

WHY ONE PERSPECTIVE IS NOT ENOUGH: THEORY-DATA ALIGNMENT FOR DYADIC, TRIADIC, AND NETWORK STUDIES IN SUPPLY CHAIN MANAGEMENT

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Highlights

- Reviews past SCM research to map dyadic, triadic, and network (DTN) design approaches
- Positions IIPE Special Issue contributions within DTN research trends and gaps
- Identifies recurring theory–data misalignments, including triadic underuse and weak network measures
- Provides a design checklist for unit selection, pairing, and interdependence modeling

CRedit authorship contribution statement

- Laharish Guntuka: Writing – original draft, Visualization, Validation, Methodology, Conceptualization
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Abstract

Supply chain management (SCM) research increasingly recognizes that single-informant designs cannot capture the complexity of interorganizational relationships. Dyadic, triadic, and network designs incorporate multiple actors and can yield richer evidence, but they also introduce substantial theoretical, methodological, and practical challenges. As the introductory article to the International Journal of Production Economics Special Issue “Revamping multi-tier supply chain relationships: Using dyadic, triadic, and network data to explore uncharted territory and discover new frontiers,” this paper synthesizes recent evidence on how multi-party designs are used and proposes how they can be executed rigorously in new research. We conduct a structured review of empirical SCM studies published between 2018 and 2025 in all of the eight journals from the SCM Journal List to assess how dyadic, triadic, and network designs have been used. We identify dominant research themes, theoretical perspectives, and methodological approaches across dyadic, triadic, and network studies, and we diagnose recurring misalignments between theoretical constructs and data structures, along with persistent barriers to data collection and analysis. Based on this evidence, we provide actionable recommendations on when and how to employ dyadic, triadic, and network designs and outline strategies for data collection, measurement, and analysis. Overall, this paper offers guidance to strengthen theoretical justification, methodological rigor, and practical feasibility for scholars using multi-party designs in the SCM domain.

Keywords: Supply chain management, dyads, triads, networks, multi-party data, structured review

1. Introduction

Over the last decade, supply chain management (SCM) research has increasingly recognized that single-informant designs cannot capture the complexity of supply chain relationships and broader network interactions (Flynn et al., 2018b). Early studies often relied on data from one side of the exchange, typically buyers or suppliers, which limited insights into multi-tier supply chain dynamics and governance. More recent scholarship integrates perspectives from multiple actors, enabling a more accurate account of asymmetries, coordination, and governance in supply chains (Lee et al., 2025; Andrade-Rojas et al., 2024; Boehm & Sonntag, 2023). This shift reflects growing recognition that supply chain operations are inherently relational and that empirical approaches must be able to observe those relational dynamics directly.

Several factors have accelerated this evolution, including rising global supply chain complexity, the spread of digitally mediated coordination, greater exposure to multi-tier risks, increasing expectations for transparency and sustainability, and the growing use of artificial intelligence in supply chain decision-making (Bellamy et al., 2014; Wiedmer & Griffis, 2021). From a research perspective, these developments place greater demands on empirical designs, which must capture interdependencies, behavioral asymmetries, and heterogeneous perspectives across firms and tiers. As a result, researchers have increasingly employed dyadic, triadic, and network (hereafter referred to as DTN) data collection approaches. Dyadic designs collect data from both parties in a focal relationship (e.g., buyer and supplier), making them well suited to examining mutual perceptions, behaviors, and interactions (e.g., Maestrini et al., 2021) and to identifying relationship-level dynamics, such as trust asymmetries between buyers and suppliers (e.g., Villena et al., 2011). Triadic designs extend this logic to three interconnected entities (e.g., buyer, supplier, and third-party logistics provider), allowing researchers to examine intermediary

effects and three-way coordination (e.g., Suurmond et al., 2022; Patrucco et al., 2022). Network approaches broaden the unit of analysis to interconnected firms in multi-tier supply systems, enabling research on knowledge diffusion, systemic risk and how structural position influences innovation and resilience (e.g., Borgatti & Li, 2009; Choi & Kim, 2008; Wang et al., 2021; Durach et al., 2024). Together, these designs can reveal blind spots that single-informant studies cannot capture reliably, including misaligned perceptions of collaboration, divergent governance logics, and hidden dependencies.

Despite their theoretical appeal and empirical promise, DTN data collection strategies are difficult to implement and typically require substantial effort and resources. Researchers must secure participation from multiple organizations, ensure comparable measurement across actor types, address confidentiality concerns, and coordinate data collection procedures across sites. Additionally, empirical methods in the SCM domain must continue to evolve to meet these demands, as research questions and empirical contexts have become increasingly complex (Flynn et al., 2018b; Ketokivi, 2019). Although multi-party perspectives are increasingly used, systematic guidance remains limited on when each design is warranted, how it should map to theory, and what feasibility trade-offs are involved. Without careful alignment between theory and measurement, studies risk mismatches between theoretical constructs and the data structures used to examine them (Patrucco et al., 2026). Clearer guidance on when and how to use these approaches is therefore needed to strengthen both methodological rigor and practical relevance in SCM research (Culot et al., 2023).

In 2024, we launched the International Journal of Production Economics (IJPE) Special Issue (SI) “*Revamping multi-tier supply chain relationships: Using dyadic, triadic, and network data to explore uncharted territory and discover new frontiers*” to advance research that uses

multi-party data in theoretically grounded and empirically feasible ways. This article serves as the introductory piece to the SI. Its purpose is to consolidate recent SCM research on dyadic, triadic, and network research designs, clarify theory-data misalignment and feasibility constraints, and use those insights to frame how the SI papers extend prior work and open new research directions.

To accomplish this, we rely on two complementary sources. First, we synthesize evidence from recent empirical studies published in core SCM outlets to outline how DTN designs have been implemented, the mechanisms they aim to test, and the recurring design challenges across different approaches. Second, we situate the SI in relation to IJPE by emphasizing how IJPE scholarship has increasingly addressed questions regarding interorganizational and multi-tier supply chain relationships, demonstrating how the SI advances and clarifies this ongoing focus. Based on these insights, we provide guidance on when each design is appropriate, how it should correspond to the underlying theoretical mechanism, and how researchers can navigate the practical constraints of collecting and analyzing multi-party data.

We proceed as follows. Section 2 outlines the conceptual and methodological foundations for multi-party data collection. Section 3 reports the findings of our structured review of dyadic, triadic, and network studies in core SCM outlets. Section 4 maps the SI papers onto the design patterns and gaps identified in the review and clarifies the SI's contribution in the context of IJPE's ongoing research on interorganizational and multi-tier relationships. Section 5 offers design recommendations and addresses key challenges in data collection, measurement, and analysis. Section 6 concludes with implications and directions for future SCM research.

2. Using Multi-Party Data: Conceptual and Methodological Foundations

The choice of DTN designs in SCM research is driven primarily by the theoretical mechanism under investigation rather than by the empirical setting. Accordingly, empirical SCM studies are expected not only to ground their research questions in theory but also to test the proposed mechanisms in ways consistent with how the focal constructs are conceptualized. This has direct implications for research design: when a theory defines key constructs as relational (e.g., jointly formed trust, reciprocity, governance) or structural (e.g., embeddedness, diffusion, brokerage), data from a single actor are typically inadequate to validate or extend the theoretical claims (Park et al., 2018). In such cases, multi-party data are not merely additional observations; they are necessary to align theory and empirical design and to avoid drawing inferences from one-sided measures.

In the following section, we first describe how widely used theoretical perspectives in SCM provide the rationale for dyadic, triadic, and network forms of observation. We then complement this theoretical grounding by summarizing empirical patterns that further motivate multi-party designs, particularly in contexts where single-informant approaches obscure asymmetries, misalignment, or structural effects.

2.1. Theoretical basis for dyadic, triadic, and network research

Almost all leading SCM journals emphasize theoretical contributions, underscoring the importance of selecting an appropriate data structure (i.e., dyadic, triadic, or network) based on the research question and the underlying theoretical mechanism. Over the years, SCM scholars have drawn on a range of theoretical perspectives that justify the use of multi-party data, with some of the most extensively applied being Social Exchange Theory (SET), Transaction Cost

Economics (TCE), Resource Dependence Theory (RDT), Social Network Theory (SNT), Institutional Theory (IT), and the Relational View Theory (RVT). These perspectives emphasize the need to analyze interorganizational exchanges from multiple viewpoints, as supply chains involve interdependencies that extend beyond a single actor's perspective. They highlight mechanisms such as reciprocity, governance, dependence, structural positioning, legitimacy, and relational rents, which are difficult to test credibly unless data are collected from multiple parties (Borgatti & Li, 2009; Nyaga et al., 2010; Wilhelm et al., 2016; Wiedmer & Griffis, 2021). *Table 1* summarizes these theories, their core constructs, and the primary reason multi-party data are needed for empirical tests.

First, SET highlights reciprocal interdependencies and the co-construction of trust, reciprocity, commitment, and governance in exchange relationships (Cropanzano & Mitchell, 2005; Wu et al., 2014). Because these processes unfold across parties, dyadic or triadic data are often required to capture their mutual nature (Griffith et al., 2006; Ambrose et al., 2010). Relying on single-party reports risks obscuring reciprocity and biased inferences (Flynn et al., 2018a; 2018b). Second, TCE emphasizes governance, safeguards, and opportunism (Williamson, 2010). Evaluating, monitoring, enforcing, and aligning contractual expectations requires the perspectives of multiple parties to the contract (Brito & Miguel, 2017; Sheng et al., 2018). Studies that measure opportunism or governance effectiveness from only one side are therefore vulnerable to systematic misrepresentation and reduced explanatory power.

RDT explains how firms manage dependence and power through interorganizational ties (Pfeffer & Salancik, 1978). Accurately diagnosing asymmetries, resource control, and their behavioral consequences requires the views of multiple actors in the relationship (Pulles et al., 2014). Perceived dependence and power can diverge across partners, with implications for

Table 1. Theoretical foundations for multi-party data collection in supply chain management research.

Theory	Core constructs	Typical unit of analysis	Why multi-party data are needed	Key references
<i>Social Exchange Theory</i>	Trust, reciprocity, commitment, governance	Dyadic / Triadic	Core constructs are relational and co-constructed; one-sided reports can obscure reciprocity and governance dynamics	Cropanzano & Mitchell (2005); Griffith et al. (2006)
<i>Transaction Cost Economics</i>	Governance, safeguards, opportunism, contracts	Dyadic (sometimes extended beyond dyads)	Monitoring/enforcement and alignment of contractual expectations require both parties' perspectives	Williamson (2010); Brito & Miguel (2017); Sheng et al. (2018)
<i>Resource Dependence Theory</i>	Power, dependence, interdependence, resource control	Dyadic / Triadic	Power and dependence often differ by actor; multi-party data reveal asymmetries and behavioral consequences	Pfeffer & Salancik (1978); Pulles et al. (2014)
<i>Social Network Theory</i>	Centrality, brokerage, structural position, ties	Network	Structural mechanisms (diffusion, resilience, brokerage) require observation across connected actors	Milgram (1967); Myerson (1977); Uzzi (1996); Borgatti & Li (2009); Choi & Kim (2008); Kim et al. (2011) Kim & Zhu (2018)
<i>Institutional Theory</i>	Legitimacy, isomorphism, compliance, diffusion of pressures	Dyadic / Triadic / Network	Different actors face different pressures across tiers; multi-party data capture cascades and uneven compliance	DiMaggio & Powell (1983); Wilhelm et al. (2016)
<i>Relational View</i>	Relational rents, joint value creation, relation-specific investments	Dyadic / Triadic	Value creation and appropriation are co-produced; requires observation across partners	Dyer & Singh (1998)
<i>Dynamic Capabilities</i>	Sensing, seizing, reconfiguring	Dyadic / Triadic	Partner-enabled adaptation and reconfiguration are joint processes; single-firm measures can miss the relational component	Teece et al. (1997); Eisenhardt & Martin (2017)
<i>Competitive Dynamics</i>	Action, response, strategic interaction	Dyadic / Network	Interdependent actions and reactions require multi-actor observation	Chen & Miller (2012); Ketchen et al. (2004)
<i>Signaling Theory</i>	Signals of trust, quality, commitment	Dyadic	Sender-receiver pairing is necessary to observe both intent and interpretation	Spence (1973); Connelly et al. (2011)

<i>Information Processing Theory</i>	Information load, uncertainty, decision-making	Dyadic / Network	Information sharing and coordination are relational; alignment cannot be inferred from one side alone	Galbraith (1974); Premkumar et al. (2005)
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compliance, adaptation, and joint performance. Single-party approaches can conceal these divergences and limit both theoretical insight and practical relevance. In contrast, SNT strengthens the case for network-level data by linking network structure to outcomes. Constructs such as centrality, betweenness, and brokerage, and phenomena such as diffusion and resilience, cannot be inferred from a focal firm alone and require systematic observation across connected actors (Borgatti & Li, 2009; Choi & Kim, 2008; Kim et al., 2011).

IT also supports the need for multi-party observation, as coercive, normative, and mimetic pressures often cascade unevenly across supply chain tiers (DiMaggio & Powell, 1983). Buyers, suppliers, and intermediaries may experience distinct institutional expectations, and capturing these differentiated pressures frequently requires DTN data (Wilhelm et al., 2016; Falcone et al., 2024a). For example, sustainability requirements often originate with a focal buyer but diffuse to second- and third-tier suppliers, a process that single-informant designs struggle to detect. Similarly, RVT emphasizes the co-creation of inter-firm value (Dyer & Singh, 1998). Relational rents arising from joint learning, knowledge-sharing routines, and relation-specific investments are inherently co-produced; thus, dyadic and triadic designs are well suited to examining how partners generate and appropriate value and how governance mechanisms shape these outcomes.

These examples are not exhaustive; other perspectives also motivate the use of multi-party data in SCM. For example, DCT (Teece et al., 1997) points to joint sensing, seizing, and reconfiguring across partners, which is observable only when multiple parties are measured. Competitive Dynamics Theory (Chen & Miller, 2012; Guntuka et al., 2024a) treats actions and responses as interdependent, calling for multi-party perspectives to capture interactions among competitors. Signaling Theory (Spence, 1973) requires sender-receiver data to observe both

signal intent and interpretation. Information Processing Theory (Galbraith, 1974) predicts that uncertainty prompts collaborative information sharing and joint problem-solving; capturing these adjustments across parties benefits from data that goes beyond the single firm.

2.2. Empirical motivations for dyadic, triadic, and network research

Complementing the theoretical rationale in Section 2.1, empirical evidence from SCM research also underscores the necessity of multi-party designs. Across several research streams, findings from one-sided measurement are frequently incomplete or systematically biased, particularly when constructs are jointly enacted, contested among partners, or shaped by actors beyond the focal dyad.

For example, evidence from research on trust and collaboration illustrates the limitations of one-sided measurement. Buyers and suppliers often hold systematically different perceptions of trust, effort, and contribution within the same relationship (e.g., Villena et al., 2011; Revilla & Knoppen, 2015), and the effectiveness of collaborative practices cannot be inferred reliably from a single informant (Bellamy et al., 2014). Moreover, when intermediaries are involved, triadic studies show that misalignment can extend beyond the focal dyad to the broader set of participating actors (Wilhelm et al., 2016). Accordingly, multi-party data are required to assess whether collaboration is mutually shared, asymmetric, or contested.

Opportunism and governance research highlights that exchange hazards and safeguards are interpreted differently across parties. Partners may disagree about the presence of opportunism, the adequacy of safeguards, and the alignment of contractual mechanisms (Zeng et al., 2017; Sheng et al., 2018; Belhadi et al., 2021). Dyadic designs allow researchers to test whether governance arrangements reduce opportunism from both perspectives, rather than

reflecting a single party's assessment (Handley & Benton, 2012; Bhattacharya et al., 2015).

Absent multi-party data, governance effects may capture respondent-specific bias or positional interests instead of relationship-level phenomena.

Empirical research on risk and resilience shows that many SCM outcomes unfold across organizational boundaries and multiple tiers. Disruptions propagate through supply networks, and coordinated responses cannot be understood from a single focal firm's perspective (Scholten & Schilder, 2015; Durach et al., 2020; Qazi et al., 2018). Evidence from network studies further indicates that structural position shapes knowledge flows, innovation capability, and adaptive performance (Choi & Kim, 2008; Kim & Zhu, 2018). Capturing centrality, brokerage, and indirect ties (e.g., common suppliers) requires data from multiple connected actors; otherwise, key structural drivers of behavior and performance remain unobserved.

These patterns point to a common implication: when constructs are relational, contested, or structurally embedded, single-informant data are a weak test of the mechanism. Consequently, DTN designs make it possible to model the relevant interdependence, such as perceptual gaps, governance alignment, and position-based effects, rather than treating them as noise. The next section builds on this logic by mapping how recent SCM studies have operationalized DTN designs.

3. From Theory to Evidence: Mapping Multi-Party Designs in SCM

Section 2 argued that multi-party designs are often necessary when the phenomenon of interest is relational or structurally embedded. The next step is to examine how such designs have been used in recent SCM research. To do so, we conducted a structured review of empirical studies employing dyadic, triadic, and network data. The review is intended to map the substantive

questions studied, the theoretical lenses mobilized, the units of analysis adopted, and the methods used. This mapping provides the empirical basis for the design recommendations developed later in the paper.

3.1. Review approach and search strategy

Our review design choice is intentionally selective. Rather than attempting to cover every journal in which DTN-related SCM research may appear, we focus on all eight journals in the SCM Journal List¹: *Decision Sciences Journal* (DSJ), *Journal of Business Logistics* (JBL), *Journal of Operations Management* (JOM), *Journal of Supply Chain Management* (JSCM), *Management Science* (MS), *Production and Operations Management* (POM), *Manufacturing & Service Operations Management* (MSOM), and *Operations Research* (OR). We use the SCM Journal List because it provides a transparent and widely recognized basis for defining the review boundary. It spans both SCM-focused journals and broader operations outlets in which SCM research regularly appears, making it well-suited to our purpose of comparing how DTN designs are used across SCM studies. In doing so, we were able to minimize the ex-post selection bias that can arise from journal inclusion and exclusion criteria. This choice is also consistent with prior SCM reviews that have used the same journal set to define their sample (see, e.g., Maloni and Carter, 2018; Fahimnia et al., 2019; Phadnis, 2024; Hughes et al., 2025). This boundary is not intended as a judgment on the relevance of work published elsewhere; other journals clearly publish important research on the topic, but those studies fall outside the review sample used in Section 3. Equally important, limiting the review to this set keeps the article sample manageable and allows us to examine the identified articles in greater depth. Expanding the review to

¹ See <http://www.scmlist.com/>

additional outlets would broaden coverage, but at the cost of a less detailed and less focused analysis. However, given the context of this IJPE special issue, we also provide a focused review of IJPE articles in *Section 4* to complement the core analysis.

Our review period covers 2018 to 2025. We chose 2018 as the starting point because it marks a shift in the methodological standards and guidance for multi-party research designs. Notably, the 2018 JSCM SI (Vol 54, Issue 1) and related editorial advice on survey research (see, e.g., Flynn et al., 2018b; Ketokivi, 2019) emphasized construct definition, measurement accuracy, and informant selection—key issues for researchers studying relational mechanisms across organizational boundaries. Simultaneously, SCM research during this time increasingly adopted secondary and archival data sources for studying interorganizational relationships and multi-tier structures, broadening the scope and scale of DTN research (see Miller et al., 2021; Miller & Kulpa, 2022; Culot et al., 2023). Additionally, the COVID-19 pandemic heightened focus on multi-tier interdependencies, risk spread, and networked responses, while also boosting reliance on multi-source and secondary data. These factors justify using 2018-2025 as the timeframe to examine DTN research aligned with current methodological standards and available data structures.

We implemented a keyword-based search. For dyadic and triadic studies, we identified articles where “dyad” or “triad” appeared in the abstract or the title. For network studies, given the broad use of “network” terminology across empirical domains, we initially limited retrieval to articles with “network” in the title to maintain precision and then verified in screening that “network” referred to interorganizational or supply chain network data rather than unrelated network usage. This procedure yielded a preliminary set of 356 articles.

Each article was manually reviewed by the research team. We excluded purely conceptual pieces and studies that did not actually use dyadic, triadic, or network data. For example, we excluded conceptual typologies such as Azadegan and Dooley (2021), which propose classifications of supply network resilience strategies but do not analyze dyadic, triadic, or network data. We retained only empirical articles that used primary or secondary DTN data. The screening resulted in a final sample of 111 articles, which form the basis for our analysis. For transparency, we summarize the identification and screening steps in a review flow diagram (Appendix A), which includes the reasons for exclusion at each stage.

To enable comparability, each article was coded along common dimensions: (1) the focal SCM relationship or phenomenon; (2) overarching theoretical lenses; (3) methodology and analytical technique; (4) data sources; (5) unit of analysis (firm, dyad, triad, network); (6) key variables or constructs; (7) software (where applicable); (8) industry context; and (9) sample size. This coding approach supports the identification of patterns in how DTN designs are matched to research problems and theories, and it helps pinpoint recurring misalignments and underused designs². Appendix B provides summary statistics of our coded articles.

3.2. Dyadic supply chain studies

3.2.1. Main research themes

The dyadic stream examines how governance choices and relational mechanisms shape performance and stability in buyer-supplier exchanges. These dyadic studies position governance (formal contracts alongside informal safeguards such as trust) as a central lever in dyadic

² For transparency, the detailed coding of sample articles is provided in the online supplementary material (Table OA1). The full coding table with all the articles will be made available upon request.

relationships. For example, Phadnis and Joglekar (2021) analyze regulatory contexts to show how governance design conditions respond to disruption, while Song et al. (2023) trace how buyers' environmental choices cascade into supplier outcomes.

Contracting and bargaining dynamics form a second cluster. Using experimental evidence, Johnsen et al. (2021) compare short- versus long-term contracting horizons and show how these choices affect coordination. Chang et al. (2022) focus on customer bargaining power in dyads and its financial implications, reinforcing that contractual microstructure influences efficiency and risk sharing.

A third theme shows that dyads are embedded in competitive, cultural, and institutional settings that shape the effectiveness of governance. For example, Taubeneder et al. (2024) examine coopetition in dyads, where collaboration and rivalry coexist and complicate governance. Fan et al. (2024) study cross-border dyads in emerging economies, documenting how institutional voids alter coordination and relational safeguards. Using a dyadic panel dataset, Lee et al. (2018) examined how suppliers use trade credit as both a financial tool and a strategic lever in competitive supply chains.

Finally, trust and signaling remain persistent topics. Kumar et al. (2023) analyze suppliers' signaling to attract and retain buyer trust, while Wang et al. (2023) argue that performance can be sustained in "low-trust" relationships when mechanisms align with expectations. Palit et al. (2022) extend this argument to global dyads, highlighting interactions between trust and governance across borders.

3.2.2. Overarching theories

Dyadic studies draw on a broad set of lenses to explain how two firms govern exchanges, manage risk, and create value. Economic governance and power perspectives, such as TCE,

agency and principal-agent theory, and RDT, explain how contracts and safeguards address coordination hazards and how dependence and switching costs shape bargaining power (Johnsen et al., 2021; Chang et al., 2022; Fan et al., 2024; Mukandwal et al., 2020; Susarla et al., 2020).

Behavioral and relational perspectives focus on expectations and reciprocity. The behavioral theory of the firm examines joint planning amid uncertainty (Phadnis & Joglekar, 2021), while psychological contract theory emphasizes expectation alignment (Deng, 2022). Social exchange views indicate that consistency, not just trust, facilitates knowledge sharing (Wang et al., 2023). Similarly, research on CSR alignment suggests that mismatches within dyads reduce performance (Liu et al., 2021).

Information, signaling, and capability perspectives provide a third strand. Signaling theory explains supplier quality signals (Kumar, 2023), absorptive capacity conditions learning and innovation (Palit et al., 2022), and social capital approaches link structural positioning to supplier innovation (Chae et al., 2020). Environmental research integrates belief-action-outcome logic and revisits pollution-haven claims by demonstrating buyers' active role in stimulating supplier innovation (Bellamy et al., 2020; Song et al., 2023). Finally, theories of coopetition and institutional context extend dyadic governance beyond simple cooperation or conflict; combined RDT-TCE arguments explain the lock-in of overseas partners amid geopolitical frictions (Fan et al., 2024), while coopetition theory formalizes tensions among rivals collaborating within dyads (Taubeneder et al., 2024).

3.2.3. Methodological approaches

Methodologically, dyadic research uses experiments, econometric analyses of secondary or panel data, dyadic surveys, and qualitative process studies. Experimental designs offer causal leverage by simulating dyadic decisions in controlled settings: Phadnis and Joglekar (2021) test scenario

planning under regulatory disruption, and Johnsen et al. (2021) study contracting horizons and the ratchet effect. Park et al. (2018) conducted a longitudinal, inductive case study of a major automotive manufacturer (e.g., Nissan and its first-tier strategic supplier) from 1999 to 2012. The researchers also used a computational simulation model to demonstrate that temporarily loosening embedded ties can prompt exploratory searches and generate performance gains for both buyers and suppliers.

Econometric analyses dominate the studies in our sample. Studies used fixed-effects panel models and identification strategies to address endogeneity. For example, Chang et al. (2022) combined propensity-score matching with fixed effects, while Palit et al. (2022) applied Poisson fixed effects with a control-function approach. Among other techniques, Song et al. (2023) estimated greenhouse-gas leakage using Bayesian Markov Chain Monte Carlo (MCMC); Fan et al. (2024) conducted event studies; and Chae et al. (2020) and Susarla et al. (2020) estimated dyadic outcomes using logit/probit models.

Survey-based dyadic designs capture relational constructs directly from both sides. Wang et al. (2023) and Deng (2022) use polynomial regression and response surface methods to examine congruence effects; Skowronski et al. (2022) pair survey evidence on buyer-supplier culture with secondary data; and Liu et al. (2021) assess CSR incongruence. Collecting data from both parties improves construct validity and reduces single-respondent bias.

Finally, longitudinal and qualitative case studies provide process evidence on how dyads evolve. Taubeneder et al. (2024) combine interviews, observations, and archival sources to track coopetition dynamics over time, revealing mechanisms and temporal sequencing that are difficult to recover from cross-sectional data.

3.3. Triadic supply chain studies

3.3.1. Main research themes

Research on triadic supply chain relationships remains limited compared with dyadic and network studies, despite their relevance for understanding coordination, governance, and performance when third actors are involved. Among triadic studies, service triads are a prominent context. For instance, Suurmond et al. (2022) show that the formation of service triads and the quality of feedback among service buyers, service suppliers, and end users condition operational effectiveness. Karatzas et al. (2020) find that manufacturer-led training in mixed-ownership service networks builds capabilities across partners and improves performance. Together, these studies extend governance and performance considerations beyond the buyer-supplier dyad and make a case for mechanisms that foster coordination and trust across all three nodes.

Resilience is a recurring theme, with contributions suggesting that resilience in triads arises through both operational levers (e.g., extended inventories) and sociocultural levers (e.g., collectivist orientations). Durach et al. (2024) demonstrate that inventory slack at first- and second-tier suppliers buffers upstream disruptions, with measurable consequences for the buyer, highlighting interdependencies across tiers. Razak et al. (2024) extend this logic to agri-food supply chains, showing how collectivist cultural norms in Sub-Saharan Africa facilitate traceability and resilience by reinforcing shared values and relational rents.

A third theme is the diffusion and alignment of practices. Studies indicate that triads are not simply additive versions of dyads, as misalignments and free-riding can undermine collective benefits, while closure can facilitate coordination and diffusion. For example, Falcone et al. (2024a) analyze the diffusion of CSR practices in triads and show that customer-supplier closure

and relational dynamics shape whether firms follow partners or free-ride. Gligor et al. (2022) examine supply chain orientation fit and find that alignment of strategic orientations among triadic partners is central to collaboration and performance.

3.3.2. Overarching theories

Theoretical lenses used in triadic studies reveal distinctive dynamics. Suurmond et al. (2022) combine service operations and business ecosystem perspectives to explain how triads form, function, and exchange feedback within broader ecosystems. Karatzas et al. (2020) apply the Motivation-Opportunity-Ability (MOA) framework to show how manufacturer-led training enhances triadic service performance by shaping motivation and capabilities across partners. In resilience settings, Durach et al. (2024) draw on the Extended Resource-Based View (ERBV) to argue that resource buffers, such as inventories at first- and second-tier suppliers, yield advantages during disruptions. Relational perspectives are also prominent: Falcone et al. (2024a) use the relational view to account for CSR diffusion and the role of closure in promoting cooperation over free-riding, and Razak et al. (2024) mobilize relational arguments to explain how collectivist norms enable traceability and resilience across agri-food triads.

3.3.3. Methodological approaches

Triadic studies employ qualitative and quantitative designs suited to multi-actor coordination and diffusion phenomena. Suurmond et al. (2022) adopt a multiple-case design for service triads in higher education, using cross-case comparison to identify formation and feedback mechanisms. Razak et al. (2024) also conduct a multi-case study of agri-food chains in Sub-Saharan Africa, combining thematic coding with within- and cross-case analyses and using an abductive approach to link evidence to the relational view.

Quantitative work assesses triadic mechanisms at scale. Karatzas et al. (2020) use panel regressions to estimate the effects of manufacturer-led training on service delivery performance. Durach et al. (2024) apply weighted least squares to test how inventories at first- and second-tier suppliers affect buyer performance during disruptions. Falcone et al. (2024a) analyze secondary data to track CSR diffusion patterns across triads, distinguishing cooperative follow-on behavior from free-riding.

3.4. Network supply chain studies

3.4.1. Main research themes

Extending dyadic and triadic perspectives, network research treats supply chains as multi-actor systems in which positions, ties, and structures shape firm behavior and outcomes. From a DTN data perspective, we consider a setting “network-based” when interdependencies among three or more actors are explicitly modeled using relational data, regardless of whether those ties arise in supply, competition, platform, or project contexts. One stream in this domain examines competitive positioning and interfirm rivalry within networks. For example, Andrade-Rojas et al. (2024) show how firms leverage competition networks and IT-enabled operational integration to improve operating performance, while Manchiraju et al. (2023) link network strategy and competitive actions to on-time performance in airlines. Hofer et al. (2022) likewise argue that rivalry is conditioned by network structure and that network competition affects performance.

A second theme focuses on information flows and knowledge spillovers. Fang et al. (2023) document how signals from customer credit markets spill over into supplier valuations, and Marques et al. (2020), together with Palit et al. (2022), show that knowledge diffuses across buyer-supplier, supplier-supplier, and diagonal ties in global networks. Risk transmission follows

similar pathways: Wang et al. (2021) find that financial exposures propagate beyond direct ties, shaped by network characteristics, and Osadchiy et al. (2021) demonstrate that demand shocks in one part of a network amplify variance upstream, producing a system-wide bullwhip effect.

A third set of studies examines network effects and market dynamics, showing how externalities and complementarities shape competitive behavior and pricing strategies. For instance, Wang et al. (2022) analyze indirect network economies in grocery platforms, Liu and Luo (2023) examine network effects in smartphone markets and their implications for dynamic pricing, and Zheng et al. (2024) assess how refurbished products interact with standard competition in markets with strong network effects.

Network governance is a fourth theme. Roehrich et al. (2023) explain how task complexity in large inter-organizational projects shapes governance architectures. In global supply networks, Diebel et al. (2024) show that suppliers mimic environmental disclosures, and Falcone and Ridge (2024b) find that CSR conformity is associated with firms' network prominence and partner practices. In humanitarian settings, Quarshie and Leuschner (2020) describe how government agencies coordinate disaster response with NGOs and private actors.

Finally, scholars have examined structure, resilience, and learning, arguing that supply chain networks can be viewed as dynamic systems in which structure, governance, and interaction patterns shape resilience and performance. Wiedmer and Griffis (2021) characterize topological complexity in supply networks; Chen et al. (2022) introduced "*supply network resilience learning*," showing how networks improve robustness following disruptions; and DuHadway and Narasimhan (2021) examine opportunism in automotive recall networks, revealing oscillations between control and subversion. More recently, Guntuka et al. (2024b)

studied “*supply chain plasticity*”, documenting how firms reconfigure network ties over time in response to disruptions.

3.4.2. Overarching theories

Network-focused studies draw on theories that foreground structure and interdependence. A core stream builds on network and embeddedness perspectives, linking centrality, tie strength, and position to outcomes. Andrade-Rojas et al. (2024) integrate embeddedness and synergy arguments to show how IT investments amplify the benefits of competition-network positions, and Li and Shou (2024) highlight centrality and tie strength in temporary project networks. Potter and Wilhelm (2020), Wiedmer and Griffis (2021), and Quarshie and Leuschner (2020) apply network theory to supplier-supplier innovation and disaster-response orchestration.

Institutional and legitimacy lenses explain convergence and disclosure. Diebel et al. (2024) analyze how institutional logics shape suppliers’ environmental disclosure across global networks, and Reusen et al. (2020) examine the imitation of management practices. Related work mobilizes signaling and congruence arguments in network contexts: Kumar et al. (2023) link network instability to pricing through signaling mechanisms, and Liu et al. (2021) use congruence theory to study CSR misalignment at the network scale.

Researchers also used social network theory and actor-network perspectives to explain diffusion and innovation. Marques et al. (2020) and Son et al. (2024) analyze knowledge diffusion and innovation leveraging network ties. Hald and Spring (2023) used Actor-Network Theory to theorize heterogeneous actants in SCM.

Competition and market-structure perspectives complement these views. Lim et al. (2021) build on spatial competition to study warehouse-club retailing; Hofer et al. (2022) draw on competitive dynamics to link networked rivalry with performance; and Grieser et al. (2022)

examine product-market competition in industry networks. Liu and Luo (2023) analyze network concentration and dynamic pricing, and Boehm and Sonntag (2023) explain vertical integration using M&A arguments.

Finally, risk and resilience theories inform work on propagation, adaptation, and learning. Wang et al. (2021) ground risk propagation in supply chain risk management; Chen et al. (2022) theorize resilience learning; Osadchiy et al. (2021) frame the bullwhip effect as a network phenomenon; and DuHadway and Narasimhan (2021) theorize fraud and oscillatory opportunism in recall networks.

3.4.3. Methodological approaches

Network studies used various methods including quantitative, simulation, and qualitative approaches, suitable for structural and diffusion research. Many utilized longitudinal panels and regression analyses with secondary or archival data. Wang et al. (2021), Liu and Luo (2023), Boehm and Sonntag (2023), Grieser et al. (2022), and Osadchiy et al. (2021) examined how network structure relates to risk, pricing, and behavior through econometric techniques. Hu et al. (2024) developed a new method to map the liabilities network among financial institutions. They identified a borrower-lender network with the worst expected losses to assess the significance of network structure, especially in regulations where risk-taking is constrained by each institution's conditional value-at-risk. Fang et al. (2023) used lead-lag models to link credit-default-swap movements to supplier stock prices. Lim et al. (2021) used a quasi-experimental difference-in-differences design with bootstrapping to analyze spatial competition. Likewise, Arora et al. (2025) used the FactSet Revere and SDC Platinum databases and employed a staggered difference-in-differences approach to examine vertical mergers between firms and other entities within supply networks. Other studies construct networks from industry settings (e.g., Li &

Shou, 2024) or combine multi-source surveys with response-surface methods (e.g., Liu et al., 2021).

A second cluster uses simulation to study dynamic processes and counterfactuals. Xu and Bhattacharyya (2021) apply stochastic actor-based models with MCMC simulations to analyze taste transitivity in networked consumer dynamics. Chen et al. (2022) and DuHadway and Narasimhan (2021) develop agent-based simulations to examine resilience learning and opportunism in recall networks.

A smaller stream employs qualitative or mixed-method designs to capture mechanisms that are difficult to observe quantitatively, revealing interaction patterns and governance processes that complement large-sample and simulation studies. For example, Quarshie and Leuschner (2020) provide a grounded-theory analysis of disaster-response networks. Similarly, Villena and Gioia (2018) examined archival data, field notes, and interviews from three multinational corporations and their tier-one and lower-tier suppliers and found that many lower-tier suppliers address labor and environmental issues passively rather than actively. Marques et al. (2020) combine a longitudinal case design with social network analysis, while Razak et al. (2024) use multi-case comparison with abductive coding to connect cultural factors to resilience.

3.5. Synthesis of findings

The synthesis across studies shows that dyadic, triadic, and network designs reveal different underlying mechanisms, not just different scales. Dyadic research is most effective when focusing on bilateral reciprocity, contracting decisions, and perception alignment between two parties. Triadic approaches are essential when a third actor influences value creation or governance—for example, through intermediation, service co-production, or tiered buffering—

since the main phenomenon cannot be understood from just two bilateral connections. Network analyses are appropriate when outcomes depend on structural position, path-dependent diffusion, or exposure beyond immediate partners. The themes in Figure 1 highlight this distinction in mechanisms across units of analysis, rather than a simple progression from dyads to networks.

Comparing theories across different designs helps clarify these distinctions. Economic governance and power perspectives are predominant in dyadic research, where risks and protections are defined for each party. Triadic studies incorporate ecosystem, MOA, and relational view theories to better understand mediated coordination and diffusion processes. Network research employs embeddedness, institutional, and competition theories to connect a firm's position, closure, and externalities to its performance. This distribution highlights possible areas of misalignment. For example, it includes applying dyadic data to assess network-level concepts such as position or closure, or using network theories to predict firm outcomes without considering structural measures.

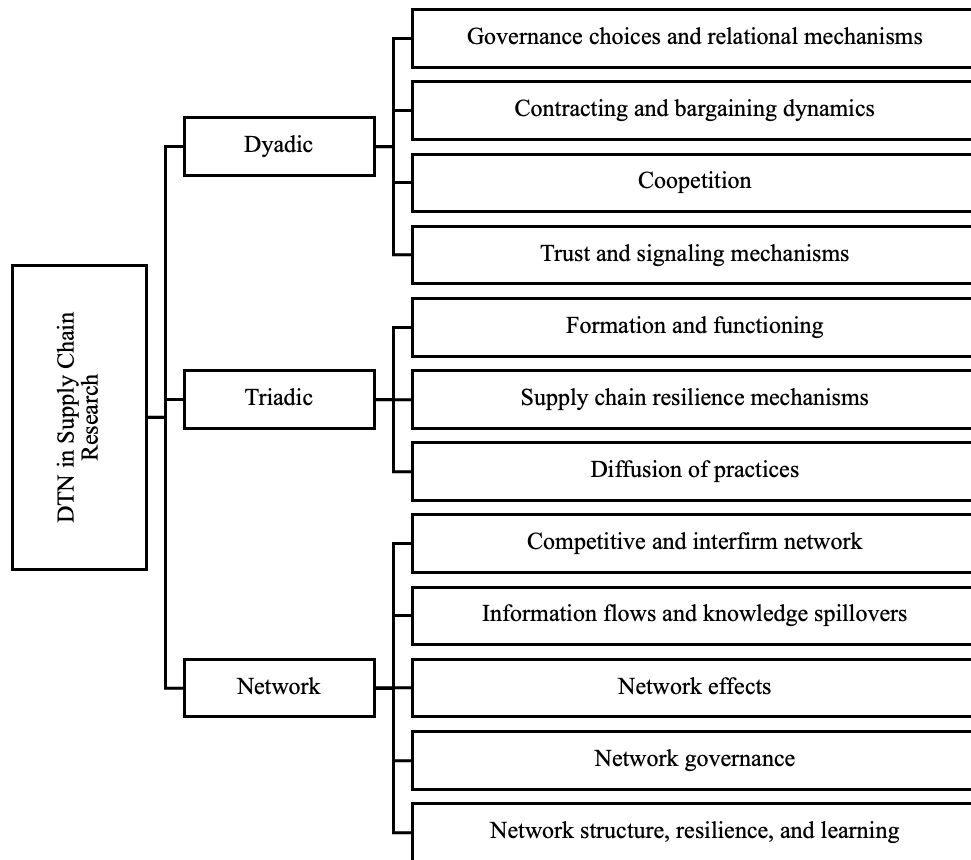


Figure 1. Key themes in Dyadic, Triadic, and Network (DTN) research.

Methodological choices also reflect these theoretical distinctions. Experiments, dyadic surveys, and bilateral panel designs continue to serve as the primary methods for studying dyads, allowing precise analysis of reciprocity, contracting, and congruence. Triads are mainly examined through case studies or small-sample panel designs, due to access limitations and the necessity to observe mediated interactions directly. Network research frequently relies on archival panels, structural estimation, and simulation to analyze diffusion, externalities, and resilience learning. This pattern is more than just technical; each approach tends to favor different strategies for identifying and addressing validity threats, such as single-informant bias

in dyads, missing-node bias in triads, and gaps between constructs and measures related to network position.

Table 2 consolidates these differences. Two gaps stand out. First, triadic designs remain uncommon despite their high theoretical importance, even for questions that explicitly involve intermediaries or second-tier effects. Second, many studies on networks often use limited structural instrumentation when modeling firm-level outcomes, which limits the interpretation of mechanisms based on position. These insights motivate the design recommendations discussed in the next section.

Table 2. Comparative dimensions of DTN research designs in SCM³.

Dimension	Dyads	Triads	Networks
Key themes	Governance choices and relational mechanisms, contracting and bargaining dynamics, coopetition, trust and signaling mechanisms	Formation and functioning of triads, supply chain resilience, diffusion of practices	Competitive and interfirm network, information flows and knowledge spillovers, network effects, network governance, network structure, resilience, and learning
Overarching theories	Transaction cost economics, resource dependence theory, behavioral theory, trust and social exchange, congruence theory, signaling theory, belief-action-outcome model	Motivation-Opportunity-Ability, Extended Resource-Based View, Relational View	Synergy theory, institutional theory, social network theory, competitive dynamics, meso-level resilience strategies
Methodologies	Behavioral experiments, panel data econometric models, laboratory experiments comparing contract structures, long-horizon event studies with matched dyads, multi-source dyadic surveys using polynomial regression and response surface modeling, multiple case studies	Qualitative multi-case studies of service triads, Panel data regression, thematic analysis with abductive coding	Longitudinal panel data studies on network positions, Structural estimation models in industries, Quasi-experimental designs with difference-in-differences (DID), Stochastic actor-based network models with MCMC simulations, multi-method approaches combining surveys, case studies, and network analysis, grounded theory studies, content analysis of secondary and unstructured datasets, agent-based simulations
Unit of analysis	Buyer–supplier dyads (firm–supplier pairs, cross-border transactions, major customers, container shipping dyads, technology-intensive industries, outsourcing relationships, NPD projects, IT outsourcing contracts, manufacturer–3PL dyads in reverse supply chains, multiparty alliances including buyer–supplier and supplier–supplier ties). Units include contract decisions across periods, firm–rival matched dyads, and firm–year supplier–customer relationships.	Service triads (buyer, supplier, end user) as operational entities; company-owned vs. outsourced service units with KPIs; upstream triads in agriculture (e.g., Ghana’s cocoa and fruit chains); buyer–first-tier–second-tier supplier triads.	Industry-level networks (movie production and distribution teams, video game product networks, tablet product networks); supply networks of focal firms (tier-1 and tier-2 relationships); global food retail networks (RetailCo); interorganizational disaster response networks (state as focal actor); user–movie dyads in taste networks; consumer–vendor platform interactions; household-level shopping activities and retail competition; airline-month operational networks; smartphone pricing networks; stochastic actor-based supply chain networks; simulations of Honda and Toyota networks.

³Given the breadth of information reviewed, we intentionally limit Table 2 to analytically central dimensions to preserve readability in the main narrative. Detailed information on data sources, variable constructions, and software tools is reported in online supplementary material (Table OA2).

4. Positioning the Special Issue: DTN in the International Journal of Production Economics

Because this article complements and introduces an SI in IJPE, it is useful to show how the issue connects to the journal's existing work on multi-tier relationships and related DTN questions. We therefore examine IJPE separately, applying the same search terms and screening logic used in Section 3. The purpose is not to extend the structured review, but to situate the SI in relation to IJPE's recent literature.

4.1. IJPE's trajectory on multi-tier relationships and DTN-relevant research

Applying the same search terms and screening logic used in *Section 3* to IJPE, we identified 22 papers published between 2018 and 2025. After screening for fit with our focus and excluding the papers included in this SI, 11 articles were retained for this section. These articles reflect several of the same patterns identified in *Section 3*.

The earlier IJPE contributions, many of them associated with the 2019 virtual special issue on multi-tier sustainable supply chain management⁴, mainly framed the sustainability problem across tiers and its managerial implications. They emphasized how limited a focal firm's visibility and influence often are beyond the first tier. These researchers called for multi-tier governance and leadership, and proposed practical approaches (e.g., cascading requirements) to make deep-tier sustainability more manageable in mineral and emerging-economy supply chains (see Sarkis et al., 2019; Jia et al., 2019; Sauer & Seuring, 2019). In parallel, IJPE has expanded

⁴ Link to the special issue <https://www.sciencedirect.com/journal/international-journal-of-production-economics/vol/217/suppl/C>

the multi-tier lens beyond material and information flows by examining financial interdependence through a network perspective on supply chain finance (e.g., Wetzel & Hofmann, 2019).

More recent IJPE work moves beyond framing the multi-tier challenge and begins to explain how network structure, governance, and capability shape outcomes. These studies treat supply chains less as linear chains and more as relational systems, linking features such as complexity, density, clustering, and cultural interconnectedness to environmental and economic performance. They also show that these effects are not uniform, but often nonlinear and contingent on context (Adhikary et al., 2020; Lin et al., 2021; Sharma et al., 2022). Other studies highlight the role of technology-enabled visibility, including satellite remote sensing, as well as the cross-firm capabilities needed to identify and manage sustainability risks in upstream tiers (Heldt & Beske-Janssen, 2023).

Overall, IJPE's 2018-2025 body of work provides a clear context for the SI. The journal has clearly already created space for research that moves beyond dyadic assumptions and takes multi-tier structure, governance, visibility, and interdependence seriously. The papers in this SI build on that trajectory while pushing further on the design and use of DTN data.

4.2 How the Special Issue advances the DTN conversation

Building on the themes in IJPE's recent DTN-relevant work (Section 4.1) and the design logic developed in Sections 2 and 3, the manuscripts in this SI engage three recurring challenges: theorizing interdependence and structure, meeting higher standards for measurement rigor, and managing the feasibility constraints that make multi-party data difficult to obtain. The contributions do not assume that collecting data from more than one actor is automatically better.

Instead, they argue that multi-party data are valuable, especially when the theory implies interdependence (e.g., reciprocity, mediation, network position) and when the data structure matches the mechanism being tested. *Table 3* summarizes the SI papers and situates them within this DTN design logic. Across the nine papers, three contributions emerge as especially noteworthy.

First, the SI advances methodological rigor by addressing asymmetry in matched data, a longstanding source of bias in buyer-supplier relationship research (Park et al., 2018). Several manuscripts strengthen dyadic inference by addressing a central validity challenge in multi-party designs: matched reports are often asymmetric and not directly interchangeable. For example, Sodhi (2025) advances dyadic measurement by introducing a metric and statistical test that detects meaningful asymmetry in matched-pair data, thereby reducing construct-measure mismatch in dyadic survey designs. Building on the same concern with reciprocity and non-equivalence, Lee et al. (2025) use paired survey data to show how procedural and interactional justice shape responses to disruption and how these effects vary with relational embeddedness, an argument that relies on observing both sides of the relationship rather than relying on a single informant. Xu et al. (2025) likewise leverage matched buyer-supplier dyads to examine power imbalance and suppliers' financial flexibility, clarifying when flexibility buffers the adverse consequences of asymmetry and reinforcing the value of dyadic designs for theorizing dependence and bargaining.

A second set of contributions demonstrates how DTN designs can be combined with emerging data sources (particularly text and event-based data) to study information flows and spillovers across firms. Du et al. (2025) operationalized customers' MD&A sentiment as a downstream demand signal and linked it to upstream inventory dynamics associated with the

bullwhip effect, illustrating how textual measures can be embedded in a dyadic structure to capture interfirm information transmission. Wang et al. (2025) examined reputational spillovers from negative publicity and demonstrated that adverse information propagates to both suppliers and customers, with distinct temporal patterns, highlighting that supply chain risk transmission can operate through informational and market channels that extend beyond the focal firm.

Finally, this SI provides clear examples of when moving beyond dyads is not optional but required by the mechanism, either because the phenomenon is explicitly multi-tier or because effects are structural. For example, Liu et al. (2025) extend analysis from buyer-tier-1 dyads to buyer-tier-1-tier-2 configurations using multi-tier network data, linking centrality at multiple positions to buyer financial performance and showing that payment practices (e.g., timely supplier payment) condition these relationships. Zhang et al. (2025) offer a process account of how digital transformation diffuses across tiers, identifying how focal firms and first-tier suppliers shape upstream adoption as initiatives move beyond the first tier. Liang (2025) connects dyadic dependence (customer and supplier concentration) to network positioning by examining productivity implications and the moderating role of network dominance. Finally, Kuo et al. (2026) link upstream and downstream disruption behaviors by pairing retailer forward buying with consumer reactionary buying, demonstrating a feasible multi-party approach to capturing coupled supply- and demand-side dynamics that single-actor designs would miss.

One final point concerns the DTN design. While the SI includes several dyadic studies and various network or multi-tier structures, it lacks a paper that uses a fully triadic empirical approach. Kuo et al. (2026) is the closest, as it links upstream and downstream behaviors using paired retailer–consumer data, but the primary unit remains dyadic rather than triadic. This

absence highlights the gap noted in Section 3.5: triadic designs remain relatively underutilized, even when third-actor mediation or tiered buffering is conceptually relevant.

Table 3. Overview of special issue papers and alignment with DTN research designs

Special Issue article	DTN design	Data (source and type)	Methodology	Mechanism / contribution to DTN research
Sodhi (2025)	Dyad	Matched-pair dyadic data; develops and validates an asymmetry metric for matched pairs	Metric development; statistical test; empirical illustration	Introduces an asymmetry metric (and significance test) to improve inference when partners' reports diverge and to reduce construct–measure mismatch in dyadic studies
Lee et al. (2025)	Dyad	Paired survey data (manufacturers and key buyers)	Dyadic hypothesis testing; moderation	Shows how procedural and interactional justice shape disruption response and how embeddedness conditions these effects, illustrating why reciprocal constructs require both sides' data
Xu et al. (2025)	Dyad	Matched buyer–supplier dyads	Dyadic econometric/hypothesis testing	Examines power imbalance and supplier financial flexibility, distinguishing customer vs. supplier power and identifying when flexibility buffers the effects of asymmetry
Du et al. (2025)	Dyad	Supplier–customer panel paired with textual demand signals (customer MD&A sentiment)	Text-based measure construction; panel analysis	Links downstream narrative signals to upstream inventory dynamics associated with the bullwhip effect, illustrating a text-enabled dyadic information-transmission mechanism
Wang et al. (2025)	Network	Supply chain ties combined with negative publicity events	Event-based spillover analysis	Demonstrates reputational spillovers to both suppliers and customers, with distinct temporal patterns-evidence of information transmission beyond the focal firm
Liu et al. (2025)	Network	Multi-tier supply network (buyer-tier-1 and tier-1-tier-2 linkages)	Network metric construction; panel analysis	Extends centrality–performance logic to multi-tier positions and shows that timely supplier payment conditions the performance implications of multi-tier network structure
Zhang et al. (2025)	Network	Multi-tier supply chain cases (cross-tier relationships)	Multiple-case study	Develops a process account of cross-tier diffusion of digital transformation and identifies the roles of focal firms and tier-1 suppliers in enabling diffusion and monitoring
Liang (2025)	Dyad	Customer and supplier concentration measures with network-position contingencies	Archival econometric analysis	Connects dyadic dependence to productivity and shows how network dominance moderates the dependence–performance relationship
Kuo et al. (2026)	Dyad (two-sided pairing)	Two-sample design: retailer behavior and consumer behavior (disruption context)	Survey-based analysis; moderated mediation; ridge regression	Links upstream forward buying and downstream reactionary buying, illustrating coupled multi-party disruption dynamics that single-actor designs would miss

5. Recommendations for Designing Multi-Party Data Studies

Building on the review in Section 3 and the SI evidence summarized in Section 4, we now translate these insights into practical guidance for designing multi-party studies. Specifically, we discuss when dyadic, triadic, and network designs are appropriate and outline the key methodological and conceptual challenges they raise.

5.1. When should SCM researchers choose multi-party data designs?

The choice among dyadic, triadic, and network designs should be driven by *the mechanism implied by the theory* and the *level at which focal constructs are defined*, rather than by data availability or an assumed progression from dyads to networks. A useful starting question is whether the focal mechanism is (i) reciprocal and bilateral, (ii) mediated through a third actor, or (iii) structural and system-level (e.g., diffusion, spillovers, or indirect exposure). *Table 4* summarizes common theoretical themes in DTN research and the minimum data structure typically required to test them credibly.

Dyadic designs are appropriate when the focal constructs are enacted within a bilateral relationship, e.g., commitment, relational norms, contract choice, safeguards, and power asymmetries. These designs are particularly useful in settings in which bilateral coordination directly shapes quality, efficiency, and performance (e.g., Reusen et al., 2020; Susarla et al., 2020). When the constructs are theorized as mutual (e.g., trust congruence, reciprocity, perceived fairness), collecting data from both sides strengthens construct validity and reduces the risk of single-informant bias.

Triadic designs are warranted when a third actor is part of the mechanism rather than the setting because it mediates value creation, channels information, enables or constrains

coordination, or buffers disruption across tiers. In these cases, the phenomenon cannot be recovered from two bilateral links in isolation. Accordingly, triadic designs fit mechanisms such as intermediation in service triads, tiered buffering during disruptions, and practice diffusion processes in which closure and alignment across all three actors shape outcomes (e.g., Gligor et al., 2022; Suurmond et al., 2022; Durach et al., 2024; Falcone et al., 2024a). Relative to dyadic work, triadic studies also require explicit justification of why the third actor is mechanism-relevant (not simply “present”) and clear specification of the roles and ties that define the triad.

Network and multi-tier designs are required when outcomes depend on indirect exposure, diffusion, or positional advantage rather than on a single relationship. Research questions about knowledge and information flows, risk propagation and resilience, reputational spillovers, and the diffusion of sustainability practices typically require structural measures (e.g., centrality, closure, brokerage) and network boundary decisions that match the theorized mechanism (Fan et al., 2024; Jacobs & Watts, 2021; Song et al., 2023). Network-level observation is necessary when governance is conceptualized as an architecture spanning multiple organizations or projects, because the unit of analysis must align with the governance claim (Roehrich et al., 2023). The same logic applies when competitive positioning or interdependence is theorized at the network level (Andrade-Rojas et al., 2024). As our review shows, studies that invoke network mechanisms without operationalizing structural variables leave “network effects” (almost) impossible to evaluate empirically.

Table 4: Mechanism–design alignment: selecting dyadic, triadic, and network data structures in SCM research.

Mechanism / theoretical theme	Typical focal constructs	Where the focal constructs “live”	Minimum unit of analysis and data structure	What the design should make observable (what to show reviewers)	Illustrative examples
Relational reciprocity and mutuality (SET and related relational lenses)	Trust, reciprocity, commitment, relational norms, perceived fairness; also <i>governance as exchanged obligations</i>	Primarily relationship-level (mutual or comparative perceptions across parties); some components are actor-level but theorized as reciprocal	Dyad (matched buyer–supplier); Triad when reciprocity or coordination involves a third actor (e.g., an intermediary shaping obligations)	Demonstrate matched pairing, justify whether you model <i>mutual levels</i> (aggregation/congruence) or <i>asymmetries</i> (differences), and address single-informant bias where applicable	Reusen et al. (2020); Wang et al. (2023); Taubeneder et al. (2024); Falcone et al. (2024a)
Governance, safeguards, and opportunism (TCE/RDT and economic governance lenses)	Contract design/completeness, safeguards, monitoring/enforcement, opportunism, power asymmetry, dependence	Often dyad-level (governance is enacted between two parties), but can become triad-/network-relevant when governance is mediated or cascades across tiers	Dyad for bilateral contracting and enforcement; Triad when a third party materially shapes governance (e.g., project or service constellations); Network/multi-tier when hazards and safeguards propagate beyond a single dyad	Make explicit whether governance is conceptualized as bilateral or cascading; avoid claiming multi-tier governance effects without observing relevant tiers; specify whether governance is measured as <i>objective arrangements</i> vs <i>perceived effectiveness</i>	Susarla et al. (2020); Roehrich et al. (2023); Fan et al. (2024)
Information asymmetry, signaling, and information processing across interfaces	Information sharing/quality, transparency, interpretive differences, signaling credibility, demand visibility, bullwhip-related mechanisms	Typically actor-to-actor (sender/receiver roles) and dyad-level (shared/discordant interpretations); can become network-level with spillovers	Dyad when the mechanism is sender–receiver; Network when the mechanism is spillover or diffusion beyond direct ties	Show how the empirical structure matches the mechanism (e.g., sender measures + receiver outcomes, timing/lag structure), and avoid using “network” language unless structural exposure is observed or modeled	Chae et al. (2020); Wang et al. (2022); Andrade Rojas et al. (2024)

Risk propagation and resilience coordination	Disruption exposure, buffering, recovery, redundancy, resilience learning; risk perception and response alignment	Can be dyad-level (bilateral risk sharing/coordination), triad-level (tiered buffering or mediated response), or network-level (propagation, indirect exposure)	Dyad when coordination is bilateral; Triad when tier-2 or intermediary mechanisms are central; Network/multi-tier when outcomes depend on indirect ties and propagation	Establish the boundary of the risk mechanism (direct vs indirect exposure), justify tier coverage (who must be observed), and avoid focal-firm narratives when propagation is theorized	Durach et al. (2024); Wang et al. (2021); Fan et al. (2024)
Structural embeddedness and positional advantage (SNT/embeddedness perspectives)	Centrality, brokerage, closure, structural holes, network density; exposure to indirect ties	Network-level by definition; some mechanisms can be expressed as triadic structures (e.g., closure/brokerage)	Network for claims about position and indirect exposure; Triad for mechanisms that are explicitly triadic (closure, brokerage)	Provide explicit structural measures (not just labels), explain network construction and missing-node implications, and align outcomes to the structural mechanism claimed	Jacobs & Watts (2021); Liu & Luo (2023); Zheng et al. (2024)
Institutional pressures and sustainability diffusion across tiers	Coercive/normative/mimetic pressures, compliance, sustainability/ESG practices, buyer requirements and cascading adoption	Often actor-level (pressures perceived by each tier), with diffusion as a relational/network process	Dyad when the mechanism is buyer-driven compliance in a focal relationship; Triad/network when diffusion/cascade to tier-2+ is theorized	Distinguish “pressure on actor” from “diffusion process”; use triadic/network observation when you claim cascading effects; define tier boundaries and how compliance is observed	Song et al. (2023); Liu et al. (2021); Diebel et al. (2024); Mukandwal et al. (2020); Falcone et al. (2024b)

5.2. Methodological challenges and considerations

After choosing an appropriate DTN design, researchers typically face three practical problems: recruiting and matching multiple actors, analyzing interdependent and asymmetric data, and clearly stating what the design cannot observe when full multi-party coverage is infeasible. These choices shape what can be identified and how the findings should be read. Section 3.5 highlighted two common weaknesses: limited use of triadic designs when mechanisms are mediated and network claims made without structural measurement. The recommendations below try to address these weaknesses.

5.2.1. Data collection

Collecting consistent and comparable evidence from multiple actors is logistically demanding. Coordinating participation across buyers, suppliers, and intermediaries is particularly challenging in large samples and multi-tier settings (Culot et al., 2023). As a result, researchers often limit primary data collection to strategically important dyads or triads (Reusen et al., 2020) and use secondary or archival sources to extend coverage (Mukandwal et al., 2020). When researchers rely on secondary data to scale DTN designs, coverage, completeness, and cross-source comparability should be treated as explicit design choices, and any resulting limitations should be reported transparently.

Confidentiality concerns further constrain participation, especially when studies address opportunism, governance, or performance (Roehrich et al., 2023). Access frictions can be reduced through clear anonymity protections, trusted intermediaries (e.g., industry associations), and early communication of data-handling procedures (Azadegan & Dooley, 2021). Respondent selection and unit definition are equally consequential: the empirical unit should match the theorized relationship (e.g., a strategically significant supplier relationship rather than a generic

“supplier contact”) to avoid construct-unit mismatch (Falcone et al., 2024b). Finally, accurate matching is essential in dyadic and triadic designs; mismatched units weaken inference about reciprocity, congruence, and asymmetry. Unique identifiers, disciplined coding protocols, and verification checks help reduce matching errors (Fan et al., 2024).

5.2.2. Analytical and statistical treatment

Analytical challenges emerge once multi-party data are collected and matched. A first decision is how to represent information reported by multiple actors. Researchers must determine whether to aggregate perceptions (e.g., averages), model asymmetry directly, construct distance measures, or estimate actor-specific effects. Each choice carries different implications for the theoretical test. Aggregation can mask meaningful disagreement; difference or distance scores can collapse substantively different configurations into a single value; and estimating separate models for each side can ignore relational dependence between partners (Wang et al., 2021). Accordingly, authors should explain how the chosen representation follows from the theorized mechanism and report robustness checks that assess whether key conclusions depend on a particular operationalization.

A second issue concerns interdependence. Buyer and supplier behaviors are often jointly determined, which violates the independence assumptions underlying conventional regression models. If such dependence is ignored, standard errors and, in some cases, coefficient estimates may be biased (Krause et al., 2007). Designs in which dyads (or triads) share a focal actor or in which observations are nested within a supply base are especially vulnerable to these problems. In these settings, researchers should use estimation approaches that account for dependence and clustering (e.g., multilevel specifications, clustered standard errors, or other dependence-robust models), consistent with the structure of the data.

Finally, there is the issue of measurement equivalence across respondent groups. Without evidence of measurement invariance, observed differences between, e.g., buyers and suppliers may reflect differences in how scale items are interpreted rather than substantive relational dynamics (Rungtusanatham et al., 2014). Multi-group confirmatory factor analysis and related invariance tests can strengthen construct validity and improve interpretability, particularly when the research question requires comparing perceptions across sides of the relationship.

5.3. Conceptual challenges

Multi-party designs also create conceptual alignment problems that are difficult to repair once the study is underway. The central requirement is alignment among the theoretical lens, construct definitions, and the unit of analysis. Bilateral reciprocity and contracting call for dyadic observation; mediation by a third actor calls for triadic observation; and mechanisms rooted in structural exposure, diffusion, or positional advantage require network measures. Our review and the SI contributions suggest that credibility erodes when studies rely on dyadic proxies to make network claims, or when they invoke network theory without operationalizing structural constructs (Rungtusanatham et al., 2014; Ketokivi & Choi, 2014). *Table 5* summarizes these challenges and corresponding remedies.

The first challenge is to justify the design level implied by the chosen theory. TCE, for example, is oriented toward bilateral exchange hazards and the governance choices used to mitigate opportunism under asset specificity and uncertainty (Williamson, 2010; Grover & Malhotra, 2003). Extending TCE to the network level, therefore, requires an explicit argument for why hazards propagate across tiers and why governance should be conceptualized (and measured) beyond a focal dyad. Studies that develop such extensions, for example by theorizing

multi-tier diffusion of risk and safeguards, provide a defensible rationale for network designs (Carter et al., 2015; Azadegan & Dooley, 2021).

A second challenge is to define the unit of analysis with enough precision that readers can interpret the constructs and claims. Referring to “buyer-supplier dyads” without specifying whether the dyad represents a strategic partnership, an operational exchange, or a contract instance leaves ambiguity about which governance and behavioral mechanisms are being studied. Prior work shows that relationship form conditions governance, trust, and performance (Heide & John, 1992; Gulati & Sytch, 2007). Clear inclusion criteria (e.g., relationship scope, duration, spend criticality, or contract type) help align constructs with empirical observation and allow readers to assess external validity.

A third recurring issue is construct-measurement mismatch. If trust is theorized as mutual and co-constructed but measured only from the buyer, the empirical construct becomes “buyer-perceived trust.” That shift in meaning should be stated explicitly, or the study should obtain multi-respondent measurement consistent with the theoretical definition. Otherwise, construct validity is compromised, and claims about reciprocity become difficult to interpret (Cao & Lumineau, 2015). When multi-party observation is infeasible, studies should i) label constructs as actor-specific, ii) model asymmetry directly (e.g., buyer vs. supplier), and iii) clearly acknowledge what cannot be inferred from one-sided data (Krause et al., 2007; Fan et al., 2024).

Table 5. Conceptual challenges and recommendations for multi-party SCM research.

Conceptual challenge	Example	Recommended solutions
Misalignment between theory and data structure	Invoking SET while treating a triadic setting as inherently “triadic,” without specifying which reciprocal obligations are theorized to operate across which pair(s) (e.g., buyer-supplier vs. buyer-3PL).	Link the data structure to the mechanism implied by the theory. Specify which relationships carry the focal reciprocal process and collect dyadic, triadic, or network data accordingly (e.g., dyadic data for buyer–supplier reciprocity; triadic data when the third actor is part of the reciprocal mechanism).
Ambiguous unit of analysis	Referring to a “buyer-supplier dyad” without clarifying whether the unit is a strategic partnership, a transaction/exchange episode, or a contract instance.	Define the unit of analysis in terms of the theorized relationship and provide inclusion criteria (e.g., relationship scope, duration, spend criticality, or contract type) so that constructs and empirical observation align.
Constructs and measurement mismatch	Theorizing trust as mutual/co-constructed but measuring only buyer-reported trust, then interpreting results as relationship-level trust.	Align measures with construct definitions. If a construct is theorized as mutual, obtain matched measures (or model asymmetry directly). If only one side is observed, label the construct as actor-specific (e.g., “buyer-perceived trust”) and bound claims accordingly.

6. Conclusions and Implications for Research Design in SCM

This introductory article to the IJPE SI on multi-tier supply chain relationships makes a straightforward argument as its main contribution to knowledge: *when the mechanism is relational or structural, the empirical design must observe more than one actor*. DTN designs are therefore not a stylistic choice meant to “add richness,” but a requirement for testing the mechanism implied by the theory. Our structured review (Section 3) shows that DTN designs are increasingly used in core SCM outlets, yet recurring frictions remain, particularly around feasibility, clarity about the unit of analysis, and the tendency to infer multi-actor mechanisms from one-sided measures. The SI papers (Section 4) complement this evidence by demonstrating

designs that are both credible and workable, including approaches that leverage archival, textual, and event-based sources beyond traditional single-respondent surveys.

Several implications follow for how DTN studies should be designed and evaluated. One concern is how multi-party data are represented analytically. Multi-party designs are most informative when they preserve, rather than average, interdependence and asymmetry. The SI illustrates this point by treating dyads as paired perspectives instead of collapsing them into a single relationship score and by modeling disagreement, nonlinearity, or threshold effects as theoretically meaningful. For example, Lee et al. (2025) show that buyers and suppliers can differ in how justice relates to embeddedness and how embeddedness shapes disruption response, patterns that would be difficult to recover from a unilateral design. Related work strengthens dyadic inference by proposing an explicit metric for asymmetry in matched-pair data, allowing researchers to operationalize divergence rather than treat it as measurement noise (Sodhi, 2025).

A second implication concerns the boundary between dyadic and network logic. A recurring weakness in the literature is to motivate a network mechanism but then operationalize it with dyadic proxies, or to label effects as “network” without measuring structural exposure. Several SI papers present more explicit, mechanism-driven strategies, either by quantifying structural exposure through network measures when diffusion or spillovers are assumed, or by limiting theoretical claims to the dyadic level when data and observations are unavailable. For example, Liang (2025) examines how customer and supplier concentration shape productivity and shows that the focal firm’s dominant network position moderates these effects, integrating dyadic dependence with network structure rather than substituting one for the other. Other papers adopt explicitly multi-tier network designs to model diffusion and spillovers, including process evidence on how digital transformation diffuses across tiers (Zhang et al., 2025) and event-based

evidence that adverse information can transmit across supply chain relationships beyond the focal firm (Wang et al., 2025).

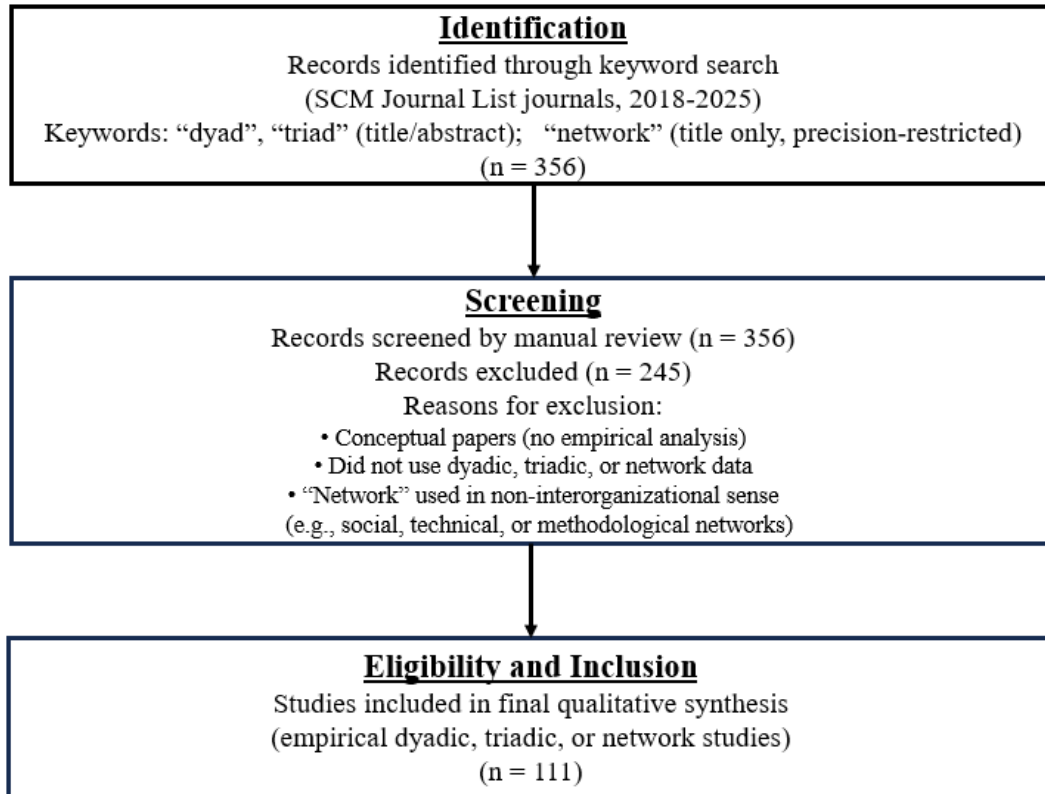
A further implication is pragmatic: feasibility constraints are real, but the appropriate response is rarely to revert to single-informant designs without redefining what can be claimed. A common and scalable alternative is to pair actors using archival and secondary sources when matched surveys are infeasible. The SI provides multiple examples of dyadic pairing through disclosed supplier-customer ties and longitudinal panels. Du et al. (2025), for example, use supplier-customer matching to link customers' forward-looking disclosure sentiment to upstream inventory dynamics associated with the bullwhip effect. Xu et al. (2025) use matched buyer-supplier data to examine how power asymmetries relate to suppliers' financial flexibility and when flexibility buffers the adverse consequences of imbalance. These studies also highlight an important requirement for theory-data alignment: when dyads are constructed from archival ties, authors must be precise about what the tie represents (e.g., "top customers," "main suppliers," transaction-based relationships) and which elements of the mechanism can (and cannot) be observed with those measures.

For researchers (and reviewers evaluating DTN studies), the practical takeaway is that DTN research is best planned as a sequence of design commitments. Scholars must specify the mechanism, identify constructs at the appropriate level, select a unit of analysis that can test that mechanism, define the boundaries of the relationship, and then decide how to pair actors and address threats of dependence and identification. Appendix C translates these commitments into a short checklist that can be used both *ex ante* (to design a study) and *ex post* (to evaluate whether theory, measurement, and data structure are aligned). The checklist also provides a transparent way to justify compromises when ideal multi-party observation is not feasible.

Looking forward, the most promising opportunities are not simply “more multi-party studies,” but more consistent theory-design matching in settings where multi-tier interdependence is central. Two directions are especially important. One is to expand triadic and multi-tier designs when intermediation, tiered buffering, or diffusion is part of the mechanism, rather than approximating these processes with bilateral proxies. The other is to strengthen identification in network and multi-tier work by combining structural measurement (who is connected to whom, across which tiers) with credible causal strategies and careful treatment of missing nodes, selection into relationships, and time-varying dependence. Progress on these fronts should make empirical SCM research more credible theoretically and more useful for managers operating in supply chains where outcomes are rarely driven by one actor’s choices alone.

APPENDIX A. Identification and Screening of DTN Studies

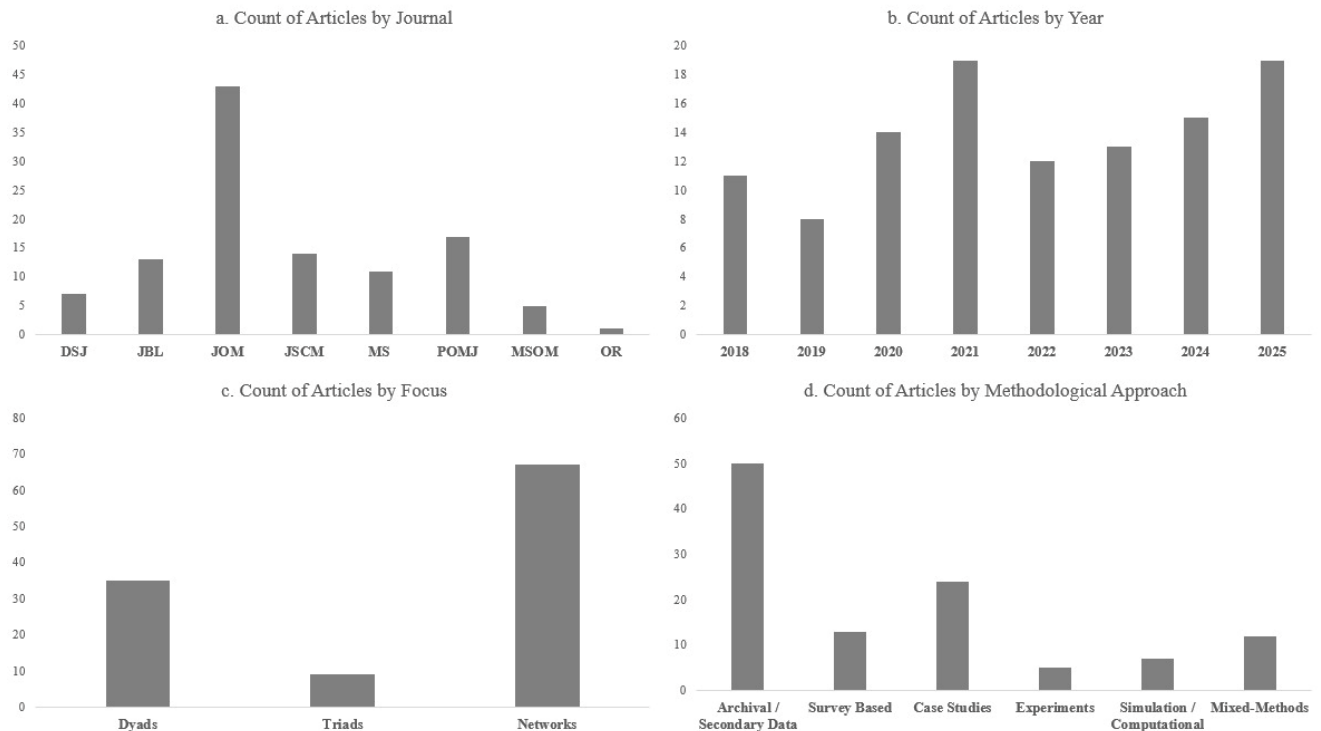
Figure A1. PRISMA flow diagram summarizing the review search criteria and final sample of papers.



Appendix B. Descriptive Analysis of DTN Papers

The 111 articles are distributed across the eight journals as follows: JOM (43), JBL (13), POM (17), JSCM (14), MS (11), DSJ (7), MSOM (5) and OR (1). Publication activity remains steady throughout the period, with a notable peak in 2021. We report trends and patterns using Figure B (panels a-d): publication trends by year and outlet, design types (dyadic, triadic, network), and methodological approaches. Detailed findings from this mapping are presented in Section 3 in the main manuscript.

Figure B1. Overview of empirical DTN research: publication trends, methods, and outlets



APPENDIX C. Checklist for Designing Dyadic, Triadic, and Network Studies in Supply Chain Management

Design dimension	Questions that must be answered	What to specify in the manuscript	Design-specific notes (dyad / triad / network)
Mechanism and causal logic	What is the mechanism: reciprocity, mediation, diffusion/structural exposure, or something else? What constitutes mechanism evidence?	A short mechanism statement that links the theory to observable implications and justifies why >1 actor (or a structure of actors) is required.	Dyad: reciprocal perceptions/actions; Triad: third-actor mediation or tiered buffering; Network: exposure, spillovers, diffusion, position effects.
Construct level and directionality	Where do the focal constructs “live” (actor, relationship, triad, network)? Are constructs symmetric (mutual) or actor-specific?	Construct definitions written at the level of theory (e.g., “mutual trust” vs. “buyer-perceived trust”), plus a mapping from definition to measurement source(s).	If measurement is unilateral, label constructs as actor-specific and avoid claims that require mutual measurement.
Unit of analysis	What unit tests the mechanism (dyad, triad, ego-network, whole network, firm-year within a network)?	Explicit unit definition, including what an observation represents (e.g., relationship instance, strategic supplier tie, tiered triad anchored on a firm).	A frequent failure mode is to theorize at one level and estimate at another without explaining aggregation, nesting, or cross-level links.
Boundary specification	What defines membership in the dyad/triad/network? What is “inside” vs. “outside” the boundary?	Inclusion rules (tier scope, tie definition, time window), plus justification tied to the mechanism (not convenience).	Network studies should state whether the network is complete, sampled, or reconstructed from disclosures, and what missingness implies.
Pairing, matching, and missingness	How are actors linked across data sources? What is the matching error risk? What is missing and why?	Matching procedure (identifiers, verification checks), response rates by side (if surveys), and diagnostics for missing ties/nodes (if networks).	Dyad/triad: mis-pairing threatens inference directly; Network: missing nodes can bias centrality/exposure measures and diffusion estimates.
Dependence, estimation, and identification	How will dependence between observations be handled? What is the primary identification concern (selection, endogeneity, reflection, simultaneity)?	A short “inference plan” stating (i) how interdependence is modeled, and (ii) what the identification strategy is (design-based or model-based) and what it does/does not rule out.	Dyad: actor-partner dependence and correlated errors; Triad: correlated shocks across nodes; Network: reflection and correlated exposure, plus simultaneity of ties.
Transparency about limitations	If the ideal DTN design is not feasible, what is the consequence for interpretation?	Clear scope conditions and a statement of what claims are supported (and which are not), including construct labeling and generalizability limits.	Authors should explicitly separate “relationship-level evidence” from “network mechanisms,” if the latter is not measured.

References

- Adhikary, A., Sharma, A., Diatha, K. S., & Jayaram, J. (2020). Impact of buyer-supplier network complexity on firms' greenhouse gas (GHG) emissions: An empirical investigation. *International Journal of Production Economics*, 230, 107864. <https://doi.org/10.1016/j.ijpe.2020.107864>
- Ambrose, E., Marshall, D., & Lynch, D. (2010). Buyer-supplier perspectives on supply chain relationships. *International Journal of Operations & Production Management*, 30(12), 1269–1290.
- Andrade-Rojas, M. G., Kathuria, A., & Lee, H. H. (2024). Multilevel Synergy of Information Technology for Operational Integration: Competition Networks and Operating Performance. *Production and Operations Management*, 33(5), 1116–1141.
- Arora, K., Singh, A., & Sahare, M. (2025). Vertical integration and market power in supply networks. *Manufacturing & Service Operations Management*, 27(6), 1939-1958.
- Azadegan, A., & Dooley, K. (2021). A typology of supply network resilience strategies: complex collaborations in a complex world. *Journal of Supply Chain Management*, 57(1), 17-26.
- Belhadi, A., Kamble, S. S., Mani, V., Venkatesh, V. G., & Shi, Y. (2021). Behavioral mechanisms influencing sustainable supply chain governance decision-making from a dyadic buyer-supplier perspective. *International Journal of Production Economics*, 236, 108136.
- Bellamy, M. A., Dhanorkar, S., & Subramanian, R. (2020). Administrative environmental innovations, supply network structure, and environmental disclosure. *Journal of Operations Management*, 66(7-8), 895-932.
- Bellamy, M. A., Ghosh, S., & Hora, M. (2014). The influence of supply network structure on firm innovation. *Journal of Operations Management*, 32(6), 357–373.
- Bhattacharya, A., Singh, P. J., & Nand, A. A. (2015). Antecedents of buyer opportunistic behavior in outsourcing relationships. *International Journal of Production Economics*, 166, 258-268.
- Boehm, J., & Sonntag, J. (2023). Vertical integration and foreclosure: Evidence from production network data. *Management Science*, 69(1), 141-161.
- Borgatti, S. P., & Li, X. (2009). On social network analysis in a supply chain context. *Journal of Supply Chain Management*, 45(2), 5–22.
- Brito, R. P., & Miguel, P. L. (2017). Power, governance, and value in collaboration: Differences between buyer and supplier perspectives. *Journal of Supply Chain Management*, 53(2), 61-87.
- Cao, Z., & Lumineau, F. (2015). Revisiting the interplay between contractual and relational governance: A qualitative and meta-analytic investigation. *Journal of Operations Management*, 33, 15-42.
- Chae, S., Yan, T., & Yang, Y. (2020). Supplier innovation value from a buyer–supplier structural equivalence view: Evidence from the PACE awards in the automotive industry. *Journal of Operations Management*, 66(7-8), 820-838.
- Chang, H., Liu, S., & Mashruwala, R. (2022). Customer bargaining power, strategic fit, and supplier performance. *Production and Operations Management*, 31(4), 1492-1509.
- Chen, K., Li, Y., & Linderman, K. (2022). Supply network resilience learning: An exploratory data analytics study. *Decision Sciences*, 53(1), 8-27.
- Chen, M. J., & Miller, D. (2012). Competitive dynamics: Themes, trends, and a prospective research platform. *Academy of Management Annals*, 6(1), 135–210.

- Choi, T. Y., & Kim, Y. (2008). Structural embeddedness and supplier management: A network perspective. *Journal of Supply Chain Management*, 44(4), 5–13.
- 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.
- Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. *Journal of Management*, 31(6), 874–900.
- Culot, G., Podrecca, M., Nassimbeni, G., Orzes, G., & Sartor, M. (2023). Using supply chain databases in academic research: A methodological critique. *Journal of Supply Chain Management*, 59(1), 3–25.
- Deng, C. (2022). Thinking alike or not: Performance implications of transactional psychological contract congruence in buyer–supplier new product development projects. *Journal of Operations Management*, 68(1), 4–32.
- Diebel, W., Gualandris, J., & Klassen, R. D. (2024). How do suppliers respond to institutional complexity? Examining voluntary public environmental disclosure in a global manufacturing supply network. *Journal of Operations Management*, 70(2), 285–315.
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality. *American Sociological Review*, 48(2), 147–160.
- DuHadway, S., & Narasimhan, R. (2021). Subverting process-based controls: Oscillation in automotive recalls and a simulation on opportunism within a network. *Decision Sciences*, 52(6), 1326–1363.
- Du, K., Jia, F., & Chen, L. (2025). The impact of customers' MD&A sentiment on the bullwhip effect: A dyadic buyer-supplier perspective. *International Journal of Production Economics*, 284, 109614.
- Durach, C. F., Peers, Y., Wang, Y., & Repasky, T. (2024). Mitigating upstream disruptions: Effects of extended inventories in first-and second-tier suppliers. *Journal of Operations Management*, 70(8), 1261–1285.
- Durach, C. F., Wiengarten, F., & Choi, T. Y. (2020). Supplier–supplier coopetition and supply chain disruption: first-tier supplier resilience in the tetradic context. *International Journal of Operations & Production Management*, 40(7/8), 1041–1065.
- Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23(4), 660–679.
- Eisenhardt, K. M., & Martin, J. A. (2017). Dynamic capabilities: what are they?. *The SMS Blackwell handbook of organizational capabilities*, 341–363.
- Fahimnia, B., Pournader, M., Siemsen, E., Bendoly, E., & Wang, C. (2019). Behavioral operations and supply chain management—a review and literature mapping. *Decision Sciences*, 50(6), 1127–1183.
- Falcone, E. C., Yan, T., & Fugate, B. S. (2024a). Follow-suit or free-ride? A relational view of CSR diffusion in a supply chain with customer–supplier closure. *Journal of Operations Management*, 70(6), 979–1006.
- Falcone, E. C., & Ridge, J. W. (2024b). An investigation of corporate social responsibility conformity: The roles of network prominence and supply chain partners. *Journal of Operations Management*, 70(4), 600–629.
- Fan, D., Ma, P., Cui, L., & Yiu, D. W. (2024). Locking in overseas buyers amid geopolitical conflicts. *Journal of Operations Management*, 70(5), 756–792.
- Fang, R., Hu, N., Liang, P., & Liu, L. (2023). Cross-market information transmission along the supply chain network. *Production and Operations Management*, 32(7), 2227–2244.

- Flynn, B. B., Koufteros, X., & Lu, G. (2018a). On theory in supply chain uncertainty and its implications for supply chain integration. *Journal of Supply Chain Management*, 54(3), 3–27.
- Flynn, B., Pagell, M., & Fugate, B. (2018b). Survey research design in supply chain management: the need for evolution in our expectations. *Journal of Supply Chain Management*, 54(1), 1-15.
- Galbraith, J. R. (1974). Organization design: An information processing view. *Interfaces*, 4(3), 28–36.
- Gligor, D., Feizabadi, J., Pohlen, T., Maloni, M., & Ogden, J. A. (2022). The impact of the supply chain orientation fit between supply chain members: A triadic perspective. *Journal of Business Logistics*, 43(4), 518-539.
- Grieser, W., LeSage, J., & Zekhnini, M. (2022). Industry networks and the geography of firm behavior. *Management Science*, 68(8), 6163-6183.
- Griffith, D. A., Harvey, M. G., & Lusch, R. F. (2006). Social exchange in supply chain relationships: The resulting benefits of procedural and distributive justice. *Journal of Operations Management*, 24(2), 85-98.
- Grover, V., & Malhotra, M. K. (2003). Transaction cost framework in operations and supply chain management research: theory and measurement. *Journal of Operations Management*, 21(4), 457-473.
- Gulati, R., & Sytch, M. (2007). Dependence asymmetry and joint dependence in interorganizational relationships: Effects of embeddedness on a manufacturer's performance in procurement relationships. *Administrative science quarterly*, 52(1), 32-69.
- Guntuka, L., Cantor, D. E., Corsi, T. M., D'oria, L., & Grover, A. (2024a). Do Supply Chain Characteristics Influence a Rival Firm's Responses to a Focal Firm's Product Preannouncements? A Competitive Dynamics Perspective. *Journal of Business Logistics*, 45(4), e12395.
- Guntuka, L., Carnovale, S., & Falcone, E. (2024b). Supply Chain plasticity: A responsive network capability to ensure resilience. *Journal of Business Logistics*, 45(4), e12398.
- Hald, K. S., & Spring, M. (2023). Actor–network theory: A novel approach to supply chain management theory development. *Journal of Supply Chain Management*, 59(2), 87-105.
- Handley, S. M., & Benton, W. (2012). The influence of exchange hazards and power on opportunism in outsourcing relationships. *Journal of Operations Management*, 30(1-2), 55-68.
- Heide, J. B., & John, G. (1992). Do norms matter in marketing relationships?. *Journal of Marketing*, 56(2), 32-44.
- Heldt, L., & Beske-Janssen, P. (2023). Solutions from space? A dynamic capabilities perspective on the growing use of satellite technology for managing sustainability in multi-tier supply chains. *International Journal of Production Economics*, 260, 108864. <https://doi.org/10.1016/j.ijpe.2023.108864>
- Hofer, C., Barker, J. M., D'Oria, L., & Johnson, J. L. (2022). Broadening our understanding of interfirm rivalry: A call for research on how supply networks shape competitive behavior and performance. *Journal of Supply Chain Management*, 58(2), 8-25.
- Hu, F., Mitchell, D., & Tompaidis, S. (2024). Robust Financial Networks. *Operations Research*, 72(5), 1827-1842.
- Hughes, M. M., Croxton, K. L., & Knemeyer, A. M. (2025). Energizing research at the intersection of public policy and supply chain resilience: a systematic review and guiding framework. *Journal of Business Logistics*, 46(1), e12403.

- Jacobs, A. Z., & Watts, D. J. (2021). A large-scale comparative study of informal social networks in firms. *Management Science*, 67(9), 5489-5509.
- Jia, F., Gong, Y., & Brown, S. (2019). Multi-tier sustainable supply chain management: The role of supply chain leadership. *International Journal of Production Economics*, 217, 44-63.
<https://doi.org/10.1016/j.ijpe.2018.07.022>
- Johnsen, L. C., Sadrieh, A., & Voigt, G. (2021). Short-term vs. Long-term Contracting: Empirical Assessment of the Ratchet Effect in Supply Chain Interaction. *Production and Operations Management*, 30(7), 2252-2272.
- Karatzas, A., Papadopoulos, G., & Godsell, J. (2020). Servitization and the Effect of Training on Service Delivery System Performance. *Production and Operations Management*, 29(5), 1101-1121.
- Ketchen Jr, D. J., Snow, C. C., & Hoover, V. L. (2004). Research on competitive dynamics: Recent accomplishments and future challenges. *Journal of Management*, 30(6), 779-804.
- Ketokivi, M. (2019). Avoiding bias and fallacy in survey research: A behavioral multilevel approach. *Journal of Operations Management*, 65(4), 380-402.
- Ketokivi, M., & Choi, T. (2014). Renaissance of case research as a scientific method. *Journal of Operations Management*, 32(5), 232-240.
- Kim, Y., Choi, T. Y., Yan, T., & Dooley, K. (2011). Structural investigation of supply networks: A social network analysis approach. *Journal of Operations Management*, 29(3), 194-211.
- Kim, D. Y., & Zhu, P. (2018). Supplier dependence and R&D intensity: The moderating role of network centrality and interconnectedness. *Journal of Operations Management*, 64, 7-18.
- Krause, D. R., Handfield, R. B., & Tyler, B. B. (2007). The relationships between supplier development, commitment, social capital accumulation and performance improvement. *Journal of Operations Management*, 25(2), 528-545.
- Kumar, P., Nowinska, A., & Schramm, H. J. (2023). The signaling effect of supplier's customer network instability on service price: Insights from the container shipping charter market. *Journal of Operations Management*, 69(8), 1282-1319.
- Kuo, T., Sheu, J., & Choi, T. (2026). Buying on the Upstream and Downstream of the Retailers: Market Resilience, Self-Regulation, and Heteronomy during a Disaster. *International Journal of Production Economics*, in press
- Lee, C., Roden, S., & Son, B. (2025). Exploring the effect of justice and buyer-supplier embeddedness on supply chain disruption response: Buyer-supplier dyadic perspectives. *International Journal of Production Economics*, 109770.
- Lee, H. H., Zhou, J., & Wang, J. (2018). Trade credit financing under competition and its impact on firm performance in supply chains. *Manufacturing & Service Operations Management*, 20(1), 36-52.
- Liang, J. (2025). The effect of customer and supplier concentration on firm productivity: The moderating role of the firm's dominant position in the supply chain network. *International Journal of Production Economics*, 109727.
- Lim, S. F. W. T., Rabinovich, E., Park, S., & Hwang, M. (2021). Shopping Activity at Warehouse Club Stores and Its Competitive and Network Density Implications. *Production and Operations Management*, 30(1), 28-46.
- Lin, Y., Chen, A., Yin, Y., Li, Q., Zhu, Q., & Luo, J. (2021). A framework for sustainable management of the platform service supply chain: An empirical study of the logistics sector in China. *International Journal of Production Economics*, 235, 108112.
<https://doi.org/10.1016/j.ijpe.2021.108112>

- Liu, K. L., Özpolat, K., & Shin, S. K. (2025). Insights from lower-tier ICT suppliers: How network centrality in multi-tier supply chain relationships affects buyer financial performance. *International Journal of Production Economics*, 109840.
- Liu, Y., & Luo, R. (2023). Network effects and multinet network sellers' dynamic pricing in the US smartphone market. *Management Science*, 69(6), 3297-3318.
- Liu, Y., Jia, X., Jia, X., & Koufteros, X. (2021). CSR orientation incongruence and supply chain relationship performance—a network perspective. *Journal of Operations Management*, 67(2), 237–260.
- Li, L., & Shou, Y. (2024). The impact of project-based interorganizational networks: Evidence from the Chinese movie industry. *Journal of Operations Management*, 70(6), 957-978.
- Maestrini, V., Patrucco, A. S., Luzzini, D., Caniato, F., & Maccarrone, P. (2021). Supplier performance measurement system use, relationship trust, and performance improvement: a dyadic perspective. *The International Journal of Logistics Management*, 32(4), 1242-1263.
- Maloni, M. J., & Carter, C. R. (2018). Publication Productivity in the SCM Discipline: 2014–2016. *Transportation Journal*, 57(1), 1-23.
- Manchiraju, C., Sohoni, M. G., & Deshpande, V. (2023). It's not simply luck: The impact of network strategy, schedule padding, and operational improvements on domestic on-time performance in the US airline industry. *Production and Operations Management*, 32(11), 3559–3574.
- Marques, L., Yan, T., & Matthews, L. (2020). Knowledge diffusion in a global supply network: A network of practice view. *Journal of Supply Chain Management*, 56(1), 33-53.
- Milgram, S. (1967) "The Small-World Problem," *Psychology Today* 2:60-67.
- Miller, J., Davis-Sramek, B., Fugate, B. S., Pagell, M., & Flynn, B. B. (2021). Editorial commentary: Addressing confusion in the diffusion of archival data research. *Journal of Supply Chain Management*, 57(3), 130-146.
- Miller, J. W., & Kulpa, T. (2022). Econometrics and archival data: Reflections for purchasing and supply management (PSM) research. *Journal of Purchasing and Supply Management*, 28(3), 100780.
- Mukandwal, P. S., Cantor, D. E., Grimm, C. M., Elking, I., & Hofer, C. (2020). Do firms spend more on suppliers that have environmental expertise? An empirical study of US manufacturers' procurement spend. *Journal of Business Logistics*, 41(2), 129-148.
- Myerson, R. (1977) "Graphs and Cooperation in Games," *Mathematics of Operations Research* 2:225-229.
- Nyaga, G. N., Whipple, J. M., & Lynch, D. F. (2010). Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ? *Journal of Operations Management*, 28(2), 101–114.
- Osadchiy, N., Schmidt, W., & Wu, J. (2021). The bullwhip effect in supply networks. *Management Science*, 67(10), 6153-6173.
- Palit, S., Hora, M., & Ghosh, S. (2022). Global buyer–supplier networks and innovation: The role of technological distance and technological breadth. *Journal of Operations Management*, 68(6-7), 755-774.
- Park, H., Bellamy, M. A., & Basole, R. C. (2018). Structural anatomy and evolution of supply chain alliance networks: A multi-method approach. *Journal of Operations Management*, 63, 79-96.
- Patrucco, A., Di Mauro, C., & Carnovale, S. (2026). Getting past the desk rejection: five critical gates to clear. *Journal of Purchasing and Supply Management*, 101109.

- Patrucco, A., Harland, C. M., Luzzini, D., & Frattini, F. (2022). Managing triadic supplier relationships in collaborative innovation projects: a relational view perspective. *Supply Chain Management: An International Journal*, 27(7), 108-127.
- Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. Stanford, CA: Stanford University Press
- Phadnis, S. (2024). A review of research on supply chain adaptability: opening the black box. *Journal of Business Logistics*, 45(1), e12370.
- Phadnis, S., & Joglekar, N. (2021). Configuring supply chain dyads for regulatory disruptions: A behavioral study of scenarios. *Production and Operations Management*, 30(4), 1014-1033.
- Potter, A., & Wilhelm, M. (2020). Exploring supplier-supplier innovations within the Toyota supply network: A supply network perspective. *Journal of Operations Management*, 66(7-8), 797-819.
- Premkumar, G., Ramamurthy, K., & Saunders, C. S. (2005). Information processing view of organizations: an exploratory examination of fit in the context of interorganizational relationships. *Journal of Management Information Systems*, 22(1), 257-294.
- Pulles, N. J., Veldman, J., Schiele, H., & Sierksma, H. (2014). Pressure or pamper? The effects of power and trust dimensions on supplier resource allocation. *Journal of Supply Chain Management*, 50(3), 16-36.
- Qazi, A., Dickson, A., Quigley, J., & Gaudenzi, B. (2018). Supply chain risk network management: A Bayesian belief network and expected utility based approach for managing supply chain risks. *International Journal of Production Economics*, 196, 24-42.
- Quarshie, A. M., & Leuschner, R. (2020). Interorganizational interaction in disaster response networks: A government perspective. *Journal of Supply Chain Management*, 56(3), 3-25.
- Razak, G. M., Stevenson, M., & Hendry, L. C. (2024). "I Am Because We Are": The Role of Sub-Saharan Africa's Collectivist Culture in Achieving Traceability and Global Supply Chain Resilience. *Journal of Supply Chain Management*, 60(4), 46-74.
- Reusen, E., Stouthuysen, K., Roodhooft, F., Van den Abbeele, A., & Slabbinck, H. (2020). Imitation of management practices in supply networks: Relational and environmental effects. *Journal of Supply Chain Management*, 56(1), 54-72.
- Revilla, E., & Knoppen, D. (2015). Building knowledge integration in buyer-supplier relationships: The critical role of strategic supply management and trust. *International Journal of Operations & Production Management*, 35(10), 1408-1436.
- Roehrich, J. K., Kalra, J., Squire, B., & Davies, A. (2023). Network orchestration in a large inter-organizational project. *Journal of Operations Management*, 69(7), 1078-1099.
- Rungtusanatham, M., Miller, J. W., & Boyer, K. K. (2014). Theorizing, testing, and concluding for mediation in SCM research: Tutorial and procedural recommendations. *Journal of Operations Management*, 32(3), 99-113.
- Sarkis, J., Santibanez Gonzalez, E. D., & Koh, S. L. (2019). Effective multi-tier supply chain management for sustainability. *International Journal of Production Economics*, 217, 1-10. <https://doi.org/10.1016/j.ijpe.2019.09.014>
- Sauer, P. C., & Seuring, S. (2019). Extending the reach of multi-tier sustainable supply chain management – Insights from mineral supply chains. *International Journal of Production Economics*, 217, 31-43. <https://doi.org/10.1016/j.ijpe.2018.05.030>
- Scholten, K., & Schilder, S. (2015). The role of collaboration in supply chain resilience. *Supply Chain Management: An International Journal*, 20(4), 471-484.

- Sharma, A., Pathak, S., Borah, S. B., & Adhikary, A. (2022). Collaboration strategies in buyer-supplier relational (BSR) networks and sustainable firm performance: A trade-off story. *International Journal of Production Economics*, 253, 108558. <https://doi.org/10.1016/j.ijpe.2022.108558>
- Sheng, S., Zhou, K. Z., Li, J. J., & Guo, Z. (2018). Institutions and opportunism in buyer-supplier exchanges: The moderated mediating effects of contractual and relational governance. *Journal of the Academy of Marketing Science*, 46, 1014-1031.
- Skowronski, K., Benton, W. C. Jr., & Handley, S. (2022). The moderating influence of supplier culture on the relationship between buyer power and supplier shirking. *Journal of Operations Management*, 68(3), 270-301.
- Sodhi, M. S. (2025). A metric for the asymmetry in matched-pair data for buyer-supplier dyads. *International Journal of Production Economics*, 287, 109653.
- Son, B. G., Ries, J. M., Subramanian, N., & Kim, S. (2024). Bridging the innovation gap: Why organizational climate matters for leveraging innovation from supply networks. *Journal of Supply Chain Management*, 60(2), 39-63.
- Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics*, 87(3), 355-374.
- Song, S., Dong, Y., Kull, T., Carter, C., & Xu, K. (2023). Supply chain leakage of greenhouse gas emissions and supplier innovation. *Production and Operations Management*, 32(3), 882-903.
- Susarla, A., Holzhacker, M., & Krishnan, R. (2020). Calculative trust and interfirm contracts. *Management Science*, 66(11), 5465-5484.
- Suurmond, R., Menor, L. J., & Wynstra, F. (2022). Examining service triad operations: Formation, functioning, and feedback exchanges. *Production and Operations Management*, 31(8), 3352-3370.
- Taubeneder, R., Roehrich, J., Tyler, B., Squire, B. C., & Gnyawali, D. (2024). Managing coopetition dynamics: A longitudinal study of a multiparty alliance formation in a large utilities project. *Journal of Operations Management*, 70(6), 875-903.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533.
- Uzzi, B. (1996) "The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect," *American Sociological Review* 61:674-698.
- Villena, V. H., & Gioia, D. A. (2018). On the riskiness of lower-tier suppliers: Managing sustainability in supply networks. *Journal of Operations Management*, 64, 65-87.
- Villena, V. H., Revilla, E., & Choi, T. Y. (2011). The dark side of buyer-supplier relationships: A social capital perspective. *Journal of Operations Management*, 29(6), 561-576.
- Wang, L., Rabinovich, E., & Richards, T. J. (2022). Scalability in Platforms for Local Groceries: An Examination of Indirect Network Economies. *Production and Operations Management*, 31(1), 318-340.
- Wang, L., Zhang, C., & Narayanan, S. (2023). The bright side of trust-less relationships: a dyadic investigation of the role of trust congruence on supplier knowledge acquisition across borders. *Journal of Operations Management*, 69(7), 1042-1077.
- Wang, Y., Li, J., Wu, D., & Anupindi, R. (2021). When Ignorance Is Not Bliss: An Empirical Analysis of Subtier Supply Network Structure on Firm Risk. *Management Science*, 67(4), 2029-2048.

- Wang, L., Ye, Y., & Huo, B. (2025). Spillover of bad publicity: Effect of negative ESG coverage in supply chains on firm performance. *International Journal of Production Economics*, 285, 109654.
- Wetzel, P., & Hofmann, E. (2019). Supply chain finance, financial constraints and corporate performance: An explorative network analysis and future research agenda. *International Journal of Production Economics*, 216, 364-383. <https://doi.org/10.1016/j.ijpe.2019.07.001>
- Wiedmer, R., & Griffis, S. E. (2021). Structural characteristics of complex supply chain networks. *Journal of Business Logistics*, 42(2), 264-290.
- Wilhelm, M., Blome, C., Wieck, E., & Xiao, C. Y. (2016). Implementing sustainability in multi-tier supply chains: Strategies and contingencies in managing sub-suppliers. *International Journal of Production Economics*, 182, 196–212.
- Williamson, O. E. (2010). Transaction cost economics: The natural progression. *American Economic Review*, 100(3), 673-690.
- Wissuwa, F., Durach, C. F., & Choi, T. Y. (2022). Selecting resilient suppliers: Supplier complexity and buyer disruption. *International Journal of Production Economics*, 253, 108601. <https://doi.org/10.1016/j.ijpe.2022.108601>
- Wu, L., Chuang, C. H., & Hsu, C. H. (2014). Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective. *International journal of production economics*, 148, 122-132.
- Xu, M., & Bhattacharyya, S. (2021). Taste Transitivity for Collaborative Filtering: A Stochastic Network Dynamics Approach. *Decision Sciences*, 52(3), 629-660.
- Xu, Y., Wang, L., Wang, J. X., & Meng, X. (2025). Power Dynamics and Financial Flexibility: Insights from Chinese Supply Chain Dyads. *International Journal of Production Economics*, 109797.
- Zeng, F., Chi, Y., Dong, M. C., & Huang, J. (2017). The dyadic structure of exchange partners' governing-agency social capital and opportunism in buyer–supplier relationships. *Journal of Business Research*, 78, 294-302.
- Zhang, Z., Mishra, N., Wulandhari, N. B. I., Gölgeci, I., & Singh, A. (2025). Diffusion of digital transformation initiatives in multi-tier supply chains: The double agency role of Tier-1 suppliers. *International Journal of Production Economics*, 288, 109728.
- Zheng, Y., Wang, Q., & Park, C. H. (2024). Friend or foe? The impact of refurbished products in markets with network effects and standards competition. *Journal of Operations Management*, 70(2), 224-242.

ONLINE SUPPLEMENTAL MATERIALS

Table OA1. Sample summary of article coding across key dimensions.

Manuscript	Key Word	SCM Relationship	Overarching Theory	Methodology	Data Sources	Unit of Analysis	Independent Variable(s)	Dependent Variable(s)	Software	Industry	Sample Size
Phadnis & Joglekar (2021)	Dyad	Buyer-supplier dyads	Behavioral theory of the firm	Behavioral experiment	Survey (MBA execs)	Firm (scenarios)	Supply chain strategy options	Performance outcomes	R	Apparel	43 responses
Song et al. (2023)	Dyad	Firm-supplier dyads	Pollution-haven hypothesis	Panel data econometric modelling	Bloomberg ESG, Compustat	Firm-supplier dyad	Trade ties, ESG exposure	Supplier environmental performance	-	Manufacturing	7,104 firm–supplier years
Suurmond et al. (2022)	Triad	Service triads (buyer-supplier-customer)	Service ops & governance theory	Qualitative multi-case study	Interviews, archival docs	Service triad	Triad formation mechanisms	Service quality, performance	-	Higher education	4 cases, 17 interviews
Durach et al. (2024)	Triad	Buyer-supplier triads	Extended RBV	Econometric modelling	Datastream, Bloomberg SPLC, Orbis	Buyer-supplier triad	Supplier slack	Buyer financial performance	-	Chemicals, plastics	330 triads
Li & Shou (2024)	Network	Project networks	Network theory	Network construction and econometric modelling	ENDATA, TOPCDB (movie projects)	Project network	Centrality, structural roles	Quality ratings	-	Movie industry (China)	821 projects, 2,609 firms
Kumar et al. (2023)	Network	Supplier-buyer service exchanges	Signaling theory	Econometric modelling	Clarksons, DynaLiners, Ship-DB, Equasis, Shipspotting, Balticshipping, Marinetraffic, Vesselfinder	Dyads (buyers-suppliers)	Supplier ego-network instability	Service exchange price	-	Shipping (containers)	3,263 dyads (260 buyers, 493 suppliers)

Table OA2. Comparative dimensions of dyadic, triadic, and network (DTN) research designs in SCM

Dimension	Dyads	Triads	Networks
Key Themes	Governance choices and relational mechanisms, contracting and bargaining dynamics, coopetition, trust and signaling mechanisms	Formation and functioning of triads, supply chain resilience, diffusion of practices	Competitive and interfirm network, information flows and knowledge spillovers, network effects, network governance, network structure, resilience, and learning
Overarching Theories	Transaction cost economics, resource dependence theory, behavioral theory, trust and social exchange, congruence theory, signaling theory, belief-action-outcome model	Motivation-Opportunity-Ability, Extended Resource-Based View, Relational View	Synergy theory, institutional theory, social network theory, competitive dynamics, meso-level resilience strategies
Methodologies	Behavioral experiments, panel data econometric models, laboratory experiments comparing contract structures, long-horizon event studies with matched dyads, multi-source dyadic surveys using polynomial regression and response surface modeling, multiple case studies	Qualitative multi-case studies of service triads, Panel data regression, thematic analysis with abductive coding	Longitudinal panel data studies on network positions, Structural estimation models in industries, Quasi-experimental designs with difference-in-differences (DID), Stochastic actor-based network models with MCMC simulations, multi-method approaches combining surveys, case studies, and network analysis, grounded theory studies, content analysis of secondary and unstructured datasets, agent-based simulations
Data Sources	MBA student surveys and laboratory experiments, Compustat (Annual, Segment, CRSP-Compustat merged), Bloomberg ESG, Bloomberg SPLC, Bloomberg Sustainability Survey, Proprietary IT outsourcing contracts dataset (ITF, EDGAR), Hofstede's cultural values database, Clarksons Shipping Intelligence, Equasis, IHS Markit, Lloyd's List, Hexun CSR, CSMAR, Global Competitiveness Report, surveys of managers in buyer-supplier dyads, industry reports, board papers, government reports	Interviews with managers in service triads, firm documents, project records, archival reports, training records and service performance data (European OEM), Refinitiv, FactSet Revere, Compustat, interviews in Ghana cocoa/fruit supply chains	Passport competition database, FactSet Revere, Compustat, Thomson Reuters Eikon, Datastream, Bureau of Transportation Statistics, FAA, ASPM database, USDA AMS, US BLS, ACNielsen Homescan, ESRI store directory, Costco store directory, KLD, BoardEx, PATSTAT Global, Japan Platform for Patent Information, comScore smartphone data, Glassdoor reviews, Orbis IP, , Container Intelligence (Clarksons, DynaLiners, Equasis), Vessel databases (MarineTraffic, VesselFinder, VesselTracking), Interviews, archival documents, observations (disaster response, producer forums, NGO/government studies)
Unit of Analysis	Buyer-supplier dyads (firm-supplier pairs, cross-border transactions, major customers, container shipping dyads, technology-intensive industries, outsourcing relationships, NPD projects, IT outsourcing contracts, manufacturer-3PL dyads in reverse supply chains, multiparty alliances including buyer-supplier and supplier-supplier	Service triads (buyer, supplier, end user) as operational entities; company-owned vs. outsourced service units with KPIs; upstream triads in agriculture (e.g., Ghana's cocoa and fruit chains); buyer-first-tier-second-tier supplier triads.	Industry-level networks (movie production and distribution teams, video game product networks, tablet product networks); supply networks of focal firms (tier-1 and tier-2 relationships); global food retail networks (RetailCo); interorganizational disaster response networks (state as focal actor); user-movie dyads in taste networks; consumer-vendor platform

Dimension	Dyads	Triads	Networks
	ties). Units include contract decisions across periods, firm-rival matched dyads, and firm-year supplier–customer relationships.		interactions; household-level shopping activities and retail competition; airline-month operational networks; smartphone pricing networks; stochastic actor-based supply chain networks; simulations of Honda and Toyota networks.
Independent Variables	Contract structures (short- vs. long-term, payoff fairness, buyer cost structure, supplier pricing); Buyer-supplier dependence and bargaining power (customer dependence, supplier dependence, relative market power, strategic fit in R&D, SG&A, and CapEx); trust, power, and psychological contracts (trust congruence, coercive vs. expert power, transactional psychological contracts); technological characteristics (technological distance, breadth, global sourcing); environmental/CSR variables (firm GHG emissions, supplier R&D intensity, CSR orientation incongruence, environmental innovations, suppliers' environmental expertise); relational/structural factors (structural equivalence, ego-network instability, alliance governance, competitive bidding, multiparty alliances, relationship duration, reputation, political ties, national culture).	Service triad formation and coordination (value creation goals, buyer engagement, feedback exchanges); Service operations (manufacturer-led training, ownership type, size, incentives, location); Supply base and customer base CSR; Inventory slack at multiple tiers; Investments in relation-specific assets; Informal governance (community leaders, cultural norms); Social characteristics of supply chain actors influencing behavior.	Structural/network position (centrality, degree centrality, prominence, network diversity, structural holes, brokerage); Strategic/operational actions (route additions/drops, schedule padding, operational improvements, competitor actions); Platform/market factors (local vendor count, demand incidence and basket size, product price/costs, household spending and distance to stores, gasoline prices, smartphone pricing/contracts/OS updates); Relational dynamics (homophily-relational, location, practice; coopetition fears, disintermediation concerns, supplier ego-network instability); Governance and institutional environment (formal/informal norms, government as facilitator, organizational climate facets, interaction practices); Innovation and knowledge flows (customer CDS innovation, earnings announcements, patents, technological breadth/distance); Risk and uncertainty (environmental uncertainty, supplier risk metrics, bullwhip layers, dynamic relationship parameters); Social/behavioral factors (taste transitivity, movie popularity, user activity, demographics; relationality, heterogeneity, performativity).
Dependent Variables	Scenario planning outcomes (number of driving forces identified, ability to influence/control external factors, planning complexity); environmental outcomes (supplier GHG emissions intensity, environmental disclosure score); contracting outcomes (buyer's contract choice, supplier contract adjustments, profit distribution, efficiency under contract types, contract choice between fixed price vs. cost-plus); Financial and innovation outcomes (supplier Return on Assets, buyer–supplier transaction value, buyer innovation performance via patents,	Service performance outcomes (quality, customer satisfaction, coordination, innovation, operational efficiency); Objective service KPIs (MOT pass rate, breakdown attendance time, preventive maintenance compliance, unscheduled repair responsiveness); Financial/CSR outcomes (buyer financial performance post-disruption, focal firm CSR); Resilience and traceability outcomes (traceability effectiveness, triadic supply chain resilience).	Firm and operational performance (revenue productivity per employee, sales efficiency, inventory turnover, SG&A costs, focal firm financial/operational performance, CapEx/R&D/leverage/cash flows); Service and innovation performance (quality and sales performance of projects, buyer innovation performance, supplier innovation, knowledge diffusion across the network, supplier environmental disclosure, service exchange price, product performance, confidentiality performance, patents, emergence/transformation of SCM practices); Market/platform outcomes (consumer purchase

Dimension	Dyads	Triads	Networks
	suppliers' innovation value, supplier knowledge acquisition, business volume, shirking, service exchange price, product quality, development efficiency, relationship performance, coopetition balance, project outcomes-cost, schedule, quality); Relational/operational outcomes (trust/collaboration effectiveness, Reverse Supply Chain operations outcomes such as efficiency, cost reduction, innovation, flexibility, cycle time improvements).		incidence and basket size, vendor counts, platform surplus, household spending and travel, Amazon selling price, tablet sales shares, user-movie appreciation); Risk and resilience outcomes (supplier stock returns, CSR conformity, imitation of control practices, risk measures-equity, idiosyncratic, industry-adjusted; bullwhip effect and demand variability; disaster response effectiveness; continuity of critical goods/services supply; learning to recover/prevent disruptions, opportunistic behavior, vertical tie dissolution); Network structure effects (changes in airline on-time performance and rankings, network continuity measures).
Software / Tools	R; NVivo & QDA Miner (qualitative coding of interviews/documents); SPSS (survey and regression analysis); Stata (regression, robustness checks, endogeneity tests); Python scripts; UCINET 6 (social network analysis); WordStat (content analysis); Standard statistical software (unspecified).	NVivo 12 (qualitative data analysis and coding)	R (igraph, RSiena for stochastic actor-based models); UCINET (social network analysis, QAP regression); Gephi (network visualization); MATLAB (GRETN toolbox); Mplus (structural modeling); SPSS & Stata (regressions, robustness checks); NVivo (qual coding); WordStat (content analysis); Stata MP & Julia (econometric and simulation modeling); Violin plots;
Industry Context	Apparel (EU–UK, Brexit); manufacturing (SIC 2000-3999: electronics, machinery, chemicals); automotive (GM-Alcan and global), retail (Kaufland-Unilever); publicly traded U.S. firms; utilities (UK nuclear project); multi-industry (U.S.-China tariffs: raw materials, machinery, electronics); container shipping; Chinese manufacturing (chemical, textile, apparel, pharma, equipment); electronics & consumer goods (U.S. & EU), communications, semiconductors; 3C (computers, communications, consumer electronics); global outsourcing (discrete product industries); U.S. manufacturing; IT outsourcing.	Higher education services (outsourced: printing, catering, student insurance); Commercial vehicle service networks (European manufacturer-UK service); Manufacturing (NAICS 32–33: paper, chemicals, plastics, machinery, electronics, appliances); Agri-food (cocoa & fruit supply chains in Ghana).	Beauty & personal care, alcoholic drinks, apparel, electronics, food service, health, tobacco (consumer industries); U.S. airlines (on-time performance); pharmaceuticals, electronic equipment, business services, petroleum, trading; online grocery retail; retail (warehouse clubs: Costco); North American manufacturing; Chinese movie industry; global manufacturing suppliers; online retail product-level data; shipping (container/vessel); high-tech (electronics & communications); Chinese manufacturing (chemicals, textiles, pharma, equipment); Toyota & suppliers; video gaming; computer & electronics manufacturing; e-commerce platforms (Amazon, MovieLens, IMDB); consumer goods manufacturing (Fortune 500); manufacturing (S&P 500); humanitarian logistics & disaster response; global food supply networks (SMEs, smallholders); consumer goods, high-tech, healthcare,

Dimension	Dyads	Triads	Networks
			manufacturing; telecommunications; automotive; multi-industry (Fama-French industry datasets; consumer staples & discretionary).

REFERENCES

- Durach, C. F., Peers, Y., Wang, Y., & Repasky, T. (2024). Mitigating upstream disruptions: Effects of extended inventories in first-and second-tier suppliers. *Journal of Operations Management*, 70(8), 1261-1285.
- Kumar, P., Nowinska, A., & Schramm, H. J. (2023). The signaling effect of supplier's customer network instability on service price: Insights from the container shipping charter market. *Journal of Operations Management*, 69(8), 1282-1319.
- Li, L., & Shou, Y. (2024). The impact of project-based interorganizational networks: Evidence from the Chinese movie industry. *Journal of Operations Management*, 70(6), 957-978.
- Phadnis, S., & Joglekar, N. (2021). Configuring supply chain dyads for regulatory disruptions: A behavioral study of scenarios. *Production and Operations Management*, 30(4), 1014-1033.
- Song, S., Dong, Y., Kull, T., Carter, C., & Xu, K. (2023). Supply chain leakage of greenhouse gas emissions and supplier innovation. *Production and Operations Management*, 32(3), 882-903.
- Suurmond, R., Menor, L. J., & Wynstra, F. (2022). Examining service triad operations: Formation, functioning, and feedback exchanges. *Production and Operations Management*, 31(8), 3352-3370.



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Why one perspective is not enough: theory-data alignment for dyadic, triadic, and network studies in supply chain management

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