

Theorizing the impact of network characteristics on multitier sustainable supply chain governance: a power perspective

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Abstract

Purpose – While the literature on multitier supply chain management traditionally assumes that first-tier suppliers belong to the visible proportion of the supply base, intermediaries might limit focal firms' visible horizon already at this stage. High power asymmetries promoting centrality and complexity in the supply network are seen as a particular root cause that limits the impact of governance mechanisms for sustainability. To map the space for governance mechanisms in a network-sensitive context more comprehensively, the study analyzes supply network characteristics from a power perspective.

Design/methodology/approach – This research is conceptual. To better understand power imbalances and mutual dependencies from network centrality and complexity, network configurations were constructed drawing on resource dependence theory. These configurations allow deducing the impact of (non)-mediated governance mechanisms for a sustainable development in the supply network. An agenda to stimulate future empirical and model-based research is accordingly presented.

Findings – The research shows that those networks with densely interconnected first-tier suppliers promote network centrality and complexity, leading to an inverted U-shape relationship between the focal firm's exertion of coercive power and the sustainability performance in the supply network. The findings allow a more comprehensive theoretical grounding for mapping governance approaches in a network-sensitive context and provide insights on how to avoid negative effects from power asymmetries.

Practical implications – The findings suggest the need for accompanying, indirect governance mechanisms already at the stage of first-tier suppliers based on non-mediated forms of power, such as referent power, also promoting disintermediation. Purchasing companies may also consider using digital platform technologies that foster disintermediation, such as blockchain technology.

Originality/value – By studying intermediaries from a power and network perspective, the conceptualization adds to the discussion on governance in multitier sustainable supply chain networks in various industries. Furthermore, it contributes to the increasing efforts of middle-range theorizing in logistics and supply chain management. The results partially challenge previous assumptions on the moderating role of specific network characteristics.

Keywords Supply chain governance, Power asymmetry, Sustainable supply chain management, Supply networks

Paper type Conceptual paper



1. Introduction

Buyer–supplier relationships are traditionally supposed to be governed directly by the buyer. However, recent research shows that centrality and complexity in first-tier supplier networks limit the buying firm's visible horizon, thus precluding direct forms of governance for sustainability already at this tier (Gold *et al.*, 2020). Accordingly, supply network characteristics such as centrality and complexity shape the context in which a company is embedded in (Vurro *et al.*, 2009) and impact governance performance (Chowdhury *et al.*, 2022). Therefore, contemporary research on governance in multitier sustainable supply chains should not be limited to rule enforcement or incentivization instruments but may include network aspects of governance such as decentralized governance mechanisms through the standardization of transactions, i.e. in blockchains (Schmeiss *et al.*, 2019). To map the space for governance mechanisms more comprehensively, network characteristics need to be considered when choosing the suitable governance mechanism(s). Although extant literature already linked network characteristics with supply chain governance (e.g. Tachizawa and Wong, 2015), efforts to provide an overarching theoretical frame are scarce.

In the clothing industry, for instance, the lack of direct contractual agreements, power imbalances and cultural distances can make it difficult for focal clothing retailers to expand their control over globalized multitier supply chains to achieve or maintain the desired level of sustainability performance (Grimm *et al.*, 2016). Gold *et al.*'s (2020) study on the fashion industry pointed to central and dense network structures among suppliers and subcontractors as opportunities to hide subcontractors' lousy labor practices, such as via showroom factories dedicated to auditing visits (Labowitz and Baumann-Pauly, 2014), giving buyers a false impression of good labor standards or making it easy for them to claim ignorance. Other industry examples, where high pressure from retailers and the demand for low-cost goods led to precarious working conditions and supply chain fragmentation can be found in the logistics and meat sector (Battistelli and Campanella, 2020). Prominently, the European horsemeat scandal in 2013 showed how power asymmetries and mutual dependence between supply chain actors might result in criminal and unethical practices (Madichie and Yamoah, 2017). For this example, research already showed that subcontracting to Romanian and Polish slaughterhouses through a central importer reduced traceability (Smith and McElwee, 2021).

Although visibility is blurred in such cases, power-based governance mechanisms based on pressure from buyers rather than suppliers' intentions still represent a common form of supply chain management (SCM) (Lund-Thomsen and Lindgreen, 2014). Following the traditional logic of buyer pressure facilitating supplier compliance through monitoring, control and threats of penalties, direct forms of power such as coercive power promote centrality and complexity in supply networks (Maloni and Benton, 2000). However, the previous assumptions that high supply chain density and centrality pressure companies to comply with their stakeholder expectations for sustainability (Vurro *et al.*, 2009) need to be challenged and complemented. Particularly supply chain complexity necessitates advanced governance structures beyond direct governance (Cole and Aitken, 2020) as (sub)suppliers' densely interconnected production capacities might create complexity, further impeding direct governance mechanisms based on monitoring and controlling subcontractors for sustainability (Gold *et al.*, 2020). Therefore, non-mediated forms of governance through referent power, expert power and legitimate power (cf., Maloni and Benton, 2000) exerted by different actors in the supply chain need to be taken increasingly into consideration in network-sensitive contexts.

While the role of governance from a sustainable supply chain management (SSCM) perspective is receiving more attention from scholars and practitioners alike (Grimm *et al.*, 2014; Wilhelm *et al.*, 2016), the impact of network characteristics on mediated/non-mediated governance mechanisms for sustainable supply chains lacks comprehensive theorizing, also limiting the understanding of more advanced SSCM governance. Cole and Aitken (2020) see intermediaries or platforms as critical actors to exchange knowledge with other actors when

suitable sustainability practices need to be spread. Broadening the perspective on mediating/non-mediating actors in the supply chain, intermediaries can be defined as governing or coordinating actors or digital platforms in multitier supply networks, acknowledging that single supply chain actors can have multiple roles at the same time (i.e. nexus suppliers as an intermediary, [Yan et al., 2015](#)). Pointing to the entanglement between sustainability governance mechanisms, network characteristics and the role of intermediaries, the following questions guided the present research: *How can intermediaries impede the impact of multitier supply chain governance for sustainability? Which network characteristics amplify/weaken their influence?*

To build a more robust theoretical grounding, conceptual reasoning is applied ([Meredith, 1993](#); [Sauer and Seuring, 2018](#)) to explore the relations between highly central and/or complex upstream supply networks that include an intermediary. Resource dependence theory was used as a theoretical starting point for middle-range theorizing ([Swanson et al., 2020](#)), which explains how critical external resources influence organizational behavior ([Hillman et al., 2009](#)). Here, power understood as mutual dependence is particularly relevant for suppliers' compliance within sustainable supply chains and influences the sharing of sustainability-related risks ([Touboulic et al., 2014](#)). To map power patterns for sustainability governance more precisely, four mediation configurations are conceptualized: (1) first-tier suppliers as direct intermediaries, (2) lower-tier suppliers as indirect intermediaries, (3) third- and fourth-party logistics service providers (3PL, 4PL) as indirect intermediaries and (4) disintermediation through digital platforms. The proposed network configurations are further illustrated within industry examples from the fashion, food, electronics and logistics industries. While the selected configurations and industry examples are not exhaustive, they are vibrant for the analysis based on inherent power asymmetries, an important variable that determines which management approach focal companies should implement to govern their multitier supply chains ([Tachizawa and Wong, 2014](#)).

The conceptual analysis demonstrates that direct governance cannot fully mitigate power asymmetries when the degree of supplier centrality and complexity is high, challenging traditional assumptions on buyer's centrality as solely positive contingency factor. In such cases, purchasing companies may consider the complementary use of non-mediated forms of power, such as referent and expert power, to indirectly create capabilities and a shared vision of collaborative practices throughout the supply chain. Generally, an inverted U-shape relationship between the exertion of coercive power and sustainability performance of the supply chain can be hypothesized, pointing toward additional decentralization and disintermediation through digital platforms based on blockchain technology. To flatten the U-shape relationship and avoid negative effects from strong mediation, governance through coercive power has to be complemented by non-mediated forms of power, such as in the case of short supply chains. Thereby, the application of resource dependence theory complements and enriches the discussion on governance mechanisms in multitier supply networks, contributing to increased middle-range theorizing in logistics and supply chain management (LSCM). This research contributes to the knowledge of governing multitier supply networks while offering a power-related theoretical view on intermediaries and the mediating effect of network characteristics.

The remainder is structured as follows: [Section 2](#) provides an overview of the relevant theoretical background regarding complexity and centrality, as well as the theoretical lens of resource dependence theory. [Section 3](#) conceptualizes the proposed mediation configurations with resource dependence theory and illustrates them through selected industry examples. [Section 4](#) compares the mediation configurations, elaborating on the implications of complexity and centrality for direct governance mechanisms. [Section 5](#) discusses the results of the conceptual analysis against previous literature. Finally, [section 6](#) summarizes the research implications, while [section 7](#) concludes this conceptual research, pointing to its limitations and potential future research avenues.

2. Theoretical background

To analyze the success of governance mechanisms in a network context, related theory needs to be capable of explaining network embeddedness factors, such as repeated ties, network centrality, and density (Choi *et al.*, 2001). The general literature on multitier SCM has tackled complexity and centrality issues to address more general operations management issues, such as the amplification of demand and yield risks by vertically and horizontally complex network structures but also sustainability risks (Koberg and Longoni, 2019). In this vein, companies are more affected by the risks of other companies when cross-company dependencies increase (Hallikas *et al.*, 2004). Table 1 provides an overview of network characteristics in a general supply chain context acknowledging that these constructs partially differ from their meaning in network science (Newman, 2010). I use centrality in its definition as overall connectedness is organized around a particular company in the network (Borgatti and Li, 2009), while I understand complexity as a multidimensional construct that is a function of the number of network actors establishing different types of interrelationships (Choi and Krause, 2006; Tachizawa and Wong, 2015).

2.1 Complexity and centrality in sustainable supply networks

While the concept of multitier supply chains emphasizes complexity when moving beyond the first-tier supplier (Mena *et al.*, 2013), some research has specifically addressed the impact of supply network characteristics on governing supply networks, such as the relational complexity of sub-supplier management (Grimm *et al.*, 2014) as well as vertical and horizontal supply chain complexity (Gold *et al.*, 2020; Wilhelm *et al.*, 2016). Grimm *et al.* (2014) suggested that the relational complexity of managing sub-suppliers is a key obstacle to governing multitier supply chains by focal companies. Wilhelm *et al.* (2016) identified supply chain complexity as an essential and highly differentiated contingency factor of a buying firm's sub-supplier management. These authors proposed that low levels of horizontal complexity at the first tier and high levels at the second tier facilitate sub-supplier management delegation to first-tier suppliers if the institutional distance is low. Due to Koberg and Longoni (2019), the governance of such complex supply chain situations requires structural approaches that facilitate a stronger connection between multiple-tier suppliers and buyers or the support of third parties (e.g. NGOs or 3PLs) when addressing multiple sustainability outcomes. They suggest constituting a third-party configuration adopting both direct and indirect governance approaches.

Tachizawa and Wong (2015) looked at supply network characteristics when conceptually analyzing how supply network complexity, centralization and density moderate the relationship between formal and informal green SCM governance mechanisms and environmental performance. More comprehensively, Vurro *et al.* (2009) showed that firms could exert more influence over their network when their centrality increases. While previous empirical studies applying stakeholder approaches often acknowledge that network characteristics such as centrality are essential and positive contingency factors for sustainable supply chain governance (Vurro *et al.*, 2009), only a few studies addressed the (possibly negative) role of intermediaries in this vein. Proposing the concept of the nexus supplier, Yan *et al.* (2015) argued that suppliers' and subcontractors' centrality arises from their network position and interorganizational ties. Suppliers with high network centrality might cause network asymmetries as they are associated with more mediated forms of power and realize high power imbalances.

Just recently, Gold *et al.* (2020) showed that the combined impact of vertical complexity and supplier–subcontractor centrality and density is negatively associated with sustainability standard adoption in supplier–subcontractor networks. In a very recent study on the apparel industry in Bangladesh, Chowdhury *et al.* (2022) found that low levels of

Construct definition in network science	Meaning in the supply chain context
<i>Vertical complexity</i> : number of “jumps” in the network, denoted by the mean path length between one chosen node and all other nodes	In extant SCM literature, complexity is often tied to the structure of multitier supply chains, relying on the dimensions of vertical complexity (number of tiers) and spatial complexity (geographical dispersion of supply chain actors) (Choi and Hong, 2002). Generally, network complexity is defined as a function of the number of network participants, differentiated between the level and types of their interrelationships (Choi and Krause, 2006)
<i>Horizontal complexity</i> : number of nodes in the network	Horizontal complexity from a supply chain context refers to the number of actors/suppliers on a single supply chain tier (Choi and Hong, 2002). While the number of actors in the network and their interrelations with each other rise, coordination of single tiers becomes more demanding (Tachizawa and Wong, 2015). Particularly an increasing number of suppliers promotes information asymmetries and, thereby, challenges direct governance activities
<i>Network centrality</i> : average number of ties within the network, denoted by the mean node degree	Network centrality from an organizational context refers to the degree to which the power of decision-making is concentrated at a single company in the supply network (Tachizawa and Wong, 2015). Ibarra (1993) described network centrality as a particular source of power. Centrality is supposed to positively affect direct governance mechanisms through decreased information asymmetries, increased controllability and decreased coordination costs (Tachizawa and Wong, 2015)
<i>Density</i> : average ratio of actual ties to potential ties in the network, denoted by the mean of the ratio of the number of edges to the number of possible edges	From an organizational perspective, denser networks require more effort/power to be governed as suppliers interchange critical information more easily and may act opportunistically (Choi and Krause, 2006; Tachizawa and Wong, 2015). In this vein, transaction costs will increase in denser supply networks to protect the focal firm against suppliers’ opportunistic behavior (Choi and Krause, 2006)

Table 1.
Complexity and
centrality constructs
in SCM

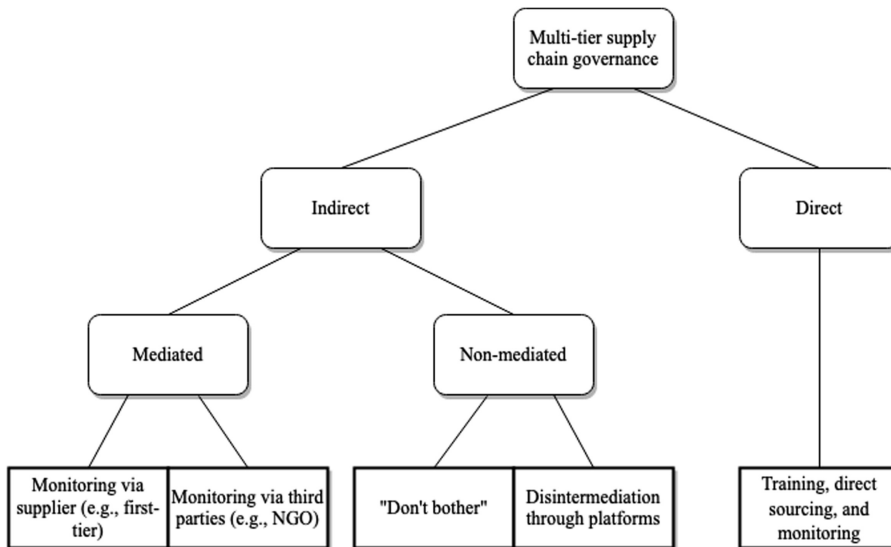
complexity moderate the exertion of supply chain relational capital for supply chain sustainability governance while being insignificant for a high level of network complexity. More generally, Najjar and Yasin (2021) found that, although institutional controls are important to managing first-tier suppliers’ sustainability, duplicating institutional controls to lower-tier suppliers might not be effective due to the inherent complexities. Therefore, firms should attempt to foster modest mechanisms that reinforce adaptation and self-organization, such as collaboration and guiding mechanisms, to manage the sustainability of lower-tier suppliers effectively. Summarizing the literature, it can be stated that the effectiveness of governance approaches is found to be network context-sensitive (cf., Vurro *et al.*, 2009; Chowdhury and Quaddus, 2021), while a comprehensive theoretical grounding is still missing.

2.2 Sustainable supply chain governance through power

Extant literature has identified several governance mechanisms to mitigate sustainability risks on vertical and horizontal supply chain levels, including trust (e.g. through the

commitment to the buyer–supplier relationships) and collaboration (e.g. through information sharing and integration with suppliers) (de Almeida *et al.*, 2015). Tachizawa and Wong (2014) conceptualize how focal firms may manage lower tiers of suppliers to govern multitier supply chains using four approaches: direct, indirect (via first-tier suppliers), work with third parties (e.g. NGOs, competitors, standards and auditing institutions), and “don’t bother” (no management of lower-tier suppliers). Building on their work, several authors studied the implementation of governance practices for SSCM (see, for example, Formentini and Taticchi, 2016). Another recent study by Chowdhury and Quaddus (2021) showed that a combination of collaboration and control-based governance mechanisms positively affects sustainable supply chain performance. A comprehensive literature review on governance mechanisms in SSCM can be found by Koberg and Longoni (2019). Figure 1 illustrates the different governance mechanisms as adapted from Tachizawa and Wong (2014).

Reimann and Ketchen (2017) differentiate mediated and non-mediated forms of power for supply chain governance, stating that the understanding of the interplay between them is still limited. Mediated forms of power are either based on promising incentives and rewards (i.e. reward power) or by threatening punishments in the case of noncompliance (i.e. coercive power) (cf., Maloni and Benton, 2000). Non-mediated forms of power, in contrast, are difficult to control directly as being created by the perception of the less-powerful party (Reimann and Ketchen, 2017). It includes the desire for identification with the exchange partner (i.e. referent power), the appreciation of the other party’s expertise (i.e. expert power) and the perception of the other party’s legitimation (i.e. legitimate power) (cf., Maloni and Benton, 2000). Reimann and Ketchen (2017) advise avoiding simple investigations of the direct effects of power and call for more research beyond buyer–supplier dyads. Furthermore, Brito and Miguel (2017) argue that research facilitating a network perspective on power leads to a better understanding of how power results from the network position of single actors and how power dynamics influence resource exchange in other network links.



Source(s): Adapted from Tachizawa and Wong, 2014

Figure 1.
Sustainable supply
chain governance

2.3 Supply chain governance from a resource dependence theory perspective

To better understand the influence of network characteristics on sustainable supply chain governance through intermediation, a connection to another field of management research, namely, resource dependence theory as initially proposed by Pfeffer and Salancik (1978), needs to be established. Resource dependence theory has been widely employed to suggest and explain organizational strategies for reducing environmental interdependence and uncertainty (Hillman *et al.*, 2009). In this line of thought, resource dependence theory explains why and how organizations intend to reduce other supply chain members' power while establishing their own supremacy (e.g. by assuming a more central position in the supply network) (Blumentritt, 2003). Power understood as control over fundamental resources is a core construct in resource dependence theory used to explain interdependencies in interorganizational relationships along supply chains (Bode *et al.*, 2011). Power asymmetries thereby result from a firm needing another firm's resources more than the other way around (Casciaro and Piskorski, 2005).

According to resource dependency theory, organizations gain access to resources in their external environment via buyer–supplier relationships and their dependence on supplying firms increases. As a result, direct and indirect links are established to manage these dependencies and reduce risks (Paulraj and Chen, 2007). Resource dependence theory can explain the impact of direct and indirect governance mechanisms in supply chain networks under power asymmetries. For the SSCM domain, resource dependence theory elucidates why focal firms do not necessarily transfer their corporate sustainability agendas into control mechanisms for managing the sustainability of their suppliers (Schnittfeld and Busch, 2016). In this vein, Schnittfeld and Busch (2016) found evidence that power and trust dynamics play an essential role in transferring SSCM practices and positioned sustainability as a new resource dependence between focal firms and their supply base.

Aiming to predict the impact of governance mechanisms in dependence on the intermediary's centrality and the network's complexity, the present conceptual analysis builds on two distinct theoretical dimensions of power: power imbalance and mutual dependence. Following Casciaro and Piskorski (2005), these two theoretical dimensions of power are the main building blocks of resource dependence theory. Power imbalance thereby captures the difference of power of one actor over another, while mutual dependence captures the existence of bilateral dependencies in a dyad (Casciaro and Piskorski, 2005). Given the resource dependence theory's potential for predicting interorganizational arrangement formation and its consequences, it is also a promising starting point for middle-range theorizing in LSCM, combining power and network theoretical dimensions.

3. Mediation configurations in supply networks

In the line of thought with previous research, it can be assumed that dependence on powerful intermediaries weakens the impact of direct contractual agreements in cases of high complexity and/or centrality and, thereby, impacts the efficiency of mediated forms of power for sustainable governance. Although resource dependence theory recognizes the influence of (mediated) power in interorganizational relationships, disintermediation as a means of balancing power asymmetries might be helpful in the interaction with intermediaries. Considering the theoretical underpinnings as proposed by Casciaro and Piskorski (2005) for this research, mediation configurations from various supply chain actors and their network position are now conceptualized as a starting point for theory building, namely first- and lower-tier suppliers, logistics service providers and platform technology as governing actors or intermediaries (see detailed description in the following subsections). In addition, the mediation configurations are illustrated with selected industry examples. Table 2 provides an

Intermediaries	Traditional governance approach from the buyer's perspective	Network context
First-tier suppliers	Direct	High network complexity, high centrality of the supplier
Second-tier suppliers	Indirect	Medium network complexity, high centrality of the nexus supplier
Lower-tier suppliers	Third party, "don't bother"	Medium network complexity, high centrality of the nexus supplier
3PL logistics service providers	Third party, "don't bother"	Medium network complexity, medium centrality of the 3PL
4PL logistics service providers	Platform	High network complexity, low centrality of the 4PL
Digital platforms	Platform	High network complexity, low centrality of the platform

Table 2.
Intermediaries

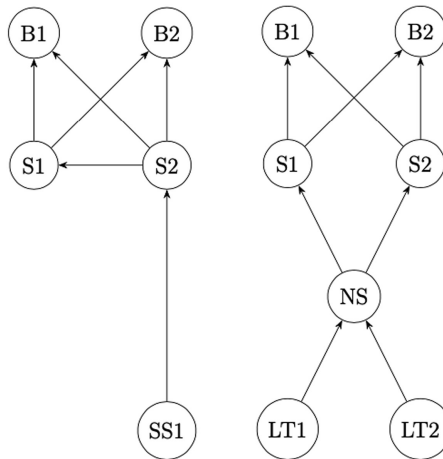
overview of the supply chain actors, related governance approaches and their network context.

3.1 First-tier suppliers as intermediaries

Suppliers are seen as essential actors in multitier supply chains, mainly when producing complete/finished products managing numerous components as first-tier suppliers, and partially sourcing components from sub-suppliers (Holweg and Pil, 2008). Accordingly, supply networks at the first-tier supplier stage can be characterized by high complexity and centrality already, for which the buyer must account (Grimm *et al.*, 2014). In some cases, first-tier suppliers exert high centrality by using their subcontractors' resources to gain power against focal buyers and blur their visible horizon (Gold *et al.*, 2020). Thus, they act as intermediaries between the subcontractors and the buying firm with medium mutual dependence. Such a horizontal expansion of the first-tier supplier results in a weaker position for the buying firm with fewer alternatives to obtain the critical resources from the mediated subcontractors. Particularly, focal clothing retailers facilitate supply chains with central suppliers to realize price advantages, resulting in increased complexity of supply networks with multitier structures and a greater number of sub-suppliers (Grimm *et al.*, 2016). Gold *et al.*'s (2020) study on the fashion industry points to central and dense network structures among suppliers and subcontractors as opportunities to hide suppliers' and subcontractors' lousy labor practices. Soundararajan and Brammer (2018) further showed that the sub-supplier's response to social sustainability requirements and related procedures is highly contingent on the framing of the intermediaries. Figure 2 (left) illustrates a related supply network.

3.2 Second-tier and lower-tier suppliers as intermediaries

Beyond the first tier, previous research addressed the antecedents of sub-supplier management (Grimm *et al.*, 2014; Sancha *et al.*, 2019), pointing to the role of structural power, interdependences, and stability for first-tier suppliers to pass sustainability requirements upstream the supply chain (Mena *et al.*, 2013). Following the theory of the nexus supplier (Yan *et al.*, 2015), for instance, Sancha *et al.* (2019) describe the role of smelters in the electronics supply chain for precluding the visible horizon of downstream supply chain actors. The authors particularly point to the complexity in lower-tier supply networks limiting the diffusion of sustainability practices and, at the same time, resulting in power gains of the nexus supplier. Hence, the impact of the traditional "don't bother" governance



Note(s): B = buyer, S = supplier,
SS = sub-supplier, NS = nexus supplier,
LT = lower-tier supplier

Figure 2.
First-tier suppliers and
lower-tier suppliers as
intermediaries

approach for managing lower-tier suppliers is not sufficient and needs to be accompanied by director forms of governance, such as through sustainability standards in mineral supply chains (Sauer, 2021). Analyzing lower-tier intermediaries from a resource dependence perspective, the ties to the focal company become weaker when they are more distant, thereby featuring less mutual dependence of the intermediary than its supply network. With this, third-party standards are supposed to enhance the power and reach toward distant suppliers (Sauer, 2021). Nonetheless, downstream supply actors are highly dependent on the nexus suppliers when increasing the supply chain's sustainability performance (Sancha *et al.*, 2019) as they can take over a facilitating or leading role. Figure 2 (right) illustrates a related supply network.

3.3 3PL logistics service providers as intermediaries

3PLs can be seen as a critical intermediary acting at multiple industries and tiers of the supply chain. They are defined as parties arranging the transportation, warehousing, shipping, and distribution of goods and services on behalf of the buying or supplying companies (Skender *et al.*, 2016). Here, logistics intermediaries connecting buying and supplying firms are supposed to reduce complexity, particularly in highly competitive markets offering standardized products and services, such as in the fashion and logistics industries (Kummer and Badura, 2010). While the freight forwarding sector has been facing high global competition levels, digitalization processes have changed traditional 3PL businesses, which led to more de-centrally organized logistics services (Hofmann *et al.*, 2019). Analyzing logistics service intermediaries from a resource dependence perspective, extant literature rates logistics as a resource itself to enable strategic moves, supply chain integration (Mellat-Parast and Spillan, 2014) and supply chain agility (Gligor and Holcomb, 2012) of the buying or supplying companies. Due to the impact of logistics services on the buying company's performance, logistics sourcing is a crucial factor in remaining competitive. However, the medium to high mutual dependency on logistical resources from 3PL service providers enables mediated power gains compared to their customers due to the

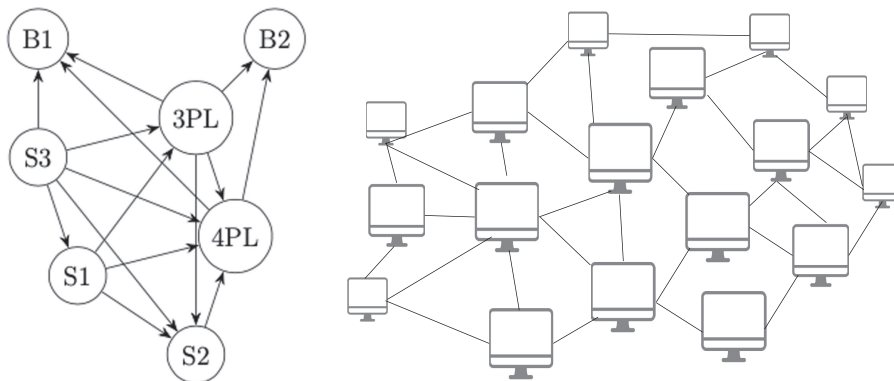
highly competitive logistics market, leading to a restrained diffusion of sustainability practice.

3.4 4PL logistics service providers as intermediaries

Schramm *et al.* (2019) see a clear trend away from simply organizing transportation and logistics activities as part of 3PL business models to providing IT platforms and other value-adding services, such as planning, analytics, and monitoring as part of fourth-party logistics (4PL) business models. In this vein, 4PL logistics intermediaries exceed more control (and power) over their supply chain partner’s businesses and facilitate less centrality in complex supply networks due to their asset-free nature. Consequently, specific mediating actors such as freight brokers in maritime logistics lost power in the past as they were partially removed through 4PL digital freight platforms (Gruchmann *et al.*, 2020). 4PL logistics intermediaries govern the supply network through platforms and decrease power imbalances and mutual dependencies simultaneously. As illustrated by the logistics industry, the involvement of the 4PL service provider and associated transportation planning reduces power asymmetries and, thereby, can reduce environmental pollution and mitigate social barriers in the form of existential fears (Mehmann and Teuteberg, 2016). Nonetheless, related supply chains rely on the centralized 4PL information management systems. While there is the potential for such platform business models to further gain power due to information centralization, more decentralized forms of disintermediation are studied in the following subsection. Figure 3 (left) illustrates a related supply network.

3.5 Digital platforms as intermediaries

Multitier supply chain governance is not limited to single actors/firms but can also be embedded in a platform’s technical architecture that mediates transactions between different actors (Gawer, 2014). While physical supply chain entities require significant trust for relying on one organization or broker, such as freight brokers in maritime logistics (Gruchmann *et al.*, 2020), platforms may reduce power asymmetries. While corresponding, platform governance goes beyond brokerage, which aims to connect to actors to initiate exchange (Burt, 2007). Hence, platform governance reduces the reliance on centralized (governance) architectures or trusted third parties when applying third-party governance (Casino *et al.*, 2019). From a network perspective, the platform’s disruptive decentralization and disintermediation effects impact governance in (multitier) SCM (Queiroz *et al.*, 2019) by replacing the traditional



Note(s): B = buyer, S = supplier

Figure 3.
Logistics service
providers and digital
platforms as
intermediaries

mediator's role through communication, digital payment, and distributed ledger technologies, allowing participants to cut the middleman to directly transact with each other (Gu and Zhu, 2021).

Besides using mainstream information and communication technologies in digital platforms, blockchain technologies can facilitate additional (permissionless) consensus mechanisms to automatically reach transaction validity which allows nodes to coordinate the system status through mass collaboration (Bogart and Rice, 2015; Nakamoto, 2008) [1]. Through the standardization and automation of transactions, platform governance can eliminate dependence on the third or focal parties by disintegrating the mediation (Schmeiss *et al.*, 2019). However, the power to enforce its adoption and the ability to benefit directly from it currently lies in legislation or other non-business actors rather than in the collective of supply chain partners. Therefore, Narayanan *et al.* (2016) suggest redistributing power from well-established legal, social and financial institutions, which entails the risk of conflicts with existing governance structures. In the light of resource dependence theory, digital platform technologies can be seen as a promising mechanism for reducing power imbalances cemented by intermediaries with a central position controlling the flow of information. Figure 3 (right) illustrates the related information network in digital platforms.

3.6 Mapping the space for governance mechanisms

As elaborated above, network characteristics need to be incorporated in the conceptualization of power asymmetries to enhance governance in multitier sustainable supply networks. While it is assumed that the impact of supplier governance through monitoring, control and threats of penalties is limited under conditions of high centrality and complexity, Figure 4 shows the position of the mediation configurations regarding their degree of mutual dependence on the network as hypothesized from resource dependence theory. Following Casciaro and Piskorski (2005), boxes below the diagonal in Figure 4 feature power imbalance in favor of the intermediary, which is the core focus of this study. In this vein, Vurro *et al.* (2009) described the case of mediation through the focal firm itself in environments with high supply chain density and centrality, which is added for completeness in the framework. Analyzing mediation from buyers through a resource dependence theory perspective, focal companies use their suppliers' external resources to increasingly focus on core processes, such as in the automotive industry. However, while drawing on their mediated market power, focal companies as central actors themselves create dense and highly complex supply networks. Accordingly, the purely positive effect of direct governance (and the mediation by the focal company itself) is limited to contractual means of enforcement. All mediation archetypes, as (indirectly) proposed by Vurro *et al.* (2009) and elaborated on in the previous subsections, are included in Figure 4.

4. A power perspective on the mediation constellations

This section compares the mediation constellations based on specific network characteristics, namely complexity and centrality as important contingency factors for power imbalances and mutual dependencies. Since intermediaries are structurally (and culturally) embedded in their extended business networks (Choi and Kim, 2008; Pullman *et al.*, 2018), their position in the supply network and the related network characteristics determine how much control they can exert over fundamental resources. Table 3 presents an overview of the degrees of network complexity, centrality, power imbalances, mutual dependencies and visibility for the mediation configurations. While these phenomena may not be exclusive to the selected industries, nonetheless, the examples illustrate the interaction between the intermediary's network position, its network environment and the resulting power asymmetries that limit

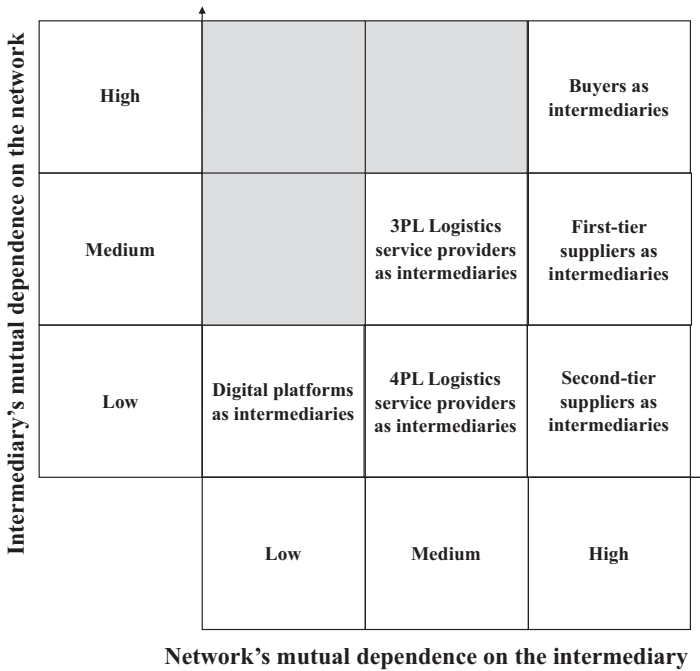


Figure 4. Proposed mediation configurations

	Visibility of the buying actor(s)	Power imbalance in favor of the intermediary	Mutual dependence in the entire network	Complexity in the buyer network	Complexity in the supply network	Centrality of the intermediary
Buying firms as intermediaries	Medium	High	High	Low	High	High
First-tier suppliers as intermediaries	Low	High	High	Low	High	High
Second-tier suppliers as intermediaries	Low	Medium	High	Medium	Medium	High
Logistics service providers as intermediaries	Medium	Medium	Medium-Low	Medium	Medium	Medium
Platform technologies as intermediary	High	Low	Low	High	High	Low
No mediation	Low	Low	Low	Medium	High	Low

Table 3. Network characteristics, power asymmetries, and visibility in the selected industries

the buying actors' visible horizon. In the following subsection, the theoretical implications that can be drawn regarding the shortening of supply chains, the mediation effect of centrality and complexity, and the positive effect of complementing coercive power with non-mediated forms of power are comprehensively presented.

4.1 *The effect of shortening supply chains*

While complexity increases with the number of tiers, shorter supply chain alternatives featuring local and small-scale production and supply provide the potential for a better sustainability diffusion and performance (Bazzani and Canavari, 2013). By promoting decentralization and disintermediation strategies, first-tier suppliers can manage their supply networks more creatively to ensure financial viability and, at the same time, deliver a social good (Pullman *et al.*, 2018). An analysis of short supply chains from a resource dependence perspective reveals that intermediaries exert weaker centralizing effects on the production network. First-tier suppliers in short supply chains gain less mediated power due to higher transparency concerning the individual members of the production network. Accordingly, there are minor power imbalances and mutual dependencies between producers, intermediaries and buyers due to a higher degree of decentralization and other forms of governance, such as those based on transparency and cultural embeddedness (Pullman *et al.*, 2018; Renting *et al.*, 2003). Particularly in short food supply chains, the coordination of decentralized production entities (farmers) with customers and the minimization of intermediaries to create proximate or embedded forms of food supply (Ilbery and Maye, 2006). Including important stakeholders as part of their supply network, Pullman *et al.* (2018) suggest governance based on trust-based rather than traditional power-based relationships.

Trust is created by information transparency and/or personal relationships with the producers (Renting *et al.*, 2003). Here, blockchain technology and its ability to guarantee reliability, traceability and authenticity of the information in a trustless and anonymous environment may also minimize power imbalances and potentially improve the SSCM performance (Saber *et al.*, 2019). For instance, in the food industry, blockchain technology enables traceability systems for real-time food tracing (Tian, 2017). Given that information cannot be modified through blockchain's immutability, the technology helps to prevent data manipulation. As illustrated by the food industry example, power inequalities hinder the development of trust in relationships. While substantial power imbalances may harm interorganizational relationships, "careful" use of coercive power promotes supply chain integration (Maloni and Benton, 2000; Silva *et al.*, 2021) and increases sustainability performance. Accordingly, alternative forms of mediation with lower power imbalances and mutual dependencies decrease competition and ease transformations toward sustainability. The subsequent research propositions (RPs) can be deduced:

- RP1. Strategies to shorten supply chains reduce power imbalances and mutual dependencies in the supply network.
- RP2. Decentralization and disintermediation strategies reduce power imbalances and mutual dependencies in supply networks.

4.2 *The mediating effect of centrality and complexity in supply networks*

Within all the selected cases, the networks are characterized by high to medium levels of centrality and complexity upstream of the supply chain. Comparing the different types of network configurations, complexities downstream the supply chain do not necessarily feature power asymmetries (power imbalance, mutual dependence). In contrast, complexity in the supplier network and centrality of the intermediary are most crucial in limiting the effects of direct governance mechanisms. To summarize the analysis, there is evidence that power asymmetries favoring the buying firm and a high degree of complexity in the supplier network limit the effect of direct governance mechanisms to a certain extent, even if or because a central intermediary is in place. Beyond the selected cases, Vurro *et al.* (2009) describe further cases ranging from non-mediation in the wood processing industry where

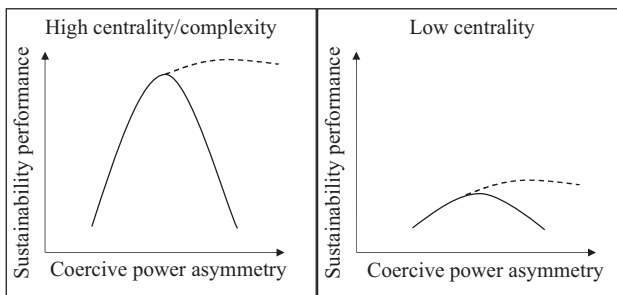
supply chain density and centrality are low to the mediation through the focal firm itself in environments with high supply chain density and centrality. Their results show that non-mediation is particularly characterized by low sustainability performance due to a lack of integration. Not touching on the effect of complexity, [Vurro et al. \(2009\)](#) predict that in the case where the focal company takes over the mediating role, the structural conditions foster collaborative governance models for sustainability.

To build a more complete picture of how coercive power asymmetries as centrality- and complexity-mediated factors facilitate sustainable governance, an inverted U-shape relationship between the exertion of coercive power and sustainability performance of the supply chain (see [Figure 5](#)) is hypothesized. In strategic management literature, many relationships follow an inverted U-shaped pattern ([Haans et al., 2016](#)), where moderate (governance) strategies with coercive power lead to optimal sustainability performance. Acknowledging power, not as a static but a dynamic variable, strategies to alter power imbalances and mutual dependencies from a high- to a medium-level are relevant to decreasing buyer or supplier dominance. The conceptual reasoning suggests that, under conditions of high centrality and complexity, direct governance mechanisms need to be accompanied by indirect forms of power from a certain point on to avoid a decline in sustainability performance (see also [section 4.1](#)). Under conditions of low centrality, the power asymmetry curve is flattened such that governance mechanisms based on coercive power become less important than governance forms based on trust and communicative aspects, such as in the case of local (food) supply chains ([Renting et al., 2003](#)). In turn, in upstream supply networks with a central lower-tier supplier, non-mediated governance such as the “don’t bother” notion in the context of smelters in the electronics industry may be accompanied by more direct forms of governance ([Sancha et al., 2019](#)). The subsequent RPs can be deduced:

- RP3.* Network centrality moderates the impact of mediated power on spreading sustainable practices.
- RP4.* Network complexity moderates the impact of mediated power on spreading sustainable practices.
- RP5.* There exists an inverted U-shaped relationship between mediated power exertion and related sustainability performance.

4.3 The positive effect of complementing coercive power with non-mediated forms of power

Highlighting the inability of the central mediating actor to decrease complexity and thus expand the buying actor’s visible horizon by reducing its own power supremacy, the cases of



Note(s): --- Alternative forms of power

Figure 5. Inverted U-shape relationship between the exertion of coercive power and sustainability performance

local food networks and 4PL digital platforms suggest a need for complementing direct governance mechanisms with indirect instruments, such as increasing transparency or trust in the supply chain, including non-mediated forms of power replacing coercive power at a specific point. Such mechanisms decentralize the intermediaries' position and reduce mediated power asymmetries to a certain extent. For the case of hidden subcontracting in the fashion industry (cf., [Gold et al., 2020](#)), extant literature already suggested non-mediated forms of power, such as referent and expert power, to complement direct governance mechanisms. Accordingly, a positive relationship between the exertion of referent and expert power and sustainability performance is hypothesized (see [Figure 5](#)). Besides the mentioned alternative forms of power to facilitate indirect governance for sustainability and balance power asymmetries, digital platform technologies enabling disintermediation could also be seen as an alternative promoting non-mediated forms of power by building on transparency, traceability and trust ([Saberli et al., 2019](#)). The case of blockchain governance illustrates the potential of diminishing the power of governing actors and replacing it with trust through anonymity and immutability ([Schrepel, 2019b](#)). In the fashion industry, blockchain technology can block nefarious agents and hold the corrupt accountable for social and environmental misconduct ([Saberli et al., 2019](#)). The subsequent RP can be deduced:

RP6. There exists a positive relationship between non-mediated forms of power and related sustainability performance.

5. Discussion

In the light of the need for more systematic attention toward network characteristics and their effect on governance mechanisms for sustainability, the proposed typology of mediation configurations complements the traditional view of multitier SCM, which focuses on the focal firm's perspective (cf., [Tachizawa and Wong, 2014](#)). Enriching purchasing and supply management research from a network and power perspective, in turn, helps the buying companies to accompany their purchasing policies with an additional governance element. Building on and partially challenging previous research, both conceptual (i.e. [Vurro et al.'s \(2009\)](#) work on supply chain governance models and [Yan et al.'s \(2015\)](#) theory of nexus suppliers) and empirical (i.e. [Touboulic et al.'s \(2014\)](#) conclusion that the exertion of buyer power creates resistance among suppliers and stops the diffusion of sustainability or [Cole and Aitken's \(2020\)](#) findings on supply chain intermediaries in establishing SSCM), previous research is embedded in a more complete theoretical frame on how network characteristics may moderate the effect of power asymmetries on sustainable transformations. The present research thereby also responds to the call by [Reimann and Ketchen \(2017\)](#) to differentiate mediated and non-mediated forms of power in supply chain governance.

5.1 Theoretical implications

So far, the role of intermediaries in sustainable supply chains has been predominantly studied through transaction cost theory, stakeholder theory and the (natural) resource-based view (RBV) ([Touboulic and Walker, 2015](#)). Considering highly competitive markets with standardized products and services, transaction cost theory sees efficiency gains by entering interorganizational arrangements, mainly through the cooperation with external, mediating partners to achieve lower costs ([Halldorsson et al., 2007](#)). While mediation, such as through blockchains, may reduce transactional costs ([Schrepel, 2019b](#)), it provides only a limited view on reaching holistic sustainability goals. While previous research found evidence that stakeholder pressure and SSCM both contribute to an organization's sustainability performance, a nuanced view of how intense pressures should be is

relatively rare (Wolf, 2014). Regarding the RBV, this theory focuses on the competitive advantage derived from a mediated management of resources and (sustainability-related) competencies (Touboulic and Walker, 2015). Although the RBV hypothesizes a positive relationship between mediating the resources and competitive advantage, only a few studies applied a power perspective (e.g. Moon and Lado, 2000).

Since the proposed conceptualization is developed from existing literature and resource dependence theory, the discussion reflects the relationship between power asymmetries, SSCM, and corporate sustainability performance. Applying another resource-centered theory, Chowdhury *et al.* (2022) used social capital theory to address the network resources through social relationships. Although the present study facilitated a network science perspective (Newman, 2010) links to constructs such as trust and cooperation can be drawn. Acknowledging that further theories are taking a relational perspective on supply chain networks, such as social network theory (cf., Borgatti and Li, 2009), this conceptual study focuses on resource dependence theory due to its strong emphasis on power constructs (Casciaro and Piskorski, 2005). Nonetheless, the application of social network theory provides an opportunity for future research due to the potential of full network analysis with regard to trust and mutual dependence. Social network theories' application on network constructs such as centrality also points toward an integration of both network and relational perspectives for sustainable supply chain governance, which is beyond the scope of the present study.

Despite its notion as a leading theory, resource dependence theory is not rigorously explored and tested yet and contested on both empirical and conceptual grounds (Drees and Heugens, 2013). Here, it has been criticized for confounding the theoretically separate dimensions of power imbalance and mutual dependence in the single construct of interdependence (Pfeffer and Salancik, 1978; Drees and Heugens, 2013). Addressing this untouched potential of resource dependence theory for predicting the sustainability performance of specific supply network structures, this study intends to stimulate further research activities that may help solve contradictions through a more refined use of power constructs. It further becomes evident that external grand theories from economics, management, and social sciences need to be translated and potentially be combined for further advancements in LSCM theory and provide a starting point for middle-range theorizing. In this line, the present study contributes to the increasing efforts of middle-range theorizing in LSCM (Swanson *et al.*, 2020).

Just a few studies applied resource dependence theory in a network context and mainly dealt with qualitative investigations in the food industry, pointing toward the level of power (mediated or non-mediated) and the level of mutual dependence between buyer and supplier (e.g. Silva *et al.*, 2021). This study thereby provides the theoretical explanation for empirical observations already made in extant literature. For the food industry context, for instance, the present study explains the power dynamics that arise from the prominence and legitimacy of third-party certification that can pose challenges for farmers in short food supply chains (de Lima *et al.*, 2021). Future research accordingly should widen the focus beyond studying the diffusion of sustainability standards as one form of third-party governance but study more generally the impact of different forms of power on spreading sustainable practices in supply networks. In the light of the conceptual analysis pursued in this study, RPs are proposed to guide future research activities for sustainable governance.

5.2 Managerial implications

The industry examples show that mediation through central actors directly governing necessary resources in complex supply chains is likely to be replaced by digital technologies in the future. Particularly for the sake of improved sustainability performance

(Saber *et al.*, 2019), digital technologies support governance from the bottom up (Jacob *et al.*, 2019), thereby acting as an intermediary itself. These new forms of governance allow for the mobilization and allocation of critical resources with less significant power asymmetries in the supply chain. Particularly in public blockchains, the consensus mechanism governs the single actors while creating convergence without coercive action (Schrepel, 2019a). In contrast, in private or consortium blockchains, while there is no mining, no proof of work and no remuneration, the control over the consensus mechanism lie with the governing party, leading to higher power asymmetries (Schrepel, 2019b). However, using additional consensus and encryption mechanisms, the consistency and validity of new entries and the restriction of transactions in private blockchains can be ensured without the involvement of third parties of any kind.

On the other hand, the implementation of blockchain involves inherent challenges. For instance, a case study on blockchain technology in SCM found that users perceived increased IT-handling complexity as an obstacle (Sternberg *et al.*, 2020). Huang *et al.* (2019) see significant challenges in the immense amount of redundant data created through the decentralized architecture, increasing network traffic, storage and processing costs across the network. Similarly, the need for sufficient computing power to achieve consensus in a peer-to-peer network is considered a downside of blockchain applications. Accordingly, technical challenges currently somewhat limit the use of technologies featuring decentralization. This becomes obvious in the logistics industry, where some blockchain applications already exist, but most platforms still use centralized database architectures. Nonetheless, blockchain technology and its effect on power asymmetries in multitier supply chains are promising future avenues. For now, the complementary use of other forms of power, such as referent and expert power, rather than the application of blockchain technology should be prioritized.

Although Jacob *et al.* (2019) use the term “governance from the bottom up” between governmental and non-state actors; the concept can be applied to the context of multitier supply chains, too. As new technologies and social actors emerge from the bottom up, new networks, such as those emerging in line with the new food production and supply trends, not only allow a lower degree of centrality of individual actors and a high degree of complexity at the same time but also provide competitive advantages despite the shared use of crucial resources. Here, information-sharing and related supply chain transparency and traceability can positively affect sustainability performance (Garcia-Torres *et al.*, 2019). As illustrated by the fashion industry example, purchasing managers may consider the complementary use of referent and expert power to create capabilities and a shared vision of sustainable work practices throughout the supply chain (Gold *et al.*, 2020). Thus, purchasing policies need to extend collaborative governance beyond contractual enforcement, e.g. through supplier assessments, including more indirect governance practices such as capacity-building from standards, increased transparency and legitimacy.

Summarizing the practical implications, managers need to be aware of the potential negative effects of solely using mediated forms of power. While the privileged access of intermediaries to information and power asymmetries enforces sustainability diffusion to a certain extent, an over-use leads to the contrary, particularly under conditions of high network centrality and complexity. The present study thereby provides insights into the potentials and risks involved in non-traditional ways of governing sustainable supply chains. Thus, new information technologies affect the underlying governance processes in networks using the inherent features of the distribution of power of technologies like blockchain (cf., Lohmer *et al.*, 2021). These lead to new governance structures increasingly based on trust and collaboration, i.e. in consortia, with hybrid governance configurations facilitating balancing mediated and non-mediated forms of power.

6. Conclusion

Evidence suggests that intermediaries limit focal firms' visible horizon in some cases already at the first-tier stage. To better understand this phenomenon, the present research conceptually compared the role of intermediaries in selected industries and constructed related mediation constellations. It further explains power asymmetries in these specific configurations while being grounded on resource dependence theory. It confirms that suppliers' densely interconnected production capacities promote network centrality and complexity and impede direct governance mechanisms based on mediated forms of power. Therefore, indirect governance mechanisms are already suggested at the first-tier supplier stage based on a complimentary use of non-mediated forms of power, such as referent and expert power, and point to digital technologies in promoting disintermediation and decentralization. While blockchain involves inherent challenges in its realization, at least at the moment, general platform technologies are more promising for reducing power asymmetries in multitier supply chains.

Although our conceptual approach provides valuable insights, this study needs to be refined by further (empirical) research. Qualitative, empirical research through case studies accordingly provides a future research avenue for a deeper understanding of intermediaries' actions and relationships in different industries (Seuring, 2008). Although the author borrowed the perspective of resource dependence theory from outside the SCM field to explain the observed phenomena (deductive-external), the findings can also be analyzed using SCM as a middle-range theoretical lens itself in future empirical studies (deductive-internal) (Seuring *et al.*, 2020; Swanson *et al.*, 2020). Similar to the research design by Gold *et al.* (2020), future research might also model the proposed mediation archetypes with an agent-based or system-dynamics simulation. Model-based research can quantify the impact of power asymmetries and evaluate different means to manage these asymmetries for increased sustainability performance.

Notes

1. In public blockchains, all participants are equal, and all transactions are visible and verifiable by the public. Privacy is achieved by protecting transacting parties through anonymity provided by public-key cryptography (Nakamoto, 2008).

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