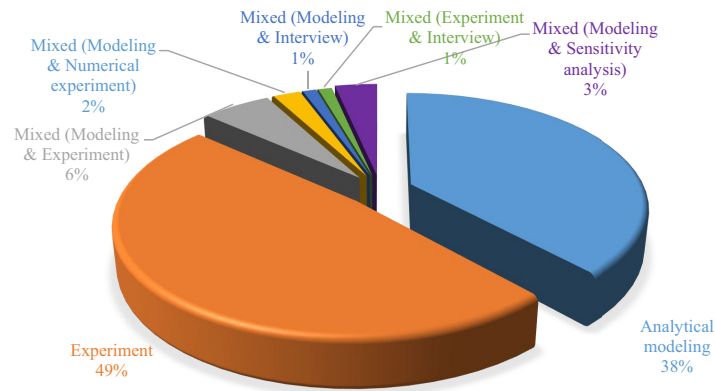


Figure A3 Distribution of studies based on the theory

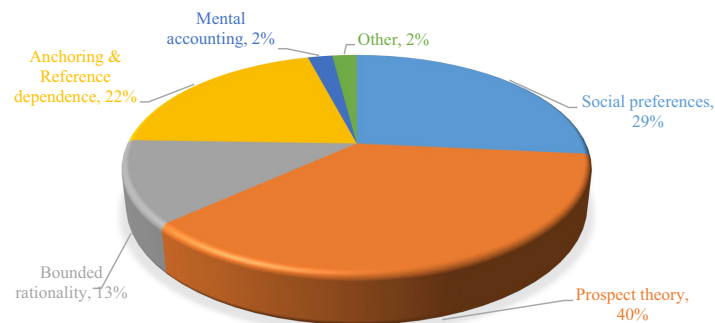


Figure A4 Conceptual framework

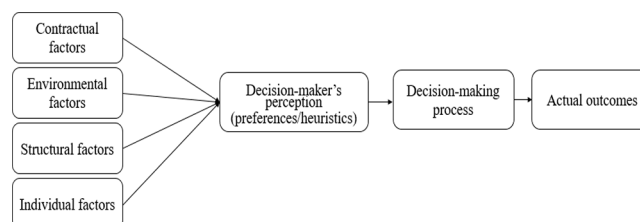


Table A1 Set of keywords

Search round	Keywords
Round 1	Supply chain coordination, channel coordination AND behavioral/behavioral* operations
Round 2	Supply chain coordination, channel coordination, collaboration, cooperation AND behavioral/behavioral* supply management, behavioral/behavioral* economics, behavioral/behavioral* experiment, behavioral/behavioral* supply, behavior/behavior*, experiment, laboratory, risk/loss avers**/seek**, fairness, anchoring, bounded rationality, bias AND reference dependence
Round 3	Information sharing, knowledge sharing, information-sharing, knowledge-sharing, information technology, sharing benefits, joint decision-making, bullwhip, align**, contract** AND behavioral/behavioral* operations, behavioral/behavioral* supply management, behavioral/behavioral* economics, behavioral/behavioral* experiment, behavioral/behavioral* supply, behavior/behavior*, experiment, laboratory, risk/loss* avers**/seek**, fairness, anchoring, bounded rationality, bias, reference dependence AND supply chain

Notes: 1: The "*" shows that two different ways to spell the word have been considered in the keyword searching process (e.g. behavioral operations and behavioral operations); Note 2: The "**" shows that all the variations of the keyword have been used (e.g. alignment, aligning, etc.)

Table A2 Pool of papers

Source title	No. of articles	No. of times cited	h-index
<i>Production and operations management</i>	18	2,180	14
<i>European Journal of Operational Research</i>	14	1,124	12
<i>Int. J. Production Economics</i>	12	702	11
<i>Management Science</i>	12	3,112	12
<i>Decision Sciences</i>	5	369	5
<i>Journal of Operations Management</i>	4	640	4
<i>IEEE Transactions on Systems, Man and Cybernetics: Systems</i>	3	177	3
<i>Manufacturing and Service Operations Management</i>	3	145	3
<i>Omega</i>	3	287	3
<i>Computers and Industrial Engineering</i>	2	40	2
<i>International Journal of Production Research</i>	2	127	2
<i>Transportation Research Part E</i>	2	76	2
<i>Annals of Operations Research</i>	1	21	1
<i>Automatica</i>	1	99	1
<i>Business Research</i>	1	10	1
<i>Flexible Services and Manufacturing Journal</i>	1	67	1
<i>IIE Transactions</i>	1	15	1
<i>Journal of Business Economics</i>	1	6	1
<i>Journal of Business Logistics</i>	1	23	1
<i>Journal of Cleaner Production</i>	1	36	1
<i>Journal of the Operational Research Society</i>	1	10	1

Table A3 Journals' citation impact and productivity

Reviewed articles/year	Source title	Focus of theory	Research method	No. of times cited
Crosan and Donohue (2003)	<i>Production and operations management</i>	Reference dependence and anchoring	Experiment	339
Gan et al. (2004)	<i>Production and operations management</i>	Prospect theory (risk attitude)	Analytical modeling	431
Steckel et al. (2004)	<i>Management Science</i>	Bounded rationality	Experiment	260
Gan et al. (2005)	<i>Production and operations management</i>	Prospect theory (risk attitude)	Analytical modeling	445
Crosan and Donohue (2006)	<i>Management Science</i>	Reference dependence and anchoring	Experiment	633
Wu and Katok (2006)	<i>Journal of Operations Management</i>	Bounded rationality	Experiment	261
Cui et al. (2007)	<i>Management Science</i>	Social preferences (inequity aversion)	Analytical modeling	707
Wang and Webster (2007)	<i>Decision Sciences</i>	Prospect theory (loss aversion)	Analytical modeling	243
Choi et al. (2008)	<i>European Journal of Operational Research</i>	Prospect theory (risk attitude)	Analytical modeling	259
Choi et al. (2008)	<i>Omega</i>	Prospect theory (risk attitude)	Analytical modeling	212
Ho and Zhang (2008)	<i>Management Science</i>	Reference dependence and anchoring	Experiment	385
Katok et al. (2008)	<i>Manufacturing and Service Operations Management</i>	Prospect theory (loss aversion)	Experiment	95
Loch and Wu (2007)	<i>Management Science</i>	Reference dependence and anchoring	Experiment	269
Cantor and Macdonald (2009)	<i>Journal of Operations Management</i>	Social preferences (fairness concern)	Experiment	119
Katok and Wu (2009)	<i>Management Science</i>	Bounded rationality	Experiment	292
Rong et al. (2008)	<i>Flexible Services and Manufacturing Journal</i>	Prospect theory (loss aversion)	Mixed methods (experiment and sensitivity analysis)	67
Caliskan-Demirag et al. (2010)	<i>European Journal of Operational Research</i>	Reference dependence and anchoring	Analytical modeling	235
Haines et al. (2010)	<i>Journal of Business Logistics</i>	Social preferences (inequity aversion)	Experiment	23
Wei and Choi (2010)	<i>European Journal of Operational Research</i>	Bounded rationality	Analytical modeling	181
Wu et al. (2010)	<i>Int. J. Production Economics</i>	Prospect theory (risk attitude)	Analytical modeling	77
Chiu et al. (2011)	<i>Automatica</i>	Prospect theory (risk attitude)	Analytical modeling	99
Kalkanci et al. (2011)	<i>Management Science</i>	Bounded rationality	Experiment	148
Shen et al. (2011)	<i>Int. J. Production Economics</i>	Prospect theory (loss aversion)	Analytical modeling	35
Cantor and Katok (2012)	<i>Transportation Research Part E</i>	Bounded rationality	Experiment	42
Wu (2013)	<i>Int. J. Production Economics</i>	Social preferences (reciprocity)	Experiment	39
Ancarani et al. (2013)	<i>Int. J. Production Economics</i>	Bounded rationality	Experiment	50
Becker-Peth et al. (2013)	<i>Management Science</i>	Prospect theory (risk attitude)	Experiment	190
Elahi et al. (2013)	<i>Int. J. Production Economics</i>	Reference dependence and anchoring	Experiment	37
Katok and Pavlov (2013)	<i>Journal of Operations Management</i>	Social preferences (inequity aversion)	Experiment	253
		Bounded rationality		(continued)

Table A3

Reviewed articles/year	Source title	Focus of theory	Research method	No. of times cited
Shen et al. (2013)	IEEE Transactions on Systems, Man and Cybernetics: Systems	Prospect theory (risk attitude)	Analytical modeling	123
Chen et al. (2014)	Production and operations management	Prospect theory (risk attitude)	Analytical modeling	46
Croson et al. (2014)	Production and operations management	Social preferences (reciprocity)	Experiment	220
Davis et al. (2014)	Management Science	Bounded rationality	Experiment	80
Du et al. (2014a)	International Journal of Production Research	Prospect theory (loss aversion)	Analytical modeling	106
Du et al. (2014b)	European Journal of Operational Research	Social preferences (reciprocity)	Analytical modeling	40
Ho et al. (2014)	Production and operations management	Social preferences (reciprocity)	Experiment	187
Hyndman et al. (2014)	Production and operations management	Social preferences (inequity aversion)	Experiment	15
Kalkanci et al. (2014)	Production and operations management	Reference dependence and anchoring	Experiment	53
Katok et al. (2014)	Production and operations management	Social preferences (inequity aversion)	Mixed methods (analytical modeling and experiment)	131
Wu and Chen (2014)	Production and operations management	Reference dependence and anchoring	Experiment	76
Xu et al. (2014)	Int. J. Production Economics	Prospect theory (risk attitude)	Analytical modeling	290
Zhang et al. (2014)	Manufacturing and Service Operations Management	Prospect theory (risk attitude)	Mixed methods (analytical modeling and interviews)	20
Avinadav et al. (2015a)	Int. J. Production Economics	Prospect theory (risk attitude)	Analytical modeling	50
Avinadav et al. (2015b)	European Journal of Operational Research	Prospect theory (risk attitude)	Analytical modeling	47
Chen et al. (2015)	Decision Sciences	Social preferences (horizontal fairness concern)	Mixed methods (analytical modeling and experiment)	19
Choi (2015)	IEEE Transactions on Systems, Man and Cybernetics: Systems	Prospect theory (risk attitude)	Mixed methods (analytical modeling and sensitivity analysis)	34
Choi (2015)	Transportation Research Part E	Bounded rationality	Analytical modeling	34
Chow et al. (2015)	Omega	Social preferences (inequity aversion)	Mixed methods (analytical modeling and experiment)	27
Davis (2015)	Production and operations management	Prospect theory (loss aversion)	Experiment	30
Hartwig et al. (2015)	Production and operations management	Reference dependence and anchoring	Experiment	43
Li et al. (2015)	Production and operations management	Social preferences (fairness concerns)	Analytical modeling	52
Narayanan and Moritz (2015)	Production and operations management	Reference dependence and anchoring	Experiment	60
Sarkar and Kumar (2015)	Int. J. Production Economics	Bounded rationality	Experiment	56
Voigt (2015)	Journal of the Operational Research Society	Social preferences (inequity aversion)	Mixed methods (analytical modeling and sensitivity analysis)	10
Zhao and Zhao (2015)	Int. J. Production Economics	Reference dependence and anchoring	Experiment	19
Becker-Peth and Thonemann (2016)	European Journal of Operational Research	Mental accounting	Experiment	65

(continued)

Table A3

Reviewed articles/year	Source title	Focus of theory	Research method	No. of times cited
Choi and Messinger (2016)	<i>European Journal of Operational Research</i>	Social preferences (reciprocity)	Experiment	60
Niederhoff and Kouvelis (2016)	<i>European Journal of Operational Research</i>	Social preferences (inequity aversion)	Experiment	24
Ohmura and Matsuo (2016)	<i>Int. J. Production Economics</i>	Prospect theory (risk attitude)	Analytical modeling	18
Qin et al. (2016)	<i>European Journal of Operational Research</i>	Social preferences (reciprocity)	Experiment	62
Tokar et al. (2012)	<i>Decision Sciences</i>	Bounded rationality	Experiment	34
Zhang et al. (2016)	<i>Management Science</i>	Prospect theory (loss aversion)	Experiment	101
Haines et al. (2017)	<i>Int. J. Production Economics</i>	Bounded rationality	Experiment	21
Nie and Du (2017)	<i>European Journal of Operational Research</i>	Social preferences (inequity aversion)	analytical modeling	103
Udenio et al. (2017)	<i>IIE Transactions</i>	Reference dependence and anchoring	Analytical modeling	15
Sadrieh and Voigt (2017)	<i>Journal of Business Economics</i>	Bounded rationality	Experiment	6
Wang et al. (2017)	<i>Computers and Industrial Engineering</i>	Prospect theory (risk attitude)	Analytical modeling	23
Zhao et al. (2017)	<i>Annals of Operations Research</i>	Prospect theory (risk attitude)	Mixed methods (analytical modeling and numerical experiment)	21
Choi et al. (2018)	<i>Decision Sciences</i>	Prospect theory (risk attitude)	Analytical modeling	59
Davis and Hyndman (2018)	<i>Management Science</i>	Social preferences (reciprocity)	Mixed methods (analytical modeling and experiment)	18
Davis and Leider (2018)	<i>Manufacturing and Service Operations Management</i>	Social preferences (inequity aversion)	Experiment	30
Du et al. (2018)	<i>International Journal of Production Research</i>	Social preferences (inequity aversion)	Analytical modeling	21
Fan et al. (2018)	<i>Production and operations management</i>	Other regarding theories (costly channel membership)	Experiment	5
Kalakbandi (2018)	<i>European Journal of Operational Research</i>	Boundedly rational	Mixed methods (analytical modeling and numerical experiment)	1
Kirshner and Shao (2018)	<i>European Journal of Operational Research</i>	Mental accounting	Analytical modeling	13
Lee et al. (2018)	<i>Journal of Operations Management</i>	Reference dependence and anchoring	Experiment	7
Villa and Castañeda (2018)	<i>European Journal of Operational Research</i>	Social preferences (inequity aversion)	Experiment	19
Wuttke et al. (2018)	<i>Production and operations management</i>	Other regarding theories (cultural impact on bonus and penalty contracts)	Experiment	15
Xie et al. (2016)	<i>IEEE Transactions on Systems, Man and Cybernetics: Systems</i>	Reference dependence and anchoring	Experiment	20
Yang et al. (2018)	<i>Production and operations management</i>	Prospect theory (risk attitude)	Analytical modeling	29
Zhao and Zhu (2018)	<i>Journal of Cleaner Production</i>	Prospect theory (risk attitude)	Analytical modeling	36
Anderson and Monjardino (2019)	<i>European Journal of Operational Research</i>	Prospect theory (risk attitude)	Analytical modeling	15
Castañeda et al. (2019)	<i>Int. J. Production Economics</i>	Reference dependence and anchoring	Mixed methods (interview and experiment)	10
Choi et al. (2019)	<i>Omega</i>	Prospect theory (risk attitude)	Analytical modeling	48
		Prospect theory (risk attitude)		(continued)

Table A3

Reviewed articles/year	Source title	Focus of theory	Research method	No. of times cited
Davis and Hyndman (2019)	<i>Management Science</i>	Reference dependence and anchoring Prospect theory (risk attitude)	Experiment	29
Haruvy et al. (2019)	<i>Business Research</i>	Social preferences (reciprocity)	Mixed methods (analytical modeling and experiment) Experiment	10
Johnsen et al. (2019)	<i>Decision Sciences</i>	Bounded rationality Social preferences	Analytical modeling	14
Lu et al. (2019)	<i>Production and operations management</i>	Social preferences (inequity aversion) Prospect theory (risk attitude)	Analytical modeling	3
Sharma et al. (2019)	<i>Computers and Industrial Engineering</i>	Social preferences (inequity aversion)	Analytical modeling	17

Table A4 The summary of the external engagement responses

Sentiment	Aggregated conceptual map	Scope of assessment	
		Personal conceptual map	
Sentiment			
Generally positive comments	<p><i>Scholar A:</i> "... So I think this is great. It actually reminds me a lot of Wikipedia real study your kind of algorithms working with human judgment, right. You come up with a forecast and then you tweak it right based on your own sort of intuition. I'd say with respect to the field, it looks pretty good" ... "So you have both of those (e.g. information sharing and SC contracting) captured" ... "So I would say it's, you know, in the broad strokes is good and need some massaging"</p> <p><i>Scholar C:</i> "The aggregate map can reflect mostly the existing literature on this topic"</p> <p><i>Scholar E:</i> "Both conceptual maps look reasonable and comprehensive"</p>	<p><i>Scholar A:</i> "incentive for sure is on there. Right. So I'm glad that showed up because it's usually as a bonus, it is a monetary incentive" ... "All those [concepts, i.e. inventory, bargaining, contracts] are good"</p> <p><i>Scholar B:</i> "... coordination is just connected to contracts, which shows that contract is a way to make the coordination and cooperation so that it yeah, ... it actually covered one aspect of the coordination"</p> <p><i>Scholar C:</i> "The Leximancer conceptual map can accurately reflect my studies"</p> <p><i>Scholar E:</i> "Both conceptual maps look reasonable and comprehensive"</p>	
Limitation and rooms for improvement	<p><i>Scholar A:</i> "I think Prospect Theory might have popped up, but I don't know if people would use Prospect Theory directly that much because there are so many components, right. Prospect Theory is combined with losses and reference points and probability weighting. So maybe that's why Prospect Theory doesn't show up"</p> <p><i>Scholar B:</i> "... And so I don't know why decision box is a separate box and order is a separate box ... I think the terminology again you will say order sometimes the ordering decision, sometimes a decision, the same thing can be said in different ways. ..."</p> <p><i>Scholar C:</i> "I would like to provide more relevant keywords in the field for your references such as coordination, loss aversion, social preference, profit, utility, behavioral experiment and cognitive bias"</p> <p><i>Scholar D:</i> "... [by using this type of software] things will be in the dark and I always find counter-examples (something missing or something wrong). I think you need to justify why your method makes sense. What people cannot do without your method and double-check for accuracy"</p>	<p><i>Scholar A:</i> "I think like retailer ... I would hope for something more like a two-stage supply chain where a retailer requires a necessary component ... I kind of used that as a generic term to represent any buyer"</p> <p><i>Scholar B:</i> "... the seller box. I'm not sure it has any meaning" ... "sometimes we change the terminology is not always sometimes the retailer could remain retailer. Sometimes you could call it a seller, sometimes an agent" ... "there is a word which appears in this literature called double marginalization. Yeah, that's a bit my language is not showing up in your boxes" ... "So those three terms (e.g. decentralized, coordination, contract) right now are kind of not connected the way I would see them be connected in different places" ... "so that connection goes through contract, profits, supply, retailer order, quantity, period, manufacture and centralized. Yeah, it [period] is not necessary. Because period only comes in the problems. Ah, yeah, it is not an essential part of most of these papers except the two-period paper ... It's not a necessity to be appeared in between the centralized and contracts and the coordination" ...</p>	

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