International Journal of Production Research

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tprs20

# Multiple multi-tier sustainable supply chain management: a social system theory perspective

Yu Gong, Yan Jiang & Fu Jia

**To cite this article:** Yu Gong, Yan Jiang & Fu Jia (2021): Multiple multi-tier sustainable supply chain management: a social system theory perspective, International Journal of Production Research, DOI: 10.1080/00207543.2021.1930238

**To link to this article:** https://doi.org/10.1080/00207543.2021.1930238



Published online: 31 May 2021.

INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH
https://doi.org/10.1080/00207543.2021.1930238



# Multiple multi-tier sustainable supply chain management: a social system theory perspective

Yu Gong [a], Yan Jiang [b] and Fu Jia [c*]

[a]Southampton Business School, University of Southampton, Southampton, UK; [b]Business School, Middlesex University, The Burroughs, London, UK; [c]The York Management School, University of York, York, UK

**ABSTRACT**

A multi-tier supply chain is a complex system as it covers a focal company and multiple tiers of suppliers in a complex supply chain network. This study explores the complexity in multi-tier sustainable supply chain management (SSCM) through a social systems theory perspective. We carried out a case study on IKEA China's sustainable cotton initiative and examined its five cotton-textile supply chains. The primary data were collected through 22 semi-structured interviews with managers of IKEA China and their multi-tier suppliers. The findings suggest that in order to cope with environmental complexity in implementing multi-tier sustainable initiatives, focal companies tend to create both internal complexity and collaborative complexity in a variety of governance mechanisms. In addition, environmental overlap and available collaborative complexity increase in this process and can feed back into systems to facilitate further creation of requisite variety. We contribute to the multi-tier SSCM literature through providing an in-depth understanding of nuanced mechanisms of managing different tiers of suppliers to cope with complexities by adopting a social systems theory perspective. We also contribute to multi-tier supply chain governance mechanisms from an evolution perspective.

**ARTICLE HISTORY**
Received 7 December 2020
Accepted 28 February 2021

**KEYWORDS**
Multi-tier supply chains; social systems theory; cotton-textile supply chain; sustainable supply chain management; case study

## 1. Introduction

Sustainable Supply Chain Management (SSCM) has been considered increasingly important by both industry and academia (Taylor and Vachon 2018). With today's ever more complex and fragmented supply chains due to global sourcing (Mena, Humphries, and Choi 2013; Zhao, Zuo, and Blackhurst 2019), companies have gradually moved their focus from Tier 1 suppliers to sub-tier suppliers and even suppliers in the extreme upstream (e.g. raw material suppliers) while managing sustainability issues (Mena, Humphries, and Choi 2013; Grimm, Hofstetter, and Sarkis 2014, 2016; Tachizawa and Wong 2014; Wilhelm et al. 2016a, 2016b).

Studies on multi-tier supply chains have focused on diverse topics. Traditionally the research is quality management-oriented. For instance, Biotto, De Toni, and Nonino (2012) provide a single case study of the Illycaffe Group with a focus on quality management-oriented supply chain learning where Illycaffe played a supply chain coordinator role in order to efficiently and effectively manage quality along the whole supply chain. Tse and Tan (2011) propose an analysis framework to manage the quality risk in a multi-tier global supply chain. More recently, sustainability issues have started to draw attention in multi-tier SSCM studies. For example, Wilhelm et al. (2016a) explore the double agency role of the first-tier suppliers in SSCM who acts as agents fulfil the lead firm's sustainability requirements and implement such requirements in their suppliers' operations. Wilhelm et al. (2016b) identify three main factors of supply chain complexity, the sustainability management capabilities of the first-tier supplier, and the type of sustainability in focus (i.e. environmental or social sustainability) which can determine when and how buying firms actually extend their sustainability strategies to their sub-suppliers.

Nevertheless, the exploration of diffusing sustainability in multi-tier supply chains is still in its very early stages and multiple challenges have been recognized (Pathak et al. 2007; Mena, Humphries, and Choi 2013; Dou, Zhu, and Sarkis 2018; Sarkis 2018; Jabbour, de Sousa Jabbour, and Sarkis 2019). On the one hand, supply chains can be simplified into three tiers (Grimm, Hofstetter, and Sarkis 2014, 2016; Wilhelm et al. 2016a, 2016b), and the complexity embedded in each tier varies (Pathak et al.

**CONTACT** Fu Jia jeff_fujia@hotmail.com The York Management School, University of York, York, YO10 5DD, UK
*Present address: School of Economics and Management, Chongqing Jiaotong University, Chongqing, China

Supplemental data for this article can be accessed here. https://doi.org/10.1080/00207543.2021.1930238

2007; Mena, Humphries, and Choi 2013; Zhao, Zuo, and Blackhurst 2019). Therefore, the way focal companies influence and control different tiers' suppliers is to tailor their characteristics and positioning in the supply chain accordingly (Tachizawa and Wong 2014; Gong et al. 2018; Sarkis, Gonzalez, and Koh 2019).

On the other hand, initiating sustainability in multi-tier supply chains further 'adds complexity to an already difficult problem' (Sarkis 2018; Jabbour, de Sousa Jabbour, and Sarkis 2019) given the additional stakeholder involvement, broader performance objectives, and increased business practices (Dou, Zhu, and Sarkis 2018). All these challenges drive a substantial call for further research in this area (Sarkis 2018). Put briefly, one of the most salient research gaps in SSCM is different ways of coping with environmental complexity or uncertainties in diffusing sustainability within Tier 1, middle-tier and extreme upstream suppliers by the focal companies (Wilhelm et al. 2016a, 2016b).

To respond to this call, we adopt social systems theory to explore how focal companies govern multi-tier suppliers by leveraging different governance mechanisms to reduce complexity in implementing SSCM initiatives. Social systems theory offers a complexity-based sociological perspective on how a system responds to challenges in the environment (Luhmann 1995; Schneider, Wickert, and Marti 2017). It is particularly suitable for investigating multi-tier SSCM for two reasons. First, the multi-tier supply chain is considered as a complex system that requires the coordination of various supply chain members, and management efforts, therefore, need to be made at a system level (Choi, Dooley, and Rungtusanatham 2001; Surana et al. 2005; Holweg and Pil 2008; Hall, Matos, and Silvestre 2012). Second, implementing sustainability initiatives on multi-tier supply chains makes an already complex issue more challenging as two dimensions of complexity are further embedded. On one hand, a wider range of stakeholders, e.g. non-government organizations (NGOs), rather than only the traditional supply chain members (e.g. suppliers, manufacturers, and retailers) are involved (Tachizawa and Wong 2014; Gong et al. 2018). On the other hand, sustainability-related issues contain three elements, i.e. financial, social, and environmental, which implies more complex management efforts in the supply chain context (Linton, Klassen, and Jayaraman 2007; Matos and Hall 2007; Hutchins and Sutherland 2008). Therefore, we adopt social systems theory in this study.

Building on social systems theory (Luhmann 1975, 1995; Seidl and Becker 2006; Schneider, Wickert, and Marti 2017), we carried out a case study on IKEA's sustainable cotton initiative in China. The cotton-textile supply chain covers seven stages: cotton farming, ginning, spinning, weaving, dyeing, cutting and stitching, and branding. IKEA has been proactive in promoting sustainable cotton practices in its extreme upstream cotton farming. It announced the goal of achieving 100% sourcing from more sustainable sources by August 2015. Sustainable Cotton Ranking positions IKEA as number 1, a leader of the benchmarked brands, in using sustainable cotton as raw materials (Sustainable Cotton Ranking 2017). This proactive multi-tier sustainable initiative provides us a unique opportunity to explore the following research question:

> How do focal companies leverage various governance mechanisms on multi-tier suppliers to implement sustainability initiatives in a supply chain context?

Our research contributes to the SSCM literature in the following ways: first, it may be the first attempt to adopt a social systems perspective to explore sustainability issues in the multi-tier supply chain. The study enriches the understanding of nuanced mechanisms to manage different tiers of suppliers to cope with environmental complexities. Second, this study empirically extends the works of Tachizawa and Wong (2014), Gong et al. (2018) and Jia, Gong, and Brown (2019) on multi-tier SSCM via an empirical case study approach. We found that supply chain focal companies tend to apply a mixed and evolving governance mechanism when dealing with multiple tiers' suppliers.

After this introduction, Section 2 reviews the research that has been undertaken on the key concepts; Section 3 presents the case study research method; Section 4 presents the case description and the data analysis; and Section 5 discusses the case findings against the reviewed literature and develops several propositions; Finally, Section 6 summarizes the theoretical and practical contributions, acknowledges limitations of the research, and points out future research directions.

## 2. Literature review

In order to answer the research question, we examined two bodies of literature of (i) multi-tier supply chain governance mechanisms and (ii) social systems theory.

### 2.1. Multi-tier supply chain governance mechanisms

The definition of SSCM suggests that focal companies should achieve the balanced development of economic, environmental and social aspects and should oversee governance across the whole supply chain of a multi-tier system (Tachizawa and Wong 2014, 2015). To embrace suppliers into sustainability, different governance mechanisms have been developed by focal companies.

These governance mechanisms have been discussed by existing research at company, chain and network levels. From the focal company's perspective, supplier assessment and supplier collaboration have been explored to contribute to better sustainable performances (Gimenez and Sierra 2013; Danese, Lion, and Vinelli 2019; Mena and Schoenherr 2020). Supplier assessment refers to supplier selecting, evaluating and monitoring activities on sustainability; whilst supplier collaborations refer to supplier training and development, and joint efforts with suppliers to improve sustainability (Gimenez and Sierra 2013). Contingent factors such as environmental dynamism and stakeholder pressure may impose a synergistic effect on these two governance mechanisms and sustainable performance (Ni and Sun 2018). More importantly, Ni and Sun (2018, 155) propose that the fit between governance mechanisms and contextual factors is crucial for the achievement of sustainability. However, the evolution of the governance mechanism and contextual factors remains to be studied.

From a supply chain network perspective, Tachizawa and Wong (2015) conceptually propose a research framework on supply chain governance mechanisms, supply network structure/complexity and environmental performance. However, instead of focusing on supplier assessment and collaboration, Tachizawa and Wong (2015) explore formal and informal supply chain network governance mechanisms. The formal refers to 'structural arrangements designed to influence the behaviour of network members in an explicit way' and the latter refers to 'structural arrangements designed to influence the behaviours of organization members based on social control and trust rather than bureaucratic structure' (Tachizawa and Wong 2015, 22). Similar to Ni and Sun (2018), Tachizawa and Wong (2015) also explore the contextual factors but from a network perspective on centralization, density and complexity. In particular, supply chain complexity refers to the number of network participants, differentiation between suppliers and levels, and types of interrelationships between suppliers.

Finally, governance mechanisms have been discussed from a multi-tier supply chain management perspective which is also our focus. Mena, Humphries, and Choi (2013) carry out a study on three-tier supply chains and propose three types of governance structures – i.e. open, transitional, and closed triads. Tachizawa and Wong (2014) further develop the work of Mena, Humphries, and Choi (2013) with a focus on lower-tier suppliers (Tier 2 and beyond). They conceptually propose four governance mechanisms of 'direct', 'indirect', 'work with third party' and 'don't bother' approaches. The *direct* mechanism involves practices such as provide requirements to lower-tier suppliers, direct sourcing, monitor suppliers, share buyer-generated databases and provide assistance to suppliers via training, conferences and joint research. The *indirect* mechanism includes activities such as provide requirements to first-tier suppliers and pass on such requirements to lower-tier suppliers, require lower-tier suppliers to be certified, and assist first-tier suppliers to monitor or collaborate with lower-tier suppliers. The *work with third party* mechanism refers to activities jointly carried out with third parties such as use information provided from third parties, and collaborate with NGOs, competitors, industry associations and auditing firms. Finally, the *don't bother* mechanism refers to a hands-off approach with lower-tier suppliers. Again, Tachizawa and Wong (2014) also explore the contingence factors on focal companies' choices of governance mechanisms on lower-tier suppliers, which include power, stakeholder pressure, material critically, industry, dependency, distance and knowledge resources.

After Tachizawa and Wong (2014), Gong et al. (2018) and Jia, Gong, and Brown (2019) apply a case study approach to empirically analyse the governance mechanisms in three multinational companies' multi-tier sustainable supply chain initiatives in China. Interestingly, they borrow the concept of supply chain transformational/transactional leadership (Defee, Esper, and Mollenkopf 2009a, 2009b, 2010; Gosling et al. 2016; Chen et al. 2021) on analysing the focal companies' governance mechanisms on first-tier suppliers and Tachizawa and Wong's (2014) classification on lower-tier suppliers. Both studies tend to simplify the multi-tier supply chain into a few tiers without exploring the details at a network perspective.

To conclude, existing research explored the governance mechanisms of multi-tier supply chain management at different levels, with contingency factors and sustainable performance. Only few studies have focused on the complexity of the multi-tier supply chain network and the evolution of the governance mechanisms (Tachizawa and Wong 2015; Gong et al. 2018).

### 2.2. Social systems theory

Hall, Matos, and Silvestre (2012) suggest that SSCM can be treated as a complexity challenge as it requires the coordination of supply chain members on various sustainability elements (e.g. environmental and/or social). Social systems theory particularly deals with complexity challenges through interactions among organizations. Social systems theory originates from cybernetics (Ashby 1956) and was then systematically developed by Luhmann (1973, 1975, 1995, 2013) to analyse various areas of social life. Scholars have adopted it to explore a wide range of topics ranging from the macro-level (e.g. the whole society or sub economic system) to the micro-level (i.e. organization) (Langenmayr

2016; Seidl and Schoeneborn 2016). Social systems theory is also highly appreciated in the field of organization studies for theory discussion and building (Seidl and Mormann 2014). In particular, Schneider, Wickert, and Marti (2017) adopted it to explore how organizations respond to environmental complexity through creating either internal complexity or collaborative complexity.

In social systems theory, complexity is one of the key concepts that describe the number of and the connections between elements that comprise a system or the environment (Luhmann 1975). The environmental complexity increases as the number of elements increases or with the emergence of a new issue (Schneider, Wickert, and Marti 2017), e.g. implementing sustainability initiatives among multi-tier suppliers (Hall, Matos, and Silvestre 2012). To respond to the complexity, companies need to possess sufficient amount of requisite variety, which refers to the variety of actions available to a system (Ashby 1956; Luhmann 1995). The development of requisite variety can be achieved through creating either *internal complexity* or *collaborative complexity* (Schneider, Wickert, and Marti 2017), where internal complexity indicates the structure and processes that are established within a company (Daft and Lengel 1986; Damanpour 1996) and collaborative complexity indicates those established between companies (Schneider, Wickert, and Marti 2017). Moreover, companies may combine internal and collaborative forms of complexity in different ways when considering *environmental overlap* (i.e. the degree to which a specific issue concerns more than one company) and *available collaborative complexity* (i.e. the requisite variety created by other companies) (Schneider, Wickert, and Marti 2017).

Scholars suggest that social systems theory is particularly suitable for investigating the implementation of sustainability initiatives for two reasons. First, implementing sustainability represents a high environmental complexity due to the multifaceted interactions between business and society in terms of the economic, environmental, and social aspects (Baumann-Pauly et al. 2013). Second, to respond to the environmental complexity, many companies create both internal and collaborative complexities in the implementation of sustainability initiatives (Rasche, De Bakker, and Moon 2013). Regarding the creation of internal complexity, for example, Baumann-Pauly et al. (2013) propose that companies may establish a sustainability department, develop codes of conduct, and train employees to handle sustainability issues. These activities are considered as the operationalization of internal complexity (Schneider, Wickert, and Marti 2017). Regarding the creation of collaborative complexity, scholars propose that companies may join multi-stakeholder initiatives, work with NGOs, adopt collaborative industry self-regulation, or participate in industry round tables (Reinecke and Ansari 2016). Because such activities belong to different governance mechanisms, we consider the supply chain governance mechanism as the operationalization of collaborative complexity.

In adopting social systems theory, we are interested in the focal company's internal activities and effect of governance mechanisms on multi-tier suppliers, how focal companies operationalize internal and collaborative complexities to reduce environmental complexity in implementing sustainability initiatives along multi-tier supply chains, as well as the contingency content under which focal companies can achieve this more effectively.

## 3. Research methodology

Given the limited research on the multi-tier supply chain context and the fact that our research question is a 'how' question (Yin 2008), a retrospective longitudinal case study method was adopted, where we collected data regarding the implementation process and the evolutionary changes of internal and collaborative complexities. We adopted a nested case design strategy selecting five of IKEA's cotton-textile supply chains implementing the sustainable cotton initiative as our cases.

### 3.1. Case selection and data collection

IKEA China was selected for this research because it has higher complexity in its supply chains and is believed to be much more mature in addressing environmental complexity, particularly in the long and complex cotton-textile supply chains (Gong et al. 2018; Jia, Gong, and Brown 2019). IKEA is an exemplar in implementing sustainability in its multiple tier supply chains and has multiple multi-tier supply chains in textile products, adding richness and allowing us to select supply chains with different levels of vertical integration.

Semi-structured interviews were conducted as the primary data source. Eisenhardt and Graebner (2007) suggest that interviews are a highly efficient way to gather rich, empirical data – particularly when the phenomenon of interest is highly episodic and infrequent – which are tacitly stored in interviewees' minds. To reduce respondents' bias, multiple interviews were conducted with focal companies' senior executives and managers, managers of different tiers of suppliers, government agencies, NGOs or other third partiers with knowledge of the sustainable initiatives, providing multiple perspectives.

Interviews were carried out between late 2014 and the end of 2015 following the interview protocol as listed in Appendix 1. In total, 22 interviews were conducted with a focus on the sustainable cotton initiative with IKEA China's five cotton-textile supply chains. The list

of interviews is shown in Appendix 2. We further validate the information in early 2018 to update the information without major changes. The suppliers were selected based on the level of vertical integration: from fully vertically integrated suppliers (suppliers cover all the production stages besides cotton farming) to the least integrated (multiple suppliers cover one or few stages). More details are provided in the case description and data analysis. An interview protocol was customized for each company and as guidance for these interviews. When we finished an interview, we asked the suppliers to introduce us to their upstream or downstream supply chain partners. Through this snowball method, we gained access to five supply chains (Table 1), which IKEA later confirmed could represent different scenarios.

Most of the interviews (21) were conducted in Chinese Mandarin, with one in English. All the interviews were digitally recorded except for one in which the interviewee did not agree to be recorded. Detailed notes were taken for this one. Sixteen of the interviews were conducted face to face in eight cities across China, and six interviews were conducted via telephone either due to distance or interviewees' time schedule conflict. Field notes were taken during and after the interviews to record immediate reflections of the field researchers. The average length of each interview was around 50 min. Fieldwork was called off when a theoretical saturation was reached (Eisenhardt 1989), i.e. further interviews did not provide new information to offer further understanding of the research question.

All the recorded interviews were transcribed into Chinese/English with more than 223,000 characters/words in total. Besides these formal interviews, a number of informal interviews/conversations were conducted along with the factory/plant tours. Factory visits were made to nine suppliers with two Tier 1 suppliers, one cotton farm, and six middle-tier suppliers.

The data were saved in a database together with any digital information provided by the interviewees. Photos were taken wherever permitted and kept as reminders of the field experience and to provide a different data source. Archival data were also extensively collected including company websites, news coverage, internal company documents and public corporate social responsibility reports. These multiple sources of data (i.e. interviews, observation and archival data) were applied to triangulate the data (Eisenhardt 1989).

### 3.2. Coding and data analysis

After data collection, data were coded and analysed. Based on Miles, Huberman, and Saldana (2013), within-case analysis was first conducted followed by the

**Table 1.** Background information of interviewed companies.

| Supply chains | Company | Starting time (Year) | Sales Revenue (RMB) | No. of employees | Supplying IKEA | Share of Sales Revenue | Product | Activities | Purchasing/Supply amount |
|---|---|---|---|---|---|---|---|---|---|
| **S1** | S1-T1 | 2004 | 3.5 billion (2014) | 4000 | since 2008 | IKEA accounts for 30% | Textile product | Ginning to cutting and stitching | 9000 lint cotton |
| | S1-T2 | 2007 | NA | 518 households | since 2014 | NA | BCI cotton | Cotton farming | 1000 tonnes seed cotton in 2014 and 45 tonnes seed cotton in 2016 |
| **S2a, S2b** | S2-T1 | 1992 | 2.6 billion (2014) | 9000 | > 10 years | IKEA accounts for 35% | Filled products | Dyeing, cutting and stitching | 2000–3000 lint cotton |
| | S2a-T2 | 1999 | 1.5 billion (2015) | 2700 | since 2008 | S1-T1 and S2-T1 each account 5% | Fabric | Spinning and Weaving | NA |
| | S2b-T2 | 2007 | 50 million (2015) | 320 | since 2013 | S3a-T2 accounts 20-30% | Velvet products, cushion | Spinning, weaving and dyeing | Yarn 2200 tonnes |
| | S2b-T3 | 2007 | NA | 1400 households | since 2013 | NA | Lint cotton | Cotton farming and ginning | Lint cotton capacity 5200 |
| **S3a, S3b** | S3-T1 | 1997 | 1 billion (2015) | 1000 | ≈ 20 years | IKEA accounts 90% | Sofa textile and curtain | Cutting and stitching | 2000–4000 lint cotton |
| | S3a-T2 | 1994 | 170 million (2015) | 110 | since 2000 | S3-T1 accounts 70-80% | velvet products, curtain fabric | Weaving and dyeing | NA |
| | S3a-T3 | 2005 | 50 million (2015) | 300 | since 2007 | S3a-T2 accounts 80% | Yarn | Spinning | 500 |
| | S3a-T4 | 2002 | NA | 30 households | NA | NA | Lint cotton | Cotton farming and ginning | Lint cotton capacity 10,000 |
| | S3b-T2 | 2014 | 50 million (2015) | 48 | since 2014 | S3-T1 accounts 90% | Woven products | Weaving and dyeing | Yarn 1000 tonnes |

Note: data as in the end of 2015.

**Table 2.** SSCM governance mechanism on lower-tier suppliers.

| SSCM governance mechanisms | | Operational definition |
|---|---|---|
| Governance mechanisms on Tier 1 suppliers | Collaboration | Working directly with suppliers, providing training, support, or other joint efforts. |
| | Assessment | Any activities related with evaluating suppliers such as company visits, auditing, evaluation and providing feedback. |
| Governance mechanisms on lower tier suppliers | Direct | Focal company has direct access to lower-tier suppliers. |
| | Indirect | Focal company contacts lower-tier suppliers indirectly through another supplier. |
| | Work with third party | Focal company collaborates or delegates responsibilities to other organizations (e.g. NGOs, competitors, firms from the same industry, standards institutions). |
| | Don't bother | Focal company focuses on first-tier suppliers and has neither information about lower-tier suppliers nor intention to influence them. |

Sources: Gimenez and Sierra (2013); Tachizawa and Wong (2014); Wilhelm et al. (2016b).

**Table 3.** Complexity in the multi-tier SSCM system.

| Complexity-related constructs | Operational definition |
|---|---|
| Internal complexity | Focal company creates its internal structure and processes to cope with complexity, e.g. functional specialization, structural differentiation, enhancing organizational process. |
| Collaborative complexity | Focal company jointly creates with other organizations (such as suppliers and NGOs) the inter-organizational structure and processes to collectively respond to complexity they commonly face, e.g. the adoption of different governance mechanisms. |
| Environmental overlap | The degree to which a particular issue is perceived relevant to more than one organization, e.g. the more supply chain members that regard sustainability issues as relevant, the higher environmental overlap among them. |
| Available collaborative complexity | The existing collective actions that have been created and taken by other organizations and can be adopted from an individual organization's point of view. |

Source: Schneider, Wickert, and Marti (2017).

**Table 4.** Reliability and validity tests.

| Test | Application in this study |
|---|---|
| Construct validity | Multiple sources of evidence including semi-structured interviews, various forms of secondary data and observation;<br>A chain of evidence: multiple informants in focal companies, and multiple informants at suppliers/non-traditional supply chain partners;<br>Review of findings by an uninvolved senior academic;<br>The senior managers reviewed the final writing with feedback. |
| Internal validity | Structured data coding and analysis;<br>Development of propositions based on a chain of evidence. |
| External validity | Theoretical sampling approach;<br>Thick descriptive data;<br>Site visits to various suppliers (IKEA: two Tier 1 suppliers and seven lower-tier suppliers). |
| Reliability | Use case study protocol to guide field research and analysis;<br>Develop case study database including recordings, transcripts, field notes, sustainability reports, internal documents, academic case studies, news coverage;<br>Iterative discussion with uninvolved senior academics. |

Source: Yin (2008).

cross-case analysis. The aim of within-case analysis is to identify the constructs and the relationships between them. Coding of the interview transcripts and secondary data was done by two researchers, independently, via an iterative process and notes were compared (both researchers are bilingual and fluent in both English and Chinese). The coding scheme is provided in Tables 2 and 3. Agreements were reached for all the constructs and relationships after many rounds of discussions.

Cross-case analysis helps to identify the patterns in different settings and seeks to increase the external validity of the findings. The cross-case results were iteratively discussed with one of the co-authors who was not involved in the data collection and who played a 'resident devil's advocate' role to bring a more objective view (Sutton and Callahan 1987).

Eisenhardt and Graebner (2007) suggest that qualitative research may build new theory (grounded theory approach) or elaborate on existing theory. We position our study in between these two extremes, i.e. we have a prior framework, governance mechanisms in multi-tier supply chains (collaboration/monitoring on Tier 1 suppliers and direct/indirect/work with third party/don't bother with lower-tier suppliers). However, we did not set out to test a theory (e.g. social systems theory). The constructs of social systems theory emerged at a later stage of our data analysis. The whole process is iterative, going back and forth between data and literature.

Finally, the whole research was validated according to Yin's (2008) four tests as shown in Table 4. Construct validity was ensured by triangulating interview data with field notes and observations and corroborating the findings through different perspectives of supply chain and non-supply chain actors in the cases. The English transcripts were translated back into Chinese and compared with original Chinese recordings by an academic expert. In order to strengthen the construct validity of the analysis results, the final reports were sent to IKEA managers for feedback to check accuracy and obtain ethical approval. Internal validity was ensured by matching the

pattern with the predicted one developed from literature. Using multiple cases enabled replication of the findings, providing external validity. Reliability was ensured by rigorous use of the case study protocol and developing a case study database. To reduce the possibility of respondents not recalling prior events, at least one informant for each firm involved was selected from those who had stayed for the whole duration of the implementation process of the sustainable cotton initiative.

## 4. Case description and data analysis

IKEA is the world's largest furniture retailer. Cotton is the second most important raw material at IKEA after timber. In 2005, together with other world-leading brands and organizations, IKEA launched a global platform, the Better Cotton Initiative (BCI), a NGO which aimed to make cotton production better for the people who produce it, better for the environment it grows in, and better for the sector's future (BCI 2017). In 2011, IKEA started implementing the sustainable cotton initiative in China. A dedicated sustainable cotton team was set up for this purpose. The target of the project is to promote sustainable cotton practices at the cotton field level and to ensure that IKEA's final products made from cotton should be 100% sourced from sustainable cotton sources, a target that was achieved globally by the end of its 2015 financial year.

The project generally followed four steps: (i) *supply chain mapping* – i.e. mapping the cotton-textile supply chain to the cotton farm level; (ii) *awareness building* – i.e. holding training sessions internally and providing training and workshops with Tier 1 (cutting and stitching) suppliers and key Tiers 2, 3 dyeing and weaving suppliers; (iii) *capacity building* – i.e. besides providing access to foreign BCI suppliers, making direct contact with Tier 5 ginners and Tier 6 cotton farmers in China with an aim of creating sustainable cotton supplier bases and engaging BCI in the cotton farming training; and (iv) *securing the supply chain* – i.e. as a promise to BCI to continuously develop Chinese cotton farms. At the end of the 2014 financial year, IKEA China achieved sourcing 100% of its cotton from sustainable cotton sources, one year ahead of its group target.

We carried out interviews relating to five supply chains as in Figure 1. In total, there are three Tier 1 suppliers, six middle-tier suppliers which cover spinning, weaving and dyeing, and five extreme upstream suppliers dealing with cotton farming and ginning. Table 1 provides the detailed information for each company and the full information of each cotton-textile supply chain is provided in the supplement document.

Next, we discuss how IKEA China applied its governance mechanism on its Tier 1 suppliers and on lower-tier suppliers of middle-tier and extreme upstream suppliers, along with the internal and collaborative complexities that the initiative created.

### 4.1. Governance mechanism on Tier 1 suppliers

Before IKEA began working with its suppliers, it first created internal complexity in terms of organizational structure and setting up its better cotton team. The team is responsible for developing cotton sources and overseeing the sustainability initiative, while business development teams are responsible for liaising with suppliers and building awareness. From this, the organizational process was created, where the two teams worked closely together and communicated frequently to achieve agreement before collaborating with suppliers.

The business development team then looked at environmental overlap, making sustainability initiatives a concern among suppliers through awareness building. The Business Development manager said,

> We approached at least the suppliers' president or general manager level, and we could sit down and have a deep discussion on the topic, including what is the meaning of this strategy for IKEA and for the suppliers . . . suppliers soon realize it is a win-win situation, because if IKEA wants to be a global sustainable cotton retailer and a leading brand, and if the suppliers achieve the agreement and together we work on it, in fact the supplier can become a leading company in China or even globally.

The sustainable cotton team also considered environmental overlap, inspiring the suppliers to believe that the targets are achievable through continuous communication. The IKEA Sustainable Cotton Manager mentioned,

> We emphasized communication at the very beginning, and we did lots of detailed analysis with the suppliers with some training on what the whole project, our target and the steps are.

IKEA, together with Tier 1 suppliers, then jointly created collaborative complexity in a variety of ways. First, IKEA drew up plans with suppliers according to their conditions which reflect the supplier differentiation. For example, of the three suppliers, it would be easy for S1-T1 to implement the project as it is in a highly vertically integrated supply chain with a small number of tiers; thus, S1-T1 is expected to be a role model – that provides available collaborative complexity – for other suppliers. As the Sustainable Cotton Manager suggested,

> Normally we won't give the suppliers a tough timeline. They could adjust it to their own pace. We then compare whether it matches our overall target. If they can't meet

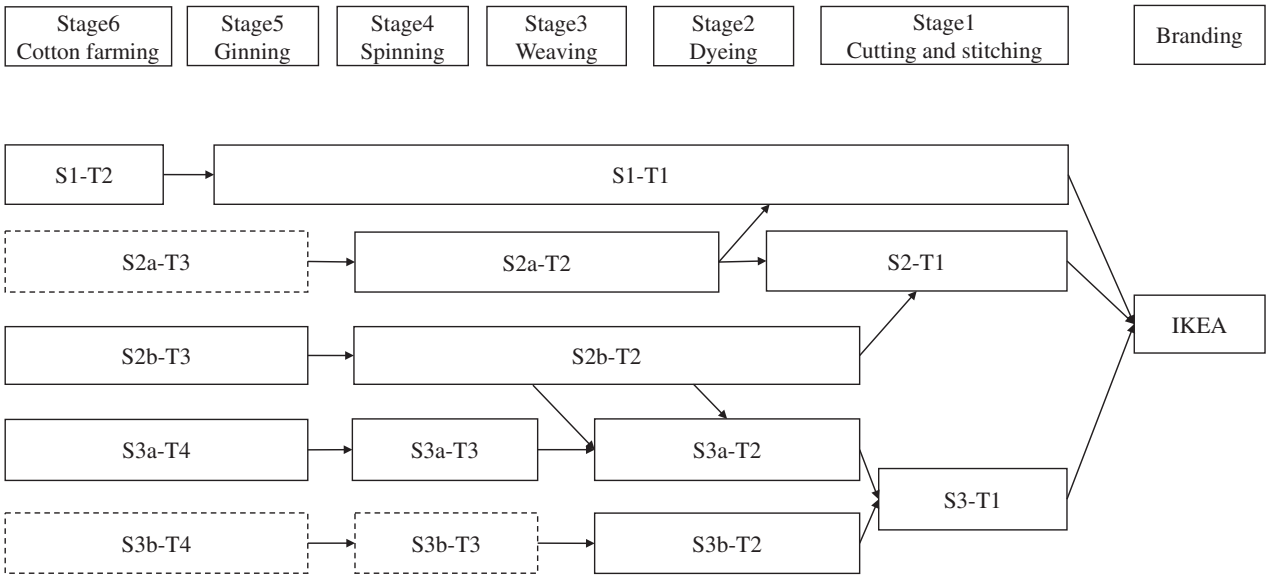


**Figure 1.** Interviewed cotton-textile supply chains. Note: Information on the dotted companies was gathered through/from other suppliers.

> it, then we will analyze why they can't make it, and we will provide one-to-one support accordingly.

Meanwhile, IKEA organized various forms of training for its suppliers. The Tier 1 suppliers can bring Tier 2 and even Tier 3 suppliers to the training sessions. IKEA also organized workshops with international traders and cotton and yarn suppliers from India with the support of Indian colleagues. It also brought the suppliers to visit the pilot sustainable cotton farms in Xinjiang, a major cotton supply base in China. The sustainable cotton team also shared the preferred sourcing list with the suppliers.

Besides IKEA's efforts, the Tier 1 suppliers also made efforts in responding to IKEA's requirements to become more familiar with sustainable cotton themselves. The CEO and Purchasing Manager of S3-T1 visited India through its network and purchased both lint cotton and yarn made from IKEA's sustainable cotton sources in India to show its goodwill.

In addition, from the very beginning, the business development team also made sure that the strategy had a strong link with suppliers' business via rewards or sanctions, particularly for the suppliers with cotton as the main raw material. The Business Development Manager said,

> We highlight it at the very beginning, to suppliers which have the sustainable cotton platform and channel and are doing their best, such that we could give priority for product development. If you are left behind, you won't have the chance to develop new cotton-related products . . . we send a strong signal that sustainable development is our core focus.

Last, IKEA also applied monitoring and contracting with its Tier 1 suppliers. It made purchasing of sustainable cotton resources a requirement in the contracts and verified the cotton sources by checking the purchasing records, contracts and logistics files.

### 4.2. Supply chain governance mechanisms on middle-tier suppliers

In total there are six middle-tier suppliers (the suppliers between Tier 1 and extreme upstream suppliers) in the five supply chains. We carried out direct interviews with five of them and gathered information for S3b-T3 from both S3b-T2 and S3-T1.

Together with the T2 suppliers in S2a, S2b and S3a, IKEA jointly created collaborative complexity through a direct approach. For S2a-T2, IKEA applied a direct approach. The two companies have a direct relationship in their product development. The Marketing Manager said,

> Although we are a Tier 2 supplier, we have a generally close relationship with IKEA especially on product development. We supply to IKEA via different clients. However, we are always trying to fulfil IKEA's final product requirements.

Because it is familiar with the cotton sources, it facilitates IKEA in searching for cotton suppliers at the early stages. Similarly, for S2b-T2, IKEA applied a direct approach. S2b-T2 helped IKEA to make contact with S2b-T3 and developed it into one of the sustainable cotton sources.

IKEA also applied direct governance with S3a-T2. S3a-T2 has a direct collaborative relationship with IKEA on many issues: prior to the interview with the CEO, IKEA invited SGS (an international auditing company) to audit its energy usage with the aim to identify opportunities to make savings. IKEA covered half of the expenses; IKEA arranges various training sessions for S3a-T2 whenever it has a need. In the sustainable cotton initiative, IKEA provides the sustainable cotton training and went to Xinjiang with S3-T1 to visit the pilot sustainable cotton farms.

Based on the above available collaborative complexity, together with these suppliers, suppliers' suppliers, and third parties, IKEA then jointly created collaborative complexity through an indirect approach. For S3a-T3, IKEA mainly applied an indirect and work with third party approach. S3a-T2 passed on the sustainable cotton information and requirements to S3a-T3. S3a-T3 also obtained the information on BCI from S3a-T2. It participated in the BCI annual conference together with S3a-T2. Through the BCI annual conference it also reduced its lint cotton suppliers to one which can supply sustainable cotton.

For S3b-T2, IKEA applied an indirect approach with it. Since S3b-T2 started its business in 2014 when there were enough sustainable cotton sources it acquired the requirements from S3-T1. S3-T1 also suggested an IKEA-preferred supplier, S3b-T3, to S3b-T2.

Finally, IKEA applied a direct approach with S3b-T3. S3b-T3 is unique compared to other middle-tier suppliers in that it directly purchases foreign cotton sources without the restriction of importing quota. IKEA approached it on the sustainable cotton initiative, and it was willing to make related changes.

Of all the middle-tier suppliers, IKEA applied an indirect approach throughout. As the Purchasing Manager at S2-T1 commented:

> IKEA provides training to us every year. They let us know the requirements and we then pass these requirements to our suppliers . . . we first set constraints in the contract and make it clear that IKEA's fabric needs to use IKEA-recognized sustainable cotton sources.

To summarize, in the middle-tier supply chain, collaborative complexity was jointly created by IKEA, middle-tier suppliers, and third parties through mixed governance mechanisms of direct/indirect/work with third party. Besides the indirect requirements, IKEA worked directly with S2a-T2 and S2b-T2 to identify sustainable cotton sources. It provided training directly to S2a-T2 and S3a-T2. It also directly approached S3b-T3, which has a unique setting. These actions also provided available collaborative complexity for creating more collaborative complexity through an indirect/work with third party approach at a later stage. Table 5 presents a summary of IKEA's governance mechanisms on middle-tier suppliers.

### 4.3. Supply chain governance mechanisms on extreme upstream suppliers

Of the five extreme upstream suppliers, we carried out direct interviews with S1-T2, S2b-T3 and S3a-T4, while information from S2a-T3 was collected from their customers and IKEA. With a focus on domestic practices, S3b-T4 with its foreign sources is out of our scope for discussion.

In the extreme upstream supply chain, given the rich experience of BCI in sustainable cotton initiatives – that reflects a high available collaborative complexity – IKEA, together with BCI and extreme upstream suppliers, jointly created collaborative complexity in a variety of ways. For S1-T2, IKEA applied a work with third party governance mechanism on it. S1-T2 was developed by BCI and became a supplier of S1-T1 from 2014. BCI helped S1-T2 to set up a three-tier training structure where BCI invites experts to provide training to its managers, and the managers then pass the training on to branch managers and agronomists, who further pass this on to their study group members.

For S2a-T3, IKEA applied both direct and work with third party approaches. S2a-T3 has been selected as one of the earliest pilot sustainable cotton farms. IKEA directly approached its manager, a third party Solidaridad has been invited as BCI's partner to provide the professional training to cotton farmers with better cotton criteria before BCI's appearance in China. After BCI entered China, IKEA persuaded S2a-T3 to apply for BCI certification and BCI took over providing the training to the supplier.

For S2b-T3, IKEA also applied both direct and work with third party approaches. S2b-T3 has a long history of cotton farming. IKEA purposely approached it because of its location and quality. By developing it, IKEA could have a sustainable cotton base in a different location rather than just in Xinjiang and different quality types. IKEA first provided training and material with sustainable cotton standards adopted from better cotton to S2b-T3. The manager of S2b-T3, who is also a government officer, was then able to influence policy to provide training to the local cotton farmers. Later on, he persuaded the local governments to be organized when applying BCI certification. BCI then engaged with S2b-T3 and helped it set up a similar training structure to that of S1-T2. S2b-T3 gained the BCI certificate in 2015.

Finally, for S3a-T4, IKEA applied a work with third party approach. S3a-T4 has been developed by BCI and

**Table 5.** IKEA China's governance mechanisms on middle-tier suppliers.

| | Governance Mechanisms | Exemplar quotes |
|---|---|---|
| S2a-T2 | Direct and indirect | 'We are familiar with ginners, so once it passes the sustainable cotton concept to us, we are willing to accept it and to work on this together'.<br>'Although we are Tier 2 suppliers, IKEA comes to our factory and provides us with training'.<br>'We support IKEA to look for and help support cotton farms, and to develop the BCI sustainable processes. We participate along the whole process'. |
| S2b-T2 | Direct and indirect | 'We did not have contact with IKEA before. Because IKEA is trying to develop sustainable cotton farms, we then got in contact with them'.<br>'With IKEA's sourcing information. I placed the first order of better cotton from Zambia'. |
| S3a-T2 | Direct and indirect | 'We participated in the training organized by IKEA and went to IKEA two or three times'.<br>Together with S3-T1 and IKEA we paid a visit to Xinjiang Better Cotton Fields in June 2013'. |
| S3a-T3 | Indirect and work with third party | 'Through S3a-T2 we got to know the requirements. S3a-T2 got the requirements by S3-T1, it requires S3a-T2 to use the yarn made from better cotton'.<br>"At the beginning we know nothing about BCI. We heard its name from one of our customers who also heard about BCI from their customer. It was September 2013 when there was a BCI conference, so I registered and would like to know more about better cotton initiative".<br>'At the beginning I am not good at using the BCI system, so posed lots of questions to BCI. We have frequent contact'. |
| S3b-T2 | Indirect | 'IKEA set out the requirement for S3-T1 and then it requires us to follow it'. |
| S3b-T3 | Direct and indirect through Tier 1 | 'From one perspective it is willing to collaborate with us, willing to follow IKEA's requirements to purchase better cotton; from another perspective, it has a natural advantage by locating in the bonded zone. Cotton needs quotas but yarn doesn't'.<br>For example, S3b-T3 has more contact with us and even with IKEA. Slowly, we think it is fulfilling our requirements and then we will introduce it to our supplier (S3b-T2)'. |

got in touch with S3a-T3 at one of the BCI's annual conferences.

To summarize, for extreme upstream suppliers, collaborative complexity was jointly created through direct and/or work with third party governance mechanisms. Along the implementation process, IKEA tended to gradually delegate the responsibility to its third party, BCI. Table 6 summarizes IKEA's governance mechanisms on the extreme upstream suppliers. Finally, all complexity-reducing activities in multi-tier supply chains are summarized in Table 7.

## 5. Discussion

This section presents discussions based on the cross-case analysis and compares findings with the existing literature. In order to answer the research question, and based on the case description and cross-case analysis, we summarize the constructs of the multi-tier supply chain governance mechanism and social systems theory. Propositions are developed accordingly on the relationships between these constructs.

We found that IKEA created an amount of requisite variety to respond to environmental complexity in implementing the sustainability initiative in multiple multi-tier supply chains. This includes IKEA creating internal complexity through horizontal differentiation and corresponding processes, and jointly creating collaborative complexity with multi-tier suppliers and third parties by applying various governance mechanisms. Environmental overlap and available collaborative complexity increase during this process and then feeds back to systems to further influence requisite variety creation.

### 5.1. Reducing environmental complexity through building internal complexity

Previous studies suggest that companies tend to respond to sustainability issues collectively rather than on their own (Huxham and Vangen 2005). In our study, we found that, before approaching external suppliers, IKEA first created its internal complexity to ensure that its organizational structure and processes are appropriately prepared in order to interact with suppliers. Our findings add to previous studies by showing that, to collectively respond to environmental challenges, companies must primarily work on internal organizational design. Meanwhile, Schneider, Wickert, and Marti (2017) propose that internal and collaborative complexities are the requisite variety that companies can choose from when considering environmental overlap and available collaborative complexity. By adopting social systems theory in multi-tier supply chains, we further extend this by proposing that internal complexity is an essential prerequisite for collaborative complexity in implementing sustainability initiatives.

**Table 6.** IKEA China's governance mechanisms on extreme upstream suppliers.

| | Mechanism | Exemplar quotes |
|---|---|---|
| S1-T2 | Work with third party | 'We are an upstream suppler of another brand which is also a BCI founding member'.<br>'BCI helped us set up the co-operation structure. We have five branches with five branch managers and five field administrators; in total, 21 study groups'. |
| S2a-T3 | Direct and work with third party | 'At the beginning, we brought in BCI's lowest criteria to get in contact, provide training and to implement the project. The project required them to change their organization structure and have dedicated personnel in charge of it'.<br>'We hire third parties such as SGS to audit the sustainable cotton farms according to our standards'.<br>'Later on we encourage all our sustainable cotton farms to apply BCI certification'. |
| S2b-T3 | Direct and work with third party | 'IKEA provides us training at the beginning with BCI's actual standards'.<br>'I quite admire IKEA's approach, it won't happen overnight to truly change an idea and carry it out . . . To change people's mind, I think it is a gradual process . . . firstly they recognize our progress and secondly point out the problems, so in the second year I am quite clear about what I should do in order to achieve my target'.<br>'We passed IKEA's third party auditing two years ago. This year if we get BCI certification, we could have more sales channels'.<br>'This year we sent all of our Agriculture Bureau officials to receive BCI training in Shandong province. Then they organized meetings with the staff in charge of agriculture at each town'. |
| S3a-T4 | Work with third party | 'BCI organizes an annual meeting so we could have a chance to meet clients. It also organizes operational training for us every year'.<br>'We don't have contact with IKEA'. |

**Table 7.** Complexity reduction on multi-tier supply chains.

| | | IKEA | Tier 1 | Middle tier | Extreme upstream |
|---|---|---|---|---|---|
| Internal complexity | Organizational structure | Horizontal specialization: Sustainable cotton team + business development team | / | / | / |
| | Organizational process | Intensive communication, co-management of suppliers, joint decision making | / | / | / |
| Environmental overlap | | / | Through awareness-building and vision alignment | / | / |
| Available collaborative complexity | | / | Jointly created by focal company and a fully vertical integrated Tier 1 supplier | Created through a direct approach | Created with BCI and a direct approach |
| Collaborative complexity | Inter-organizational structure – participants | / | Business development team, sustainable cotton team, Tier 1 suppliers, international cotton trader, Indian cotton and yarn supplier | Business development team, sustainable cotton team, middle-tier suppliers, BCI | Sustainable cotton team, extreme upstream suppliers, BCI, external experts, Solidaridad, local government |
| | Inter-organizational process – governance mechanism | / | Collaboration: joint plan making, training, workshops, site visits, resource sharing, business matching, strategy priority<br>Monitoring: list requirements in formal contracts; verification of the sourcing records | Direct approach: close relationship on product development, tightly requirements, direct collaboration. Indirect approach: resource sharing, indirect requirements, BCI support (information provision, annual conference) | Work with third party/direct approach: training, developing standards, gaining certifications |

In addition, in the operationalization of internal complexity (Raadt 1987; Schneider, Wickert, and Marti 2017), we found that IKEA applied horizontal differentiation (Blau and McKinley 1979; Damanpour 1996; Larsen, Manning, and Pedersen 2013) to modify its organizational structure by setting up a sustainable cotton team and, simultaneously, enhanced the density of communication between departments (Daft and Lengel 1986) – i.e. the business development team and the sustainable cotton team – to ensure that the organizational process is adapted. This answers Schneider et al.'s (2017) doubts about whether the ways in which companies build internal complexity nowadays differ from those described by scholars who examined large corporations

in the 1960s and 1970s (Child 1973). We confirm that the traditional measures of internal complexity are still appropriate and adoptable, even in a supply chain context. Therefore, we propose that:

> P1: To reduce environmental complexity while implementing sustainability initiatives in multi-tier supply chains, focal companies create internal complexity (e.g. change of organizational structure and process) prior to creating collaborative complexity with suppliers.

### 5.2. Reducing environmental complexity with Tier 1 suppliers

Initially, the environmental overlap between IKEA and its suppliers was low as sustainability initiatives are only perceived critical by IKEA rather than by its suppliers. So, before IKEA began to work on sustainability initiatives with Tier 1 suppliers, its internal teams first raised awareness of the importance of sustainability initiatives among Tier 1 suppliers (especially the ones with high vertical integration levels) via vision alignment. This increased environmental overlap between IKEA and its suppliers, which facilitated the joint creation of collaborative actions in diverse formats such as training and workshops, and field visits. Our findings are aligned with those of Schneider, Wickert, and Marti (2017) that although inter-organizational systems are temporarily stable, an increase in environmental overlap may trigger the creation of collaborative complexity. In addition, existing views on environmental overlap treat it as a contextual determinant of inter-organizational collaboration (e.g. Sorenson and Stuart 2008), which explains why companies choose to create internal or collaborative complexity. We extend this by showing that in order to create collaborative complexity, environmental overlap among organizations – as a determinant – can be increased from a low degree to a high degree. Thus, we propose:

> P2a: To implement sustainability initiatives with Tier 1 suppliers, focal companies tend to increase environmental overlap with Tier 1 suppliers by awareness building and vision alignment, which in turn facilitates the creation of collaborative complexity in order to reduce environmental complexity.

In the creation of collaborative complexity, multiple participants were involved including IKEA's internal teams, Tier 1 suppliers, international cotton traders, and foreign suppliers. Building on social systems theory, such inter-organizational structure forms a distinct social system that aims to provide collective responses to environmental complexity (Schneider, Wickert, and Marti 2017), i.e. the implementation sustainability initiatives on the Tier 1 supply chain. Different forms of collective responses can be jointly developed as manifestation of collaborative complexity, ranging from direct interactions between two organizations (Mohe and Seidl 2011), to organizational networks (Provan, Fish, and Sydow 2007), and to different forms of partial organizations (Ahrne and Brunsson 2011).

On the Tier 1 supply chain, IKEA encouraged Tier 1 suppliers to take part in the initiative and pass on sustainability requirements to lower-tier suppliers. In addition, IKEA provided training workshops and site visits to international cotton traders and foreign suppliers for Tier 1 suppliers. At the same time, IKEA listed the sourcing requirements in formal contracts and verified the sourcing records. This is not a simple direct interaction or partial organization but rather a tailored operationalization of organizational networks through particular mechanisms; i.e. the application of both collaboration and monitoring. Our findings respond to the challenges of measuring collaborative complexity (Raadt 1987; Schneider, Wickert, and Marti 2017) by revealing such a mechanism in the Tier 1 supply chain context. Accordingly, we propose that:

> P2b: To reduce environmental complexity while implementing sustainability initiatives with Tier 1 suppliers, focal companies tend to apply both collaboration and assessment mechanisms to create collaborative complexity with Tier 1 suppliers.

Among multiple Tier 1 suppliers in particular, IKEA first created collaborative complexity with a specific supplier (i.e. S1-T1). This then served as existing collective responses to implementing sustainability initiatives that can be adopted by other Tier 1 suppliers. In other words, the available collaborative complexity for other Tier 1 suppliers has been increased to a higher degree, which further facilitated the joint creation of collaborative complexity between IKEA and these remaining Tier 1 suppliers. Our findings align with those of Schneider, Wickert, and Marti (2017) that the more available collaborative complexity is, the higher the possibility of choosing the pattern of collaborative complexity is. Since both (a) the creation of collaborative complexity and (b) further creation due to available collaborative complexity created by prior creation occurred among Tier 1 suppliers, we postulate this as an internal feedback process within the Tier 1 supply chain. This finding further adds to the existing view of collaborative complexity by shedding light on the feedback effect of collaborative complexity among the same group of organizations (Meyer, Gaba, and Colwell 2005). Thus, we propose that:

> P2c: Available collaborative complexity created with Tier 1 suppliers in a highly vertically integrated supply chain can feed back into the system and facilitate creation of collaboration complexity with other Tier 1 suppliers to reduce the environmental complexity.

### 5.3. Reducing environmental complexity with middle-tier suppliers

To create collaborative complexity with middle-tier suppliers, a distinct social system on the middle-tier supply chain is first formed through the participation of three parties, i.e. IKEA's internal teams, middle-tier suppliers, and BCI. As suggested by Van de Ven (1976), measuring the number of participants in inter-organizational relationships can serve as a proxy for collaborative complexity. The formation of this system provides the inter-organizationally structural foundation of developing collective responses to environmental complexity (Schneider, Wickert, and Marti 2017); i.e. implementing sustainability initiatives among middle-tier suppliers.

In the creation of collaborative complexity with middle-tier suppliers, a mixed form of governance mechanisms is applied by IKEA on middle-tier suppliers; i.e. the combination of direct, indirect, and work-with-third party approaches. With the direct approach, IKEA could identify the middle-tier suppliers' lower-tier suppliers and diffuse the sustainability requirements directly to extreme upstream suppliers. The creation of collaborative complexity with middle-tier suppliers through a direct approach, then, served as available collaborative complexity that facilitates the collaborative complexity through an indirect approach. An indirect approach has been applied constantly in the whole process in the drawing-up of formal contracts. Each tier of suppliers is responsible for their direct upstream suppliers in meeting the sustainability requirements.

Finally, IKEA also worked with third parties such as BCI to provide a platform for middle-tier suppliers: the annual conference provides an opportunity for suppliers to network with both upstream and downstream supply chain partners; it also disseminates general sustainable cotton knowledge to suppliers. In addition, BCI serves as a platform, attracts various middle-tier suppliers, and builds a large supplier base for Tier 1 suppliers. Therefore, the collaborative complexity created between IKEA and BCI further served as available collaborative complexity and facilitated the creation of collaborative complexity with middle-tier suppliers. Our findings extend those of Schneider, Wickert, and Marti (2017) by revealing that the available collaborative complexity created through one governance mechanism can further facilitate the creation of collaborative complexity with other governance mechanisms. Based on the discussion we propose that:

> P3a: To reduce environmental complexity while implementing sustainability initiatives on middle-tier suppliers, focal companies tend to apply a mixed governance mechanism of direct, indirect, and work with third party approaches to jointly create collaborative complexity with middle-tier suppliers.

> P3b: Available collaborative complexity created with direct and work with third party approaches can facilitate the creation of collaborative complexity with middle-tier suppliers with an indirect approach to reduce environmental complexity.

### 5.4. Reducing environmental complexity with extreme upstream suppliers

To create collaborative complexity with extreme upstream suppliers, a more extensive inter-organizational system is formed on the extreme upstream supply chain through a wider range of participants, including IKEA's internal teams, extreme upstream suppliers, BCI, external experts, auditing companies, and local government. As the number of participants serves as a proxy for collaborative complexity (Schneider, Wickert, and Marti 2017), the more participants in the system implies a higher potential for collectively responding to environmental complexity; i.e. implementing a sustainability initiative on the extreme upstream supply chain.

In the creation of collaborative complexity on the extreme upstream supply chain, IKEA tended to apply a mixed approach of work with third party and/or direct with extreme upstream suppliers. Before BCI entered China, IKEA had been proactive in directly collaborating with extreme upstream suppliers to identify and develop them into sustainable cotton sources.

IKEA also adopted a work with third party approach such as hiring auditing firms in order to gain legitimacy. After BCI entered China, IKEA worked closely with it to diffuse its sustainable sources and encourage them to apply BCI certification. Overall, IKEA relied on BCI to provide and organize training for cotton farmers. It also relied on BCI to develop more BCI sources to offer its middle-tier suppliers greater choice. As the largest cotton sustainability programme in the world, the engagement of BCI indicated a high degree of available collaborative complexity due to certifications it established, extensive resources it possessed, and various forms of training it provided. This increased the opportunity for creating collaborative complexity, by working together with BCI, on the extreme upstream supply chain. In other words, available collaborative complexity is mainly created with BCI, which then facilitates the creation of collaborative complexity with extreme upstream suppliers. After the engagement of BCI and achieving 100% sourcing from sustainable sources, IKEA China tended to delegate the responsibility to Tier 1 suppliers to pass on the requirements and to third party organizations. Our findings echo the dynamic perspective of Meyer, Gaba, and Colwell (2005) by emphasizing the dynamic changes of available

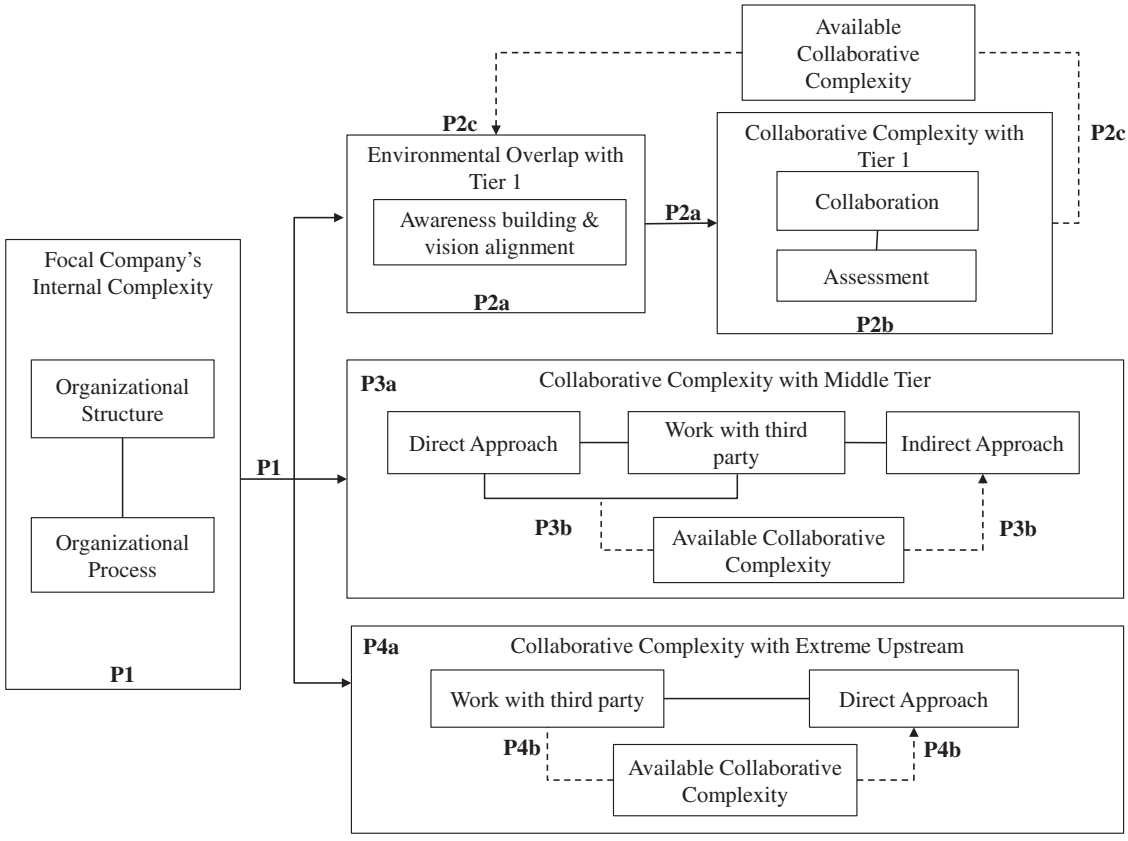


**Figure 2.** Reducing Complexity in Multi-tier Supply Chains. Note: solid lines represent normal effects; dashed lines represent feedback effects.

collaborative complexity on extreme upstream suppliers. Thus, we propose that:

> P4a: To reduce environmental complexity while implementing sustainability initiatives on extreme upstream suppliers, focal companies tend to apply a work with third party and/or direct approach to jointly create collaborative complexity with extreme upstream suppliers.
>
> P4b: Available collaborative complexity created with a third party can facilitate the creation of collaborative complexity on extreme upstream suppliers with indirect/work with third party approach to reduce environmental complexity.

Finally, we build the integrated conceptual framework that depicts all the above propositions, as shown in Figure 2.

## 6. Conclusion

Our research significantly enriches the research stream of SSCM in multi-tier supply chains and examines the research topic through IKEA's sustainable cotton initiative in five supply chains. Going beyond the traditional focus on three tiers of supply chains, we explore longer and multiple multi-tier supply chains. We further explore the dynamics of multi-tier supply chain governance and social systems theory.

### 6.1. Theoretical contributions

In answering the research question set out at the beginning of this paper, we make the following contributions to SCM literature and social systems theory.

First, this study may be the first to adopt a social systems theory perspective considering a focal firm's supply chains as a system in multiple multi-tier supply chain settings. While focal firms implement SSCM initiatives, their ultimate goal is to reduce environmental complexity. In this process, we identify and provide nuanced mechanisms combining various sets of supply chain governance mechanisms of managing multiple supply chains with different tiers of suppliers (i.e. Tier 1, middle tier and extreme upstream) and different vertical integration levels. To the best of our knowledge, no previous study has identified mechanisms at this level of detail. More importantly, all the mechanisms can be considered as internal and collaborative complexities, two terms used in social systems theory adding to the conceptual depth of our analysis. Our study responds to the call to address challenges related to the operationalization of requisite

variety; i.e. the creation of both internal complexity and collaborative complexity (Schneider, Wickert, and Marti 2017).

Second, our research contributes to the literature on multiple multi-tier supply chain governance mechanisms. This study empirically enriches and extends the work of Tachiwaza and Wong (2014, 2015), Gong et al. (2018) and Jia, Gong, and Brown (2019) on multi-tier supply chain governance mechanisms by examining the same phenomenon through a different theoretical lens – i.e. social systems theory – considering IKEA's cotton-textile supply chains as a system and focusing on how IKEA's supply chains reduce environmental complexity. It extends the works of Tachizawa and Wong (2014) and Gong et al. (2018) by suggesting that focal companies tend to consider the vertical integration levels of multiple supply chains. Then apply various and mixed governance mechanisms particularly on middle-tier and extreme upstream suppliers in multiple multi-tier SSCM settings. The mixed governance mechanisms tend to evolve during the implementing process along with the reduction of environmental complexity.

### 6.2. Practical contributions

Besides the theoretical contributions, this research has significant relevance to practice. This study provides a very detailed roadmap on what mechanisms are available and how focal firms could leverage these mechanisms to implement sustainable initiatives. For focal companies intending to implement sustainable initiatives in multi-tier supply chains, they could adopt a collaboration approach with Tier 1 suppliers especially the ones with high integration levels. Focal companies should inspire the suppliers, persuade them to 'buy-in' to the sustainability supply chain vision, and align with the focal companies to pursue long-term sustainability goals. Focal companies need to be very proactive in mobilizing and orchestrating resources internally and externally to create environmental overlap and available collaborative complexity in order to reduce environmental complexity for lower-tier suppliers.

### 6.3. Limitations and future research directions

The research has the following limitations: First, we carried out a typical case study on IKEA's five cotton-textile supply chains in China. However, IKEA's channel power may have played a critical role in the implementation process, so other companies that wish to learn the practice need to bear in mind the context in which the case is embedded. Second, methodologically, this paper employs a case study approach comprising five supply chains. It is not the intention for the study to be exhaustive of all the types of sustainable initiatives; the generalization of the findings is constrained by the context.

In terms of future research, first, SSCM scholars could take an alternative approach such as a large sample survey to test the findings. Second, we only explored IKEA's sustainable cotton practices within China in this research. As the cotton-textile supply chain is a complex global multi-tier supply chain, future research could cover the practices employed in other national contexts, and explore other types of sustainable supply chain initiatives. Third, we call for more research on governance mechanisms from a multi-tier supply chain network perspective. Future research may integrate the governance mechanisms of collaboration/assessment and direct/indirect/work with third party approaches to distinguish different approaches and collaboration efforts. Finally, social systems theory can be further explored in supply chain management research.

## Disclosure statement

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

## Notes on contributors

*Dr. Yu (Jack) Gong* is Lecturer in Operations Management at Southampton Business School, the University of Southampton. He obtained his PhD at the University of Exeter and MSc in Cranfield University. He has publications in several high quality journals such as: International Journal of Operations & Production Management (ABS 4), International Journal of Production Economics (ABS 3), International Journal of Production Research (ABS 3), Industrial Marketing Management (ABS 3), Transportation Research Part D: Transport and Environment (ABS 3). Prior to his academic career, he had three years' working experience in management consulting firms in both Malaysia and China. His main research interests are sustainable supply chain management and supply chain innovation.

*Dr. Yan Jiang* is the Lecturer in Operations Management at the Management Leadership & Organisations Department, the Middlesex University in the UK. She obtained her PhD and MSc at the University of Rome "Tor Vergata" in Italy. She mainly carries out empirical research with applying different methods on supply chain management, sustainability, and global sourcing. She has published in leading Operations and Supply Chain Management journals including International Journal of Production Research (ABS3*), and Supply Chain Management: An International Journal (ABS3*).

***Prof. Fu (Jeff) Jia*** is a Chair Professor of Supply Chain Management at the Management School, University of York and a visiting professor in several universities in China, Italy, and UK. He holds a BEng in Mechanical Engineering from China, an MBA from Birmingham Business School and an MRes and a Ph.D. in Management from Cranfield School of Management. He leads large scale research projects which focus on the relationships between business, nature and value creation. He is a productive author publishing in top OM/SCM, Agri-food and IB journals such as Journal of Operations Management, International Journal of Operations and Production Management, Food Policy, Supply Chain Management: An International Journal, International Journal of Production Economics, International Business Review, Technological Forecasting and Social Change, Journal of Business Logistics and Journal of Purchasing and Supply Management, and International Journal of Logistics Management among others. Fu is an Associate Editor of International Journal of Operations and Production Management and Journal of Purchasing and Supply Management, a Managing Editor of International Food and Agribusiness Management Review (IFAMR) and an Editorial Review Board Member of Industrial Marketing Management.

## ORCID

*Yu Gong* http://orcid.org/0000-0002-5411-376X
*Yan Jiang* http://orcid.org/0000-0002-4343-9123
*Fu Jia* http://orcid.org/0000-0002-9830-121X

## References

Ahrne, G., and N. Brunsson. 2011. "Organization Outside Organizations: The Significance of Partial Organization." *Organization* 18 (1): 83–104.

Ashby, W. R. 1956. *An Introduction to Cybernetics*. New York: J. Wiley.

Baumann-Pauly, D., C. Wickert, L. J. Spence, and A. G. Scherer. 2013. "Organizing Corporate Social Responsibility in Small and Large Firms: Size Matters." *Journal of Business Ethics* 115: 693–705.

BCI. 2017. Accessed March 22 2018. https://bettercotton.org/.

Biotto, M., A. F. De Toni, and F. Nonino. 2012. "Knowledge and Cultural Diffusion Along the Supply Chain as Drivers of Product Quality Improvement: The Illycaffè Case Study." *The International Journal of Logistics Management* 23 (2): 212–237.

Blau, J. R., and W. McKinley. 1979. "Ideas, Complexity, and Innovation." *Administrative Science Quarterly* 24: 200–219.

Chen, L., F. Jia, T. Li, and T. Zhang. 2021. "Supply Chain Leadership and Firm Performance: A Meta-analysis." *International Journal of Production Economics* 235: 108082. doi:10.1016/j.ijpe.2021.108082.

Child, J. 1973. "Predicting and Understanding Organization Structure." *Administrative Science Quarterly* 18 (168): 85.

Choi, T. Y., K. J. Dooley, and M. Rungtusanatham. 2001. "Supply Networks and Complex Adaptive Systems: Control Versus Emergence." *Journal of Operations Management* 19 (3): 351–366.

Daft, R. L., and R. H. Lengel. 1986. "Organizational Information Requirements, Media Richness and Structural Design." *Management Science* 32: 554–571.

Damanpour, F. 1996. "Organizational Complexity and Innovation: Developing and Testing Multiple Contingency Models." *Management Science* 42: 693–716.

Danese, P., A. Lion, and A. Vinelli. 2019. "Drivers and Enablers of Supplier Sustainability Practices: A Survey-Based Analysis." *International Journal of Production Research* 57 (7): 2034–2056.

Defee, C. C., T. Esper, and D. Mollenkopf. 2009a. "Leveraging Closed-Loop Orientation and Leadership for Environmental Sustainability." *Supply Chain Management: An International Journal* 14 (2): 87–98.

Defee, C. C., T. P. Stank, and T. L. Esper. 2010. "Performance Implications of Transformational Supply Chain Leadership and Followership." *International Journal of Physical Distribution & Logistics Management* 40 (10): 763–791.

Defee, C. C., T. P. Stank, T. L. Esper, and J. T. Mentzer. 2009b. "The Role of Followers in Supply Chains." *Journal of Business Logistics* 30 (2): 65–84.

Dou, Y., Q. Zhu, and J. Sarkis. 2018. "Green Multi-Tier Supply Chain Management: An Enabler Investigation." *Journal of Purchasing and Supply Management* 24 (2): 95–107.

Eisenhardt, K. M. 1989. "Building Theory from Case Study Research." *Academy of Management Review* 14 (4): 532–550.

Eisenhardt, K. M., and M. E. Graebner. 2007. "Theory Building from Cases: Opportunities and Challenges." *Academy of Management Journal* 50 (1): 25–32.

Gimenez, C., and V. Sierra. 2013. "Sustainable Supply Chains: Governance Mechanisms to Greening Suppliers." *Journal of Business Ethics* 116 (1): 189–203.

Gong, Y., F. Jia, S. Brown, and L. Koh. 2018. "Supply Chain Learning of Sustainability in Multi-Tier Supply Chains: A Resource Orchestration Perspective." *International Journal of Operations & Production Management* 38 (4): 1061–1090.

Gosling, J., F. Jia, Y. Gong, and S. Brown. 2016. "The Role of Supply Chain Leadership in the Learning of Sustainable Practice: Toward an Integrated Framework." *Journal of Cleaner Production* 137 (November): 1458–1469.

Grimm, J. H., J. S. Hofstetter, and J. Sarkis. 2014. "Critical Factors for sub-Supplier Management: A Sustainable Food Supply Chain Perspective." *International Journal of Production Economics* 152 (June): 159–173.

Grimm, J. H., J. S. Hofstetter, and J. Sarkis. 2016. "Exploring sub-Suppliers' Compliance with Corporate Sustainability Standards." *Journal of Cleaner Production* 112: 1971–1984.

Hall, J., S. Matos, and B. Silvestre. 2012. "Understanding why Firms Should Invest in Sustainable Supply Chains: A Complexity Approach." *International Journal of Production Research* 50 (5): 1332–1348.

Holweg, M., and F. K. Pil. 2008. "Theoretical Perspectives on the Coordination of Supply Chains." *Journal of Operations Management* 26 (3): 389–406.

Hutchins, M. J., and J. W. Sutherland. 2008. "An Exploration of Measures of Social Sustainability and Their Application to Supply Chain Decisions." *Journal of Cleaner Production* 16 (15): 1688–1698.

Huxham, C., and S. Vangen. 2005. *Managing to Collaborate: The Theory and Practice of Collaborative Advantage*. Oxford: Routledge.

Jabbour, C. J. C., A. B. L. de Sousa Jabbour, and J. Sarkis. 2019. "Unlocking Effective Multi-Tier Supply Chain Management for Sustainability Through Quantitative Modeling: Lessons Learned and Discoveries to be Made." *International Journal of Production Economics* 217: 11–30.

Jia, F., Y. Gong, and S. Brown. 2019. "Multi-tier Sustainable Supply Chain Management: The Role of Supply Chain Leadership." *International Journal of Production Economics* 217: 44–63.

Langenmayr, F. 2016. *Organizational Memory as a Function: The Construction of Past, Present and Future in Organizations*. Berlin: VS Springer.

Larsen, M. M., S. Manning, and T. Pedersen. 2013. "Uncovering the Hidden Costs of Offshoring: The Interplay of Complexity, Organizational Design, and Experience." *Strategic Management Journal* 34: 533–552.

Linton, J. D., R. Klassen, and V. Jayaraman. 2007. "Sustainable Supply Chains: An Introduction." *Journal of Operations Management* 25 (6): 1075–1082.

Luhmann, N. 1973. *Zweckbegriff und Systemrationalit€at*. Frankfurt: Suhrkamp.

Luhmann, N. 1975. "'Komplexit€at'." In *Soziologische Aufkl€arung. Aufs€atze zur Theorie der Gesellschaft*, edited by N. Luhmann, Vol. 2, 204–220. Opladen: Westdeutscher Verlag.

Luhmann, N. 1995. *Social Systems*. Stanford, CA: Stanford University Press.

Luhmann, N. 2013. *Introduction to Systems Theory*. Cambridge: Polity Press.

Matos, S., and J. Hall. 2007. "Integrating Sustainable Development in the Supply Chain: The Case of Life Cycle Assessment in oil and gas and Agricultural Biotechnology." *Journal of Operations Management* 25 (6): 1083–1102.

Mena, C., A. Humphries, and T. Y. Choi. 2013. "Toward a Theory of Multi-Tier Supply Chain Management." *Journal of Supply Chain Management* 49 (2): 58–77.

Mena, C., and T. Schoenherr. 2020. "The Green Contagion Effect: An Investigation Into the Propagation of Environmental Practices Across Multiple Supply Chains Tiers." *International Journal of Production Research*. doi:10.1080/00207543.2020.1834160.

Meyer, A. D., V. Gaba, and K. A. Colwell. 2005. "Organizing far from Equilibrium: Nonlinear Change in Organizational Fields." *Organization Science* 16: 456–473.

Miles, M. B., A. M. Huberman, and J. Saldana. 2013. *Qualitative Data Analysis A Methods Sourcebook*. 3rd ed. London: Sage.

Mohe, M., and D. Seidl. 2011. "Theorizing the Client—Consultant Relationship from the Perspective of Social-Systems Theory." *Organization* 18 (1): 3–22.

Ni, W., and H. Sun. 2018. "A Contingent Perspective on the Synergistic Effect of Governance Mechanisms on Sustainable Supply Chain." *Supply Chain Management: An International Journal* 23/3: 153–170.

Pathak, S. D., J. M. Day, A. Nair, W. J. Sawaya, and M. M. Kristal. 2007. "Complexity and Adaptivity in Supply Networks: Building Supply Network Theory Using a Complex Adaptive Systems Perspective." *Decision Sciences* 38 (4): 547–580.

Provan, K. G., A. Fish, and J. Sydow. 2007. "Interorganizational Networks at the Network Level: A Review of the Empirical Literature on Whole Networks." *Journal of Management* 33 (3): 479–516.

Raadt, J. D. 1987. "Ashby's law of Requisite Variety: An Empirical Study." *Cybernetics and Systems: An International Journal* 18 (6): 517–536.

Rasche, A., F. G. A. De Bakker, and J. Moon. 2013. "Complete and Partial Organizing for Corporate Social Responsibility." *Journal of Business Ethics* 115: 651–663.

Reinecke, J., and S. Ansari. 2016. "Taming Wicked Problems: The Role of Framing in the Construction of Corporate Social Responsibility." *Journal of Management Studies* 53 (3): 299–329. doi:10.1111/joms.12137.

Sarkis, J. 2018. "Sustainable and Green Supply Chains: Advancement Through Resources, Conservation and Recycling." *Resources Conservation and Recycling* 134: 1–3.

Sarkis, J., E. D. S. Gonzalez, and S. L. Koh. 2019. "Effective Multi-Tier Supply Chain Management for Sustainability." *International Journal of Production Economics* 217: 1–10.

Schneider, A., C. Wickert, and E. Marti. 2017. "Reducing Complexity by Creating Complexity: A Systems Theory Perspective on how Organizations Respond to Their Environments." *Journal of Management Studies* 54 (2): 182–208.

Seidl, D., and K. H. Becker. 2006. "Organizations as Distinction Generating and Processing Systems: Niklas Luhmann's Contribution to Organization Studies." *Organization* 13: 9–35.

Seidl, D., and H. Mormann. 2014. "'Niklas Luhmann as Organization Theorist'." In *Oxford Handbook of Sociology, Social Theory and Organization Studies: Contemporary Currents*, edited by P. S. Adler, P. du Gay, G. Morgan, and M. Reed, 125–156. Oxford: Oxford University Press.

Seidl, D., and D. Schoeneborn. 2016. "Systems Theory." In *International Encyclopedia of Communication Theory and Philosophy*, edited by K. Bruhn, B. T. Jensen, J. Craig, and E. Rothenbuhler. London: Wiley. doi:10.1002/9781118766804.wbiect040.

Sorenson, O., and T. E. Stuart. 2008. "Bringing the Context Back in: Settings and the Search for Syndicate Partners in Venture Capital Investment Networks." *Administrative Science Quarterly* 53 (2): 266–294.

Surana, A., S. Kumara, M. Greaves, and U. N. Raghavan. 2005. "Supply-chain Networks: A Complex Adaptive Systems Perspective." *International Journal of Production Research* 43 (20): 4235–4265.

Sustainable cotton ranking. 2017. Accessed March 20 2018. http://www.sustainablecottonranking.org/files/download/452f911b7649fca.

Sutton, R., and A. Callahan. 1987. "The Stigma of Bankruptcy: Spoiled Organizational Image and its Management." *Academy of Management Journal* 30 (3): 405–436.

Tachizawa, E. M., and C. Y. Wong. 2014. "Towards a Theory of Multi-Tier Sustainable Supply Chains: A Systematic Literature Review." *Supply Chain Management: An International Journal* 19 (Nos 5/6): 643–663.

Tachizawa, E. M., and C. Y. Wong. 2015. "The Performance of Green Supply Chain Management Governance Mechanisms: A Supply Network and Complexity Perspective." *Journal of Supply Chain Management* 51 (3): 18–32.

Taylor, K. M., and S. Vachon. 2018. "Empirical Research on Sustainable Supply Chains: IJPR's Contribution and Research Avenues." *International Journal of Production Research* 56 (1-2): 950–959.

Tse, Y. K., and K. H. Tan. 2011. "Managing Product Quality Risk in a Multi-Tier Global Supply Chain." *International Journal of Production Research* 49 (1): 139–158.

Van de Ven, A. H. 1976. "On the Nature, Formation, and Maintenance of Relations among Organizations." *Academy of Management Review* 1 (4): 24–36.
Wilhelm, M. M., C. Blome, V. Bhakoo, and A. Paulraj. 2016a. "Sustainability in Multi-Tier Supply Chains: Understanding the Double Agency Role of the First-Tier Supplier." *Journal of Operations Management* 41 (January): 42–60.
Wilhelm, M. M., C. Blome, E. Wieck, and C. Y. Xiao. 2016b. "Implementing Sustainability in Multi-Tier Supply Chains: Strategies and Contingencies in Managing sub-Suppliers." *International Journal of Production Economics* 182: 196–212.
Yin, R. 2008. *Case Study Research: Design and Methods*. 4th ed. London: Sage.
Zhao, K., Z. Zuo, and J. V. Blackhurst. 2019. "Modelling Supply Chain Adaptation for Disruptions: An Empirically Grounded Complex Adaptive Systems Approach." *Journal of Operations Management* 65 (2): 190–212.

# Appendices

## Appendix 1. Interview protocol

- How does your company understand SSCM? What is your company SSCM strategy?
- Which department leads SSCM projects internally? What other departments/functions have been involved and what role do they assume?
- Which SSCM projects do you implement? Why does your company take part in XX company's SSCM project (suppliers)?
- What are the barriers when your company implements SSCM projects? How do you solve them?
- How do Chinese customers and/or suppliers (Tier 1 & Tier 2 or even the whole upstream) learn in SSCM projects?
- How does your company help them in the learning process?

## Appendix 2. List of interviewers

| No | Company | Job Title | Date | Location |
|---|---|---|---|---|
| 1 | IKEA | Sustainability Manager | 23/10/2014 | Shenzhen, Guangdong |
| 2 | IKEA | Business Development Manager A | 06/11/2014 | Shanghai |
| 3 | IKEA | Business Development Manager B | 29/12/2014 | Shanghai |
| 4 | IKEA | Deputy Sustainability Compliance Manager | 09/04/2015 | Shanghai |
| 5 | IKEA | Specialist Better Cotton Project | 16/04/2015 | Shanghai |
| 6 | BCI | Membership Officer | 17/04/2015 | Shanghai |
| 7 | S2b-T3 | General Manager | 03/05/2015 | Songzi, Hubei |
| 8 | S3-T1 | Purchasing Manager | 04/05/2015 | Nanjing, Jiangsu |
| 9 | S2-T1 | Better Cotton Specialist and Purchasing Manager | 04/05/2015 | Shanghai |
| 10 | IKEA | Specialist Better Cotton Project | 23/11/2015 | Shanghai |
| 11 | IKEA | Business Development Manager B | 24/11/2015 | Shanghai |
| 12 | External government stakeholder | Secretary | 25/11/2015 | Binzhou, Shandong |
| 13 | S1-T2 | Cooperative Director | 26/11/2015 | Binzhou, Shandong |
| 14 | S2a-T2 | Deputy General Manager | 27/11/2015 | Zibo, Shangdong |
| 15 | S1-T1 | General Manager of Raw Material Branch | 28/11/2015 | Binzhou, Shandong |
| 16 | S3a-T4 | Agriculture Technic | 30/11/2015 | Xinjiang |
| 17 | S3-T1 | Purchasing Manager | 30/11/2015 | Jiangyin, Jiangsu |
| 18 | S3a-T2 | Sales Manager | 01/12/2015 | Jiangyin, Jiangsu |
| 19 | S3a-T2 | CEO | 01/12/2015 | Jiangyin, Jiangsu |
| 20 | S3a-T3 | Sales Manager | 02/12/2015 | Bengbu, Anhui |
| 21 | S3b-T2 | General Manager | 03/12/2015 | Shaoxing, Zhejiang |
| 22 | S2b-T2 | General Manager | 10/12/2015 | Songzi, Hubei |