

University of Groningen

Boundaries as opportunities: A multilevel investigation of resilience

van den Adel, Mitchell

DOI:
[10.33612/diss.203014243](https://doi.org/10.33612/diss.203014243)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2022

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):
van den Adel, M. (2022). *Boundaries as opportunities: A multilevel investigation of resilience*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen, SOM research school.
<https://doi.org/10.33612/diss.203014243>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

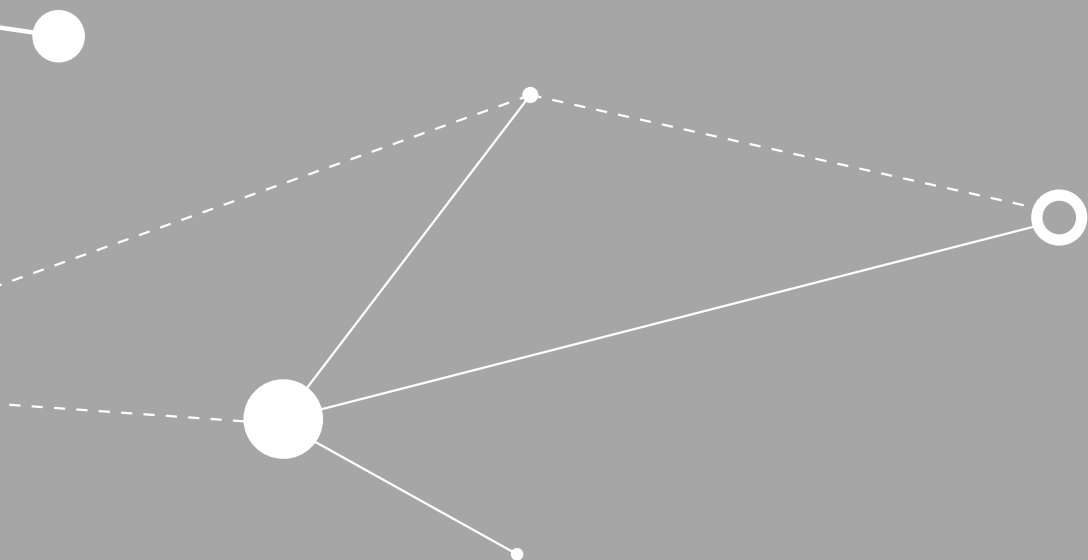
Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

CHAPTER 5

GENERAL DISCUSSION AND CONCLUSION



5.1 | Introduction

Managing disruptions and ensuring resilience across organizational boundaries is critically important within supply chains (SCs), but also notoriously difficult. The introductory chapter of this dissertation explored two prevalent notions that have guided extant resilience research within the SC literature, and motivated the research presented here. First, the concept of resilience within this literature appeared to have been primarily understood in relation to organizations' and SCs' ability to deal with large-scale disasters, as opposed to the more typical disruptions that confront managers on a daily basis. Second, previous resilience studies have mainly focused on what an individual (buying) organization or a single buyer-supplier dyad can do to mitigate the impact of disruptions, preventing a more detailed consideration of how organizations beyond this dyad can work together (i.e., engage in bridging actions) to ensure the entire SC's resilience. As a result, the introductory chapter concluded that extant resilience research can insufficiently inform managers on how best to resolve disruptions collectively with partnering organizations, particularly in response to day-to-day disruptions.

This final chapter provides a summary of the main research findings of this dissertation, and elucidates how they help to address the principal ambiguities identified in the introductory chapter and collectively contribute to the SC literature. In addition, we detail how this dissertation may guide managers in, for example, using cross-functional teams or establishing supplier relationships to resolve day-to-day disruptions more effectively and thereby enhance their organizations' resilience. This general discussion concludes by describing how the findings presented here may inform future research to further improve our academic understanding of resilience.

5.2 | Overview of main findings

5.2.1 | The role of cross-functional teams in ensuring organizational resilience

Chapter 2 investigates when and how an organization can deploy a cross-functional team to help it deal effectively with disruptions in its SC. In this chapter, we build on group information processing theory to examine information scouting as an important bridging action by a cross-functional team's members to help the team search for and access relevant information necessary for managing SC disruptions. To study this role of information scouting, we tracked 80 cross-functional teams over time while they were exposed to SC disruptions in a realistic SC management simulation. Every cross-functional team in our sample belonged to a different organization, and was tasked with resolving the

SC disruptions on behalf of that organization. The obtained data comprised objective log files from the simulation, as well as questionnaires administered to each team member individually. For Chapter 2, we thus collected data in a longitudinal manner, using different sources and multiple informants.

The results of Chapter 2 demonstrate that the benefits of a cross-functional team's information scouting for its organization's resilience are contingent upon the team's level of internal integration. Specifically, more intense information scouting by the team's members is only associated with higher organizational resilience when these members share information and coordinate efforts well within the team. Such internal integration allows team members to have a better overview of the information available within the team and helps prevent wasting valuable time and energy on gathering redundant or duplicate information. We further find that this central role of internal integration is exacerbated when an organization is more vulnerable to disruptions within its SC. Under high SC vulnerability, information scouting by a cross-functional team that is well-integrated internally continues to be associated with higher organizational resilience. In contrast, however, information scouting by a cross-functional team that lacks internal integration under these demanding circumstances is associated with a decrease in organizational resilience. In such a situation, team members face considerable time pressure, while, at the same, they fail to effectively combine the information necessary for resolving the SC disruptions at hand.

Taken together, Chapter 2 demonstrates that, for a cross-functional team to effectively manage SC disruptions and strengthen organizational resilience, it needs to match its degrees of both information scouting and internal integration with the level of SC vulnerability it faces. Accordingly, this chapter offers fine-grained insights into specific human behaviors (e.g., individuals' efforts directed at information scouting or internal integration) that may form the microlevel, behavioral foundations for an organization's ability to effectively manage SC disruptions. In doing so, Chapter 2 answers calls for (multilevel) research that develops a more comprehensive understanding of how individual- and team-level processes may contribute to organizational resilience (e.g., Fahimnia et al., 2019; Mena et al., 2020; Scholten et al., 2020).

5.2.2 | Suppliers as the cause and cure of disruptions

Building on Chapter 2's insights regarding the role of an organization's vulnerability to disruptions within its overall SC, Chapter 3 set out to explore the primary source of such disruptions in further detail: the organization's first-tier suppliers. That is, the purpose of Chapter 3 was to examine how the characteristics of the relationship between an organization and a first-tier supplier could help

minimize the adverse consequences of the small, but frequent supplier-induced disruptions within such a relationship. In this chapter, we aimed, therefore, to offer more precise insights into the SC-level vulnerability observed in Chapter 2, as well as that we sought to extend this earlier chapter's level of analysis of bridging actions from the team and organizational level to the interorganizational or relationship level. To do so, we collected data on day-to-day supplier-induced disruptions to an electronics company that specializes in the assembly of high-tech products. We obtained access to the company's detailed records on nearly 2,000 such disruptions across a period of five years, involving more than 170 different suppliers.

Drawing from event system theory, we suggested that supplier-induced disruptions are more harmful when they represent nonroutine or novel events with which an organization has no relevant prior experience. We further integrated a social capital perspective to propose that either a broader or a deeper relationship with the supplier from which the novel disruption emerged can help alleviate the disruption's impact. In particular, a broader supplier relationship is characterized by multiple and diverse connections between the organization and its supplier, and we argued that this provides the organization a greater diversity of potential sources of information and support. These various sources of information make it easier for the organization to identify and access information it needs for dealing with the nonroutine disruption at hand. Similarly, we suggested that the commitment and sense of reciprocity that is typical for a deeper supplier relationship make the supplier more likely to share high-quality and potentially sensitive information, as well as make it more willing to collaborate intensively. We posited that this, in turn, enabled the organization to more quickly understand and mitigate a supplier-induced disruption that it had not dealt with before. The findings presented in Chapter 3 reveal that, indeed, the breadth and, particularly, the depth of the supplier relationship attenuate the negative association between disruption novelty and an organization's resilience. At the same time, however, these findings also demonstrate that more routine disruptions in such broader and deeper supplier relationships are associated with lower resilience.

Overall, Chapter 3 provides important insights into how an organization's first-tier suppliers may both function as notorious sources of disruptions, and as important partners to help resolve these same disruptions. By engaging in more intense bridging actions (i.e., establishing broader and/or deeper relationships), an organization and its first-tier suppliers can work together to prevent disruptions that started at these suppliers from harming the organization's functioning. Consequently, this chapter illustrates that, in addition to the overall vulnerability of an organization's SC observed in Chapter 2, also the characteristics of the

individual supplier relationships within that SC are critical in determining the organization's resilience. Furthermore, Chapter 3 offers an important first step toward developing a much-needed better understanding of the smaller, more typical disruptions that confront managers on a daily basis.

5.2.3 | Organizations' joint efforts and network-level resilience

To further improve our academic understanding of managing day-to-day disruptions, Chapter 4 was developed to explore how multiple organizations within a particular type of SC can collectively deal with such disruptions. Specifically, Chapter 4 explores how the service supply network responsible for operating and managing a critical infrastructure (CI) can effectively resolve the small disruptions that occur multiple times a day within such a system. In this chapter, we thus elevate the level of analysis compared to the two preceding chapters to the overall supply network level. We combine insights from both these earlier chapters with organizational information processing theory (OIPT) to examine when day-to-day disruption may have more adverse consequences for the supply network, and how, subsequently, organizations within the network can successfully mitigate these consequences. Chapter 4 builds upon longitudinal data collected on disruption management within the Dutch national railway CI, covering 277 day-to-day disruptions over a one-month period.

Supplementing insights from Chapter 3 regarding the role of nonroutineness or novelty in determining day-to-day disruptions' impact, we introduced co-occurrence in Chapter 4 as a second determinant of such disruptions' impact. That is, we proposed that the impact of a day-to-day disruption increases when it coincides with multiple other disruptions affecting the same supply network, as the organizations within the network will need more time to manage possible interdependencies between the co-occurring disruptions. Chapter 4 similarly builds on insights from Chapter 2 related to the benefits of information scouting for managing disruptions and increasing organizational resilience. In particular, we extended these insights to a similar, but more reciprocal bridging action: cross-boundary information exchange among all organizations within the supply network. Such information exchange allows the involved organizations to share relevant insights, coordinate their efforts, and engage in joint problem solving. Accordingly, we suggested that more intense cross-boundary information exchange enables the supply network to mitigate the adverse effects of day-to-day disruptions that co-occur or are nonroutine. Confirming the findings of the earlier chapters, the results of Chapter 4 largely corroborate these predictions and show that network-level bridging actions can help mitigate the detrimental consequences of co-occurring and nonroutine day-to-day disruptions.

Taken together, Chapter 4 offers more detailed insights into the underexplored day-to-day disruptions in the SC literature by revealing when they may be more or less harmful. In addition, this chapter further underscores the importance of bridging actions for dealing with disruptions, and provides novel insights into how such bridging actions may be executed at the level of the overall supply network.

5.3 | Theoretical contributions

Beyond their contributions described in each of the individual chapters, the findings summarized above also jointly make a number of important contributions to theory. Foremost, this dissertation helps to address the ambiguity within the SC literature that has resulted from the earlier introduced notions that have guided previous resilience research in this field. Specifically, Chapters 3 and 4 complement the singular focus on large-scale disasters that is common within the SC literature by considering which characteristics make smaller, more typical day-to-day disruptions more harmful. Similarly, Chapters 2, 3, and 4 collectively expand on this literature's predominant focus on individual organizations or relationships, and advance a more comprehensive perspective on bridging actions and resilience at and across multiple levels of analysis. In addition to expanding these two prevalent notions, the three empirical chapters' findings further help to resolve the unbalanced, largely positive image of resilience strategies, as each chapter reveals important contingencies or diminishing returns to such strategies. These and other theoretical contributions of this dissertation are explored in more detail below. Table 5.1 provides an overview of this dissertation's overall theoretical contributions and illustrates how each chapter addresses the overarching research themes.

5.3.1 | Managing day-to-day disruptions

As observed in the introductory chapter, extant resilience research has primarily been guided by the notion that the concept of resilience relates to organizations and SCs' ability to deal with large-scale disasters (e.g., Cantor et al., 2014; Pournader et al., 2020; Tenhiälä & Salvador, 2014). While this notion is well-justified considering that these disasters have an immense impact on organizations' operations and people's well-being across the globe, they are rare and managers typically (hopefully) are only confronted with them once or twice over the course of their careers, if at all. On a nearly daily basis, however, these managers need to deal with smaller, more typical disruptions, such as adverse weather, machine malfunctions, and late or cancelled deliveries (e.g., Donadoni et al., 2019; Scholten et al., 2020; Tukamuhabwa et al., 2017). Because of the

fundamentally different nature of these day-to-day disruptions, the predominant focus on large-scale disasters has prevented extant resilience research from guiding managers in ensuring their organizations' resilience to these more typical disruptions.

Combined, the empirical chapters in this dissertation help address this ambiguity by identifying two central disruption characteristics that can explain why some day-to-day disruptions are more harmful or difficult to resolve than others. Specifically, the conceptual frameworks developed in Chapters 3 and 4 reveal how the timing of a day-to-day disruption alongside other such disruptions (i.e., complicatedness), as well as the unfamiliarity with the type of disruption (i.e., nonroutineness) may affect an organization's or SC's recovery time following the disruption. These insights add to extant resilience research as they introduce two disruption characteristics that have been overlooked in regard to large-scale disasters, which are inherently complicated and nonroutine to resolve. That is, the sheer magnitude of large-scale disasters has prevented the conceptual frameworks put forward in extant resilience research from identifying these more fine-grained characteristics that differentiate day-to-day disruptions—and their management—from one another. Lacking a comprehensive understanding of these characteristics, as the examples in the introductory chapter illustrate, managers therefore struggle to manage day-to-day disruptions effectively, and may fail to prioritize resolving those disruptions that our insights now reveal will be the most harmful.

Our conceptual frameworks on the characteristics of day-to-day disruptions further contribute by presenting two distinct bridging actions (i.e., supplier-relationship management, cross-boundary information exchange) that managers may engage in to minimize the adverse effects of the identified characteristics. As a result, this dissertation offers comprehensive insights not only into which characteristics may increase the impact of day-to-day disruptions, but also into how organizations, in turn, may effectively manage those. Finally, and more generally, the present dissertation demonstrates how established theoretical frameworks (e.g., OIPT, event system theory) can be adopted and combined to accentuate distinct elements of day-to-day disruptions and how organizations can best anticipate those. Taken together, this dissertation therefore points to important variables and theoretical frameworks that can assist future resilience research to establish a more comprehensive understanding of managing day-to-day disruptions.

5.3.2 | Establishing resilience within and across organizational boundaries

The introductory chapter further detailed how previous resilience research has mainly focused on how a focal (buying) organization can minimize the adverse

effects of SC disruptions on its own operations and performance. Accordingly, this literature has identified numerous strategies such as establishing redundant inventory (e.g., Brandon-Jones, Squire, & van Rossenberg, 2015) or developing back-up suppliers (Bode & Wagner, 2015) that can help the focal organization effectively deal with disruptions in its SC. However, despite many of these strategies revolving around working across or bridging organizational boundaries, limited research has attempted to explore how two or more organizations can work together to increase the resilience of their joint operations and performance (e.g., Azadegan & Dooley, 2021; Pournader et al., 2016; Zhao et al., 2019). In addition to the scarce research that moves beyond the organizational or, occasionally, relationship level, few resilience scholars have further aimed to understand the elements and processes within an organization that contribute to the organization's resilience. That is, the individuals and teams centrally involved in executing resilience strategies have remained largely ignored (e.g., Fahimnia et al., 2019; Mena et al., 2020; Scholten et al., 2020). Correspondingly, much resilience research has explored externally-oriented resilience strategies (i.e., bridging actions) without considering how these affect and are affected by intraorganizational dynamics.

The present dissertation makes an important contribution toward broadening this restricted focus of extant resilience research on the organizational level primarily. By studying resilience at and across multiple levels of analysis, we identify underexplored variables and contingency factors that influence an organization's ability to manage disruptions within its SC effectively. In addition, we illustrate the importance of attuning intra- and interorganizational resilience strategies to one another and to the characteristics of the environment, relationship, and SC. Chapter 2's insights, in particular, indicate that an organization's resilience is critically determined by both micro-level coordination flows within the organization's cross-functional team and macro-level circumstances facing the organization (i.e., SC vulnerability). Findings from Chapters 3 and 4 further show how resilience in an SC context is fundamentally shaped by the characteristics of individual supplier relationships, as well as by network-level processes. Regarding the ambiguities described in the introductory chapter, this combination of different levels of analysis helped us to address the lack of insights into how multiple organizations may collectively ensure the resilience of their overall SC, as well as to illuminate micro-level processes that can explain why not all organizations successfully do so.

The present dissertation's insights into this interplay between team-, organization-, and network-level processes demonstrate that focusing on a single level of analysis provides an incomplete perspective on how interdependent organizations can establish their individual and joint resilience. Instead, these

insights suggest that a “systems approach,” comprising elements and mechanisms at and across multiple levels of analysis, is necessary to establish a more complete understanding of resilience within and across organizational boundaries. Accordingly, this dissertation helps the SC literature to advance from a singular focus on how to ensure organizational or interorganizational resilience toward assisting organizations to implement relevant resilience strategies at these and other levels simultaneously and more effectively. As “disruption response processes are inherently a multilevel phenomenon” (Reimann et al., 2017, p. 38), the research presented in this dissertation thus offers a promising, if not prerequisite, multilevel approach that future resilience research can build upon.

5.3.3 | Contingencies to bridging actions’ effectiveness

Besides helping to resolving the ambiguities described in Chapter 1, this dissertation also challenges the universal effectiveness of resilience strategies in general and of bridging actions specifically. That is, bridging actions such as information exchange and establishing more collaborative relationships are generally positioned to be uniformly effective in helping organizations manage disruptions and, as such, increase their resilience (cf., Ali et al., 2017; Hohenstein et al., 2015; Tukamuhabwa et al., 2015). Research into these bridging actions thus follows broader resilience research, which “sketches an overwhelmingly positive image of resilience” (van der Vegt et al., 2015, p. 975) and rarely reflects on the costs and tradeoffs of engaging in resilience strategies. This may—at least partially—be explained by the SC literature’s focus on large-scale disasters, in response to which resilience strategies’ benefits are likely to substantially outweigh any costs or inefficiencies. Nevertheless, extant SC literature increasingly recognizes the need for a more comprehensive understanding of the adverse implications and associated diminished effectiveness of resilience strategies across different situations and disruptions (e.g., Ali et al., 2017; Ambulkar et al., 2015; Bode et al., 2011).

This dissertation helps to address this issue by theorizing and empirically demonstrating that bridging actions’ overall effectiveness is contingent upon both external and internal conditions that organizations face. Specifically, we demonstrate that, at all levels of analysis, bridging actions become less effective or even counterproductive as situational characteristics become less demanding or when these actions are not adequately attuned to internal organizational processes. At a more fundamental level, these insights thus reveal that engaging in bridging actions is not without costs, and that the context in which such actions are executed critically determines whether their benefits will outweigh their costs. The conceptual frameworks put forward in this dissertation, combined with our principal focus on the less impactful day-to-day disruptions, have made these costs and diminishing returns of bridging actions visible. In doing

so, this dissertation introduces organizations to important trade-offs that they need to make before engaging in such actions, and to the subsequent need for a contingency approach toward managing disruptions. Such an approach contrasts with extant resilience research focusing on large-scale disasters that has instead recommended a more universal approach to implementing resilience strategies.

Importantly, however, the tradeoffs identified here are likely not restricted to bridging actions only, and organizations would be well-served by a more complete understanding of the costs and diminishing returns associated with other resilience strategies. By drawing from adjacent research fields (e.g., team effectiveness research) and placing more emphasis on the context in which resilience strategies are executed, the present dissertation provides an important approach for future research for identifying these costs and diminishing returns. In other words, this dissertation advances extant resilience research by promoting a broader awareness of bridging actions' costs and diminishing returns, where the developed conceptual frameworks may also be usefully extended to other resilience strategies.

5.3.4 | Interdisciplinary research

The present dissertation further contributes to the general SC literature because it reiterates the value of interdisciplinary research to the development of this field. As the discussion above illustrates, this dissertation builds not only upon insights from the SC literature, but also upon those from adjacent research disciplines. For example, we draw from insights from the organizational behavior (OB) literature to study a cross-functional team's functioning while it resolves SC disruptions on behalf of its organization. Similarly, we use observations from the public administration literature to help elucidate the complexity that organizations face in providing public services and managing CIs. Accordingly, insights from these adjacent research disciplines aided the research presented here by shedding light on previously unknown or overlooked aspects regarding phenomena that have received little attention in the SC literature. Insights from the OB literature have, for example, enabled us to reveal the individual- and team-level processes that can explain when and how a cross-functional team may actually hurt its organization's resilience. While Sanders, Zacharia, and Fugate (2013, p. 416) already noted that interdisciplinary research is "the critical requirement for the development and evolution of supply chain management into a respected discipline," calls for such research remain persistent in contemporary SC literature in general (e.g., Sanders, Fugate, & Zacharia, 2016; Wieland, 2021) and in resilience research specifically (e.g., de Vries et al., 2021; Scholten et al., 2020). The present dissertation both responds to these calls and accentuates their relevance by showing how integrating insights from cognate research areas advances the SC literature's understanding of bridging actions and resilience.

5.3.5 | Moving beyond theory exploration

A final contribution of this dissertation emerges from its unique and comprehensive data gathering approaches. That is, each of its three empirical chapters revolves around detailed and mostly objective data at different levels of analysis, enabling the overall dissertation to offer some of the much-needed empirical validation of bridging actions in general (e.g., Bode et al., 2011; Manhart et al., 2020), and those of cross-functional teams (e.g., Blackhurst et al., 2011; da Silva Poberschnigg et al., 2020) and at a SC level (e.g., Pournader et al., 2016; Zhao et al., 2019) specifically. For these particular topics within extant resilience research, the present dissertation thus moves beyond the prevailing theory exploration based upon qualitative research (e.g., case studies; Ali et al., 2017; Daghar, Alinaghian, & Turner, 2021; Ghadge et al., 2019) toward theory testing, which builds more upon longitudinal and/or objective data such as we collected (e.g., archival research). Regarding these topics, we therefore help address the “clear need to use these observations [from case studies] to build more general theories that can be quantitatively tested and used to equip decision makers with better models to base crisis preparation and responses upon” (van der Vegt et al., 2015, p. 974; see also Hohenstein et al., 2015; Scholten et al., 2020).

5.3.6 | Overview of main theoretical contributions

In Table 5.1, we summarize the theoretical contributions discussed above and provide an overview of how the empirical chapters in this dissertation add to them. The first contribution or overarching research theme across the three empirical chapters is to help resolve the lack of attention within the SC literature regarding managing day-to-day disruptions. The second and third themes depicted in Table 5.1 relate to the principal focus of extant resilience research on a single level of analysis, typically the organizational or relationship level. In addressing these research themes, we take an important first step toward broadening the two prevalent notions guiding extant resilience research that we observed in the introductory chapter. Table 5.1 further reveals how the different empirical chapters add to the fourth overarching research theme on the overly positive view of resilience strategies. Although we did not set out to offer more nuance to this view, our insights across the chapters revealed important contingencies to resilience strategies’ benefits. Finally, the above discussion also illuminated how the overarching research approaches underlying the research themes similarly provide meaningful contributions to the SC literature. Specifically, the present dissertation’s interdisciplinary nature and its ability to move beyond theory exploration may inspire future (resilience) research in this field to adopt similar approaches.

	Chapter 2	Chapter 3	Chapter 4
Overarching research themes			
I Insufficient insights into managing the smaller, more typical day-to-day disruptions	Combination of larger-in-scale and day-to-day disruptions as a determinant of SC vulnerability	Disruption novelty as a determinant of the impact of day-to-day disruptions	Disruption co-occurrence and nonroutineness as determinants of the impact of day-to-day disruptions
II Limited understanding of resilience strategies beyond the perspective of the focal organization	Information-scouting and coordination efforts of individuals and teams to increase organizational resilience	Managing supplier relationships in the context of supplier-induced disruptions	Intensity of cross-boundary information exchange at the supply network level
III Growing awareness of the need for studying the micro-level, behavioral component of resilience	Cross-functional teams may decrease organizational resilience under particularly demanding conditions	Deeper supplier relationships may reduce organizational resilience against more routine disruptions	Benefits of cross-boundary information exchange diminish as disruptions become less challenging
IV An unbalanced, overly positive image of resilience strategies	Drawing from organizational behavior literature to help explain individual- and team-level mechanisms	Introducing event system theory as an established and more widely adopted theoretical framework in general management literature	Building on insights from public administration research on the complexity of delivering public services
Overarching research approaches			
I Encouragement of interdisciplinary research to help understand complex SC phenomena better	Questionnaire and simulation data on 80 cross-functional teams	Archival data on nearly 2,000 disruptions across more than 170 supplier relationships of an electronics company	Archival data on nearly 300 disruptions confronting the service supply network managing the Dutch railway system
II Increasing demands for theory testing using quantitative approaches (as opposed to theory exploration using qualitative approaches)			

Table 5.1 | Overview of overarching contributions to theory

5.4 | Managerial implications

In the introductory chapter of this dissertation, we described how important ambiguities in extant SC literature prevented managers from effectively managing more typical, day-to-day disruptions, as well as from doing so collectively with organizations beyond their immediate suppliers. In attempting to resolve these ambiguities, this dissertation therefore offers a number of important practical insights for managing, particularly, day-to-day disruptions. Specifically, the findings presented here can inform managers on what actions they can take in response to different types of day-to-day disruptions and at different levels to increase their organization and overall SC's resilience. Starting with the day-to-day disruptions, the present dissertation provides important insights into when these disruptions can be more harmful and when, as such, bridging actions are most beneficial. Our findings suggest that, in the absence of adequate levels of bridging actions, day-to-day disruptions appear to be more harmful when they co-occur or are unprecedented. Because of their more typical, recurring nature, managers are likely to need to deal with more than one day-to-day disruption at the same time. When, indeed, day-to-day disruptions co-occur, managers typically struggle more with each individual disruption and possible interdependencies between them, causing such disruptions to harm the organization for an extended period. In response to such co-occurring disruptions, managers are recommended to take a step back and, despite it feeling counterintuitive, take a moment to figure out and act on any interdependencies rather than battling these disruptions head on. Similarly, our findings indicate that managers should be aware that a specific disruption may need more time to resolve when it has not happened before in the previous one or two years and is, as such, largely unfamiliar to the managers. Lacking relevant experience, managers need to develop a new response, again allowing the disruption to persist for a longer time. To resolve an unfamiliar disruption, our insights suggest that it is important for managers to collect as much information as possible on the disruption's cause and on successful responses to comparable disruptions in the past. When managers are aware of these disruption characteristics, they can better prioritize their efforts and model the intensity of their bridging actions accordingly to increase their organization and SC's resilience.

In addition to these insights for managing day-to-day disruptions, this dissertation also provides important implications for managers on how to increase resilience with concrete bridging actions at different levels of analysis. First, at the intraorganizational level, the present dissertation illustrates how managers can realize the full potential of cross-functional teams that are tasked with resolving SC disruptions on behalf of their organization. Based on these findings, such teams can be an effective tool for managers to search for or scout

relevant information and expertise required to deal with the disruptions at hand. Importantly, however, these findings also indicate that managers should promote these teams' internal integration despite the fact that their members are primarily engaged in activities outside of the team. To ensure that team members, indeed, continue to feel connected to the team and responsible for the team's functioning, managers may draw from the literature on team cohesion (e.g., Beal, Cohen, Burke, & McLendon, 2003; Carbonell & Rodríguez Escudero, 2019; Mathieu, Hollenbeck, Knippenberg, & Ilgen, 2017) and stimulate members to work from the same location, organize daily team meetings, and allow for informal or social interactions among members. In doing so, managers ensure that the information and insights that team members collect are shared and used efficiently by the team to resolve disruptions. These insights are critical for managers as cross-functional teams which lack such internal integration may inadvertently end up decreasing their organization's resilience through ignoring or overlooking relevant information and reduced team cohesion.

Second, at the interorganizational level, this dissertation illustrates how managers can design the relationships with their direct suppliers such that the impact of supplier-induced disruptions is diminished. That is, to help mitigate the consequences of more unfamiliar supplier-induced disruptions, the present research suggests that managers should seek to establish a relationship with the respective supplier that is characterized by either high breadth or high depth. A broader relationship signals that the diversity of sourced products at the supplier is larger and that, as such, the organization and the supplier interact with each other using multiple connections among different employees. Such a broader relationship allows for a diversity of different perspectives and sources of potentially relevant information, making it more likely that the organization can access the information necessary for resolving the nonroutine disruption at hand. For example, when the organization and its supplier work together across a number of different product groups, employees' insights into common disruptions within one of these groups may be relevant to help resolve similar disruptions that may be unfamiliar to other groups. In addition, managers are recommended to demonstrate commitment to the respective supplier and refrain from engaging in dual or multiple sourcing to promote a deeper relationship. In such a relationship, the supplier is more willing to share high-quality and potentially sensitive information that helps the organization better deal with the unfamiliar disruption, even if the supplier itself is the source of that disruption. Correspondingly, we recommend managers to consider communicating their stance on the relationship clearly and stressing that any information that the supplier shares will be used for the benefit of both parties and not for replacing the supplier as soon as possible. These findings are imperative for managers

when deciding on the type of relationship to engage in with a new supplier, or when evaluating the relationship with a current supplier.

Third, at the overall SC level, this dissertation offers critical insights for managers on when and how to work collectively with other organizations in their SC to prevent day-to-day disruptions from escalating and causing SC-wide failures. Specifically, the example of the chaos at the Belgian railway system in the introductory chapter illustrated how managers often struggle with collectively resolving a disruption and what the consequences may be when a day-to-day disruption is not addressed effectively. The present dissertation's findings demonstrate that increasing resilience at the SC level also requires direct communication and information sharing at the level of the entire SC. That is, rather than working together in dyadic or triadic relationships, we show that organizations should aim for doing so with all organizations in their SC. By asking for and sharing relevant information simultaneously to all organizations in the SC, the overall SC is much more likely to handle day-to-day disruptions effectively and prevent them from escalating. Guided by these insights, managers may initiate actions aimed at increasing the involvement and transparency across all organizations in their SC and, as such, increase their active participation when a disruption emerges, which we show is a prerequisite to increasing SC resilience. Such actions may, for example, include establishing a shared communications system with all relevant organizations in the SC (such as was present for the service supply network studied in the fourth chapter) or setting up a task force with representatives from these organizations.

5.5 | Future research directions

As outlined above, the chapters of this dissertation individually and collectively offer important theoretical and managerial contributions. Similarly, besides each chapter's unique future research directions, the chapters jointly uncover several opportunities for further inquiry in future research. Principally, and as described more comprehensively below, there remains much scope to develop our systems approach further at the included levels of analysis, as well as by additionally incorporating the intrateam level as an even more detailed level of analysis. Moreover, we showed how all chapters suggest that bridging actions are not uniformly effective and reveal important boundary conditions to such actions' benefits, which points to the need for a better understanding of what prevents these actions from being consistently beneficial. Below, we describe these and other opportunities in more detail and how corresponding future research can continue improving both academics and practitioners' understanding of bridging actions and resilience.

5.5.1 | Expanding the systems approach toward studying resilience

An important contribution of the present dissertation is its systems approach toward studying bridging actions and resilience, exploring the implications of such actions at and across multiple levels of analysis within the context of SCs. While already comprehensive, this systems approach can be meaningfully extended by further research in several ways. First, insights from Chapter 2 revealed the prominence of a cross-functional team and its internal processes for ensuring organizational resilience, yet this chapter could offer only limited insights into the intricacies of these internal processes. By exploring this intrateam level in more detail, future research may develop a more fine-grained understanding of how, for example, a cross-functional team may effectively organize or configure its members' engagement in bridging actions. Specifically, related research on team effectiveness suggests that how information is collected and by whom may be as important as information being collected in the first place (Gibson, Dunlop, & Cordery, 2019; Power, 2018). Bridging actions may be most efficiently executed when they are performed by only one or a few individuals (i.e., centralized) and when these individuals can focus exclusively on these activities (i.e., specialized). Such centralization and specialization of bridging actions allows for only a limited number of team members to spend time on bridging, permitting them to develop relevant skills and become more proficient. Accordingly, the other team members who do not engage in bridging actions can focus more fully on their and their team's core tasks, reducing potential role overload and stress (Crawford & LePine, 2013). Incorporating this intrateam level of analysis may, therefore, help further explain why Chapter 2 showed that internal integration is centrally important for a cross-functional team in ensuring its organization's resilience, expanding the systems approach put forward in this dissertation even further.

Besides introducing this extra, more detailed level of analysis, our systems approach may also be extended by broadening its scope at the already included levels of analysis. At the interorganizational level, for instance, future research could explore partnering organizations other than the first-tier suppliers studied here. That is, Chapter 3 demonstrated how small, but frequent supplier-induced disruptions can be resolved within the disrupted supplier relationship itself. Further studies may examine how bridging actions targeted, instead, at competing organizations may help deal with these disruptions, as insights from related resilience research suggest that competitors may sometimes be willing to help out in terms of sharing inventory or even production capacity (Bakshi & Kleindorfer, 2009; Scholten & Schilder, 2015). Other relevant partnering organizations that could be explored further at this interorganizational level are institutions such as government or trade associations, although these typically will only be involved for more long-term risk management projects involving

multiple organizations (Azadegan & Dooley, 2021). In addition to examining other partnering organizations, future research could expand on our insights at this level regarding more lasting bridging actions (i.e., developing particular types of supplier relationships) to study more immediate or real-time bridging actions such as forms of information exchange that we studied at the other levels of analysis.

Similarly, the aforementioned insights from team effectiveness research concerning the centralization of bridging actions may also guide further developments at the SC level of our systems approach. In particular, Chapter 4 illustrated that organizations within an SC could better deal with day-to-day disruptions when they collectively engage more intensively in cross-boundary information exchange. It was, however, beyond the scope of this chapter to examine whether organizations in an SC that evenly participate in such bridging (i.e., decentralized) are more effective, compared to an SC where one or a few organizations take the lead in collecting all relevant information and insights from the involved organizations (i.e., centralized). A more centralized approach could, for example, allow the focal organization to establish a more complete overview of the situation and possible countermeasures, and give more central direction to the bridging efforts in the overall SC. This reduces the chances that organizations unwittingly duplicate one another's actions or are working on redundant countermeasures, without every organization having to extensively engage in bridging actions (see, for example, de Vries et al. [2021] on such centralization benefits for cross-functional teams facing SC disruptions). Empirical research that builds on these notions may provide more detailed insights into the role of SC-level bridging actions than our preliminary research provides, and, as such, specify even more accurate directions to managers who frequently struggle with effectively managing disruptions together with other organizations in their SC.

5.5.2 | Exploring day-to-day disruptions' characteristics in further detail

Besides broadening the proposed systems approach, future research could further advance the present dissertation's insights into managing day-to-day disruptions. We developed conceptual frameworks that help explain under what conditions these disruptions that are smaller in scale, but more frequent have a larger adverse impact on organizations' functioning. These frameworks may serve as an important starting point for future research to explore alternative disruption characteristics that may additionally determine day-to-day disruptions' impact. In Chapter 4, for example, we built upon OIPT to propose that day-to-day disruptions are more harmful when they are more complicated to resolve. In this chapter, we assessed such complicatedness by the timing of the

day-to-day disruption, that is, whether it occurred simultaneously with other day-to-day disruptions. Understandably, however, a day-to-day disruption may also be more complicated to resolve in and of itself. A day-to-day disruption may, for instance, be more complicated to deal with when it affects a highly innovative or technologically advanced component or system (see, for example, Ghadge et al., 2019, for a review on cyber risks), or when it involves a partner several tiers up or down the SC, which may be less familiar and well-understood by the focal organization (Bode & Wagner, 2015). Moreover, while the empirical data studied in this dissertation included (day-to-day) disruptions from different origins (e.g., internal and demand-side disruptions in the simulation in Chapter 2, supplier-induced disruptions for the electronics company in Chapter 3), this origin was not explicitly included as a disruption characteristic. Nevertheless, supply-side disruptions that typically result in insufficient inventory likely impact organizations differently than demand-side disruptions that may, instead, lead to excess inventory. Hence, we reiterate Reimann et al. (2017) and others (e.g., Habermann et al., 2015; Pettit, Croxton, & Fiksel, 2013) and call for further research into how the origin of a day-to-day disruption may influence the disruption's impact and its management. Combined with the disruption characteristics presented in this dissertation, research into these additional characteristics may offer further insights for managers on how to effectively deal with day-to-day disruptions.

Our conceptual frameworks on day-to-day disruptions' characteristics can further be extended by exploring in more detail the mechanisms underlying the relationships between these characteristics and the disruptions' impact. Regarding disruption nonroutineness, for example, we centrally posited in Chapters 3 and 4 that as a particular type of disruption occurs more frequently, the affected organizations can learn from their prior experiences with this disruption to handle future occurrences more effectively. Although we find support for a diminishing impact as disruptions become more routine, additional research is needed to illuminate how repeated disruptions translate into these learning effects by means of, for example, studying whether new protocols were developed or existing ones revisited. Or, whether such learning occurs less intentionally through the more informal sharing and capturing of knowledge (cf., Scholten et al., 2019). In addition, learning or accumulating experiences from disruptions may primarily—if not solely—occur in organizations that have a more active “disruption orientation.” Specifically, disruption orientation refers to an organization's inclination to explore and understand the root cause of and successful response to (earlier) disruptions, as opposed to merely identifying a remedy that works and moving on (Bode et al., 2011; Daft & Weick, 1984). Previous research suggests that organizations with a more active disruption

orientation are more likely to learn from disruptive events through evaluations and developing and updating protocols (Ambulkar et al., 2015; Zhang et al., 2018). Furthermore, such organizations are also more likely to actively manage disruptions by means of, for example, the bridging actions presented in this dissertation (Bode et al., 2011). Future studies that combine the present dissertation's insights related to disruption nonroutineness and bridging actions with extant research on organizations' disruption orientation may provide more comprehensive insights into the intricacies of how managers may best deal with day-to-day disruptions.

5.5.3 | Determining when not to bridge

Another direction for future research concerns explicating the downsides to or costs of bridging actions that cause such actions to be more beneficial under some conditions than others. Specifically, and as described in more detail above (Section 5.3.3), all three empirical chapters of this dissertation reveal that bridging actions are not uniformly effective and may even decrease resilience. The scope and nature of the collected data, however, prevented us from examining these contingencies to bridging actions in more detail, and further research is needed to understand the fine-grained mechanisms and processes that can help explain why bridging actions are not consistently beneficial in the context of resilience. As introduced in Chapter 2, for example, a cross-functional team's members who engage in bridging actions with outside constituents may feel less connected to their own team or organization, and, more fundamentally, have less time and attention available for pressing tasks within their team or organization's boundaries. Because these contingencies to bridging actions primarily exist at the behavioral or micro level, the line of reasoning in Chapter 2 strongly builds on team effectiveness research (cf., Crawford & LePine, 2013; Gibson & Dibble, 2013; Uitdewilligen & Waller, 2018). Further incorporating these micro-level insights in future research is important, because extant SC literature is largely ignorant of them and, as such, misleadingly suggests to managers that engaging in more bridging actions is always beneficial (see Fugate et al., 2012, for a notable exception). The research presented in this dissertation demonstrates that this is not the case, particularly when organizations have less to gain from outside information and support under less adverse disruption characteristics. Consequently, examining the mechanisms and possible downsides of bridging actions underlying their diminishing returns or even negative influence in future research represents a necessary step for further increasing our academic understanding of bridging actions aimed at managing disruptions.

Additional research may further consider bridging actions and their potential downsides alongside alternative, buffering actions directed at dealing with,

in particular, day-to-day disruptions. That is, instead of engaging in bridging actions under less adverse disruption characteristics, an organization may be able to effectively mitigate the disruption's impact on its own through buffering actions such as excess inventory or backup suppliers. Establishing such redundancy and flexibility to manage minor disruptions may not necessarily require large investments, yet allow the organization to easily and temporarily switch to alternative means of producing or sourcing while the disruption is being resolved (e.g., Durach et al., 2020; Mishra et al., 2016). Hence, when day-to-day disruptions are not overly complicated or nonroutine to resolve, these accessible internal possibilities may be preferred over the more intricate and possibly disadvantageous bridging actions. It seems therefore pertinent to explore in more detail the comparative effectiveness of bridging and buffering actions in response to day-to-day disruptions of varying types, mirroring recent calls by Manhart et al. (2020) and others (e.g., Durach et al., 2020; Timmer & Kaufmann, 2019).

5.5.4 | Adopting alternative methodological approaches

For several of the research directions presented above, alternative research designs may be relevant, if not necessary. Indeed, we recommend future research to extend our insights using different methodological approaches to further increase our academic understanding of resilience in and of SCs. The present dissertation largely builds upon archival and simulation data to explore bridging actions' implications for resilience, thereby offering some of the much-needed theory testing regarding resilience strategies in general and these bridging actions specifically. In conducting such archival research, we demonstrate that many organizations maintain records of, especially, day-to-day disruptions to their operations, and that these records may constitute a valuable source of knowledge on how organizations may effectively deal with such disruptions. An added benefit of the archival data that we collected is that it enabled us to alleviate key weaknesses associated with more subjective research approaches such as surveys or observational studies (e.g., common method bias, recall and response bias; Helmuth et al., 2015). At the same time, this approach prevented us from capturing the detailed processes underlying our relationships of interest, as we acknowledged above (for example, in Section 5.5.2). Also, opportunities to address endogeneity concerns were limited in collecting the archival data (see Miller et al., 2021, for a recent and comprehensive overview of important considerations in archival research). Future research may, therefore, seek to combine archival data with observational or interview data in mixed methods research designs to simultaneously pursue the much-needed theory testing and

gather more fine-grained insights into the mechanisms underlying the obtained findings.

Our call for more mixed method studies is neither unique, nor new to the SC literature. Boyer and Swink (2008, p. 339) already put forward that “multiple approaches are required in order to develop a holistic understanding of operations and supply chain management phenomena.” Recently, Chandrasekaran, Linderman, and Sting (2018) reiterated this position while outlining the benefits of combining empirical and simulation methods. Specifically, they posited that simulation allows for capturing and, more importantly, manipulating wide sets of variables and interactions between them. Consequently, the combination of simulation with empirical approaches (e.g., survey, archival) makes it possible to introduce omitted variables that have or could not be unobserved empirically, and to explore the mechanisms underlying the empirical observations. Our research presented in Chapter 2 aptly illustrates these advantages, as it combines survey data with insights from a simulation to study the intricate role of individual- and team-level processes in ensuring organizational resilience. We follow Chandrasekaran et al. (2018), as such, and recommend future resilience research to incorporate simulation or experimentation in mixed method research designs. This additionally allows for establishing causality, and offers a more dynamic perspective on variables that are often captured cross-sectionally in more traditional research approaches. More generally, future longitudinal research appears pertinent to further examine the inherently dynamic nature of the bridging actions studied in this dissertation (e.g., the intensity of cross-boundary information exchange likely fluctuates over the course of a disruption). Taken together, pursuing the above research directions using the methodological approaches suggested here would advance an even more comprehensive understanding of bridging actions and resilience.

5

5.5 | Concluding remarks

Numerous examples illustrate organizations’ struggle with managing day-to-day disruptions, as well as their difficulty in coordinating disruption responses with other organizations in their SC. The introductory chapter described, for instance, how otherwise non-exceptional disruptions on the Belgian railway system and lacking coordination within the involved service supply network paralyzed the entire country’s rail transportation and stranded thousands of people. Accordingly, we set out to offer more complete guidance for managers on establishing resilience within and across their organization’s boundaries, particularly in response to day-to-day disruptions. Serving this aim, this dissertation offers novel insights into what characteristics make these more

typical disruptions that managers face on a daily basis more likely to be harmful. The insights presented here further aim to resolve key ambiguities regarding how to optimize cross-functional teams' efforts, interorganizational relationships, and network interactions for increasing resilience. Based on these insights, we can conclude that, indeed, working across or bridging organizational boundaries to access outside information and to coordinate efforts is indispensable for organizations to increase their resilience. All in all, this dissertation advances the SC literature and practice by offering a holistic approach toward studying bridging actions and resilience across multiple levels of analysis and by combining insights from different research disciplines. We hope this dissertation stimulates further research on the intricacies of bridging actions in managing (day-to-day) disruptions and that it helps managers to implement this mitigation strategy effectively.

