An Investigation into Human Related Factors for Enhanced Supply Chain Resilience

Yueheng Zhang

A thesis submitted for the degree of
Doctor of Philosophy

Cardiff University

April 2026

Abstract

Supply chain resilience (SCRES) has become a central concern for organisations facing increasingly frequent and severe disruptions. While prior research has recognised the importance of human-related factors, existing insights remain fragmented and are often discussed at a high level without clearly explaining how human capabilities are developed, enacted, and connected across organisational and supply chain (SC) boundaries over time. This thesis addresses this gap by developing a human-centred explanation of SCRES through the lens of Dynamic Human Related Capabilities (DHRCs).

The thesis adopts a sequential qualitative research design that combines a systematic literature review (SLR) with a multiple case study approach. The SLR synthesises existing research on human-related factors relevant to SCRES and identifies three core capability domains, social capital, human capital, and cognition. Building on this foundation, the empirical phase draws on multiple case studies of Chinese firms in beverage and alcoholic beverage supply chains, using semi-structured interviews and iterative within-case and cross-case analysis to examine how these capabilities are enacted in practice across actors, relationships, and disruption phases.

The findings confirm the centrality of social capital, human capital, and cognition to SCRES and show that they are enacted through nine practices: trust, reciprocity, communication, and cooperation; training and education, and experience; and individual cognitive attributes, shared codes and language, and shared narratives. The thesis demonstrates that the roles of these practices vary across the pre-disruption, during-disruption, and post-disruption phases, supporting preparedness, responsive coordination, and learning-based renewal in different ways. The findings also show that these practices interact as a reinforcing system over time, including relational reinforcement within social capital, the contribution of training and experience to cognition, and the role of shared cognitive practices in consolidating disruption learning and improving subsequent preparedness.

This thesis contributes to SCRES research by developing DHRCs theory, presenting a structured DHRCs framework and practice architecture, and reconceptualising SCRES as a dynamic, human-centred, multi-stage process. It also provides practical guidance for strengthening resilience by aligning social capital, human capital, and cognition across organisational roles, SC relationships, and disruption phases.

Acknowledgements

The completion of this thesis marks more than the end of a doctoral programme; it concludes a demanding and deeply transformative period of my life. At this milestone, I am sincerely grateful to everyone who supported me with warmth and encouragement. I am also grateful for the resilience I discovered in myself, and for the perseverance that carried me through years of sustained effort.

I would first like to express my deepest appreciation to my supervisory team, Professor Laura Purvis, Dr Yuan Huang, and Professor Yingli Wang, for their generous guidance, thoughtful feedback, and steadfast support throughout my doctoral journey. Meeting them has been one of the greatest pieces of good fortune in my PhD. Because of their support, what might otherwise have been an overwhelming experience became, for me, a doctoral journey that was not only meaningful and intellectually rewarding, but also genuinely enjoyable.

My deepest thanks go to my primary supervisor, Professor Laura Purvis. Her presence transformed what could have been a daunting programme into a journey of genuine joy and intellectual energy. Beyond her academic guidance, she created a nurturing environment, leading with warmth, approachability, and generosity of spirit. Throughout my PhD, she helped me build confidence, encouraged me to present at conferences, and supported my efforts to publish. Just as importantly, she was always generous with encouragement, often reminding me that I was doing well and recognising the effort behind the work, which made the journey feel lighter and gradually helped me become more confident. I am profoundly grateful for her care, patience, and belief in me.

I am equally grateful to Dr Yuan Huang, whose energy and positivity have inspired me both academically and personally. I am also deeply appreciative of her continued commitment to my supervision, especially as she supported and guided me even after leaving Cardiff to take up a post at another university. I have always valued her feedback for being clear, direct, and incisive, helping me identify the core of an issue and move forward with focus and confidence. Beyond academia, her discipline in exercise has also inspired me, reminding me that perseverance and strength are built through consistency. I am especially grateful for her encouragement and for the steady support she has given to my development.

My sincere appreciation also goes to Professor Yingli Wang, who generously joined my supervisory team in the later stage of my PhD. I am deeply thankful that, despite her many commitments, she was willing to offer her time, attention, and support at such an important point in my doctoral journey. Her professional insights and constructive feedback helped me refine the direction and positioning of my research, and her involvement gave me valuable support as I worked towards completion. I am truly grateful for the effort she made on my behalf, and for the encouragement she offered during the final stage of this degree.

I would also like to express my heartfelt gratitude to my external examiner, Professor Mark Stevenson, and my internal examiner, Professor Maneesh Kumar, for making the effort to attend my viva in person. Their warmth and kindness made what could have been a stressful examination feel more like a relaxed and engaging academic conversation. I am deeply grateful for their encouragement, recognition of my work, and constructive suggestions, which gave me greater confidence in my research and helped me to further strengthen the thesis.

I extend my heartfelt thanks to my family and friends for their unwavering support, understanding, and encouragement throughout this journey.

My most heartfelt thanks go to my grandmother, whose unconditional love has been a steady source of strength throughout these years. We spoke often on video calls, and I told her everything. No matter what happened, she was always on my side, praising even the smallest things I did, including something as simple as cooking a meal for myself. Heartbreakingly, only a few days after I completed the first full draft of this thesis, my grandmother suffered a stroke and spent a long time in hospital. Although she gradually improved, the distance between us became a constant ache. I will never forget the video call on the eve of my birthday. She was still in hospital and not yet fully recovered, and my family had discouraged us from speaking in case it affected her mood. Yet she remembered my birthday and called me herself. She smiled and tried to speak, even though she had little strength. Even during her recovery, she insisted on sending me New Year money, as she always does. I was deeply moved, and I also carry the sadness of not being able to return to see her during that time. Completing this doctorate was a milestone she always wished for me, and I am proud to have fulfilled it. I dedicate this achievement to her, with love and gratitude.

I am also deeply grateful to my parents for their unwavering financial support, which gave me the security to pursue this goal, and for the freedom to make my own choices without conditions on my path. I am especially thankful to my father for his patience and emotional support, and to my mother for her understanding and constant encouragement, all of which have sustained me throughout this journey. I also thank my brother, as well as my aunt and uncle, for their practical help in connecting me with interview participants. Without their introductions and support, this research would not have been possible. I am equally grateful to all my other family members who have supported me, and to those who have cared for my grandmother during this difficult time.

I am profoundly grateful to my partner, Jianchen (Joey) Shi. We first met as classmates on the pre-PhD programme in Social Science Research Methods, studying side by side and racing against deadlines, and over time we naturally built a life together. Since then, we have shared many meaningful experiences, from travelling across different countries and cities to collaborating on and publishing research together, as well as completing three half marathons side by side. Above all, we have supported, encouraged, and grown alongside each other throughout this journey. He has contributed greatly to my personal growth, and I am deeply grateful for the values, habits, and perspectives he has brought into my life.

I would also like to thank the friends who accompanied me at different stages of my PhD journey. The moments and experiences we shared formed a meaningful part of these years, bringing joy, perspective, and many valuable memories beyond my academic work. I am grateful for the conversations, companionship, and support that made this journey richer and more memorable.

Finally, I must thank myself for the determination and perseverance that carried me through this PhD journey. Over these years, I changed in ways I did not expect: I became physically stronger, completed a half marathon, developed a deeper interest in academic work, and, most importantly, grew more confident. As the Classic of Poetry puts it, “如月之恒，如日之升,” like the waxing moon and the rising sun, quietly growing brighter and steadier. I hope to carry this same strength and confidence into all that follows.

CONTENTS

Abstract ..... *I*

Acknowledgements ..... *II*

CONTENTS ..... *V*

LIST OF FIGURES ..... *XIV*

LIST OF TABLES ..... *XV*

LIST OF ABBREVIATIONS ..... *XVII*

Chapter 1. Introduction *1*

1.1 Research Background **1**

1.2 Motivations for the Research **3**

1.2.1 Empirical, Methodological, and Practical Motivations 3

1.2.2 Theoretical Motivation and Positioning 4

1.3 Research Aim and Research Questions **7**

1.4 Overview of Methodology Adopted and Key Findings **8**

1.4.1 Overview of Methodology Adopted 8

1.4.2 Overview of Key Findings 9

1.5 Overview of Thesis Contributions **10**

1.5.1 Overview of Theoretical Contributions 10

1.5.2 Overview of Practical Contributions 11

1.6 Structure of the Thesis **12**

Chapter 2. Theoretical Background and Literature Review *14*

2.1 Chapter Introduction **14**

2.2 Supply Chain Resilience **15**

2.2.1 Conceptions of Supply Chain Resilience 15

2.2.2 Supply Chain Resilience Capabilities 18

2.3 Theoretical Background **20**

2.3.1 Dynamic Capability Theory 20

2.3.2 Dynamic Managerial Capability Theory 23
2.3.3 Dynamic Human-related Capabilities 25
2.4 Dynamic Human-Related Capabilities and Supply Chain Resilience: A Systematic Literature Review 26
2.4.1 Overview of the Systematic Literature Review 27
2.4.1.1 Publication Trends Over Time 27
2.4.1.2 Distribution of Dynamic Human-Related Capabilities 29
2.4.1.3 Distribution of Publications Among Journals 31
2.4.1.4 Methodological Approaches 32
2.4.2 Content Analysis: Social Capital 33
2.4.2.1 Social Capital and Supply Chain Resilience 33
2.4.2.2 Social Capital Practices and Supply Chain Resilience 34
2.4.3 Content Analysis: Human Capital 37
2.4.3.1 Human Capital and Supply Chain Resilience 38
2.4.3.2 Human Capital Practices and Supply Chain Resilience 38
2.4.4 Content Analysis: Cognition 40
2.4.4.1 Cognition and Supply Chain Resilience 41
2.4.4.2 Cognition Practices and Supply Chain Resilience 41
2.4.5 Synthesis and Conceptual Framework of Dynamic Human-Related Capabilities 45
2.5 Synthesis and Identified Gaps 47
2.6 Chapter Summary 51
Chapter 3. Research Methodology 54
3.1 Chapter Introduction 54
3.2 Research Philosophy and Research Approach 54
3.2.1 Philosophical Positioning of the Study 55
3.2.1.1 Ontological Position: Relativism 56
3.2.1.2 Epistemological Position: Interpretivism 56
3.2.2 Research Approach 58
3.3 Research Design and Methods 59
3.3.1 Overview of Methodological Choices 59
3.3.1.1 Methodological Choice: Qualitative Research 59

3.3.1.2 Research Type: Integrated Multi-Method Qualitative Design 59
3.3.1.3 Research Strategy: Systematic Literature Review and Multiple Case Studies 60
3.3.2 Systematic Literature Review Methodology 60
3.3.2.1 Question Formulation 60
3.3.2.2 Locating Studies 61
3.3.2.3 Studies Selection and Evaluation 62
3.3.2.4 Analysis and Synthesis 63
3.3.2.5 Presentation of Results 65
3.3.3 Empirical Methodology 66
3.3.3.1 Multiple Case Study Design 66
3.3.3.2 Case Selection and Sampling 66
3.3.3.3 Data Collection 68
3.3.3.4 Data Analysis Procedures 72
3.3.3.5 Trustworthiness and Research Ethics 74
3.4 Chapter Summary 75
Chapter 4. Descriptive Findings 78
4.1 Chapter Overview 78
4.2 Case A - Findings 78
4.2.1 Background of Case A 79
4.2.2 Social Capital 80
4.2.2.1 Trust 81
4.2.2.2 Reciprocity 83
4.2.2.3 Communication 84
4.2.2.4 Cooperation 87
4.2.3 Human Capital 90
4.2.3.1 Training & Education 90
4.2.3.2 Experience 91
4.2.4 Cognition 94
4.2.4.1 Individual Cognitive Attributes 94
Employees' Cognitive Attributes 95
4.2.4.2 Shared Language and Code 95
4.2.4.3 Shared Narrative 96

4.2.5 Summary of Case A 97

4.3 Case B - Findings 98

4.3.1 Background of Case B 98

4.3.2 Social Capital 100

4.3.2.1 Trust 100

4.3.2.2 Reciprocity 103

4.3.2.3 Communication 104

4.3.2.4 Cooperation 110

4.3.3 Human Capital 114

4.3.3.1 Training & Education 114

4.3.3.2 Experience 116

4.3.4 Cognition 119

4.3.4.1 Individual Cognitive Attributes 119

4.3.4.2 Shared Language and Code 121

4.3.4.3 Shared Narrative 122

4.3.5 Summary of Case B 122

4.4 Case C - Findings 123

4.4.1 Background of Case C 124

4.4.2 Social Capital 125

4.4.2.1 Trust 126

4.4.2.2 Reciprocity 128

4.4.2.3 Communication 130

4.4.2.4 Cooperation 135

4.4.3 Human Capital 138

4.4.3.1 Training & Education 138

4.4.3.2 Experience 141

4.4.4 Cognition 143

4.4.4.1 Individual Cognitive Attributes 143

4.4.4.2 Shared Language and Code 146

4.4.4.3 Shared Narrative 147

4.4.5 Summary of Case C 148

4.5 Chapter Summary 149

Chapter 5. Cases Analysis *151*

5.1 Chapter Overview **151**

5.2 Within-Case Analysis: Case A **151**

5.2.1 Social Capital 152

5.2.1.1 Trust 153

5.2.1.2 Reciprocity 154

5.2.1.3 Communication 155

5.2.1.4 Cooperation 157

5.2.2 Human Capital 158

5.2.2.1 Training & Education 159

5.2.2.2 Experience 159

5.2.3 Cognition 161

5.2.3.1 Individual Cognitive Attributes 161

Employees' Cognitive Attributes 162

5.2.3.2 Shared Language and Code 162

5.2.3.3 Shared Narrative 162

5.2.4 Summary of Case A 163

5.3 Within-Case Analysis: Case B **164**

5.3.1 Social Capital 164

5.3.1.1 Trust 166

5.3.1.2 Reciprocity 167

5.3.1.3 Communication 168

5.3.1.4 Cooperation 171

5.3.2 Human Capital 173

5.3.2.1 Training & Education 174

5.3.2.2 Experience 175

5.3.3 Cognition 177

5.3.3.1 Individual Cognitive Attributes 177

Employees' Cognitive Attributes 178

5.3.3.2 Shared Language and Code 178

5.3.3.3 Shared Narrative 178

5.3.4 Summary of Case B 179

5.4 Within-Case Analysis: Case C 179
5.4.1 Social Capital 180
5.4.1.1 Trust 181
5.4.1.2 Reciprocity 182
5.4.1.3 Communication 184
5.4.1.4 Cooperation 186
5.4.2 Human Capital 188
5.4.2.1 Training & Education 188
5.4.2.2 Experience 189
5.4.3 Cognition 190
5.4.3.1 Individual Cognitive Attributes 191
5.4.3.2 Shared Language and Code 192
5.4.3.3 Shared Narrative 192
5.4.4 Summary of Case C 193
5.5 Cross-Case Analysis 194
5.5.1 Cross-Case Analysis: Social Capital 195
5.5.1.1 Trust 196
5.5.1.2 Reciprocity 198
5.5.1.3 Communication 199
5.5.1.4 Cooperation 204
5.5.2 Cross-Case Analysis: Human Capital 207
5.5.2.1 Training &Education 208
5.5.2.2 Experience 210
5.5.3 Cross-Case Analysis: Cognition 212
5.5.3.1 Individual Cognitive Attributes 213
5.5.3.2 Shared Language and Code 214
5.5.3.3 Shared Narrative 215
5.5.4 Explaining Cross-Case Variation in DHRCs' Practices 216
5.5.5 Summary of Cross-Case Analysis 218
5.6 Chapter Summary 220
Chapter 6. Discussion 222
6.1 Chapter Introduction 222

6.2 Social Capital, its Practices, and Supply Chain Resilience 223
6.2.1 Trust 224
6.2.1.1 Internal Trust 225
6.2.1.2 External Trust 226
6.2.2 Reciprocity 228
6.2.2.1 Internal Reciprocity 228
6.2.2.2 External Reciprocity 229
6.2.3 Communication 230
6.2.3.1 Internal Communication 230
6.2.3.2 External Communication 232
6.2.4 Cooperation 237
6.2.4.1 Internal Cooperation 237
6.2.4.2 External Cooperation 239
6.3 Human Capital, its Practices, and Supply Chain Resilience 242
6.3.1 Training & Education 243
6.3.1.1 Internal Training & Education 243
6.3.1.2 External Training & Education 245
6.3.2 Experience 245
6.3.2.1 Internal Experience 246
6.4 Cognition, its Practices, and Supply Chain Resilience 248
6.4.1 Individual Cognitive Attributes 249
6.4.2 Shared Codes and Language 252
6.4.2.1 Internal Shared Codes and Language 253
6.4.3 Shared Narrative 253
6.4.3.1 Internal Shared Narrative 254
6.4.3.2 External Shared Narrative 255
6.5 Synthesising Key Insights and Addressing the Research Questions 256
6.5.1 Dynamic Human-Related Capabilities 256
6.5.2 Dynamic Human-Related Capability Practices 257
6.5.3 Dynamic Human-Related Capability Practices and Supply Chain Resilience 258
6.5.3.1 Dynamic Human-Related Capability Practices across Disruption Stages 258
6.5.3.2 Interactions among Dynamic Human-Related Capabilities and Practices 263

6.6 Chapter Summary 265

Chapter 7. Contributions, Future Research Agenda and Limitations 269

7.1 Chapter Overview 269

7.2 Theoretical and Practical Contributions 269

7.2.1 Overarching Contribution of the Thesis 269

7.2.2 Theoretical Contributions 270

Contribution 1: Development of Dynamic Human-Related Capabilities (DHRCs) Theory for SCRES 270

Contribution 2: Development of a DHRCs Framework and Practice Architecture 272

Contribution 3: A Stage-Based Human-Centred Explanation of SCRES across Disruption Phases 273

Contribution 4: Reconceptualising SCRES as a Dynamic, Human-Centred Multi-Stage Process 275

Contribution 5: Revealing Interaction and Reinforcement Among DHRCs Practices 276

Contribution 6: Identifying Trade-Offs, Boundary Conditions, and Contingent Effects in Human-Related Capability Enactment 277

7.2.3 Practical Contributions 278

1) Practical Implications of Social Capital 278

2) Practical Implications of Human Capital 279

3) Practical Implications of Cognition 279

4) Organisational Implementation Priorities 279

5)Industry and Policy Implications 280

7.3 Future Research Agenda 280

1) Balancing Social Capital and Governance in Supply Chain Resilience 281

2) Deepening Research on Internal Social Capital and Employee-Level Relationships 281

3) Advancing Understanding of Human Capital Development Across Boundaries 281

4) Broadening and Extending Cognitive Research in Supply Chain Resilience 281

5) Investigating the Interactions Among Social, Human, and Cognition Capabilities 282

6) Examining the Role of Emotion in Human-Related Capability Enactment 282

7) Employing Process-Based Approaches to Examine Capability Evolution 282
8) Developing Quantitative Measures for the Dynamic Human-Related Capabilities Framework 282
9) Extending the Multi-Level Architecture of Human-Related Capabilities 283
7.4 Limitations 283
7.5 Chapter Summary 285
7.6 Closing Remarks 286
References 288
Appendix A. Data Collection Tool: Semi-Structured Interview 312
Appendix B. Interview Data Processing Overview 320
Appendix C. Data Cleaning Protocol 321
Appendix D. Comprehensive Coding Framework (1st–5th Order) with Notes for Use 323
Appendix E. Ethical Approval 325

LIST OF FIGURES

Figure 1.6 Structure of the Thesis 12

Figure 2.2.1 Evolution of Supply Chain Resilience 17

Figure 2.4.1.1-1 Trends in the Number of Publications from 2011 to May 2026 28

Figure 2.4.1.1-2 Trends in the number of publications for each Human-Related Capability from 2011 to May 2026 28

Figure 2.4.1.2-1 Venn Diagram of Articles by Dynamic Human-Related Capabilities 29

Figure 2.4.1.2-2 Distribution of Publications among Actors Involved in Dynamic Human-Related Capabilities 30

Figure 2.4.5 SLR-Derived Conceptual Framework of DHRCs 46

Figure 3.2.1 Research Paradigm (adapted from Saunders et al., 2019) 55

Figure 3.3.2.3 PRISMA Flow Diagram of the Study Selection Process 62

Figure 3.3.3.2 Simplified Supply Chain Structure of Case Firms 67

Figure 3.3.3.4 Framework for Analysing and Presenting Findings 73

Figure 4.2.1 Simplified Supply Chain Structure of Case A 80

Figure 4.3.1 Simplified Supply Chain Structure of Case B 99

Figure 4.4.1 Simplified Supply Chain Structure of Case C 125

Figure 6.2 Social Capital Practices and its Contribution on Supply Chain Resilience 224

Figure 6.3 Human Capital Practices and its Contribution on Supply Chain Resilience 243

Figure 6.4 Cognition Practices and its Contribution on Supply Chain Resilience 249

Figure 6.5.3.1 Integrated Framework Linking DHRCs, Practices and SCRES Outcomes ... 261

Figure 6.5.3.2 Interactions among DHRCs and Associated Practices 265

LIST OF TABLES

Table 2.2.1 Key Definitions of Supply Chain Resilience 16

Table 2.3.1.3 Distribution of Publications Across Journals 32

Table 2.4.1.4 Distribution of Methodological Approach in Journals 32

Table 2.4.2 Overview of Relevant Definitions of Social Capital and Related Practices 33

Table 2.4.3 Overview of Relevant Definitions of Human Capital and Related Practices 37

Table 2.4.4 Overview of Relevant Definitions of Cognition 40

Table 2.5 Mapping Literature Gaps to Research Questions 49

Table 3.3.2.2 Search Terms Used for the SLR 61

Table 3.3.2.3 Inclusion Criteria for this SLR 62

Table 3.3.2.4 Codebook Sample 64

Table 3.3.3.3 Overview of Key Informants and Data Collection 70

Table 5.2.1 Social Capital's Practices and Its Contributions on SCRES: Case A 152

Table 5.2.2 Human Capital's Practices and Its Contributions on SCRES: Case A 158

Table 5.2.3 Cognition’s Practices and Its Contributions on SCRES: Case A 161

Table 5.3.1 Social Capital's Practices and its Contribution on SCRES: Case B 164

Table 5.3.2 Human Capital's Practices and Its Contributions on SCRES: Case B 174

Table 5.3.3 Cognition’s Practices and Its Contributions on SCRES: Case B 177

Table 5.4.1 Social Capital's Practices and Its Contributions On SCRES, Case C 180

Table 5.4.2 Human Capital's Practices and Its Contributions On SCRES, Case C 188

Table 5.4.3 Cognition’s Practices and Its Contributions on SCRES, Case C 190

Table 5.5 Cross-Case Context Overview 194

Table 5.5.1 Social Capital's Practices and Its Contributions on SCRES 195

Table 5.5.2 Human Capital's Practices and Its Contributions on SCRES 208

Table 5.5.3 Cognition's Practices and Its Contributions on SCRES 212

Table 6.4.1 Individual Cognitive Attributes in this Study 250

Table 6.5.2 Dynamic Human-Related Capabilities (Individual and Team Perspective).....257

Table 6.6 Summary of Propositions Linking DHRCs, Practices, and SCRES 267

LIST OF ABBREVIATIONS

Abbreviations	Full words
BCI	Business Continuity Institute
DCT	Dynamic Capability Theory
DMC	Dynamic Managerial Capability
HDRC	Dynamic Human-related Capability
HQ	Headquarters.
fsQCA	Fuzzy-Set Qualitative Comparative Analysis
OB	Organisational behaviour
OSCM	Operations and Supply Chain Management
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RBV	Resource-Based View
RQ	Research Question
SC	Supply Chain
SCM	Supply Chain Management
SCRES	Supply Chain Resilience
SEM	Structural Equation Modelling
SLR	Systematic Literature Review
UET	Upper Echelons Theory
WEF	World Economic Forum
3PL	Third-Party Logistics

Chapter 1. Introduction

This chapter provides an overview of the doctoral study titled "An Investigation into Human Related Factors for Enhanced Supply Chain Resilience." It introduces the research background and outlines the motivations underpinning the study. The chapter also presents the overall research aim and the three guiding research questions, followed by an outline of the thesis structure.

1.1 Research Background

In today's turbulent business environment, supply chains (SCs) are becoming increasingly complex and are exposed to growing threats of disruptive events (Ponomarov and Holcomb, 2009; Hohenstein et al., 2015; Iftikhar et al., 2023). The Business Continuity Institute's (BCI) supply chain resilience (SCRES) Report (2023) indicates that 11.5% of respondents reported at least ten significant disruptions in the past year, which is more than twice as high as pre-pandemic levels (4.8%). This shift underscores the urgent need for contemporary enterprises to rethink how they design and build a resilient SC network to ensure they can cope with disturbances (Pettit et al., 2013; Fiksel et al., 2015; Ali et al., 2017). Furthermore, a survey by the World Economic Forum (WEF, 2021) revealed that 88% of companies felt unprepared to address sources of vulnerability in their SCs and required additional capabilities to build resilience. As such, the concept of SCRES has attracted significant attention from researchers and practitioners in recent years (e.g., Sheffi, 2005; Brandon-Jones et al., 2014; Ambulkar et al., 2016; Kamalahmadi and Parast, 2016; Purvis et al., 2016; Tukamuhabwa et al., 2017; MacDonald et al., 2018; Polyviou et al., 2020; Nikookar and Yanadori, 2022a; Daghar et al., 2023; Yang et al., 2024; Lu et al., 2025).

Resilience, rooted in disciplines such as engineering (Hollnagel et al., 2006), ecology (Holling, 1973), and disaster management (Manyena, 2006), broadly refers to a system's ability to absorb shocks, respond to them, and recover. In supply chain management (SCM), resilience emphasises navigating, adapting to, and learning from disruptions under dynamic and uncertain conditions (Christopher and Peck, 2004; Ali et al., 2017). Recent work further supports a shift from a narrow recovery-oriented understanding of SCRES towards a more dynamic and systemic view. Wieland and Durach (2021) distinguish between engineering and social-

ecological perspectives on resilience, while Wieland (2021) develops a social-ecological systems view of supply chains characterised by interdependence, adaptive cycles, and multi-level dynamics. Wieland et al. (2023) further argue that resilience involves not only bouncing back, but also learning, adaptation, and potential transformation following disruptions. Together, these perspectives support the position adopted in this thesis, which treats SCRES as a dynamic, multi-stage, and collectively enacted process rather than a static focal-firm attribute.

Given the focus of this thesis on how human-related capabilities are enacted across disruption contexts, disruptions are understood broadly as events or conditions that interrupt, destabilise, or threaten normal supply chain operations and require actors to adjust decisions, relationships, or routines to maintain resilience (Christopher and Peck, 2004; Ponomarov and Holcomb, 2009). This includes recurrent operational disruptions, such as delivery delays, supplier unreliability, inventory shortages, demand volatility, and cold-chain failures, as well as less frequent high-impact events, such as pandemics, extreme weather, regulatory shocks, or large-scale logistics breakdowns. This broad scope is consistent with SCRES research that considers both chronic small-scale disruptions and low-probability, high-impact events across interconnected supply chains (Ali et al., 2017; Tukamuhabwa et al., 2017).

In this thesis, disruptions are understood broadly as events or conditions that interrupt, destabilise, or threaten normal SC operations and require actors to adjust decisions, relationships, or routines to maintain resilience (Christopher and Peck, 2004; Ponomarov and Holcomb, 2009). This includes recurrent operational disruptions, such as delivery delays, supplier unreliability, inventory shortages, demand volatility, and cold-chain failures, as well as less frequent high-impact events, such as pandemics, extreme weather, regulatory shocks, or large-scale logistics breakdowns. This broad scope is consistent with SCRES research that views resilience as involving phases, strategies and capabilities for dealing with disruptions (Ali et al., 2017), and with Tukamuhabwa et al.'s (2017) argument that resilience should address both chronic small-scale disruptions and occasional large-scale catastrophic events across interconnected SCs.

As even the best-managed SCs cannot fully avoid disruptions, a more dynamic approach is required, one that emphasises continuous learning, flexibility, and capability development (Ponomarov and Holcomb, 2009; Pettit et al., 2013; Hohenstein et al., 2015; Christopher, 2016).

Recent research encourages deeper exploration of these capabilities within and between organisations, taking an end-to-end SC perspective (Azadegan and Dooley, 2021). In addition, SCM is fundamentally human-centric, in that operational outcomes are shaped not only by processes and technologies, but also by human judgement, interaction, and coordination (Bendoly et al., 2006; Croson et al., 2013). Vanpoucke and Ellis (2020) and Nikookar and Yanadori (2022a) emphasised that behavioural aspects of managerial decision-making have been underscored as central to developing SCRES, while Lengnick-Hall et al. (2011) and Mubarik et al. (2022) highlighted that employees' competencies and training can materially enhance organisational resilience and agility. Consequently, human-related factors are increasingly viewed as fundamental building blocks of resilience (Hoberg et al., 2020; Nikookar and Yanadori, 2022a; Mubarik et al., 2022; Gerschberger et al., 2023). Yet, despite this growing recognition, SCRES research still tends to privilege structural, process, and firm-level explanations, offering only limited insight into how resilience is enacted in practice by different organisational actors. In particular, we still know relatively little about how managers, employees, and teams jointly develop and mobilise human-related capabilities across disruption stages. As a result, existing theory remains better equipped to explain resilience as an organisational outcome than as a multi-actor and multi-level process through which resilience is actually generated, sustained, and renewed in practice.

1.2 Motivations for the Research

Given the increasing turbulence highlighted in the preceding background and the pivotal role of human related factors in shaping organisational responses to disruptions, several key gaps motivate the need for this research.

1.2.1 Empirical, Methodological, and Practical Motivations

This study is methodologically motivated by the absence of an integrated understanding of how human-related factors shape SCRES. Although prior research increasingly recognises the role of human judgement, interaction, and coordination in resilience development (e.g., Bendoly et al., 2006; Croson et al., 2013; Vanpoucke and Ellis, 2020; Mubarik et al., 2022), the evidence remains fragmented across studies, constructs, and levels of analysis. Reflecting this shift, a growing body of work has begun to examine the role of human factors in building resilience (e.g., Vanpoucke and Ellis, 2020; Mubarik et al., 2022; Nikookar and Yanadori, 2022a; Gerschberger et al., 2023). However, these valuable contributions have not yet produced a

coherent understanding of how different forms of human involvement combine to support SCRES across organisational roles and levels. This fragmentation creates a clear methodological need for a systematic literature review (SLR) to consolidate and synthesise dispersed findings, clarify which aspects of human involvement have been examined, and identify where important knowledge gaps remain.

While the SLR provides a structured synthesis of existing knowledge and helps identify important gaps (Tranfield et al., 2003; Denyer and Tranfield, 2009), it cannot on its own show how human-related factors operate in real disruption contexts. Most existing evidence on human-related factors in SCRES is based on quantitative survey research, which is useful for identifying broad patterns but offers limited insight into how resilience is enacted through sensemaking, coordination, and behavioural adjustment during disruptions. To address this limitation, this study adopts an in-depth multiple case study design, as such an approach is well suited to examining complex organisational processes in context and to developing contextually grounded theoretical explanations (Eisenhardt, 1989; Stake, 1995; Eisenhardt and Graebner, 2007; Yin, 2018).

Additionally, a critical practical puzzle remains. Although SCRES is increasingly recognised as strategically important, the literature is still inconclusive about how human-related capabilities are translated into consistent practices. As a result, many organisations lack clarity on how such capabilities should be developed and mobilised in day-to-day operations. Recent survey evidence on resilience practices shows that over 40 percent of organisations lack clear ownership or accountability, nearly 40 percent have no formal integration strategy or roadmap, and more than one third report limited executive sponsorship, alongside insufficient understanding of resilience across functions (BCI, 2025). This pattern suggests that the key bottleneck lies not only in technical systems or formal processes, but also in how organisational actors interpret disruption cues, allocate responsibilities, and coordinate across functions to enact resilience in practice. In response, this multiple case study examines how human related factors are operationalised within firms, identifying the practices through which they become embedded in everyday routines and cross-functional patterns of action or, alternatively, remain fragmented and episodic initiatives that fail to sustain SCRES.

1.2.2 Theoretical Motivation and Positioning

Beyond these empirical and practical motivations, this research is also theoretically motivated by the need to advance understanding of the human foundations of SCRES. Although resilience research increasingly recognises the importance of human-related factors, existing theoretical perspectives remain fragmented in explaining how these human elements collectively contribute to resilience development. In particular, current theory does not yet adequately explain how resilience is jointly enacted by multiple organisational actors across different levels of analysis, nor how human-related capabilities are mobilised across disruption stages to generate resilience outcomes. Most existing perspectives focus on specific actors or isolated aspects of human influence, resulting in only a partial understanding of how resilience capabilities emerge, are mobilised, and are renewed within SCs.

A predominant stream of research has centred on managerial roles, such as through the lens of Dynamic Managerial Capability (DMC) theory. Building on the dynamic capability theory (DCT), DMC emphasises that organisational performance is partly shaped by managers' ability to build, integrate, and reconfigure resources under changing conditions (Adner and Helfat, 2003; Teece, 2012). From this perspective, managers' social capital, human capital, and cognition influence the development of strategic capabilities such as resilience, highlighting the importance of managerial decision-making in dynamic environments.

Existing perspectives such as leadership theory (Horner, 1997), strategic decision-making theory (Eisenhardt and Zbaracki, 1992), and upper echelons theory (UET) offer valuable insights into the human side of organisational outcomes. However, they tend to privilege leader characteristics, top management choices, or executive cognitive frames (Hambrick and Mason, 1984; Hambrick, 2007), and therefore provide only a partial explanation of how resilience is developed and enacted across multiple organisational actors and levels under changing SC conditions.

Compared with these perspectives, DMC offers a more process-oriented lens by linking social capital, human capital, and cognition to capability development under environmental change (Adner and Helfat, 2003). This makes it particularly relevant for understanding resilience in turbulent SC contexts. However, despite this advantage, DMC remains predominantly manager-centric. Its original focus on managerial actors leaves insufficient theoretical space to explain how the broader range of organisational members who contribute to resilience in

practice, including employees and collaborative teams, collectively shape SCRES. In other words, DMC provides an important starting point for understanding the human side of dynamic capability development, but it does not yet offer a sufficiently multi-actor and multi-level explanation of how resilience is enacted in practice. Emerging studies in SCM increasingly suggest that resilience is enacted not solely through managerial decisions but through collective human efforts involving knowledge sharing, collaboration, and experiential learning across organisational boundaries (Koronis and Ponis, 2018; Mzid et al., 2019; Huang and Farboudi Jahromi, 2021; Mubarik et al., 2022; Gerschberger et al., 2023; Lu et al., 2025).

To address this limitation, this thesis extends DMC into a broader human-centred framework and introduces the construct of Dynamic Human-related Capabilities (DHRCs). DHRCs integrates social capital, human capital, and cognition as interconnected capabilities that enable organisations to sense, interpret, respond to, and learn from disruptions. This conceptual extension is necessary because resilience in SCs is not produced by managerial action alone, but through the combined and often interdependent contributions of managers, employees, and teams across internal and external interfaces. Accordingly, the thesis moves beyond traditional manager-centric views of SCRES by examining human-related factors across both individual and team levels. Within this framing, managers play a key role in decision-making and strategic guidance (Teece, 2007), while employees contribute to organisational adaptability through knowledge accumulation and execution capabilities (Grant, 1996). Teams encompass both internal and external collaborative groups (Lambert and Enz, 2017). Internally, cross-functional teams facilitate coordination among functions such as SCM, procurement, logistics, production, and sales (Kogut and Zander, 1992; Lambert and Enz, 2017). Externally, inter-organisational teams involve collaboration with SC partners, including suppliers, logistics service providers, and distributors (Cao and Zhang, 2011). By employing this classification, the study systematically examines how DHRCs contribute to the enactment and strengthening of SCRES.

This study delimits DMC by anchoring the analysis in Adner and Helfat's (2003) conceptualisation and focusing on social capital, human capital, and cognition as the human-related capabilities that support SCRES in dynamic environments. Specifically, social capital refers to resources derived from personal networks (Uzzi, 1996), human capital concerns individual knowledge and skills (Becker, 1962), and cognition relates to the mental activities involved in decision-making (Helfat and Peteraf, 2015). These three dimensions are adopted

as analytical lenses to distinguish DHRCs from broader behavioural or institutional constructs. Where overlaps arise, they are explicitly acknowledged, but the findings are interpreted through the lens of dynamic capability development rather than organisational hierarchy or leadership traits. Importantly, these capabilities are not confined to managers, but are distributed more broadly across employees and teams, who collectively contribute to the development of resilience. In this way, the study explains resilience as a process enacted through distributed human contributions rather than one attributable solely to managerial decision-making or firm-level structures. In this thesis, the term "dynamic" refers to the way human-related capabilities are activated, adjusted, and renewed across the pre-disruption, during-disruption, and post-disruption stages of resilience.

Overall, this thesis is theoretically motivated by the absence of an integrated explanation of how human-related capabilities underpin SCRES across different organisational actors and levels. By extending DMC into a broader human-centred framework, it advances existing theory in two related ways. First, it moves beyond fragmented and manager-focused perspectives by conceptualising resilience as a multi-actor and multi-level phenomenon enacted through the interactions of managers, employees, and teams. Second, it explains how social capital, human capital, and cognition are mobilised and combined across disruption stages to support preparedness, response, and post-disruption learning. The concept of DHRCs therefore offers a theoretically grounded yet empirically applicable framework for understanding how human actors collectively sense, interpret, respond to, and learn from disruptions within complex SC environments.

1.3 Research Aim and Research Questions

Building on the above considerations, this study first identifies the specific DHRCs, from both individual and team perspectives, that underpin enhanced SCRES (Research Question, hereafter RQ1). By focusing on these two levels, RQ1 complements prior work that has primarily emphasised firm-level or network-level attributes of resilience. However, identifying capabilities alone is insufficient unless the analysis also clarifies the concrete practices through which these capabilities are developed and enacted in organisations (RQ2). RQ2 therefore connects capability concepts with implementation by examining the routines and behaviours through which different organisational actors build resilience in practice. Finally, RQ3 examines how the identified capabilities and practices contribute to resilience outcomes,

thereby linking human-related capability foundations and enacted practices to SCRES. Taken together, RQ1, RQ2, and RQ3 provide an integrated account of the capabilities, practices, and contributions through which resilience is built and sustained. Accordingly, the research questions for this study are as follows:

> *RQ1: What dynamic human-related capabilities are relevant to supply chain resilience from an individual and team perspective?*
>
> *RQ2: What are the practices needed to support these dynamic human-related capabilities from an individual and team perspective?*
>
> *RQ3: How do dynamic human-related capabilities and relevant practices contribute to supply chain resilience?*

These research questions are addressed across the thesis as follows. RQ1 is primarily addressed through the SLR presented in Chapter 2, which identifies and synthesises the DHRCs relevant to SCRES from individual and team perspectives. RQ2 and RQ3 are explored through the empirical multiple case study presented in Chapters 4 and 5, with the findings further synthesised in Chapter 6 to explain the practices through which these capabilities are enacted and how they contribute to SCRES.

1.4 Overview of Methodology Adopted and Key Findings

This section briefly outlines the research design and key findings of the thesis. It first summarises how the study combines a SLR with a multiple case study approach, and then highlights how the empirical phase develops, refines, and extends the insights generated from the review.

1.4.1 Overview of Methodology Adopted

This thesis adopts a sequential qualitative research design that combines a SLR with a multiple case study approach. The SLR was used to identify, synthesise, and structure existing knowledge on human-related factors relevant to SCRES, thereby establishing the conceptual foundation for the empirical phase. Building on this foundation, the multiple case study was

designed to examine how these human-related factors are enacted in practice across different organisational roles, relationships, and disruption situations.

The empirical phase draws on case evidence from Chinese firms in beverage and alcoholic beverage SCs and uses semi-structured interviews as the primary data source, supported by iterative within-case and cross-case analysis. This design enables the thesis to move from literature-based conceptual identification to empirically grounded refinement and extension of a human-related capability perspective on SCRES.

1.4.2 Overview of Key Findings

The SLR identified three core human-related capability domains relevant to SCRES, namely social capital, human capital, and cognition, and showed that prior research had recognised their importance but had often treated them in fragmented ways. In particular, the review indicated that these factors were rarely integrated into a coherent human-centred explanation of SCRES and were insufficiently linked to the concrete practices through which resilience is enacted across disruption stages.

Building on these insights, the empirical findings developed and refined this understanding in three main ways. First, the case evidence confirmed the importance of social capital, human capital, and cognition, and showed how they are enacted through nine practices across internal and external relationships. Second, the analysis demonstrated that the contributions of these practices are stage-specific, varying across the pre-disruption, during-disruption, and post-disruption phases. Third, the findings showed that these capabilities do not operate independently, but interact as an integrated and reinforcing system in which relational practices, learning, and cognitive alignment shape one another across disruption stages and repeated disruption episodes.

The empirical phase also generated findings that extend the literature beyond the SLR-based synthesis. These include the identification of interaction and reinforcement among practices across capability domains, the role of emotional conditions in shaping communication, cooperation, and situational assessment during disruptions, and several trade-offs and boundary conditions, such as the risks associated with overembedded relationships and the importance

of role-task fit in training and experience. Taken together, the SLR and case findings support a more dynamic, human-centred, and multi-stage understanding of SCRES.

Collectively, these findings show that SCRES is not supported by isolated human attributes, but by an interconnected system of relational, knowledge-based, and cognitive capabilities enacted by multiple actors across disruption stages.

1.5 Overview of Thesis Contributions

At an overarching level, this thesis contributes to SCRES research by showing that SCRES is not merely a structural or organisational condition, but a human-centred and dynamically enacted process. More specifically, drawing on the integration of a SLR and multiple case study evidence, it explains how managers, employees, teams, and SC partners collectively build, mobilise, and renew resilience through interconnected forms of social capital, human capital, and cognition across disruption stages. Building on this overarching contribution, the thesis makes several more specific theoretical and practical contributions.

1.5.1 Overview of Theoretical Contributions

The thesis makes several theoretical contributions. First, it develops DHRCs theory as a human-centred, multi-actor, multi-level, and practice-oriented explanation of SCRES. Building on, but moving beyond, the DMC perspective, the thesis re-specifies social capital, human capital, and cognition for SC disruption contexts and explains how these capabilities are enacted across organisational boundaries and disruption phases.

Second, the thesis develops a DHRCs framework and practice architecture that organises the three capability domains into nine associated practices: trust, reciprocity, communication, and cooperation; training and education, and experience; and individual cognitive attributes, shared codes and language, and shared narratives. This framework provides a structured basis for analysing how human-related capabilities are enacted across actors, relationships, and contexts.

Third, the thesis provides a stage-based human-centred explanation of SCRES by showing how the roles of human-related capabilities and practices vary across the pre-disruption, during-disruption, and post-disruption phases. In doing so, it clarifies not only that these capabilities

matter, but also when and in what ways they matter for preparedness, response, and learning-based renewal.

Fourth, the thesis reconceptualises SCRES as a dynamic, human-centred, and multi-stage process. Rather than treating resilience as a static organisational attribute, the thesis conceptualises it as an outcome that is continuously built, enacted, and renewed through human-related capabilities and practices within and across organisational boundaries.

Fifth, the thesis identifies interaction and reinforcement among DHRCs practices, showing that the nine practices function as an integrated configuration rather than as isolated factors. In particular, it shows how practices within social capital reinforce one another, how human capital strengthens social capital practices through cognition, and how shared cognition supports the retention and renewal of resilience-relevant practices across disruption stages and repeated disruption episodes.

Sixth, the thesis identifies trade-offs, boundary conditions, and contingent effects in the enactment of human-related capabilities for SCRES. The findings show that the effects of social capital, human capital, and cognition are not uniformly positive, but depend on relational governance, role-task fit, emotional conditions, and contextual alignment.

1.5.2 Overview of Practical Contributions

The thesis also offers practical contributions for managers, organisations, and industry stakeholders seeking to strengthen SCRES in dynamic and uncertain environments. In particular, it provides a practice-based roadmap for resilience building through the deliberate development and alignment of social capital, human capital, and cognition.

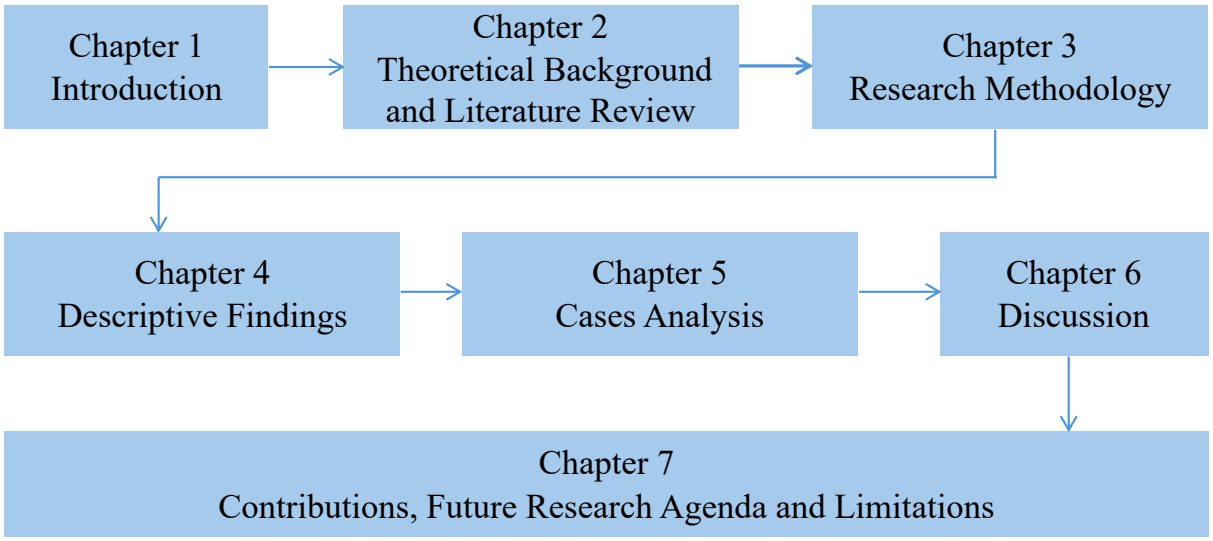
Practically, the findings highlight how organisations can strengthen social capital through trust-building, reciprocity, communication, and cooperation across internal and external relationships; strengthen human capital through role-relevant training, experience-sharing, and cross-organisational learning; and strengthen cognition through risk awareness, situational assessment, shared language, and shared narratives that support faster interpretation and more coordinated response. The thesis also identifies important implementation priorities, including communication routines, escalation pathways, post-disruption review practices, and resilience-

oriented training design. In addition, it offers guidance for industry and policy actors, such as industry associations and training providers, on how to support cross-organisational learning, shared understanding, and information transparency across SC tiers.

1.6 Structure of the Thesis

This thesis is structured into seven chapters, as illustrated in Figure 1.6.

Figure 1.6 Structure of the Thesis



Chapter 1, Introduction, presents the research background, motivations, theoretical positioning, research aims and questions, an overview of the methodology and key findings, and the overall thesis structure.

Chapter 2, Theoretical Background and Literature Review, develops the theoretical and conceptual foundations of the study. It reviews the SCRES literature, introduces the relevant theoretical lenses, and presents the SLR, which identifies, synthesises, and structures existing knowledge on human-related factors relevant to SCRES, thereby establishing the conceptual foundation for the empirical phase and identifying key research gaps.

Chapter 3, Research Methodology, explains the philosophical positioning, research design, and methodological choices adopted in this study. It outlines the sequential qualitative design, including the SLR and the multiple case study approach, and describes the data collection and analysis procedures.

Chapter 4, Descriptive Findings, presents the empirical findings from the three case companies. It provides a detailed descriptive account of the observed practices and contextual characteristics related to social capital, human capital, and cognition within each case.

Chapter 5, Case Analysis, moves beyond description to conduct within-case and cross-case analysis. It identifies patterns, compares similarities and differences across cases, and analyses how dynamic human-related capabilities are enacted across different organisational contexts.

Chapter 6, Discussion, synthesises the empirical findings with existing theory and develops the thesis's integrated theoretical explanation. Sections 6.2 to 6.4 interpret how social capital, human capital, and cognition, together with their associated practices, contribute to SCRES across the pre-disruption, during-disruption, and post-disruption stages, while identifying convergence, divergence, and theoretical extension in relation to prior literature. Section 6.5 then synthesises the key insights to address the three research questions, examines the interaction and reinforcement among DHRCs and their practices, and develops an integrated conceptual understanding of how these capabilities jointly support SCRES over time, supported by a set of propositions.

Chapter 7, Contributions, Future Research Agenda and Limitations, outlines the theoretical and practical contributions of the study, presents directions for future research, acknowledges the limitations of the thesis, and offers brief concluding reflections that reiterate its overall contribution and central insight.

Chapter 2. Theoretical Background and Literature Review

2.1 Chapter Introduction

The purpose of this chapter is to develop the theoretical and conceptual foundations for understanding how DHRCs enable SCRES. Building on the OSCM literature, the chapter positions SCRES not simply as an outcome of structural design or technological investment, but as an emergent property of how organisations and their SC partners sense, interpret, and respond to disruptions across disruption phases. In doing so, it highlights the roles of people, their relationships, and their cognitive processes as central to the development and enactment of adaptive capability in SC contexts. More specifically, the chapter argues that a multi-actor and multi-level perspective is theoretically important because it helps explain how resilience is operationalised in practice, rather than being treated merely as an abstract firm- or SC-level property. By bringing managers, employees, and teams into the analysis, the chapter clarifies how human-related capabilities underpin the enactment of sensing, response, and adaptation across disruption phases.

The chapter begins by reviewing the concept of SCRES (Section 2.2). It traces the evolution of resilience from its multidisciplinary origins to its contemporary use in SCM, synthesising key definitions and clarifying how SCRES has been conceptualised in terms of readiness, response and recovery. This is followed by a review of the wide range of capabilities that have been proposed as enablers of SCRES, such as flexibility, redundancy, visibility and collaboration, and a discussion of inconsistencies in how these capabilities are labelled, classified and linked to resilience outcomes. This section provides the conceptual basis for viewing SCRES as a multi-dimensional and processual construct that unfolds across disruption phases.

The second part of the chapter (Section 2.3) introduces the theoretical background that underpins this thesis. It first outlines DCT as a firm-level lens for explaining how organisations sustain competitiveness in turbulent environments by sensing, seizing and reconfiguring resources. It then presents DMC as an extension of DCT, emphasising managerial human capital, social capital and cognition as drivers of capability development and change. Finally, the section advances the concept of DHRCs as an extension of DMC tailored to the SCRES context. DHRCs broaden the analytical focus beyond managers to include employees and

cross-functional teams, thereby providing a more distributed and practice-based account of how resilience is developed and enacted within and across SCs.

The third part (Section 2.4) draws on a SLR to examine in depth the human-related capabilities that support SCRES. It provides an overview of publication trends, the distribution of research across social capital, human capital and cognition, and the actor levels and methodological approaches represented in the existing literature. It then synthesises how social capital (trust, reciprocity, communication and cooperation), human capital (training and education, experience) and cognition (individual cognitive attributes, shared codes and language, and shared narratives) contribute to SCRES and operate across disruption phases.

The chapter concludes by integrating these strands to identify key gaps in current knowledge (Section 2.5) and by summarising the main insights and their implications for the empirical investigation (Section 2.6). In doing so, it highlights the lack of an integrated explanation of how human-related capabilities are distributed across actors, enacted through practice, and reconfigured over time to produce resilience. The chapter also develops a conceptual framework that brings together the key human-related capability domains and their associated practices. Together, these gaps and the framework directly motivate the research questions outlined in Chapter 1 and inform the multi-method research design presented in Chapter 3.

2.2 Supply Chain Resilience

2.2.1 Conceptions of Supply Chain Resilience

In today's turbulent business environment, increasing globalisation and outsourcing have made SCs larger, more interconnected and more complex, thereby amplifying their exposure to disruption risks on a global scale (Ponomarov and Holcomb, 2009; Hohenstein et al., 2015). Conventional SC planning and control approaches, often designed for relatively stable conditions, are frequently insufficient to cope with the heightened vulnerabilities and unforeseen disruptions associated with such complex networks (Pettit et al., 2013; Fiksel et al., 2015), prompting firms to rethink how they design, build and manage their SCs (Ali et al., 2017). Building on this background, SCRES can be an important strategic weapon in the current competitive environment and is at the heart of contemporary SCM thinking and research (Melnyk et al., 2014; Pettit et al., 2019; Scholten et al., 2020). The following subsection consolidates the main SCRES definitions proposed in the OSCM literature, with

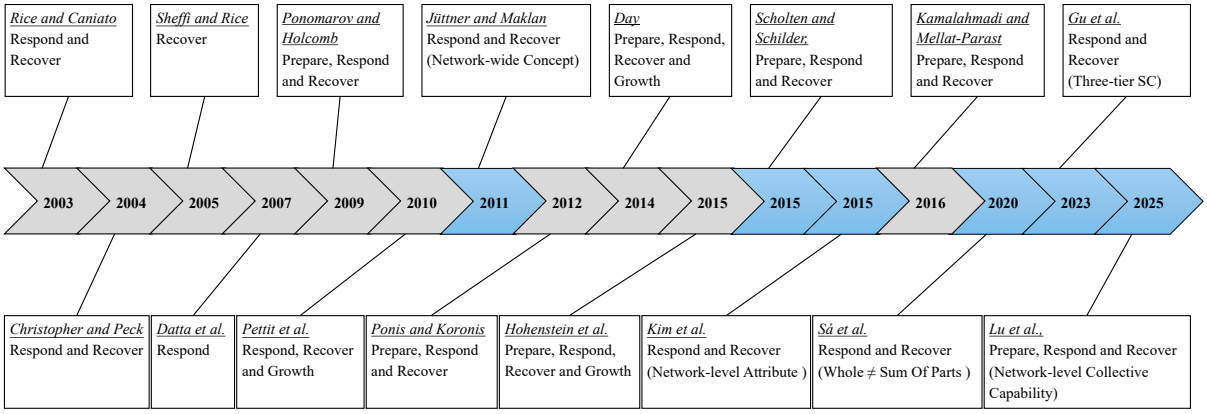
Table 2.2.1 and Figure 2.2.1 presenting a chronological overview of how these definitions have evolved over time.

Table 2.2.1 Key Definitions of Supply Chain Resilience

Authors	Definitions
Rice and Caniato (2003)	Resilience is widely used to characterize an organisation's ability to react to an unexpected disruption, such as one caused by a terrorist attack or a natural disaster, and restore normal operations.
Christopher and Peck (2004)	The ability of a system to return to its original state or move to a new, more desirable state after being disturbed.
Sheffi and Rice (2005)	The ability to bounce back from a disruption.
Datta et al., (2007)	Supply chain resilience is defined as not only the ability to maintain control over performance variability in the face of disturbance but also a property of being adaptive and capable of sustained response to sudden and significant shifts in the environment in the form of uncertain demands.
Ponomarov and Holcomb (2009)	The adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions and recover from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function.
Pettit et al., (2010)	The capacity for an enterprise to survive, adapt and grow in the face of turbulent change.
Jüttner and Maklan (2011)	Supply chain resilience addresses the supply chain's ability to cope with the consequences of unavoidable risk events in order to return to its original operations or move to a new, more desirable state after being disturbed.
Ponis and Koronis (2012)	The ability to proactively plan and design the Supply Chain network for anticipating unexpected disruptive (negative) events, respond adaptively to disruptions while maintaining control over structure and function and transcending to a post-event robust state of operations, if possible, more favourable than the one prior to the event, thus gaining competitive advantage.
Day (2014)	Resilience is "the capability to anticipate risk, limit impact, and bounce back rapidly through survival, adaptability, evolution, and growth in the face of turbulent change".
Hohenstein et al., (2015)	Supply chain's ability to be prepared for unexpected risk events, responding and recovering quickly to potential disruptions to return to its original situation or grow by moving to a new, more desirable state in order to increase customer service, market share and financial performance.
Scholten and Schilder, (2015)	Resilience enables a supply chain to be prepared for events and reduce the impact of a disruption and strengthens the ability to recover quickly from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function.
Kim et al., (2015）	". . . define supply network resilience as a network-level attribute to withstand disruptions that may be triggered at the node or arc level. Consequently, supply network resilience is an emergent structural property of a supply network"
Kamalahmadi and Mellat-Parast (2016)	The adaptive capability of a SC to reduce the probability of facing sudden disturbances, resist the spread of disturbances by maintaining control over structures and functions, and recover and respond by immediate and effective reactive plans to transcend the disturbance and restore the SC toa robust state of operations.
Sá et al., (2020)	SCRES, in turn, refers to how supply chain stakeholders contain and control a disturbance from spreading to other organisations within the system.

Gu et al., (2023)	SC resilience is defined as the capability of the SC to recover from SC disruptions and maintain the continuity of material, information, and cash flow. It requires the focal firm to work together with its suppliers and customers to guarantee the integrity of cooperative structures and processes.
Lu et al., (2025)	"The collective capability of interconnected firms within a supply chain network to prepare for, respond to, and recover from disruptions through mutual effects, where both suppliers (upstream entities) and buyers (downstream entities) contribute to and benefit from shared resilience mechanisms."

Figure 2.2.1 Evolution of Supply Chain Resilience



Note: Blue highlights indicate studies that move beyond a focal-firm view of SCRES towards network- or inter-organisational perspectives.

Resilience, rooted in disciplines such as engineering (Hollnagel et al., 2006), ecology (Holling, 1973), and disaster management (Manyena, 2006), broadly refers to a system's ability to absorb shocks, respond to them, and recover. After entering the SCM field, the definition of SCRES has evolved from static to dynamic. Early definitions grounded in engineering resilience framed SCRES as the ability to react to disruptions and "bounce back" to normal operations (Rice and Caniato, 2003; Christopher and Peck, 2004; Sheffi and Rice, 2005). Subsequent work moved beyond purely reactive recovery and explicitly incorporated pre-disruption preparedness and risk anticipation into the definition of SCRES. Ponomarov and Holcomb (2009) were among the first to explicitly highlight pre-disruption preparation, followed by related notions of anticipation (Ponis and Koronis, 2012; Kamalahmadi and Mellat-Parast, 2016; Chowdhury and Quaddus, 2016). Resilience was increasingly conceptualised as a process spanning pre-, during-, and post-disruption stages, whereby SCs prepare for and anticipate risks, absorb and adapt during disruptions, and recover while maintaining operational continuity afterwards. Later, influenced by ecological resilience, definitions began to incorporate post-disruption growth, reflected in themes such as grow, thrive, or transform

(Pettit et al., 2010; Hohenstein et al., 2015), thereby encompassing a more dynamic and process-oriented understanding of SCRES.

Building on the process-oriented view of SCRES, subsequent research has shifted from a focal-firm view of resilience towards a network- and collective-level conceptualisation. Jüttner and Maklan (2011) highlighted that SCRES is a network-wide concept, arguing that it cannot be achieved by a single organisation alone but requires alignment and coordination among all SC members in the face of risk events. Building on this network-oriented logic, Kim et al., (2015) went a step further by explicitly conceptualising SCRES as a network-level attribute and an emergent structural property of the supply network, emphasising that resilience arises from the configuration and interdependencies of nodes and links rather than from individual firms. In a similar vein, Sá et al., (2020) reinforced a systemic perspective by arguing that "the whole is not equal to the sum of its parts", demonstrating that complex interdependencies among SC actors can amplify or attenuate overall system resilience. More recently, Gu et al., (2023) refined this perspective by unpacking resilience into internal, supplier, and customer dimensions, conceptualising external resilience as an embedded capability between the focal firm and its upstream and downstream partners that sustains material and demand continuity in a three-tier SC. Extending this trajectory, Lu et al., (2025) conceptualise SCRES as "the collective capability of interconnected firms within a SC network to prepare for, respond to, and recover from disruptions through mutual effects, where both suppliers and buyers contribute to and benefit from shared resilience mechanisms."

Building on the process view and the network perspective, this study conceptualises SCRES as a dynamic capability that unfolds across pre-, during-, and post-disruption stages and is jointly enacted by internal organisational members and interconnected SC partners. Accordingly, resilience is treated not as a focal-firm attribute, but as an emergent outcome of collective effort.

2.2.2 Supply Chain Resilience Capabilities

Even well-managed SCs are exposed to turbulence and unpredictable events, which makes the development of SC resilience capabilities critical (Christopher and Peck, 2004; Christopher, 2016). Building on the definitional and phase-based views discussed above, the SCRES literature has increasingly converged on the idea that resilience is enacted through a set of

operational capabilities embedded in SC structures, processes and inter-organisational arrangements. These capabilities have been labelled in various ways, such as “capabilities” (Jüttner and Maklan, 2011; Pettit et al., 2013; Han et al., 2020), “antecedents” (Ponomarov and Holcomb, 2009; Iftikhar et al., 2021), “competencies” (Wieland and Wallenburg, 2013) and “elements” (Christopher and Peck, 2004; Hohenstein et al., 2015; Ali et al., 2017),but they generally refer to recurrent, process-based routines that strengthen the ability of SCs to anticipate, absorb and recover from disruptions.

Building on these contributions, prior studies have converged on a broadly similar set of recurrent SCRES capabilities. Robustness captures the ability of SCs to maintain stable operations in the face of disturbances, for instance through reliable processes and stable network structures (Scholten et al., 2014; Mandal, 2017). Redundancy refers to the deliberate holding of excess capacity, inventory, backup facilities and multiple suppliers to buffer against disruptions (Wieland and Wallenburg, 2013; Chowdhury and Quaddus, 2017; Werner et al., 2021). Flexibility and agility describe the capacity to quickly adapt production, sourcing and logistics decisions to changing conditions, thereby mitigating the impact of shocks and enabling rapid realignment of flows (Mandal, 2017; Chunsheng et al., 2020; Ruel and El Baz 2021; Can Saglam et al., 2021). Visibility concerns timely access to accurate information across the supply network, while security involves protecting physical, informational and cyber assets from disruptive threats (Fiksel et al., 2015; Dabhilkar et al., 2016; Gu et al., 2021). Collaboration and integration emphasise the quality of inter-organisational relationships, including information sharing, joint decision-making and coordinated processes with key partners (Riley et al., 2016; Birkie et al., 2017; Liu et al., 2018; Werner et al., 2021; Gu et al., 2021). Knowledge management and risk management culture highlight the importance of learning from past disruptions, institutionalising lessons, and embedding a proactive attitude towards risk in organisational norms and routines (Abeysekara et al., 2019a, b; Chunsheng et al., 2020; Kumar and Anbanandam, 2020). Taken together, these studies provide a solid empirical basis for understanding the operational capabilities that underpin SCRES.

A number of integrative frameworks have been proposed to organise these operational capabilities. Jüttner and Maklan (2011), for example, identify flexibility, visibility, collaboration and velocity as core resilience-enhancing capabilities, while Pettit et al., (2013) emphasise the role of visibility and other capabilities in offsetting specific sources of

vulnerability. Hohenstein et al., (2015) synthesise prior work and group 36 sub-elements into 11 SCRES capabilities, distinguishing between proactive and reactive strategies and mapping capabilities such as flexibility and redundancy across different disruption phases (readiness, response, recovery and growth). Ali et al., (2017) identify 27 resilience-related elements and consolidate them into 13 essential elements that support five higher-level capabilities, anticipate, adapt, respond, recover and learn, which they further classify as proactive, concurrent and reactive. Han et al., (2020) similarly consider 11 key SCRES capabilities and categorise them into three dimensions: readiness (e.g. situation awareness, visibility, security, redundancy), response (e.g. agility, flexibility, collaboration, leadership) and recovery (e.g. knowledge management, contingency planning, market position). Collectively, this work shows that the operational side of SCRES has been examined in considerable depth, and that these capabilities are increasingly linked to the pre-disruption, during-disruption and post-disruption phases.

Overall, however, prior research has developed a relatively mature and structured understanding of which operational capabilities are associated with higher SCRES. What remains comparatively underexplored are the human-related foundations of these capabilities, namely, how managers' and employees' skills, relationships and cognitive processes enable, shape and sustain resilience-enhancing operational routines over time. To address this gap, this study adopts a human-centred perspective on SCRES and investigates how human related factors, particularly social capital, human capital and cognition, contribute to building resilience across the pre-disruption, during-disruption and post-disruption phases. The next section sets out the theoretical background underpinning this perspective, which then informs the subsequent review of human related factors and their roles in developing SCRES.

2.3 Theoretical Background

2.3.1 Dynamic Capability Theory

DCT has become a dominant lens for explaining how firms sustain competitive advantage in volatile environments by purposefully creating, extending and modifying their resource base (Teece et al., 1997; Teece, 2007). At the core of DCT is a processual view of capability development, commonly articulated through the triad of sensing, seizing, and reconfiguring (Teece, 2007). Sensing refers to a firm's ability to scan, interpret, and make sense of changes in its internal and external environment, including emerging technologies, shifting customer

needs, and evolving competitive or regulatory conditions (Teece, 2007; Christopher and Lee, 2004; Christopher and Peck, 2004). Seizing captures the firm's capacity to mobilise resources and make timely strategic commitments in response to the opportunities and threats that have been sensed, for example, by investing in new technologies, redesigning SC structures, or introducing new products and processes ((Blackhurst et al., 2011; Gligor et al., 2019). Reconfiguring is about continued renewal (Teece, 2012), which enables ongoing changes to products and processes as firms adapt to changing customer expectations (Su and Linderman, 2016) and respond to external threats and shifting business priorities (Mikalef and Pateli, 2017; Ozanne et al., 2022). Together, these three dimensions describe a dynamic, ongoing cycle through which firms adapt, learn, and renew their competitive positions in the face of environmental turbulence (Teece, 2007; Eisenhardt and Martin, 2017).

DCT is closely related to, but distinct from, the resource-based view (RBV) of the firm. The RBV argues that sustained competitive advantage stems from owning resources and capabilities that are valuable, rare, inimitable and non-substitutable (Barney, 1991). However, the RBV has frequently been criticised for its relatively static orientation, as it tends to emphasise resource endowments at a given point in time and offers limited explanatory power for how firms adapt when environments change. Building on this critique, Grant (1991) distinguished between resources and capabilities, arguing that resources underpin the development of capabilities, whereas capabilities are the more direct sources of competitive advantage. This line of thinking has evolved into the notion of dynamic capabilities, defined as the ability of firms to adapt to rapidly changing environments by integrating, building and reconfiguring internal and external competences (Teece et al., 1997). DCT thus extends the RBV by foregrounding the processes through which firms intentionally build, renew and recombine resources under conditions of change. In this sense, dynamic capabilities are conceived as *higher-order* capabilities that govern the modification of ordinary, operational capabilities (Helfat and Peteraf, 2003). They do not guarantee superior performance in and of themselves, but they shape how effectively firms can reconfigure their resource and capability portfolios when confronted with shocks, disruptions or strategic inflection points.

In SCM, this dynamic perspective has been widely adopted to explain how firms create and adapt operational capabilities to respond to market and environmental turbulence. For example, SC collaboration has been conceptualised as a dynamic capability that enhances operational

performance and customer satisfaction by enabling partners to jointly sense and respond to changing conditions (Fawcett et al., 2011). Similarly, SC agility has been framed as a dynamic capability that positively influences operational performance by allowing firms to rapidly reconfigure flows and processes in the face of uncertainty (Blome et al., 2013). More recent studies have extended these insights to disrupted and digitally enabled SCs. Kalubanga and Gudergan (2022), for instance, show that dynamic capabilities in disrupted SCs improve performance, but that their effectiveness is contingent on environmental turbulence and dependence on key partners, highlighting the contextual nature of capability deployment in crisis situations. Dubey et al., (2023) conceptualise dynamic digital capabilities, in terms of digital adaptability and digital agility, as critical enablers of SCRES and demonstrate how these capabilities enhance resilience outcomes under different levels of government effectiveness. Complementing these contributions, Eslami et al., (2024) provide evidence that SC dynamic capabilities strengthen firms' financial performance, and that Industry 4.0 technologies positively moderate this relationship, underscoring the interplay between technological and organisational capability bases. Synthesising this emerging body of work, Stadtfeld and Gruchmann (2024) conclude that dynamic capabilities constitute a central explanatory pathway for how firms build and sustain SCRES over time. Taken together, these applications underscore the value of DCT for understanding not merely what resources firms possess, but how they dynamically orchestrate those resources to sustain competitiveness under disruption, an emphasis that is central to the present study of SCRES.

While this body of work demonstrates the value of DCT for explaining how firms develop and deploy SC capabilities under turbulence, most applications remain focused at the firm or SC level, with limited attention to the human dimensions through which these capabilities are enacted. In many studies, sensing, seizing, and reconfiguring are treated as aggregate organisational properties, rather than processes shaped by the skills, relationships, and cognitive frames of specific actors. In response, recent work in the dynamic capabilities literature has called for greater attention to the managerial and human factors underlying firm-level capabilities (Felin et al., 2012; Teece, 2007). DMC theory directly addresses this concern by foregrounding managers' human capital, social capital, and cognition as central to capability development and change, and this perspective provides the basis for the next section (Adner and Helfat, 2003).

2.3.2 Dynamic Managerial Capability Theory

While DCT offers a firm-level account of how organisations sense, seize, and reconfigure resources in dynamic environments, it says relatively little about who carries out these activities and how individual-level actions and cognitions translate into capability development. This has led scholars to move beyond an abstract organisational view of capabilities towards a more actor-centred perspective. DMC theory addresses this gap by shifting the analytical focus from the organisation as a whole to managers, whose decisions and actions shape how dynamic capabilities are built and deployed (Adner and Helfat, 2003). In this view, managerial agency helps explain why firms differ in their adaptive responses, even when they face similar environmental conditions and resource constraints.

Adner and Helfat (2003) define DMCs as the capabilities of managers to build, integrate, and reconfigure organisational resources and competences, thereby influencing the development and deployment of the firm's dynamic capabilities. Managers with strong DMCs play a critical role in identifying opportunities and threats, committing the firm to particular strategic paths, and enabling resource transformation through sensing, seizing, and reconfiguring activities (Helfat et al., 2009; Helfat and Martin, 2015). Extending this perspective to SC contexts, Nikookar and Yanadori (2022a) argue that firms' SCRES is facilitated through SC managers' DMCs and their contributions to SCRES antecedents.

According to Adner and Helfat (2003), DMCs originate from managerial social capital, human capital, and cognition. Social capital refers to resources embedded in and accessed through an individual's personal relationships (Uzzi, 1996). Human capital consists of the knowledge and skills individuals bring to their work (Becker, 1962). Cognition relates to the mental activities involved in decision-making (Helfat and Peteraf, 2015). Together, these three dimensions underpin managers' ability to sense environmental changes, seize opportunities through timely decisions, and reconfigure resources and organisational arrangements. By foregrounding human capital, social capital, and cognition, DMC theory explains how firm-level adaptation is shaped by individual-level attributes and behaviours (Adner and Helfat, 2003; Helfat and Peteraf, 2015). Rather than treating dynamic capabilities as abstract organisational properties, DMC research emphasises that they are enacted through managers' sensing, seizing, and reconfiguring actions, which are conditioned by their experience, relationships, and mental models. This perspective therefore links firm-level capability development to the

characteristics and actions of individual managers, helping to explain why firms with similar resource endowments may follow different adaptive trajectories.

To situate DMC within the broader theoretical landscape, we contrast it with other widely used approaches. Existing theories address the issue from their specific viewpoints, for instance, leadership theories focus on the traits and behaviours of individual leaders in shaping outcomes (Horner, 1997). Strategic decision-making theories define strategic choices as critical, infrequent decisions made by top executives, emphasizing bounded rationality, political dynamics, and randomness (Eisenhardt and Zbaracki, 1992). UET posits that organisational outcomes are largely determined by executives' experiences, values, and cognitive frames, which shape how they interpret and respond to situations (Hambrick and Mason, 1984; Hambrick, 2007). However, these theoretical perspectives tend to adopt a static and fragmented view, focusing either on individual traits, bounded decision-making, or top executive attributes, while overlooking the dynamic processes through which capabilities are developed across organisational levels, thus falling short of explaining how DHRCs evolve and operate across levels to build resilience in dynamic environments. In contrast, the DMC lens offers a more comprehensive and process-oriented perspective by integrating social capital, human capital, and cognition as key human-related enablers. This enables a richer understanding of how organisations adapt to turbulent environments by dynamically developing and deploying capabilities across individuals and teams.

Taken together, DMC theory offers a distinctly dynamic and process-oriented perspective on how human agency underpins organisational adaptation, setting it apart from more static, trait-based, or role-bounded theories. By explicitly linking managerial social capital, human capital, and cognition to sensing, seizing, and reconfiguring activities, DMC provides one of the most temporally sensitive and micro-founded accounts of capability evolution. However, despite these strengths, DMC remains largely manager centric. Its analytical focus privileges managers as the primary carriers of dynamic capabilities, offering limited insight into how other organisational actors, such as employees, cross-functional teams, and inter-organisational partners, contribute to resilience-building processes over time. Moreover, while DMC identifies key human-related dimensions, it does not fully capture how human-related capabilities are collectively enacted, dynamically reconfigured, and distributed across multiple organisational levels and SC interfaces. Addressing these limitations requires a broader

conceptualisation that retains the dynamic logic of DMC while extending its scope beyond managerial actors. Accordingly, this study builds on DMC theory to develop the concept of DHRCs. In this thesis, DHRCs are used as an analytical framework to explain how social capital, human capital, and cognition are developed and enacted across managers, employees, and teams to support SCRES before, during, and after disruptions. This provides a more comprehensive and multi-actor account of how human-related factors jointly enable SCRES in dynamic environments. A more detailed explanation of DHRCs is provided in the next subsection.

2.3.3 Dynamic Human-related Capabilities

Although DMC theory provides an important extension of DCT by emphasising managers' human capital, social capital, and cognition, its conceptualisation remains predominantly manager-centric (Adner and Helfat, 2003; Teece, 2012). This emphasis is particularly limiting in SC contexts, since, in the broader context of SCM, resilience emerges not only from managers' actions but also from the collective efforts, skills, and experiences of employees and teams (Koronis and Ponis, 2018; Mzid et al., 2019; Huang and Farboudi Jahromi, 2021; Mubarik et al., 2022; Gerschberger et al., 2023). As a result, current DMC-based explanations do not fully capture the broader human-related capabilities through which resilience is developed and enacted within and across SCs.

To address these limitations, and building on DMC theory, this study advances the concept of DHRCs. By extending the actor scope and analytical level of DMC beyond a manager-centric focus, DHRCs provide a more inclusive framework for explaining how human related factors contribute to SCRES across organisational and inter-organisational contexts. This conceptual extension is theoretically important because it shifts the explanation of resilience away from a narrow focus on managerial agency towards a broader account of how resilience is enacted through the coordinated actions, relationships, and cognitive processes of multiple actors. Building on the foregoing theoretical discussion, this study defines DHRCs as follows:

> *DHRCs refer to the capabilities through which human actors within and beyond organisational boundaries dynamically build, integrate, and reconfigure resources and competences in order to sense, respond to, and adapt to SC disruptions. Specifically, DHRCs comprise three interrelated human-related dimensions, social capital, human*

capital, and cognition, which jointly shape how disruption cues are interpreted, how responses are coordinated, and how adaptive reconfiguration is enacted across organisational levels and internal and external SC interfaces.

By retaining the dynamic logic of DMC while broadening its scope to include employees, teams, and inter-organisational actors, DHRCs provide a more comprehensive understanding of how human-related capabilities are distributed, coordinated, and reconfigured over time to shape adaptive capacity and resilience in dynamic environments. In this sense, DHRCs help explain not only who contributes to resilience, but also how resilience is operationalised in practice through actor-level and collective processes that unfold across disruption phases.

Importantly, DHRCs are conceptualised as dynamic rather than static human-related attributes. Unlike traditional human factor or behavioural perspectives that tend to treat social capital, human capital, or cognition as relatively stable resources, DHRCs emphasise the evolving, reconfigurable, and context-dependent nature of human-related capabilities as they are enacted over time in response to disruptions. This dynamic perspective is particularly critical in SC contexts, where resilience depends not only on the presence of human resources, but on how such resources are mobilised, recombined, and adapted across disruption phases. This conceptual move is therefore significant because it shifts the explanation of SCRES from static organisational attributes to the practice-based and actor-centred processes through which adaptive capability is enacted and renewed over time.

To the authors' knowledge, this study represents the first attempt to develop a dynamic and integrative conceptualisation of human-related capabilities that comprehensively captures social capital, human capital, and cognition as jointly evolving foundations of SCRES across organisational and inter-organisational contexts. In filling this gap, we conducted a SLR to inform this integrative conceptualisation, which is detailed in the following section.

2.4 Dynamic Human-Related Capabilities and Supply Chain Resilience: A Systematic Literature Review

This section presents the findings of the SLR conducted to address RQ1: "What dynamic human-related capabilities are relevant to supply chain resilience from an individual and team perspective?" The SLR was used to probe and synthesise prior research on human-related

factors relevant to SCRES and to identify the capability domains and associated practices that informed the initial conceptual framework. A version of this review has been published as Zhang et al. (2026). While the detailed review procedure is reported in Section 3.3.2 to maintain methodological transparency, a brief summary is provided here to improve readability, transparency and replicability.

The review followed established systematic review principles in management research and PRISMA 2020 guidance. Relevant studies were identified through searches in Scopus, Web of Science and EBSCOhost, covering publications available up to May 2026. The search combined terms related to SCRES, SC risk and SC disruption with human-related keywords associated with social capital, human capital, cognition, employees, managers and teams. Following the screening and selection process, 77 articles were included in the final review sample. The selected studies were coded iteratively in NVivo 12, using social capital, human capital and cognition as sensitising categories while allowing associated practices to be refined through full-text analysis. Further details on the search strategy, inclusion criteria, PRISMA screening process, coding procedure and synthesis approach are provided in Section 3.3.2.

Section 2.4.1 provides a descriptive analysis of the 77 articles reviewed in this study, outlining the distribution of publications by year, journal, research theme and methodological approach. Building on this foundation, Sections 2.4.2–2.4.4 then present an in-depth synthesis of the literature on social capital, human capital and cognition respectively, as the three core dimensions of DHRCs in the context of SCRES. In doing so, this section moves beyond a purely descriptive review by showing how these three capability domains have been conceptualised, operationalised and connected to resilience across actors and disruption phases.

2.4.1 Overview of the Systematic Literature Review

This section provides an overview of the 77 reviewed articles, covering their distribution by year, journal, research theme and methodology. It aims to offer a concise picture of the research landscape on human-related factors contributing to SCRES and to identify patterns that inform the subsequent thematic synthesis.

2.4.1.1 Publication Trends Over Time

Figure 2.4.1.1-1 shows the distribution of the 77 studies included in the final review sample by publication year. The results indicate fluctuating but generally increasing academic attention to dynamic human-related capabilities in building SCRES up to 2022. Publications rose notably in 2018 (10) and 2020 (8), reaching a peak in 2022 (16), suggesting strong scholarly interest in this topic. This peak may partly reflect the increased attention to SCRES during the COVID-19 period, when many studies examined operational and strategic aspects of SCM. Although the number of included studies declined after 2022, research continued in 2025 (4), and five included publications were identified in the first five months of 2026. This suggests that dynamic human-related capabilities remain an active and relevant area of SCRES research.

Figure 2.4.1.1-1 Trends in the Number of Publications from 2011 to May 2026

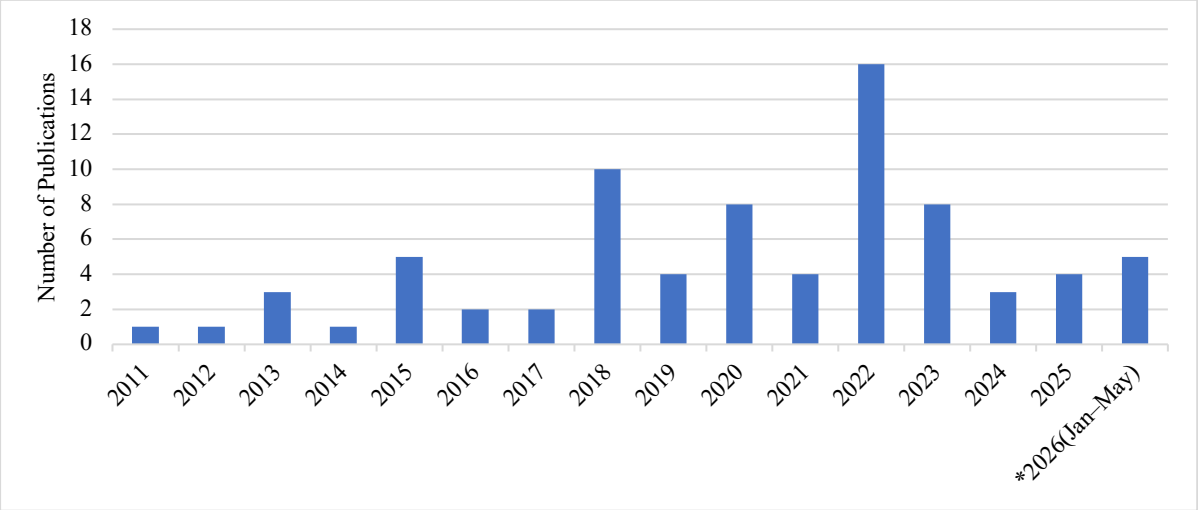
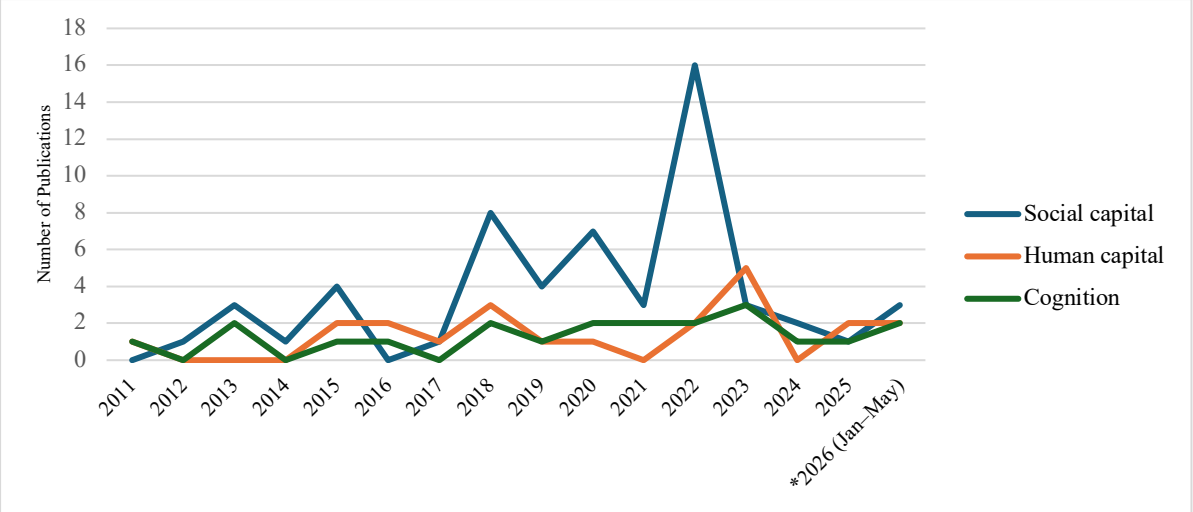


Figure 2.4.1.1-2 presents the publication trends for social capital, human capital and cognition within the final review sample from 2011 to May 2026. Social capital received the greatest research attention across most years, with a sharp peak in 2022 (16). In comparison, human capital and cognition were examined less frequently. Human capital reached its highest point in 2023 (5), while cognition also peaked in 2023 (3). In the first five months of 2026, social capital recorded three publications, while human capital and cognition each recorded two. These trends highlight a strong emphasis on social capital in SCRES research, while suggesting that human capital and cognition warrant further investigation to fully understand their role in enhancing SCRES.

Figure 2.4.1.1-2 Trends in the number of publications for each Human-Related Capability from 2011 to May 2026



2.4.1.2 Distribution of Dynamic Human-Related Capabilities

Figure 2.4.1.2-1's Venn diagram illustrates the distribution and overlap of articles focusing on social capital, human capital, and cognition, showing how dynamic human-related capabilities have been examined individually and jointly in SCRES research. The majority of studies (54 out of 77) focus on a single capability, while 21 examine two capabilities, and only two integrate all three dimensions. Notably, among studies analysing social capital, some also incorporate cognition as a related dimension (e.g., Daghar et al., 2023; Ozanne et al., 2022). DMC theory was explicitly applied to the SCRES context by Nikookar and Yanadori (2022a), who identified managerial antecedents of SCRES through social capital (managers' personal relationships), human capital (managers' knowledge and skills), and cognition (mental activities for decision-making). However, their empirical analysis focuses primarily on individual managers, with limited attention to the contributions of employees and teams as key human-related enablers of SCRES. This highlights a crucial research gap, emphasizing the need for future studies to explore broader human-related factors in strengthening SCRES. While social capital appears more prominent in the current findings in terms of publication volume, this reflects an empirical imbalance in the existing literature rather than the inherent importance of social capital, as fewer studies have explored human capital and cognition in the SCRES context. Nevertheless, this study conceptualizes all three themes, social capital, human capital, and cognition, as fundamental and interrelated components of dynamic human-related capabilities. We therefore call for future research to address these underexplored domains and to examine their interactions in shaping SCRES.

Figure 2.4.1.2-1 Venn Diagram of Articles by Dynamic Human-Related Capabilities

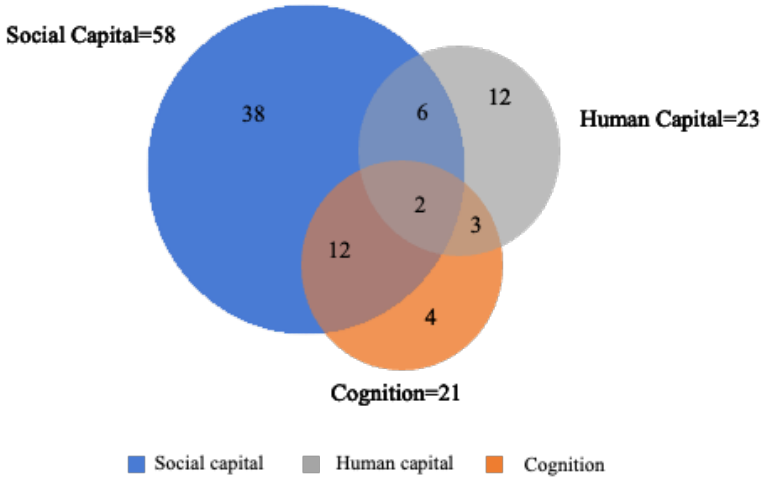
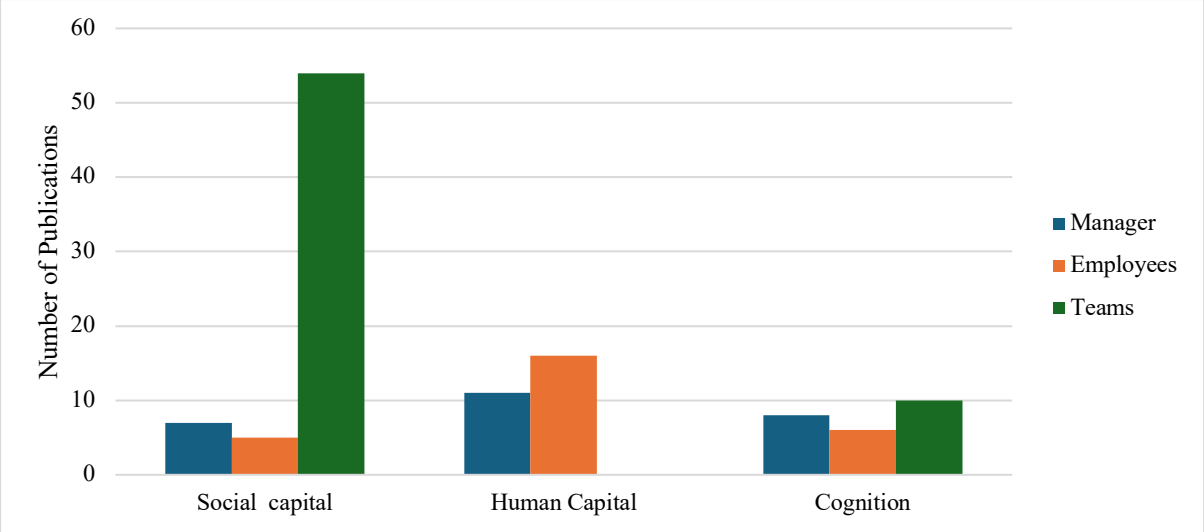


Figure 2.4.1.2-2 categorises publications according to the actors involved in dynamic human-related capabilities for resilience, namely managers, employees, and teams. The updated data show that social capital is predominantly studied at the team level (54), while managers (7) and employees (5) receive limited attention. Human capital research focuses primarily on employees (16), followed by managers (11), indicating greater emphasis on individual knowledge, skills, and experience. Cognition is examined across multiple actor levels, with teams (10), managers (8), and employees (6) represented respectively. These findings suggest that existing SCRES research tends to associate social capital with teams, human capital with individual actors, and cognition with multiple actor levels. To advance SCRES research, future studies should integrate individual and team perspectives to provide a more comprehensive understanding of dynamic human-related capabilities in SCRES.

Figure 2.4.1.2-2 Distribution of Publications among Actors Involved in Dynamic Human-Related Capabilities



Notes: Categories are not mutually exclusive, as articles may address more than one actor group.

2.4.1.3 Distribution of Publications Among Journals

The distribution of the 77 review articles across 41 interdisciplinary academic journals is summarised in Table 2.3.1.3. Notably, the *International Journal of Production Research* (IJPR) stands out as the journal with the highest number of published papers on SCRES dynamic human-related capabilities, accounting for seven articles. It is followed by the *International Journal of Operations & Production Management* and the *International Journal of Physical Distribution & Logistics Management*, with six articles each. The diversity of journals reflects the multidisciplinary nature of the topic and its broad relevance across different research communities.

To further examine the contribution of the most represented journal, we reviewed IJPR articles closely related to human-related SCRES. These studies show that IJPR has contributed to the three themes examined in this review through different but related lenses. For social capital, relevant studies examine trust, network structures and resilience (Day 2014; Giannoccaro and Iftikhar, 2022). For human capital and capability development, IJPR contributions are reflected in studies of SC managers' risk mitigation orientation, absorptive capacity and crisis response (Ambulkar et al., 2016; Münch and Hartmann, 2023). For cognition, relevant studies examine proactive risk management, risk perception, managerial interpretation of warning signals and responses to grey swan events (Grötsch et al., 2013; Akkermans and Van Wassenhove, 2018; Ambulkar et al., 2016). Together, these studies demonstrate IJPR's contribution to understanding social, human and cognitive foundations of SCRES within the production research domain.

Table 2.3.1.3 Distribution of Publications Across Journals

Journal Title	N	F (%)
International Journal of Production Research	7	9.09%
International Journal of Operations & Production Management	6	7.79%
International Journal of Physical Distribution & Logistics Management	6	7.79%
Supply Chain Management: An International Journal	5	6.49%
Industrial Marketing Management	4	5.19%
IEEE Transactions on Engineering Management	4	5.19%
Journal Of Intellectual Capital	3	3.90%
Benchmarking: An International Journal	2	2.60%
Industrial Management and Data Systems	2	2.60%
Other Journals	38	49.35%
Total	*77*	*100.00%*

Notes: N=Number of publications; F= Frequency of publications.

2.4.1.4 Methodological Approaches

Our analysis identified four primary research methodologies employed in the selected studies: empirical quantitative research, empirical qualitative research, conceptual papers, and empirical mixed-methods research (see Table 2.4.1.4). Empirical quantitative research dominates the sample, accounting for 61% of the reviewed articles. Within this category, survey-based studies alone account for 53%, indicating a strong emphasis on theory testing rather than theory building. Empirical qualitative research accounts for 19%, primarily through case studies (17%), highlighting its role in exploring complex managerial and organisational issues. Empirical mixed-methods research is the least common approach (4%), suggesting limited integration of qualitative and quantitative methods. Conceptual papers make up 16%, including theoretical papers (6%), systematic literature reviews (5%), and theory development and literature review studies (4%), showing continued attention to theoretical advancement. Overall, the dominance of survey-based studies and case studies suggests a strong reliance on structured empirical testing and qualitative inquiry, while simulation-based studies, modelling and optimisation, behavioural experiments, secondary data analysis, and mixed-methods approaches remain underutilised. Future research should encourage greater methodological diversity by integrating advanced modelling, behavioural experiments, and mixed-methods designs to enhance both theoretical and practical contributions.

Table 2.4.1.4 Distribution of Methodological Approach in Journals

Methodologies	Subcategories	N	F (%)
Empirical Quantitative Research	Survey-Based Studies	*41*	*53%*
	Simulation-Based Studies	*2*	*3%*
	Quantitative Modelling and Optimisation	*2*	*3%*

	Behavioural Experimental Study	*1*	*1%*
	Econometric Modelling and Secondary Data Analysis	*1*	*1%*
Empirical Qualitative Research	Empirical Case Studies	*13*	*17%*
	Other Qualitative Studies	*2*	*3%*
Empirical Mixed-Methods Research	Exploratory Sequential Design	*3*	*4%*
Conceptual Papers	Theoretical Papers	*5*	*6%*
	Systematic Literature Reviews	*4*	*5%*
	Theory Development and Literature Reviews	*3*	*4%*
Total	*N/A*	*77*	*100%*

Notes: N = number of publications; F = frequency of publications; N/A = not applicable.

2.4.2 Content Analysis: Social Capital

This section presents the key findings related to social capital by exploring its relationship with SCRES, identifying the four associated practices through full-text analysis, and examining how these practices influence SCRES. Related concepts are summarised Table 2.4.2.

Table 2.4.2 Overview of Relevant Definitions of Social Capital and Related Practices

Social Capital	Social capital refers to resources embedded in, available through and derived from the network of relationships possessed by an individual or social unit (Nahapiet and Ghoshal, 1998).
Trust	Trust refers to belief in partners' good intentions, competence, reliability and openness (Mishra, 1996; Johnson et al., 2013).
Reciprocity	Reciprocity refers to mutual exchange through social networks, involving fair interactions and the expectation that a company's actions will be rewarded by its partners (Saglam et al., 2022; Yang et al., 2024).
Communication	Communication refers to the formal and informal exchange of meaningful, timely and relevant information among SC actors (Wieland and Wallenburg, 2013; Nikookar and Yanadori, 2022b).
Cooperation	Cooperation refers to interactions and relationship-based connections between individuals or organisations, through which SC actors work together for mutual benefit (Wieland and Wallenburg, 2013).

2.4.2.1 Social Capital and Supply Chain Resilience

Our full-text content analysis found that 58 out of 77 articles discuss the important role of social capital in enhancing SCRES. Several studies highlight that social capital can improve access to information and resources, facilitate SCs' risk anticipation and identification, and maintain efficiency during disruptions (Johnson et al., 2013; Piriyawatthana, 2020; Prasad et al., 2015; Yu et al., 2023), particularly by strengthening information sharing, knowledge exchange and knowledge absorption among SC partners (Chen and Huang, 2022; Hussain et al., 2026; Nguyen Thi and Vu Dinh, 2025; Tu et al., 2025). Furthermore, social capital fosters a continuous problem-solving focus through coordination (Sopha et al., 2022), collaboration (Ervina and Agoes, 2022; He et al., 2022; Nikookar et al., 2026), integration (Haq and Aslam,

2026) and flexibility (Bhattacharjya, 2018; Bondeli and Havenvid, 2022), thereby enabling organisations to address rapid and radical changes. Social capital also strengthens relational commitment and partner support. For example, Guanxi compels suppliers to honour commitments and ensure timely delivery (Cheng et al., 2012), while strong relational ties secure critical support during crises (Marin et al., 2015; Huang and Farboudi Jahromi, 2021).

2.4.2.2 Social Capital Practices and Supply Chain Resilience

Our study extracted four social capital practices that were identified as contributing to SCRES in the selected studies. These practices were subsequently grouped into relational practices, namely trust and reciprocity, and interaction practices, namely communication and cooperation. Trust and reciprocity are defined as relational practices that reflect the quality of interpersonal relationships and how these relationships evolve and strengthen over time (Whipple, Wiedmer, and Boyer 2015). In contrast, communication and cooperation are considered interaction practices, as they capture information exchange and joint action among actors within a supply chain network (Polyviou, Croxton, and Knemeyer 2020; Scholten and Schilder 2015; Wieland and Wallenburg 2013). While these practices are analytically distinguished in the Findings section, the review indicates that they often operate in combination rather than isolation. A more detailed analysis of their interactions is provided in the Discussion section.

Trust

Trust plays a crucial role in shaping managerial decisions and strengthening SCRES strategies (Haq and Aslam, 2026; Johnson et al., 2013; Nikookar and Yanadori 2022a). Managers often prioritise guidance from personal networks over formal analysis, highlighting trust's significance in decision-making (Herbane, 2019; Nikookar and Yanadori, 2022b). Trust-based personal ties and social networks enhance access to critical information and resources, facilitating responsiveness during disruptions (Martinelli et al., 2018; Fan and Stevenson, 2019; Nikookar and Yanadori, 2022b). In logistics, trust enables managers to negotiate operational flexibility, such as securing late deliveries from freight forwarders, reinforcing its role in rapid response and recovery (Bhattacharjya, 2018). Furthermore, trust among boundary-spanning actors fosters deeper information exchange, resource sharing and access to timely knowledge (Fan and Stevenson, 2019; Mubarik et al., 2022).

Trust is also fundamental to long-term SC partnerships, enabling firms to go beyond contractual obligations and resolve problems with greater flexibility (Dubey et al., 2017; Faruquee et al., 2021). It fosters commitment, cooperation and coordination, helping firms prevent SC incidents and achieve common business goals (Yang and Hsu, 2018; Acar et al., 2022; Peters et al., 2023; Chowdhury et al., 2024). Specifically, trust in buyer-supplier collaboration strengthens joint risk identification (Fan and Stevenson, 2018) and facilitates access to reliable resources during disruptions (Prasad et al., 2015). Stronger social ties increase the likelihood of receiving both financial and non-financial support in times of crises, thereby reinforcing resilience (Jeble et al., 2020; Huang and Farboudi Jahromi, 2021). Additionally, trust helps mitigate key SC risks, including those arising from adversarial buyer-supplier relationships (Fan and Stevenson, 2018) and crisis-related operational and financial vulnerabilities (Huang and Farboudi Jahromi, 2021). Relational capital built on trust and supportive relationships with SC partners encourages openness, information exchange, knowledge sharing and collaboration under disruption conditions, thereby strengthening firms' adaptability and learning capabilities (Seville et al., 2015; Gölgeci and Kuivalainen, 2020; Mubarik et al., 2022; Robb et al., 2022). Hussain et al. (2026) further show that trust, access and shared resources support data sharing, coordination and analytics-driven decision-making during sudden disruptions. Ultimately, trust contributes to supply network resilience by reducing the ripple effect of disruptions (Giannoccaro and Iftikhar, 2022), while improving firms' ability to navigate disruptions, recover effectively and sustain long-term resilience (Chowdhury et al., 2019; Aslam et al., 2022; Sopha et al., 2022).

Reciprocity

Reciprocity is a fundamental element of relational social capital. Such reciprocal expectations foster shared norms, mutual trust and shared benefits, which are essential for strengthening SCRES (Saglam et al., 2022; Yang et al., 2024). By improving information exchange among SC partners, reciprocity builds closer relationships that support uninterrupted flows of information and materials during disruptions (Asamoah et al., 2020; Durach and Machuca, 2018; Saglam et al., 2022). In the Chinese context, Guanxi can reflect reciprocal obligations and mutually beneficial relationships that enhance information channels and improve supply risk management (Cheng et al., 2012). More broadly, collaborative buyer-supplier relationships further strengthen risk identification (Fan and Stevenson, 2018). Additionally, reciprocity improves preparedness and response to unexpected events by facilitating access to partner

information, tacit knowledge and resources for collaborative problem-solving and recovery (Saglam et al., 2022; Yang et al., 2024). Given its contribution to SCRES, organisations should maintain reciprocal relationships while recognising that relational ties need to be actively managed to sustain resilience benefits (Fan and Stevenson, 2019).

Communication

Communication is often conceptualised as an information transmission process, referring to the flow of explicit information through both formal and informal sharing of meaningful and timely content (Wieland and Wallenburg, 2013). Its primary function is to facilitate information exchange among SC actors (Cheng et al., 2012; Fan and Stevenson, 2018; Hu, 2022; Chowdhury et al., 2024). Internally, communication and social interactions facilitate the exchange of information, knowledge and best practice within firms, supporting swift impact assessment and contingency planning for disruptions (Polyviou et al., 2020; Ozanne et al., 2022). Effective internal communication can support delegation, faster recovery and improved visibility during disruptions (Piriyawatthana, 2020). Moreover, firms can actively shape employees' risk-taking behaviour through targeted communication, offering a cost-effective approach to SC risk management (DuHadway et al., 2018). In addition, close social interaction among decision-makers can accelerate information exchange, decision-making and coordination, thereby strengthening firms' capacity to mitigate and recover from disruptions (Ozanne et al., 2022).

Externally, communication enhances SCRES by enabling timely information sharing, joint decision-making and collaborative monitoring with SC partners, thereby strengthening risk awareness and management (Wieland and Wallenburg, 2013; Fan and Stevenson, 2018; Faruquee et al., 2021; Hu, 2022). In the Chinese context, closer communication helps Western buyers build Guanxi with Chinese suppliers, facilitating proactive information exchange and reducing supply risks (Cheng et al., 2012). Regular information sharing and supplier interactions further support early risk detection at suppliers' sites, allowing buyers to assess the type, likelihood and potential impact of risks more effectively (Fan and Stevenson, 2018). Such information flow enables firms to better manage the immediate effects of unexpected disruptions (Tu et al., 2025). Communication also provides the foundation for higher-level collaborative capabilities and crisis information exchange, which are important for proactive risk management and resilience building (Faruquee et al., 2021; Hu, 2022). Frequent and open

communication further fosters cooperation, flexible dialogue and joint problem-solving among firms (Grötsch et al., 2013; Fan and Stevenson, 2018; He et al., 2022).

Cooperation

Cooperation is a crucial factor in enhancing SCRES. Internally, Yu et al. (2022) highlight that inter-functional coordination refers to strategic cross-functional cooperation, where functional departments collaborate and share data and information. Externally, cooperation facilitates information sharing, joint problem-solving and adaptive capacity among SC members (Fan and Stevenson, 2018; Chowdhury et al., 2024). Collaborative relationships improve SC visibility and agility, enabling firms to detect and respond to risks more effectively (Asamoah et al., 2020; Jia et al., 2020). Moreover, joint problem-solving through cooperative efforts enhances proactive risk management, allowing firms to develop win-win strategies during disruptions (Faruquee et al., 2021). Cooperative SC members are perceived as more trustworthy (Wieland and Wallenburg, 2013), which strengthens buyer-supplier relationships and reinforces organisational capabilities and long-term stability by fostering shared responsibility and risk mitigation (Acar et al., 2022; Yang and Hsu, 2018). Furthermore, Dubey et al. (2017) argue that trust and cooperation among SC partners are essential for building SCRES, and empirically demonstrate that reduced behavioural uncertainty positively moderates the relationship between trust and cooperation.

2.4.3 Content Analysis: Human Capital

This section presents the relevant findings related to human capital, focusing on its relationship with SCRES and the two associated practices identified through full-text analysis. Related concepts are summarised in Table 2.4.3.

Table 2.4.3 Overview of Relevant Definitions of Human Capital and Related Practices

Human capital	Human capital refers to individual knowledge, skills and abilities developed through education, training and experience, and applied to work-related activities (Becker, 1962; Adner and Helfat, 2003; Nikookar and Yanadori, 2022a).
Training & Education	Training and education refer to formal learning through which individuals acquire transferable knowledge and skills that can support risk identification, problem-solving and adaptive responses in SCRES contexts (Becker, 1962; Nikookar and Yanadori, 2022a).
Experience	Experience refers to practical knowledge, skills and abilities gained through direct observation of, or participation in, work-related activities and events (Gerschberger et al., 2023; Nikookar and Yanadori, 2022a).

2.4.3.1 Human Capital and Supply Chain Resilience

Our SLR found 23 out of 77 articles that directly link human capital to SCRES. In SCM, human capital is perceived as crucial in building SCRES, as it fosters knowledge creation, the ability to withstand adverse shocks, flexibility and adaptability to change (Menéndez Blanco and Montes-Botella, 2017; Zhou et al., 2025). Firms with stronger human capital demonstrate greater preparedness to deal with uncertainty, as training, education, work experience and knowledge development improve their understanding of risks, threats and potential responses (Riley et al., 2016; Nikookar and Yanadori, 2022a; Mubarik et al., 2022; Tu et al., 2025). Besides, firms with higher levels of human capital are more adept at anticipating and responding to SC disruptions by enhancing knowledge absorption, knowledge diffusion and response capabilities (Lengnick-Hall et al., 2011; Menéndez Blanco and Montes-Botella, 2017; Gerschberger et al., 2023; Tu et al., 2025). SC managers' knowledge, skills and absorptive capacity enhance their risk mitigation competency (Ambulkar et al., 2016). Work experience equips SC managers with the ability to interpret information more accurately and manage disruptions more effectively, thereby supporting disruption interpretation and response effectiveness (Nikookar and Yanadori, 2022a). It also contributes to adaptive capacity by facilitating resource reconfiguration and recovery from adverse events (Menéndez Blanco and Montes-Botella, 2017). Therefore, enterprises with stronger human capital, particularly stronger managerial skills and greater experience, are more likely to have dealt with past crises successfully and to possess the capabilities needed to cope with future disruptions (Biggs et al., 2015; Nikookar and Yanadori, 2022a).

2.4.3.2 Human Capital Practices and Supply Chain Resilience

Our study found that research on the relationship between SCRES and human capital can be divided into two main practices: training and education, and experience. Skills gained from formal training and education are transferable and not unique to a specific firm or industry (Nikookar and Yanadori, 2022a). In contrast, experience refers to practical knowledge, skills or abilities gained from direct observation of, or participation in, activities and events (Gerschberger et al., 2023; Nikookar and Yanadori, 2022a).

Training and Education

Training and educating employees to prepare for disruptive events enables them to respond swiftly and effectively to change (Lengnick-Hall et al., 2011; Riley et al., 2016; Menéndez

Blanco and Montes-Botella, 2017; Mubarik et al., 2022). Riley et al. (2016) found that training is significantly associated with supply chain risk management capabilities. Hohenstein et al. (2015) and Koronis and Ponis (2018) further highlight that training and involving personnel across the organisation in resolving challenges and crises can support cross-functional coordination and improve the ability to manage risky events. Training and education also equip employees with up-to-date technical knowledge and skills, while supporting knowledge development, knowledge absorption and innovation-related capabilities (Mubarik et al., 2022; Yu et al., 2023; Tu et al., 2025). In technology-intensive contexts, these capabilities become particularly important, as continuous learning, digital skills and training investment help employees translate Industry 4.0 technologies into resilience outcomes (León and Kanat, 2026). Employee training and high-involvement human resource management practices can enhance employees' capabilities and support risk management in SCRES contexts (Gu et al., 2023). Managerial analytical skills and training are also important for interpreting information and making timely decisions under disruption conditions (Nikookar and Yanadori, 2022a). However, Riley et al. (2016) noted that training alone does not necessarily improve recovery capability, possibly because SC risks and disruption consequences vary widely. Firms may need tailored recovery training to see substantial benefits. Nikookar and Yanadori (2022a) found no significant link between formal training and SCRES-enhancing skills, such as SC data analysis and supply network design. They suggested that the use of quantitative models may partly explain these findings, highlighting the need for further exploratory research.

Experience

Experience refers to the practical knowledge, skills or abilities gained from direct observation of, or participation in, activities and events (Gerschberger et al., 2023). In the SCRES context, managers' work experience within the same firm or industry can foster context-specific knowledge, enabling them to interpret information more accurately, assess disruption-related risks and make decisions under uncertainty (Nikookar and Yanadori, 2022a; Shela et al., 2023). Such experience can support the implementation of resilience strategies by helping managers apply accumulated knowledge to disruption-related decisions (Aman and Seuring, 2023). However, experience alone may not generate SCRES benefits directly, as its contribution appears to depend on how effectively it is mobilised through collaboration (Nikookar et al., 2026).

Managers with crisis-management experience can make faster and more informed decisions, but firms must institutionalise such knowledge to avoid organisational forgetting (Akkermans and Van Wassenhove, 2018). At the employee level, experience increases knowledge and awareness of critical situations and their potential impact, helping employees relate current disruptions to past events, understand unfolding situations and avoid similar disruptions in the future (Polyviou et al., 2020; Gerschberger et al., 2023). Work experience also strengthens employees' role in knowledge absorption and dissemination across the SC (Tu et al., 2025), while industry-specific experience provides practical familiarity with specialised processes and skills, particularly in business clusters (Pereira et al., 2020). In increasingly digitalised contexts, digital experience and technology-related skills further support information processing, disruption prediction and operational optimisation (Zheng et al., 2025). Overall, experienced employees contribute to crisis management by supporting cross-functional coordination and reducing response errors during disruption and recovery phases (Hohenstein et al., 2015; Mubarik et al., 2022; Gu et al., 2023).

2.4.4 Content Analysis: Cognition

This section presents the key findings on cognition, focusing on its relationship with SCRES and identifying four associated practices. Although some studies conceptualise cognition as a dimension of social capital, this study treats cognition as a distinct human-related capability, focusing on how individuals and teams interpret information and make sense of disruptions to guide decision-making. Related concepts are summarised in Table 2.4.4.

Table 2.4.4 Overview of Relevant Definitions of Cognition

Cognition	Cognition in this study encompasses individual mental representations that shape perception and decision-making, and shared cognition that emerges from collective meanings, values and representations to support mutual understanding and collaboration in SC relationships (Adner and Helfat, 2003; Nahapiet and Ghoshal, 1998; Helfat and Peteraf, 2015; Nikookar and Yanadori, 2022a; Daghar et al., 2023).
Managers' Perception	Managers' perception refers to the meanings managers assign to external stimuli when evaluating and making sense of their environment, shaping their decisions and actions (Zsidisin and Wagner, 2010; Nikookar and Yanadori, 2022a).
Employees' Cognitive Attributes	Employees' cognitive attributes refer to employees' abilities to acquire knowledge, reason, recognise environmental changes, interpret ambiguous events and formulate appropriate responses (Huang and Farboudi Jahromi, 2021; Gerschberger et al., 2023).
Shared Codes and Language	Shared codes and language refer to common terms, goals, values, performance indicators and sector-specific language that support communication, information exchange and shared interpretation among SC actors (Nahapiet and Ghoshal, 1998; Johnson et al., 2013; Fan and Stevenson, 2018; Daghar et al., 2023).

Shared Narratives	Shared narratives refer to shared stories, experiences, values, philosophies and interpretations that create common meaning and guide collective understanding and action in SC relationships (Nahapiet and Ghoshal, 1998; Johnson et al., 2013; Fan and Stevenson, 2018; Daghar et al., 2023).

2.4.4.1 Cognition and Supply Chain Resilience

The significance of cognition in the context of SCRES is evident in our research sample, with 21 out of 77 articles discussing this topic. Cognition encompasses individual mental representations that shape perception and decision-making by giving meaning to the environment (Adner and Helfat, 2003; Helfat and Peteraf, 2015; Nikookar and Yanadori, 2022a), as well as shared cognitive capital, which emerges from collective representations, meanings and values that enhance mutual understanding and collaboration in SC relationships (Nahapiet and Ghoshal, 1998; Fan and Stevenson, 2018; Ozanne et al., 2022; Daghar et al., 2023).

Cognition enhances preparedness, information processing, collaboration and adaptability across the SC, ultimately supporting greater resilience in the face of disruptions (Chowdhury et al., 2019; Daghar et al., 2021; Daghar et al., 2023). At the managerial level, disruption perception supports environmental scanning, risk assessment, the recognition of abnormal patterns and rapid responses (Nikookar and Yanadori, 2022a). At the organisational and team levels, cognitive readiness enables organisations to identify SC vulnerabilities (Prasad et al., 2015), while shared language, culture and mutual awareness reduce unexpected behaviour and misunderstanding, thereby enhancing risk anticipation (Fan and Stevenson, 2018). Cognition also enhances SCRES by facilitating flexibility and responsiveness, as shared goals and values among SC members promote common understanding of improvement strategies (Johnson et al., 2013) and guide actions under challenging conditions (Prasad et al., 2015), while paradox cognition helps firms balance competing stability-flexibility demands (Gao et al., 2026). Furthermore, employees' cognitive abilities support crisis performance by improving coordination in preparedness and response efforts (Preston et al., 2017; Ozanne et al., 2022) and motivating employees to contribute to resilience-building strategies (Huang and Farboudi Jahromi, 2021; Gerschberger et al., 2023).

2.4.4.2 Cognition Practices and Supply Chain Resilience

Our SLR identified four cognitive practices related to SCRES within the sampled studies: shared codes and language, shared narratives, managers' perception and employees' cognitive

attributes. Shared codes and language, and shared narratives, are regarded as collective practices, as they facilitate collective cognitive processes and sensemaking among individuals or SC members (Nahapiet and Ghoshal, 1998; Johnson et al., 2013; Daghar et al., 2021). In contrast, managers' perception and employees' cognitive attributes are regarded as individual practices, capturing how individual actors use cognitive capabilities to interpret complex and ambiguous situations and make decisions that support SCRES (Gerschberger et al., 2023; Nikookar and Yanadori, 2022a).

Managers' Perception

Managers' perception influences how they interpret events and respond to environmental change, particularly through sensing, seizing and resource reconfiguration (Adner and Helfat, 2003; Dane and Pratt, 2007; Nikookar and Yanadori, 2022a). Because managers act on the meanings they attach to perceived threats and opportunities, their perception shapes the decisions, actions and response strategies they adopt (Zsidisin and Wagner, 2010; Huang and Farboudi Jahromi, 2021). Focusing on the perceived severity of future disruptions, Nikookar and Yanadori (2022a) find that managers who anticipate greater damage tend to monitor environmental changes closely and respond swiftly to abnormal patterns, thereby supporting proactive monitoring, responsiveness and adaptive responses. Recent evidence further suggests that executives' disruption perception strengthens SCRES by increasing their willingness to invest in supply chain collaboration when disruption consequences are perceived as severe (Nikookar et al., 2026). In addition, Namdar et al. (2018) emphasise that managers' risk attitudes, including their level of risk aversion, shape resilience strategies by influencing sourcing decisions and investments in recovery and warning capabilities. From a cognitive perspective, managers' perception is also shaped by cognitive styles and risk mitigation orientation. Ambulkar et al. (2016) show that risk mitigation orientation affects how managers perceive risk and apply knowledge in risk management. Grötsch et al. (2013) further examine managerial cognitive styles, particularly in terms of perception and judgement, and indicate that managers with a rational cognitive style are more likely to adopt proactive risk mitigation strategies. These findings suggest that cognitive tendencies influence managers' perception of risks and opportunities, shaping their resilience strategies. Beyond individual cognition, managers' perception of emotional cues in the supply environment can also affect SCRES. Matas et al. (2024) argue that such perceptions influence managers' choice of response strategies, ultimately determining whether they strengthen existing supplier relationships or

seek alternatives. Overall, the literature suggests that managers' perception shapes how they interpret disruptions, assess risks, balance competing demands and formulate responses.

Employees' Cognitive Attributes

Employees' cognitive attributes refer to employees' abilities to acquire knowledge, reason, recognise environmental changes, interpret ambiguous events and formulate appropriate responses (Huang and Farboudi Jahromi, 2021; Gerschberger et al., 2023). In the reviewed studies, these attributes mainly include situational assessment, experience, commitment and sensemaking (Gerschberger et al., 2023).

Situational assessment is a cognitive process involving alertness, heightened sensitivity to stimuli and a robust grasp of reality (Lengnick-Hall et al., 2011; Gerschberger et al., 2023). Employees' ability to assess situations enables continuous environmental monitoring, anomaly detection and critical evaluation of unfolding disruptions, thereby providing extended lead time for response preparation (Prasad et al., 2015; Gerschberger et al., 2023). In this cognition stream, experience refers to practical knowledge and skills gained through direct involvement in activities and events, which help employees interpret current disruptions by drawing on past situations (Gerschberger et al., 2023). Experienced employees can broaden organisational expertise by transferring knowledge to colleagues and increasing awareness of critical situations, thereby supporting disruption avoidance and recovery (Polyviou et al., 2020; Gerschberger et al., 2023). Commitment refers to an individual's psychological attachment to an organisation, including belief in its goals and values, willingness to exert effort on behalf of the organisation and desire for organisational membership (Bateman and Strasser, 1984; Gerschberger et al., 2023; Aman and Seuring, 2023). Committed employees support disruption avoidance and recovery by showing loyalty and actively engaging in problem-solving (Polyviou et al., 2020). Sensemaking refers to the process through which individuals understand and interpret events and situations (Gerschberger et al., 2023). It is particularly important in helping employees comprehend unusual and unprecedented events (Lengnick-Hall et al., 2011), accurately interpret SC disruptions and devise appropriate solutions for complex problems (Gerschberger et al., 2023).

Shared Codes and Language

Shared codes and language are pivotal for communication, information exchange and environmental interpretation, encompassing shared goals, values, visions, performance indicators, task ownership and sector-specific jargon (Nahapiet and Ghoshal, 1998; Johnson et al., 2013; Fan and Stevenson, 2018; Daghar et al., 2021; Daghar et al., 2023). Among employees, such shared understanding can enhance collaboration and help distinguish strategic from operational activities. This differentiation enables more effective prioritisation of preparedness efforts and coordinated responses during disruptions (Ozanne et al., 2022). However, Jia et al. (2020) argue that a shared vision and collective goals alone do not necessarily increase internal awareness of disruptions or directly strengthen SCRES. They emphasise that the effectiveness of pursuing collective goals also depends on the depth of personal relationships among employees and therefore should be considered alongside other social and human capital capabilities.

Additionally, shared codes and language among SC members enhance collaboration, streamline communication and establish both explicit and tacit understanding, which helps avoid conflict (Johnson et al., 2013; Aman and Seuring, 2023). They enable joint decision-making, shared norms and proactive risk anticipation, thereby supporting crisis mitigation (Fan and Stevenson, 2018; Chowdhury et al., 2019; Daghar et al., 2023). SC members who share common values and goals are also better prepared to protect organisational interests during disruptions and maintain coordinated actions under uncertainty (Prasad et al., 2015; Chowdhury et al., 2019; Nguyen Thi and Vu Dinh, 2025). These shared elements can streamline crisis responses by reducing cognitive load in risk identification, minimising accidental behaviours and misunderstandings, avoiding time lost in goal recalibration and shortening problem-solving duration under elevated demand uncertainty (Fan and Stevenson, 2018; Daghar et al., 2023).

Shared Narratives

Shared narratives constitute a key element of the cognitive dimension of social capital, providing a common framework through which groups interpret information, develop mutual goals and engage in collective action (Nahapiet and Ghoshal, 1998; Daghar et al., 2021; Ozanne et al., 2022). Collective narratives establish common goals and reduce misunderstanding and opportunistic behaviours, improving collaboration and coordination (Johnson et al., 2013;

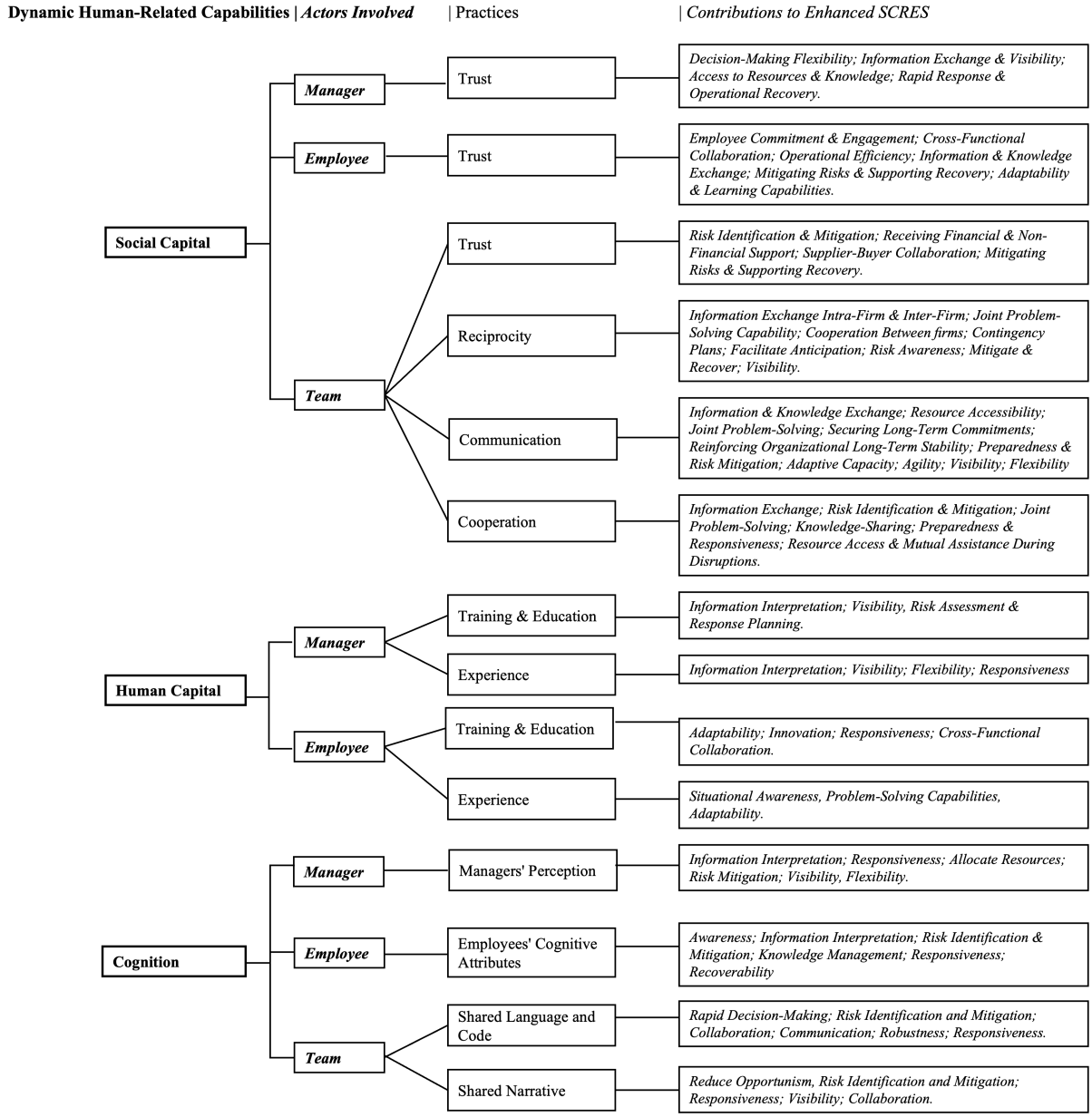
Aman and Seuring, 2023). Suppliers and buyers utilise shared corporate culture to improve tacit and explicit understanding in the identification and mitigation of supply risks (Fan and Stevenson, 2018; Chowdhury et al., 2019). Moreover, Johnson et al. (2013) suggest that shared narratives of past adaptive responses help strengthen network collaboration and the identification and resolution of complex problems. Shared narratives therefore foster collective identity and shared experiences, and facilitate collective learning by internalising past experiences, enabling firms to better prepare for future crises (Daghar et al., 2023). By providing a cohesive framework for action, shared narratives reduce confusion and support quicker responses during disruptions (Prasad et al., 2015). Nevertheless, these benefits may have limits, as Fan and Stevenson (2018) caution that over-reliance on cognitive capital can lead to "collective blinding", hindering innovative thinking among partners.

2.4.5 Synthesis and Conceptual Framework of Dynamic Human-Related Capabilities

Building on the full-text content analysis, this SLR synthesises fragmented evidence on human-related drivers of SCRES into an integrative conceptual framework of DHRCs that provides a coherent foundation for subsequent empirical investigation (See Figure 2.4.5). The framework consolidates prior findings into three interrelated capability domains, namely social capital, human capital, and cognition, and identifies associated key practices through which these capabilities are cultivated and applied in resilience contexts. Social capital is articulated through four practices, comprising two relational practices, trust and reciprocity, and two interaction practices, communication and cooperation. Human capital is represented by two practices, training and education, and experience, reflecting both the development of transferable skills and the accumulation of context-specific knowledge relevant to disruption anticipation and response. In the SLR, cognition is captured through four practices: managers' perception, employees' cognitive attributes, shared codes and language, and shared narratives. Conceptually, the first two represent individual-level cognitive processes, while the latter two reflect collective forms of cognition that support shared interpretation and coordinated action. This distinction is important because it preserves meaningful differences between managers' and employees' cognitive roles in the literature, rather than treating individual cognition as homogeneous. At the same time, for the purposes of the empirical phase, managers' perception and employees' cognitive attributes were organised under the higher-order category of individual cognitive attributes. This refinement was adopted because both practices refer to actor-level cognitive processes through which individuals interpret disruption cues, assess

situations, and formulate responses. Importantly, this did not remove role-specific distinctions. Rather, it enabled the empirical analysis to retain and compare managers' and employees' cognitive attributes as subdimensions within a broader individual-level category. By contrast, shared codes and language and shared narratives were retained as distinct collective-level practices, as both the literature and the empirical material suggested that they capture conceptually different shared cognitive mechanisms and could not be meaningfully collapsed further.

Figure 2.4.5 SLR-Derived Conceptual Framework of DHRCs



This framework reflects the synthesis of the SLR and serves as the theoretical starting point for the empirical phase. Rather than prescribing rigid empirical categories, it provides a sensitising structure for examining how social capital, human capital, and cognition are enacted across actors and disruption phases. Guided by this framework, the semi-structured interview protocol was organised by capability domain and associated practices, translating each element into clear interview sections and prompts to elicit concrete resilience-related experiences from both managers and employees. The framework also informed role-sensitive probing to capture how DHRCs are developed and enacted in different organisational positions. During analysis, it was applied as an a priori coding scaffold in NVivo, supporting consistent first-round coding at the practice level and subsequent aggregation into the three capability domains, thereby strengthening construct clarity and enabling systematic comparison across interviews and cases. In particular, the framework enabled the study to explore both commonalities and differences in how cognition was enacted by different organisational actors. While the empirical analysis organised managers' perception and employees' cognitive attributes under the broader category of individual cognitive attributes, role-specific distinctions were retained in the analysis wherever relevant. This approach allowed the study to preserve the multi-actor logic of the framework while also ensuring sufficient analytical clarity in the treatment of individual- and collective-level cognition.

2.5 Synthesis and Identified Gaps

The preceding sections have brought together three streams of literature: research on SCRES and its enabling capabilities, work on DCT and DMC theory, and a SLR of DHRCs, social capital, human capital and cognition, in SCRES. This section synthesises these strands and identifies the key gaps that motivate the empirical investigation. Taken together, these gaps are not merely empirical omissions. Rather, they point to a broader theoretical limitation in existing SCRES research, namely the absence of an integrated explanation of how human-related capabilities are distributed across actors, enacted through practice, and reconfigured over time to produce resilience.

First, the SCRES literature has evolved from early conceptualisations of resilience as the ability to "bounce back" from disruption towards more processual and capability-based views. Recent studies emphasise that SCRES involves preparedness before disruption, absorption and adaptation during disruption, and recovery and learning afterwards. Across these phases, a

range of operational capabilities, including flexibility, redundancy, visibility, collaboration, integration, and agility, have been proposed as enablers of resilience. However, as reviewed in Section 2.2, these capabilities are often treated as broad, aggregate constructs, providing limited insight into the human-related factors and concrete pathways through which they are developed and enacted. As a result, existing SCRES research offers only limited theoretical explanation of how resilience-enabling operational capabilities are operationalised, sustained, and renewed through human agency.

Second, DCT provides a useful firm-level framework for understanding how organisations adapt to turbulence through sensing, seizing and reconfiguring activities. The DMC perspective extends this logic by foregrounding managerial social capital, human capital, and cognition as key drivers of dynamic capabilities. As reviewed in Section 2.3, DMC research offers important insights into how managers' networks, experience, and mental models shape organisational adaptation and change. Yet it also shows that DMC studies remain predominantly manager-centric. In SC contexts, where resilience depends heavily on cross-functional coordination, frontline problem-solving, and inter-organisational collaboration, such a narrow focus provides only a partial account of the human-related capabilities through which dynamic adaptation is achieved. There is therefore a need to move beyond a purely managerial lens towards a broader conception of human-related capabilities that is distributed across managers, employees, and teams and evolves through practice over time. This matters theoretically because resilience in SC settings is not generated by managerial judgement alone, but by the interaction of role-differentiated actors whose decisions, communication, and coordinated actions collectively shape adaptation under disruption.

Third, the SLR of human related factors and SCRES (Section 2.4) showed that social capital, human capital and cognition have each been examined as important enablers of resilience, but in a fragmented and uneven manner. Social capital has attracted the greatest attention, with numerous studies emphasising the role of trust, reciprocity, communication and cooperation in supporting information sharing, joint problem-solving and coordinated responses to disruption. By contrast, human capital and cognition have been explored in a smaller subset of studies, often in a descriptive way and without a clear dynamic or multi-level perspective. Human capital is typically operationalised through training, education or experience, but there is limited theorisation of how these elements interact with social capital and cognition, or how

they are developed and mobilised across different disruption phases. Cognitive aspects, such as managers' risk perceptions, employees' sensemaking, shared language and shared narratives, are recognised as important, yet they are rarely integrated into a coherent framework and are sometimes subsumed under social capital's "cognitive dimension", blurring conceptual boundaries.

Synthesising these observations, four key gaps can be identified. To ensure a rigorous alignment between the theoretical gaps identified in the literature and the empirical investigation of this thesis, the relationship between the identified gaps and the research questions (RQs) is summarised in Table 2.5. This mapping demonstrates how the subsequent chapters address the limitations of existing research by developing and applying the DHRCs framework.

Table 2.5 Mapping Literature Gaps to Research Questions

Literature Gaps	Description	Corresponding Research Questions (RQs)
Gap 1: Multi-actor and multi-level gap	Existing studies predominantly focus on firm-level capabilities or top management teams (e.g., DMC theory), offering limited insight into how individuals and cross-functional teams collectively contribute to resilience.	RQ1 & RQ2: Aim to identify components of DHRCs and their related practices from individual and team perspectives.
Gap 2: Fragmentation gap	Social capital, human capital, and cognition are often studied in isolation. There is a lack of an integrated framework that conceptualises how these three dimensions interact to build and maintain SCRES.	RQ1 & RQ3: By developing an integrative DHRCs framework and analysing how these dimensions work together to support resilience outcomes.
Gap 3: Process and temporal gap	Research often adopts a static view, failing to capture how human-related capabilities are dynamically reconfigured, activated, and evolved across different disruption stages (pre-disruption, during-disruption, and post-disruption).	RQ3: Investigates how DHRCs and their associated practices contribute to SCRES across the temporal trajectory of a disruption.
Gap 4: Methodological and contextual gap	There is a heavy reliance on quantitative surveys, which may not capture the complex logic of how human capabilities are enacted in real-world crises. Furthermore, there is limited evidence within the specific context of the Chinese market.	RQ2 & RQ3: Utilises a qualitative multi-case study approach to provide in-depth insights into the enactment of DHRCs within the Chinese SC context.

First, a multi-actor and multi-level gap. Most existing work on dynamic capabilities and human-related enablers of SCRES adopts either a firm-level or manager-centric focus. Studies rarely examine how managers, employees and cross-functional teams jointly contribute to resilience, nor how human-related capabilities operate across different organisational levels (individual, team, organisational and inter-organisational). This overlooks the distributed,

collective nature of disruption management in SCs, where frontline personnel and cross-functional teams often play decisive roles in sensing weak signals, improvising responses and maintaining continuity. Theoretically, this leaves resilience underexplained as a socially distributed phenomenon, because existing models tend to attribute adaptive capacity to the firm or top managers without sufficiently unpacking how it is enacted across multiple actors and levels.

Second, a fragmentation gap across human-related capabilities. Social capital, human capital and cognition tend to be studied in isolation, with limited attempts to integrate them into an overarching framework. As a result, we know relatively little about how relational, skill-based and cognitive elements interact to support SCRES, for example, how trust and cooperation amplify (or undermine) the effects of training and experience, or how shared narratives and cognitive frames shape the way social and human capital are deployed during disruptions. The absence of an integrated perspective makes it difficult to theorise human-related capabilities as a coordinated set of foundations rather than as a collection of separate variables. This weakens theoretical development because it prevents SCRES research from explaining how different human-related capability domains reinforce, constrain, or co-evolve with one another in practice.

Third, a process and temporal gap. Although many studies acknowledge that resilience unfolds over time, most empirical work on human related factors relies on cross-sectional designs and treats social capital, human capital and cognition as static attributes. There is limited insight into how these capabilities are developed, reconfigured and enacted differently before, during and after disruption events, or how learning from past disruptions feeds back into preparedness for future ones. This constrains our understanding of the dynamic, evolving nature of human-related capabilities that the dynamic capabilities tradition emphasises. In theoretical terms, this means that the temporal and adaptive logic central to DCT and DMC is often assumed rather than empirically unpacked in relation to human-related resilience processes.

Fourth, there is a methodological and contextual gap. The SLR reveals a marked methodological skew in research on human-related capabilities and SCRES, with most studies relying on cross-sectional surveys and quantitative modelling. While these approaches provide useful correlational evidence linking social capital, human capital, cognition, and resilience,

they offer limited insight into the processes and practices through which such capabilities are enacted in disruption settings. In particular, survey-based measures often capture human related factors as relatively static perceptions or aggregate indices, rather than tracing how relationships, skills, and cognitive frames are mobilised, reshaped, and sometimes contested during concrete disruption episodes. Moreover, relatively few studies provide rich, context-sensitive accounts of human-related capabilities in specific SC settings, such as beverage and alcoholic beverage SCs in emerging economies, where product characteristics, regulatory constraints, and demand volatility create distinctive resilience challenges. Together, this methodological and contextual imbalance limits our understanding of the fine-grained, practice-based pathways through which human-related capabilities contribute to SCRES. This gap is also theoretically consequential, because without context-sensitive and process-oriented evidence, it remains difficult to refine or extend existing theory in ways that capture how resilience is actually enacted in specific SC environments.

These gaps motivate the conceptual move from a manager-centric DMC perspective to the broader DHRCs framework introduced in Section 2.3.3. DHRCs conceptualise social capital, human capital and cognition as dynamic, distributed and practice-based capabilities that are enacted by managers, employees and cross-functional teams across pre-, during- and post-disruption phases. Building on this framework, the empirical part of this thesis seeks to (1) identify how DHRCs manifest in different SC contexts, (2) unpack the concrete practices through which they contribute to SCRES, and (3) theorise how these practices operate across actors, levels and disruption stages. These objectives directly address the research questions outlined in Chapter 1 and inform the multiple-case study and analysis strategy described in Chapter 3.

2.6 Chapter Summary

This chapter has developed the theoretical and conceptual platform for examining how human-related capabilities enable SCRES. It first reviewed the SCRES literature, clarifying how resilience has been defined and operationalised in SC research. The review showed that SCRES is best understood as a multi-dimensional construct encompassing readiness, response and recovery, and that it unfolds across three temporal phases: pre-disruption, during-disruption and post-disruption. It also highlighted the proliferation of proposed SCRES capabilities, such as flexibility, redundancy, visibility, collaboration and integration, and the lack of consensus

regarding their classification, interrelationships and effects across different disruption phases. Importantly, this review also showed that, while SCRES capabilities have been widely identified, existing research provides limited theoretical explanation of how such capabilities are operationalised and sustained through human agency in practice.

The chapter then situated the study within the dynamic capabilities tradition. Drawing on DCT, it emphasised that firms sustain competitiveness in turbulent environments through sensing, seizing and reconfiguring activities that allow them to purposefully adapt their resource and capability base. Building on this foundation, the chapter introduced DMC theory as an extension that foregrounds managerial human capital, social capital and cognition as key drivers of capability development and change. At the same time, the review identified important limitations of the existing DMC literature, particularly its predominantly manager-centric orientation and its limited attention to the distributed, practice-based contributions of employees and cross-functional teams in SC settings. To address these limitations, the chapter advanced the concept of DHRCs as a broader, multi-actor and multi-level framework that retains the dynamic logic of DMC while extending it beyond managerial actors. In doing so, the chapter argued that a multi-actor and multi-level perspective is theoretically important because it helps explain how resilience is enacted across managers, employees, and teams, rather than being treated merely as an abstract firm- or SC-level property.

Finally, the chapter drew on a SLR to synthesise current knowledge on social capital, human capital and cognition as human-related enablers of SCRES. The review documented a strong emphasis on social capital and comparatively fewer studies on human capital and cognition, revealing an empirical imbalance in the existing literature. It identified four core social capital practices (trust, reciprocity, communication and cooperation), two human capital practices (training and education, experience) and four cognitive practices (managers' perception, employees' cognitive attributes, shared codes and language, and shared narratives) through which relationships, skills and cognitive processes contribute to preparedness, response and recovery. At the same time, it showed that existing research seldom treats these three dimensions as an integrated, dynamic capability set and rarely examines how they operate jointly across actors, organisational levels and disruption phases.

Taken together, the insights from this chapter justify the DHRCs framework developed in this thesis and underscore the need for an empirically grounded understanding of how social capital, human capital and cognition are enacted in practice to build SCRES. Importantly, the chapter highlights how these human-related capabilities are valued not only as relational or cognitive resources, but as actionable practices that shape preparedness, response and recovery across disruption contexts. It also shows that existing studies remain fragmented in terms of actors, levels of analysis and operational definitions, with limited evidence on how specific practices are developed, coordinated and sustained within firms and across SC relationships. More broadly, the chapter demonstrates that what is theoretically missing in existing SCRES research is an integrated explanation of how human-related capabilities are distributed across actors, enacted through practice, and reconfigured over time to produce resilience. These theoretical foundations and identified gaps directly inform the research design and methodological choices outlined in Chapter 3, as well as the empirical analyses presented in subsequent chapters.

Chapter 3. Research Methodology

3.1 Chapter Introduction

This chapter presents the methodological foundation of the study and explains how the research design was developed to address the three research questions. It outlines the philosophical assumptions, methodological choices, and analytical procedures that guided the investigation of DHRCs and their contributions to SCRES.

The chapter begins by discussing the research philosophy, which integrates a relativist ontology and interpretivist epistemology to capture the socially constructed and context-dependent nature of organisational phenomena. This philosophical stance underpins a qualitative, theory-building approach combining a SLR and a multiple case study strategy. The SLR provides a structured synthesis of existing research and identifies theoretical gaps, while the multiple case study generates in-depth, context-rich evidence from beverage and alcoholic beverage SCs in China.

Following the philosophical discussion, the chapter elaborates on the research design, including data collection, participant selection, and the analytical techniques used for within-case and cross-case analysis. It then discusses measures taken to ensure research rigor and trustworthiness, followed by a section on ethical considerations addressing consent, confidentiality, and data protection.

Overall, this chapter establishes the methodological coherence of the study, demonstrating how philosophical assumptions, research design, and analytical procedures collectively support the aim of developing the DHRCs framework as an extended explanation to explain how individuals and teams enhance SCRES.

3.2 Research Philosophy and Research Approach

Establishing a clear research philosophy is essential for ensuring methodological coherence and transparency in how knowledge is generated and interpreted. Research philosophy reflects assumptions about the nature of reality (ontology), the nature of knowledge (epistemology), and how knowledge can be developed (methodology) (Bryman and Bell, 2011; Burrell and Morgan, 2019). These philosophical choices shape how research questions are formulated, data are collected, and findings are interpreted (Bryman and Bell, 2011). The following subsections

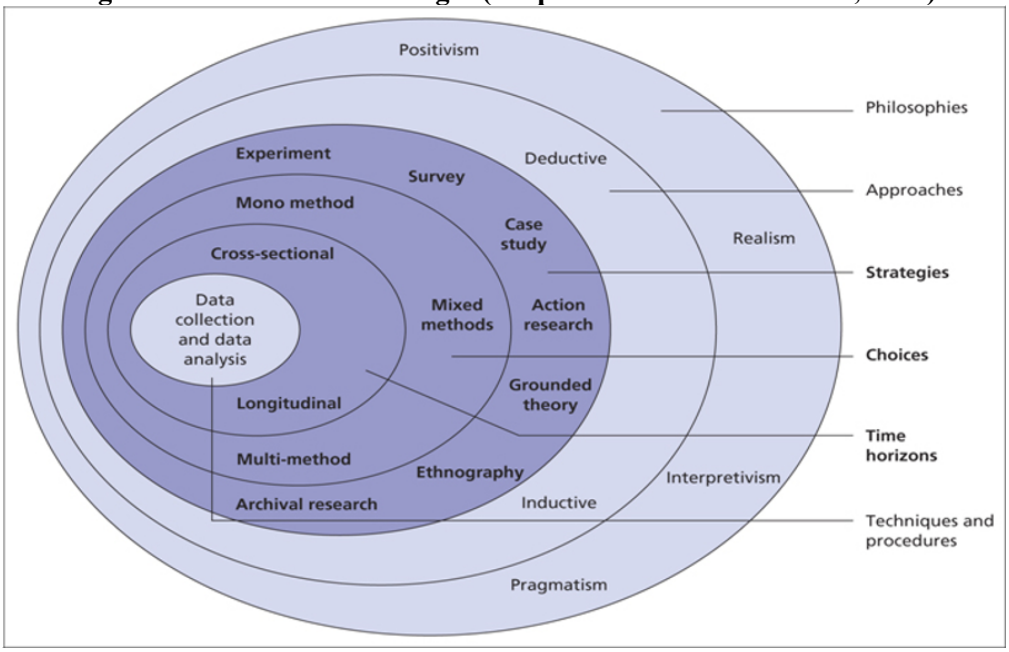
clarify the study's philosophical positioning, relativist ontology and interpretivist epistemology, and explain how this positioning informs the selected research approach and subsequent research design.

3.2.1 Philosophical Positioning of the Study

This study is positioned within an interpretivist paradigm and adopts a relativist and interpretivist stance to examine how managers, employees, and teams develop and enact DHRC, spanning social, human, and cognitive dimensions, to enhance SCRES in context (Easterby-Smith et al., 2018; Hudson and Ozanne, 1988). This positioning recognises that organisational phenomena such as resilience, learning, and capability enactment are socially constructed and context-dependent rather than objectively uniform across settings. Accordingly, the study prioritises understanding how organisational actors interpret disruptions, construct meanings, and translate these interpretations into resilience-related practices embedded in everyday work.

Figure 3.2.1 summarises this philosophical positioning using the research onion framework (Saunders et al., 2019) and shows how the study's ontological and epistemological assumptions inform the selected research approach and, subsequently, the overall research design presented in Section 3.3.

Figure 3.2.1 Research Paradigm (adapted from Saunders et al., 2019)



Source: Saunders, M., Lewis, P. and Thornhill, A. (2012) Research Methods for Business Students, 6th edn, Pearson Education Limited.

3.2.1.1 Ontological Position: Relativism

Ontology concerns the assumptions a study makes about the nature of reality, namely, what is considered "real" in the social world being investigated (Bryman and Bell, 2011). In this thesis, a relativist ontological stance is adopted, which assumes that reality is not single, fixed, or fully independent of human interpretation; instead, multiple realities may coexist and are shaped by actors' experiences and social interactions (Guba and Lincoln, 1994; Easterby-Smith et al., 2018).

From a relativist perspective, organisational phenomena such as SCRES and related resilience practices are not treated as objective entities that can be observed in the same way across settings. Rather, organisational realities and resilience-related practices are understood as contextually embedded and socially constructed, meaning that what resilience "is" and how it is enacted may vary across firms, roles, and SC contexts as people interpret disruptions, routines, and collaboration differently (Bryman and Bell, 2011). In other words, resilience is viewed as an emergent organisational reality that takes shape through ongoing human action and interaction within particular organisational and SC settings.

This ontological position is particularly appropriate for the present research because the study examines how human related factors, captured through social relationships, skill development, and cognition, shape the development and enactment of capabilities for resilience. Accordingly, the thesis assumes that SCRES-related realities are enacted differently by managers, employees, and teams, depending on their experiences, relational histories, and the situational conditions they face. This provides the ontological foundation for exploring DHRCs as context-dependent enablers of SCRES.

3.2.1.2 Epistemological Position: Interpretivism

Building upon the relativist ontological foundation, this study adopts an interpretivist epistemology, which assumes that knowledge is generated through interpreting human experiences and social interactions rather than discovered as an objective and context-free truth (Hudson and Ozanne, 1988; Bryman and Bell, 2011). The research is positioned within the interpretivist paradigm, which views organisational phenomena such as dynamic capabilities, learning, and resilience as socially constructed and context-dependent. Rather than treating

reality as objective or universal, interpretivism recognises that meanings and practices are shaped through individual and collective experiences, perceptions, and interactions (Easterby-Smith et al., 2018).

Accordingly, this thesis emphasises understanding how managers, employees, and teams perceive, interpret, and make sense of disruptions, and how such interpretations inform the development and enactment of capabilities that enable firms to adapt and recover. From an interpretivist epistemological perspective, knowledge about SCRES and resilience-related practices is generated by engaging with participants' accounts and meanings embedded in practice, and by examining how these meanings vary across roles and organisational settings (Bryman and Bell, 2011). Rather than seeking universal laws or law-like generalisations, the aim is to develop contextually grounded explanations of capability enactment, attending to the ways in which cognition, relational dynamics, and collective practices shape resilience outcomes.

This epistemological stance supports a qualitative, theory-informed theory-building orientation that prioritises depth of understanding over statistical representativeness (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). The study is positioned as theory building rather than theory elaboration alone because it seeks to construct a new explanatory framework of dynamic human-related capabilities for SCRES, rather than to refine the constructs, relationships, or boundary conditions of a single established theory. The aim is not to produce a grand theory, but to develop a contextually grounded, mid-range conceptual framework explaining how human-related capabilities contribute to SCRES.

This theory-building process is nevertheless not purely inductive. Following the notion of sensitising concepts (Blumer, 1954), existing literature and DMC theory provided initial analytical concepts, particularly social capital, human capital, and cognition, while the SLR offered an initial conceptual foundation. The empirical multiple case study subsequently enabled this framework to be explored, refined, and further developed by examining how these capabilities and associated practices are enacted across actors, relationships, and disruption stages. The thesis therefore adopts an abductive, theory-informed approach to theory building, involving iterative movement between extant theory and empirical evidence.

3.2.2 Research Approach

Research approach concerns how a study connects theory and empirical material and, in particular, the reasoning through which knowledge claims are developed (Bryman and Bell, 2011). Although deductive and inductive reasoning are often presented as two distinct approaches, qualitative research frequently combines theoretical and empirical insights through an iterative process (Bryman and Bell, 2011; Saunders et al., 2019).

Consistent with its relativist ontology and interpretivist epistemology (Guba and Lincoln, 1994; Schwandt, 1994), this thesis adopts an abductive, theory-informed qualitative research approach. This approach is appropriate because the study seeks to develop contextually grounded explanations by examining organisational actors' meanings, interpretations, and practices (Schwandt, 1994; Bryman and Bell, 2011; Easterby-Smith et al., 2018). Specifically, it investigates how managers, employees, and teams develop and enact DHRCs in relation to SCRES within particular organisational and SC contexts.

The abductive logic of the thesis lies in the iterative movement between the SLR-derived conceptual framework and the empirical case evidence (Dubois and Gadde, 2002; Saunders et al., 2019; Timmermans and Tavory, 2012). Abductive reasoning is particularly appropriate when empirical observations are interpreted through existing theoretical concepts but also prompt those concepts to be reconsidered or refined when they do not fully explain the evidence. The study was therefore not purely deductive, because the initial framework was not treated as a fixed model for hypothesis testing or straightforward confirmation (Bryman and Bell, 2011). Equally, it was not purely inductive, because the empirical analysis was informed by prior literature and theoretical concepts. Instead, following the use of sensitising concepts in qualitative inquiry (Blumer, 1954), the SLR provided an initial conceptual grounding by identifying three core capability domains and their associated practices, while the multiple case study enabled these ideas to be examined, refined, and further developed in context (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Yin, 2018).

The empirical data consequently played a generative role in the development of the DHRC framework. Through within-case and cross-case analysis (Eisenhardt, 1989; Eisenhardt and Graebner, 2007), the study examined how human-related capabilities and practices were enacted across different actors, relationships, and disruption stages. Where the empirical

evidence revealed patterns that were not fully represented in the initial conceptualisation, these insights were used to refine the framework. In particular, the analysis clarified actor-level distinctions, internal and external relational dimensions, stage-specific enactment, and interactions among practices in building SCRES. The empirical analysis therefore did more than confirm a framework derived from the literature; it contributed to reshaping and extending that framework. In this sense, the thesis adopts an abductive, theory-informed approach to theory building, in which theoretical ideas guide empirical enquiry and empirical findings, in turn, inform the further development of theory.

3.3 Research Design and Methods

3.3.1 Overview of Methodological Choices

3.3.1.1 Methodological Choice: Qualitative Research

Consistent with the study's relativist–interpretivist philosophical positioning, this thesis adopts a qualitative methodological choice to examine how DHRCs are developed and enacted to enhance SCRES in organisational contexts. Qualitative research is appropriate where the aim is to understand meaning, interpretation, and context-specific processes, rather than to measure variables or test universal relationships (Bryman and Bell, 2011; Easterby-Smith et al., 2018). Given that resilience and capability enactment are embedded in everyday practices and shaped through interaction, a qualitative orientation enables in-depth engagement with organisational actors' accounts and allows the study to capture how managers, employees, and teams make sense of disruptions and translate these interpretations into resilience-related actions (Schwandt, 1994; Stake, 1995).

3.3.1.2 Research Type: Integrated Multi-Method Qualitative Design

This research adopts an integrated multi-method qualitative design, integrating a SLR and a multiple case study. Although both components are qualitative in nature, they serve distinct yet complementary purposes that collectively enhance the study's theoretical depth and empirical validity. The SLR provides a theory-informed conceptual grounding by consolidating and critically evaluating prior research, while the case study phase enables inductive theory building through contextually grounded empirical explanation (Saunders et al., 2019; Tranfield et al., 2003; Eisenhardt, 1989). The overall design therefore follows a deductively informed, inductive theory-building sequence: insights from the SLR inform the initial conceptual framing and sensitising concepts, which are then elaborated and refined through empirical

investigation of how capabilities and resilience practices are enacted across organisational settings (Blumer, 1954; Eisenhardt and Graebner, 2007).

3.3.1.3 Research Strategy: Systematic Literature Review and Multiple Case Studies

To operationalise the integrated design, the thesis adopts two complementary research strategies. First, an SLR is used to systematically locate, evaluate, and synthesise relevant literature on SCRES and human related factors, following established evidence synthesis principles in management research (Tranfield et al., 2003; Denyer and Tranfield, 2009). Second, an interpretive multiple case study strategy is employed to generate in-depth understanding of capability development and enactment in context and to enable comparison across cases, thereby strengthening theory-building through replication logic and cross-case synthesis (Yin, 2018; Stake, 1995; Eisenhardt, 1989). Together, these strategies provide both conceptual clarity and empirical richness, creating a robust foundation for developing an extended theoretical explanation of DHRCs in the SCRES context. The key procedural steps for the review and case study components are outlined in Sections 3.3.2 and 3.3.3 respectively.

3.3.2 Systematic Literature Review Methodology

This section briefly outlines the review procedure that supported the conceptual phase of the study. Although the SLR findings are integrated into Chapter 2 (Literature Review), the key procedural steps are reported here to ensure methodological transparency. The SLR was conducted as the first phase of this research, aiming to synthesise existing knowledge on human related factors for enhanced SCRES and to identify theoretical and empirical gaps that guided the design of the subsequent multiple case study. Accordingly, the review functioned as a theory-informing stage that provided an evidence-based foundation for the subsequent case study design.

3.3.2.1 Question Formulation

The initial step in conducting a SLR, as outlined by Tranfield et al. (2003) and Denyer and Tranfield (2009), involves defining the scope of the study and clarifying the research questions, to eliminate ambiguity. As outlined in the previous section, our main research aim is to consolidate existing literature on human-related factors that contribute to enhanced SCRES. Three main research questions are posed. These research questions guide the identification of decision-making competencies required for enhancing SCRES.

3.3.2.2 Locating Studies

The second step of a SLR is to locate and select relevant studies (Denyer and Tranfield, 2009). To minimise bias and ensure comprehensive coverage of previous literature, this study searched three major online academic databases: Scopus, Web of Science, EBSCOhost. These databases were selected based on their accessibility through academic institutions, their extensive coverage of management literature (Ali et al., 2017; Ali and Gölgeci, 2019; Han et al., 2020) and their frequent use in similar systematic reviews. Consistent with established SLR procedures, a set of search terms was defined based on the main research aim and the proposed research questions (see Table 3.3.2.2). For example, searches included combinations such as “supply chain resilien*” AND “social capital"; “supply chain resilien*” AND “relational capital"; and “supply chain resilien*” AND “human capital”, among others. The advanced search function of each database was used to query these terms across keywords, abstracts and titles.

Table 3.3.2.2 Search Terms Used for the SLR

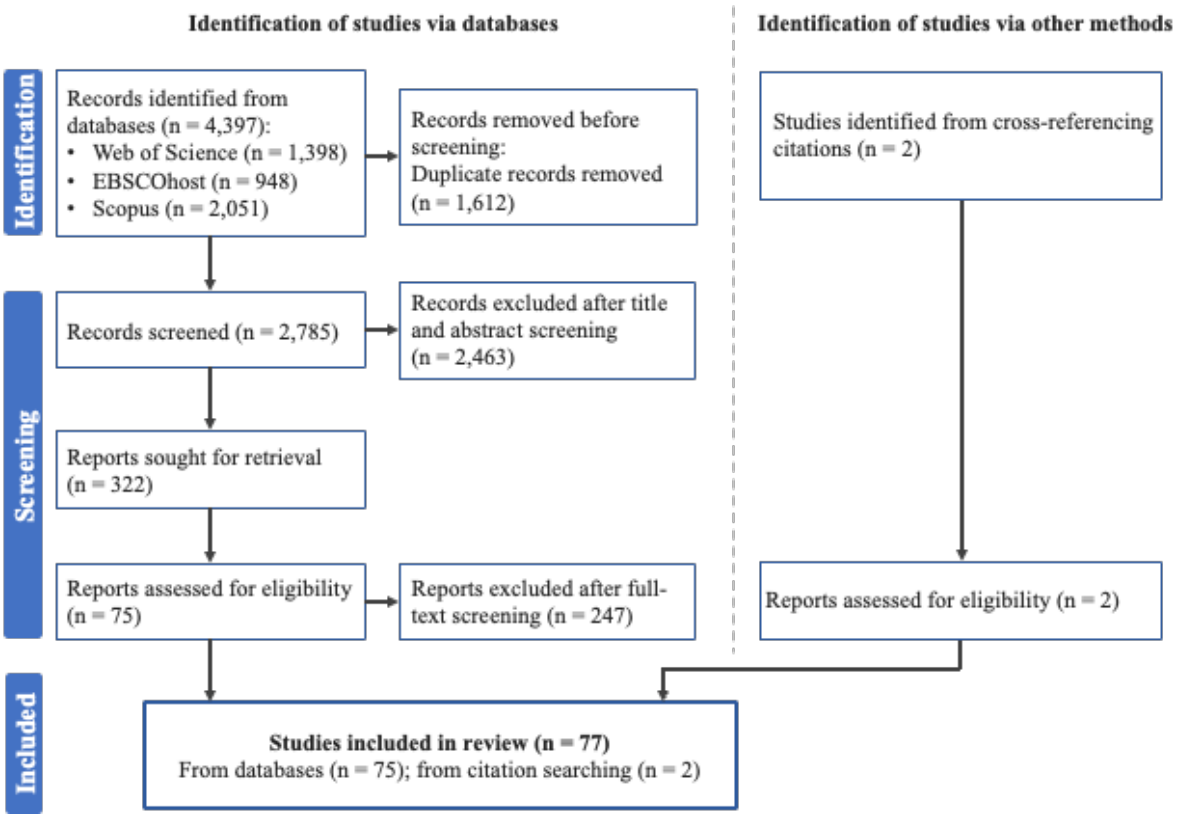
Alternative Terms for “Supply Chain Resilience”		Terms for "Human Related Factors" and "Dynamic Managerial Capabilities"
“Supply chain resilien*” OR “supply chain risk” OR “supply chain disruption”	AND	“Social capital” OR “Relational capital” OR “Social network” OR “personal network” OR “Guanxi”
“Supply chain resilien*” OR “supply chain risk” OR “supply chain disruption”	AND	“Human capital” OR “Skills” OR “Education” OR “Experience” OR “Training”
“Supply chain resilien*” OR “supply chain risk” OR “supply chain disruption”	AND	“Cognit*” OR “Perceptions”
“Supply chain resilien*” OR “supply chain risk” OR “supply chain disruption”	AND	“Employees” OR “Staff” OR “Workers” OR “Teams”
“Supply chain resilien*” OR “supply chain risk” OR “supply chain disruption”	AND	“Managers” OR “Leaders”

The inclusion of guanxi as a search term warrants further clarification. Guanxi represents a culturally embedded form of relational exchange that is closely associated with social capital and is widely discussed in Chinese business and SC contexts. Including this term enhanced the comprehensiveness of the search by capturing studies that may examine trust, reciprocity, relational ties, and personal networks through this context-specific concept. Its inclusion therefore enabled culturally embedded manifestations of social capital to be represented in the review without restricting the scope of the SLR to the Chinese context.

3.3.2.3 Studies Selection and Evaluation

To identify the most relevant studies, this review adopted the PRISMA framework (Liberati et al., 2009; Moher et al., 2010), including the PRISMA 2020 guidance (Page et al., 2021), as illustrated in Figure 2. Together with clearly defined inclusion criteria (see Table 2), PRISMA ensured transparency and consistency throughout the review process (Denyer and Tranfield, 2009). Following the protocol, the search covered publications available up to May 2026. The three database searches returned 4,397 records in total. After duplicate removal, 2,785 records were screened by title and abstract, of which 322 were retained for full-text assessment. Of these, 75 met the inclusion criteria, and two further highly relevant studies were identified through citation tracking, bringing the final number of included studies to 77. These articles were then analysed and coded to address the research questions.

Figure 3.3.2.3 PRISMA Flow Diagram of the Study Selection Process



Notes: The flow diagram follows the PRISMA 2020 guidance for reporting systematic reviews (Page et al., 2021).

Table 3.3.2.3 Inclusion Criteria for this SLR

Inclusion Criteria	Rationale
Papers must be published in peer-reviewed journals.	Ensures that the review incorporates credible and scholarly sources, thereby enhancing the quality and reliability of the findings.

Papers must be published in English.	English is the primary language for academic publishing and research dissemination in SCM.
Papers must have full text available.	Full-text access enables detailed assessment of a study's quality, relevance and practical implications.
Papers must focus on SCRES, SC risk mitigation, or disruption management, with an emphasis on human-related factors.	Ensures that the included papers directly address or contribute to understanding how SCRES is developed at the individual or team level.
Papers must be relevant to at least one of the themes of social capital, human capital, or cognition within SCM.	Aligns the selected studies with the review's research topic, theoretical lens and objectives.

3.3.2.4 Analysis and Synthesis

The objective of this stage is to analyse and synthesise the full content of the 77 selected studies, in order to generate new insights and advance theoretical understanding (Denyer and Tranfield, 2009). Various synthesis approaches are available in SLRs, including aggregation, integration, interpretation, and explanation (Thomé et al., 2016). Given the aim of consolidating evidence from multiple studies to address the research questions, this study adopts the integration approach (Rousseau et al., 2008). To ensure the reliability and consistency of the data analysis, the coding process was conducted iteratively using the NVivo 12 software, which facilitated the extraction, organisation and interpretation of relevant data. To enhance analytical rigour and inter-coder reliability, the coding framework and emerging themes were iteratively discussed and reviewed with the co-authors, consistent with SLR guidance (Denyer and Tranfield, 2009).

In the initial stage, analytical memos were created to summarise each of the 77 selected papers. This stage primarily focused on extracting essential information, including article titles, authors, publication years, journal sources, focal industries, theoretical foundations, research methods and main research topics. In the second stage, coding was conducted based on the framework of DMC theory, centred on three key themes: social capital, human capital, and cognition (see Table 3 for the sample codebook). Three corresponding nodes were created in NVivo 12, where relevant content was coded and categorised accordingly. Taking social capital as an example, this study adopts the definition by Nahapiet and Ghoshal (1998) as "*the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit*". In line with this definition, related terms such as "relational capital," "social network," "personal network," and "Guanxi" were also included to ensure comprehensive coverage (Fan and Stevenson, 2019; Piriyawatthana, 2020; Daghar et al., 2021; Aslam et al., 2022; Nikookar and Yanadori, 2022a; Nikookar et al.,

2026). For instance, Mubarik et al. (2022) describe relational capital as "*the quality of relationships among SC members*", emphasising its importance in mitigating risks and enhancing coordination during disruptions. All studies addressing such relevant constructs were coded under the corresponding themes of social capital, human capital and cognition.

Table 3.3.2.4 Codebook Sample

Theme 1: Social Capital
Code 1.1: Trust
Definition: The belief in the good intent and concern of partners, combined with confidence in their competence, reliability, and openness (Mishra, 1996), which supports social-capital-based coordination and resilience in supply chains (Johnson et al., 2013; Yang et al., 2024).
Examples: Trust-building; trustworthiness; trust-based relationships.
Instructions: Assign this code when a study examines trust as a component, dimension or practice of social capital in relation to SCRES.
Theme 2: Human Capital
Code 2.1: Training and Education
Definition: Formal training and education through which individuals acquire transferable knowledge and skills that can support risk identification, problem-solving, and adaptive responses in SCRES contexts (Becker, 1962; Nikookar and Yanadori, 2022a).
Examples: People training; employee training; formal education.
Instructions: Assign this code when a study examines training and education as components or practices of human capital in relation to SCRES.
Theme 3: Cognition
Code 3.1 Managers' perception
Definition: Managers' perception refers to the cognitive processes through which managers interpret external stimuli, evaluate disruption-related risks and opportunities, and shape decisions and actions (Zsidisin and Wagner, 2010; Helfat and Peteraf, 2015; Nikookar and Yanadori, 2022a).
Examples: SC managers' perception of SC disruption; managers' perception of risks and opportunities; managerial cognitive styles; managers' risk attitude.
Instructions: Assign this code when a study examines managers' perception as a component or practice of cognition in relation to SCRES.

In the third stage, the focus shifted to coding the specific practices that support each of the three main themes. During the coding process, it was observed that previous studies use varying terms such as "dimension" (Prasad et al., 2015), "competence" (Wieland and Wallenburg, 2013), "antecedent" (Alghababsheh and Gallear, 2020), and "practice" (Daghar et al., 2023) to describe resilience-related elements. To ensure conceptual clarity and analytical consistency, this study adopts "practice" as the standardised term to represent these sub-nodes of the three main themes: social capital, human capital, and cognition. These sub-nodes reflect recurring behavioural and relational patterns that underpin the development of SCRES. Taking social capital as an example, key elements frequently discussed in the context of SCRES, namely trust, reciprocity, communication, and cooperation, were identified. Initially treated as

individual sub-nodes, these elements were refined through an iterative review to enhance conceptual consistency. For instance, the category “trust” grouped related terms such as “trust-building” and “trustworthy relationships,” while “reciprocity” encompassed expressions like “reciprocal support” and “mutual benefit.” This iterative process resulted in four primary practices under social capital. A similar approach was applied to human capital and cognition. Notably, prior studies generally distinguish human capital from cognition, with experience mainly conceptualised as part of human capital. However, some studies also position experience within employees’ cognitive attributes. We therefore retained this limited overlap in coding while clarifying in the synthesis that human capital reflects accumulated knowledge, skills, and experience, whereas cognition reflects interpretive and judgement processes.

The final stage of the SLR was data synthesis, in which the coded data were analysed to uncover cross-study patterns, themes, and relationships. This stage served to address the research questions, highlight existing knowledge gaps, and generate meaningful insights that contribute to the theoretical and practical understanding of SCRES. An iterative coding process was employed throughout, during which the researchers continuously refined and adjusted the coding framework while working through the 77 selected studies.

3.3.2.5 Presentation of Results

The results of the SLR are presented and discussed in Chapter 2, which provides a comprehensive synthesis of existing research on human related factors for enhanced SCRES. The SLR identified three major categories of human-related capabilities, social capital, human capital, and cognition, each encompassing distinct practices that enable organisations to anticipate, respond to, and recover from disruptions. These categories collectively informed the development of the conceptual framework underpinning this thesis.

In line with the interpretivist and theory-building orientation of the study, the SLR did not merely summarise existing studies but critically analysed patterns, relationships, and gaps within the literature. It revealed the need to extend the DMC theory beyond the managerial level, leading to the conceptualisation of DHRCs. This theoretical extension highlights the roles of employees and teams, alongside managers, in developing capabilities that contribute to organisational resilience.

The insights derived from the SLR directly informed the design of the multiple case study, particularly in shaping the interview protocols, coding structure, and analytical focus. Thus, the review served both as a conceptual foundation and as a guide for empirical inquiry by informing the interview protocols, initial coding scaffold, and analytical focus of the case study phase.

3.3.3 Empirical Methodology

3.3.3.1 Multiple Case Study Design

This thesis adopts a multiple case study design to develop contextually grounded explanations of how DHRCs are developed and enacted to enhance SCRES. A multiple case study is appropriate where the phenomenon of interest is complex, processual, and embedded in organisational contexts, and where the objective is theory building rather than statistical generalisation (Eisenhardt, 1989; Stake, 1995; Yin, 2018). In line with the study's relativist–interpretivist positioning, the case study strategy enables in-depth engagement with organisational actors' meanings, interpretations, and situated practices, allowing the research to capture how resilience is understood and enacted across different organisational settings (Schwandt, 1994; Easterby-Smith et al., 2018).

3.3.3.2 Case Selection and Sampling

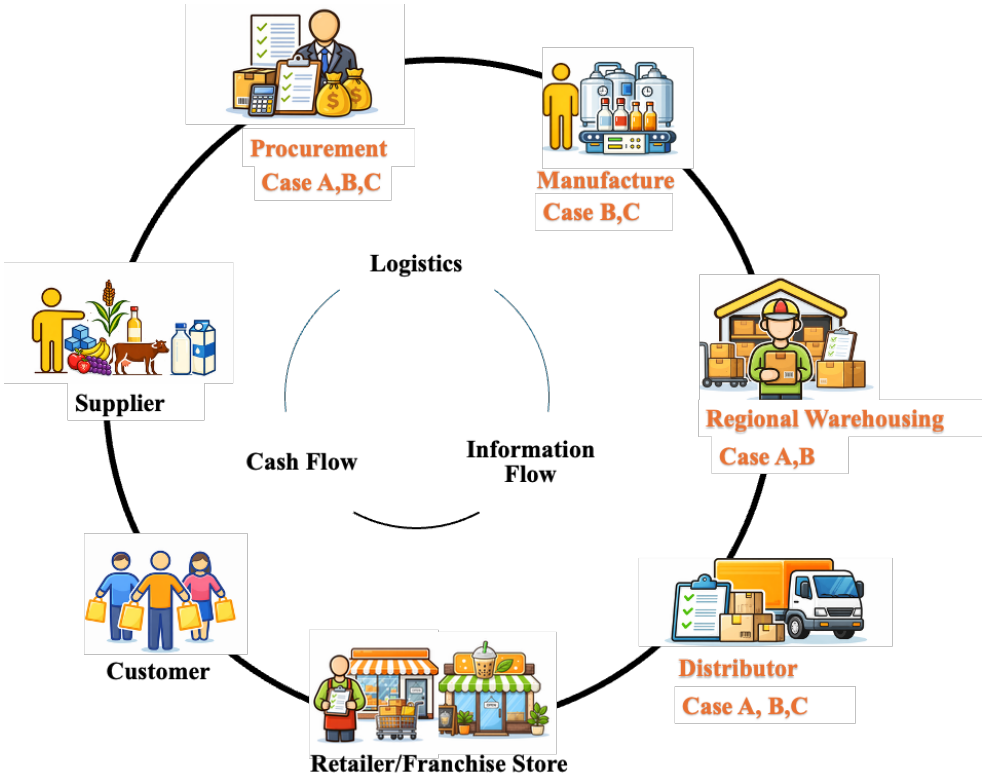
This study employed purposive sampling to select information-rich cases that could illuminate how DHRCs are developed and enacted to enhance SCRES (Patton, 1990; Corley and Gioia, 2004). Case selection was guided by three considerations. First, the cases had to be theoretically relevant to the study's focus on resilience-related capability enactment, meaning that they operated in SC settings characterised by high interdependence, uncertainty, and disruption exposure. Second, the cases were embedded in China's beverage industry, where SCs are characterised by high operational interdependence, time sensitivity (e.g., cold-chain and freshness requirements), and frequent exposure to demand volatility, making this setting well suited to examining resilience-related capability enactment. Consistent with this rationale, the three cases were selected to represent major and structurally distinct segments of the industry: alcoholic drinks (a liquor manufacturer), non-alcoholic packaged beverages (a dairy and beverage manufacturer), and freshly made tea retail (a chain beverage firm). Selecting these three segments enabled comparison across different operational and SC configurations within a common industry setting. Third, the study prioritised organisations where deep access could

be obtained to resilience-related practices across key functions (e.g., procurement, warehousing, logistics and transport, and sales and channel operations), as such cross-functional coverage is essential for capturing how DHRCs are enacted in practice.

Although China provides the empirical and contextual setting for the case study, it is not treated as the theoretical boundary of the DHRC framework. The Chinese context is relevant to the interpretation of the findings, particularly where relationship-based coordination, informal support, and guanxi-related practices shape interactions with SC partners. Nevertheless, the study does not seek to develop a China-specific theory of SCRES. Instead, evidence from Chinese SCs is used to inform and refine a broader framework of dynamic human-related capabilities, while recognising that the specific manifestations and relative importance of these capabilities and practices may vary across cultural and institutional contexts.

Importantly, empirical access in this thesis was obtained primarily at the level of regional operating units and managerial roles with regional responsibilities, rather than at corporate headquarters. For confidentiality reasons, and because standard size indicators (e.g., revenue or total headcount) are typically reported at corporate or group level, the thesis does not classify cases using strict firm-size thresholds. Instead, cases are characterised qualitatively in terms of operational profiles and SC features that are most relevant to the study's theoretical focus. Where relevant, informants were drawn from more than one operating unit or regional area within a case, which enabled comparison of resilience-related practices across sub-contexts within the same organisational system. An overview of the three cases is provided in Table 3.3.3.2. Detailed case descriptions are presented in Chapter 4, while a structured cross-case contextual comparison is provided in Table 5.5 (Section 5.5) to support cross-case synthesis.

Figure 3.3.3.2 Simplified Supply Chain Structure of Case Firms



Note: Yellow-highlighted labels represent functions specific to Case Firms

Potential case firms were identified through the research team's existing network of industry professionals. Initial contact was initiated via private messages to key individuals to assess whether their organisation met the study criteria and to confirm willingness to participate. The invitation outlined the research objectives, introduced the research team, and clarified the anticipated time commitment from managers and employees. Following initial interest, the primary contact discussed participation with a senior manager to secure organisational approval. Once access was confirmed, the research team worked with the contact to identify key informants across functions and hierarchical levels and to coordinate site engagement where feasible. Sampling continued iteratively as analysis progressed, with additional informants (and, where relevant, additional operating units within a case) identified to elaborate emerging concepts and strengthen theoretical development (Strauss and Corbin, 1990).

3.3.3.3 Data Collection

The case studies were conducted following established methodological guidelines to support the reliability and validity of the findings (Eisenhardt, 1989; Voss et al., 2002; Yin, 2009). Multiple forms of qualitative data were collected, including semi-structured interviews with

managers and employees and secondary materials, such as company websites, internal documents where accessible, press releases, and news reports. A research protocol guided the data-collection process (Voss et al., 2002; Yin, 2009). It specified the opening and closing scripts, the request to audio-record the interviews, the interview questions and their sequence, and the request for supplementary materials. A research overview and interview guidelines were also provided to each participant in advance to support their preparation (Voss et al., 2002; Yin, 2009).

The primary dataset comprised 27 semi-structured interviews with 20 participants from three case firms. Before formal data collection, two pilot interviews were conducted with senior managers from different companies to assess the clarity, relevance, and practicality of the interview questions and to identify potential problems with the interview protocol (Voss et al., 2002; Yin, 2009). Their operational experience and industry knowledge enabled them to assess whether the questions captured disruption conditions and SC practices in a clear and relevant manner. Based on their feedback, minor, non-substantive changes were made to the wording, sequencing, and follow-up prompts to improve the clarity and flow of the interview protocol (Voss et al., 2002). These changes did not alter the underlying constructs or themes.

Formal data collection was conducted in two waves approximately one year apart to support an iterative case study design (Yin, 2009; Voss et al., 2002). As shown in Table 3.3.3.3, Wave 1 comprised 11 interviews across the three cases. This exploratory phase was guided by the initial SLR-informed conceptual framework, which sensitised the data collection to social capital, human capital, cognition, and their associated practices. Participants were drawn from the principal operational and SC functions relevant to the research questions, including operations, procurement, warehousing, logistics and transport, sales, and general management. This provided initial cross-case and functional coverage and enabled recurring themes, ambiguities, and gaps in the evidence to be identified. Wave 1 concluded after 11 interviews because all three cases and the principal functional areas relevant to the research questions had been represented, while the initial evidence provided sufficiently clear directions for the subsequent stage of data collection. The purpose of Wave 1 was exploratory rather than exhaustive; it was intended to establish initial empirical patterns and identify areas requiring further clarification and investigation.

Following Wave 1, within-case and cross-case analyses were conducted (Eisenhardt, 1989; Miles and Huberman, 1994). The findings informed the refinement of the interview guide and the purposive sampling priorities for Wave 2. In particular, the second-wave interviews examined more closely how DHRC practices were enacted across different actors, internal and external relationships, and disruption stages. Wave 2 comprised 16 interviews, including seven re-interviews with Wave 1 participants and interviews with nine additional participants. The re-interviews enabled emerging themes and earlier interpretations to be explored, clarified, and supported with richer examples. The additional participants extended the functional and relational coverage of the study, particularly in procurement, sales, channel development, and frontline warehousing roles.

The interval between the two waves enabled the researcher to revisit earlier interpretations and gather additional evidence where clarification or further elaboration was required. In this way, the two-wave design supported an abductive research process through iterative movement between the SLR-derived conceptual framework and the emerging case evidence (Dubois and Gadde, 2002; Timmermans and Tavory, 2012; Saunders et al., 2019). The initial framework informed the first phase of empirical enquiry, while the analysis of Wave 1 shaped the questions and sampling priorities for Wave 2. The resulting evidence enabled the DHRC framework to be further explored, refined, and developed rather than simply confirmed. The semi-structured interview guides for both waves are provided in Appendix A. They document the principal interview questions and follow-up prompts used to maintain consistency across interviews while retaining sufficient flexibility to examine case-specific contexts and emerging themes (Voss et al., 2002).

Table 3.3.3.3 Overview of Key Informants and Data Collection

Case Firms	Participants and roles		W1	W2	Data Sources
Case A Beverage chain	FA1	Operation Manager	Yes	Yes	Semi-structured interviews with key informants; Archival documents (news articles, press releases, and firm website)
	FA2	Warehouse Manager	Yes	Yes	
	FA3	Fleet and Transport Supervisor	Yes	Yes	
	FA4	Procurement Officer	No	Yes	
Case B Liquor manufacturer	FB1	Logistics Manager	Yes	Yes	Semi-structured interviews with key informants; Archival documents (news articles, press releases, and firm website)
	FB2	Sales Specialist	Yes	No	
	FB3	General Manager	Yes	Yes	
	FB4	Warehouse Manager	Yes	No	
	FB5	Sales Manager	No	Yes	
	FB6	General Manager	No	Yes	
	FB7	Channel Development	No	Yes	

	FB8	Sales Manager	No	Yes	
	FB9	Warehouse Staff	No	Yes	
Case C Dairy and beverage manufacturer	FC1	SC Manager	Yes	Yes	Semi-structured interviews with key informants; Archival documents (news articles, press releases, and firm website)
	FC2	Sales Manager	Yes	No	
	FC3	Procurement Officer	Yes	Yes	
	FC4	Logistics Officer	Yes	No	
	FC5	Procurement Officer	No	Yes	
	FC6	Sales Manager	No	Yes	
	FC7	Procurement Manager	No	Yes	

Notes: W = waves of data collection; "Yes" indicates that the participant was interviewed in the corresponding wave; "No" indicates that the participant was not interviewed in that wave.

Across the three cases, interviews were conducted with functional managers and employees from diverse hierarchical levels and roles (e.g. operations, inventory, logistics, procurement, and sales), in order to capture distinct perspectives and a more holistic representation of resilience-related resources and capabilities (Voss et al., 2002; Corley and Gioia, 2004). The interviews lasted an average of 60 minutes, and after each interview, the researcher transcribed the interview within 24 hours (Eisenhardt, 1989). Table 3.3.3.3 summarises the key informants and corresponding data collected across the three case firms. To preserve anonymity and confidentiality, the cases are referred to as Case A, Case B, and Case C. Participants are labelled using a case prefix and an index number. Following our coding convention, FA/FB/FC denote participants from Case A/Case B/Case C, respectively (e.g., FA1–FAn, FB1–FBn, FC1–FCn).

The inclusion of three cases enabled replication logic and meaningful cross-case comparison while keeping the study feasible for detailed, process-oriented analysis (Eisenhardt, 1989; Yin, 2009). The cases provided sufficient heterogeneity to examine how DHRC-related practices were enacted under different organisational and SC conditions, while still allowing detailed within-case analysis. Overall, the design balanced depth and comparison and enhanced credibility through triangulation across cases, functions, hierarchical levels, and interview waves.

Supplementary data were collected to verify interview accounts, address gaps in the evidence, and triangulate the findings (Jick, 1979; Scholten and Schilder, 2015). Archival materials were gathered for each case both before and after the interviews. Company websites and internal documents, where accessible, were used to familiarise the researcher with the firms and their operations, while press releases and news articles provided additional contextual evidence concerning disruptions experienced by the case firms.

3.3.3.4 Data Analysis Procedures

The data analysis followed an iterative and systematic process combining within-case and cross-case techniques (Miles and Huberman, 1994; Eisenhardt, 1989).

Each interview was transcribed within 24 hours using iFLYTEK's intelligent speech-to-text software, and the transcripts were cleaned within 48 hours while the researcher's memory of the conversation remained vivid to ensure accuracy and reliability. The interview data were first cleaned and refined in the original Chinese language of the interviews, before translation into English, adhering to strict standards: filler words (e.g., "uh," "oh") were removed, dialectal expressions were standardised, and incomplete sentences were reconstructed to maintain meaning consistency. This approach ensured that linguistic nuances, cultural meanings, and contextual details were preserved during translation and enhanced the traceability of analytic interpretations. As suggested by Temple and Young (2004), van Nes et al., (2010), and Squires (2009), analysing and refining qualitative data in the source language prior to translation helps maintain semantic accuracy and reduces interpretive bias. Similar to Santos et al., (2015), who emphasised that translation conducted after initial analysis preserves the richness and contextual meaning of qualitative data, this "source-language-first" process enabled a more faithful representation of participants' intentions and improved the reliability of subsequent coding and interpretation.

After the first phase of interviews, the researcher began the initial stage of coding and analysis. The first-cycle coding (open coding) involved reading each transcript multiple times and assigning initial codes to relevant sentences or short paragraphs that addressed the research questions (Scholten and Schilder, 2015). A preliminary set of sub-factors, such as trust, reciprocity, communication, and cooperation, derived from the SLR findings was used as a guiding framework for the first phase of coding. This approach facilitated early categorisation while allowing new codes to emerge inductively. A within-case report was then written for each case, integrating descriptive summaries, key quotes, and preliminary interpretations.

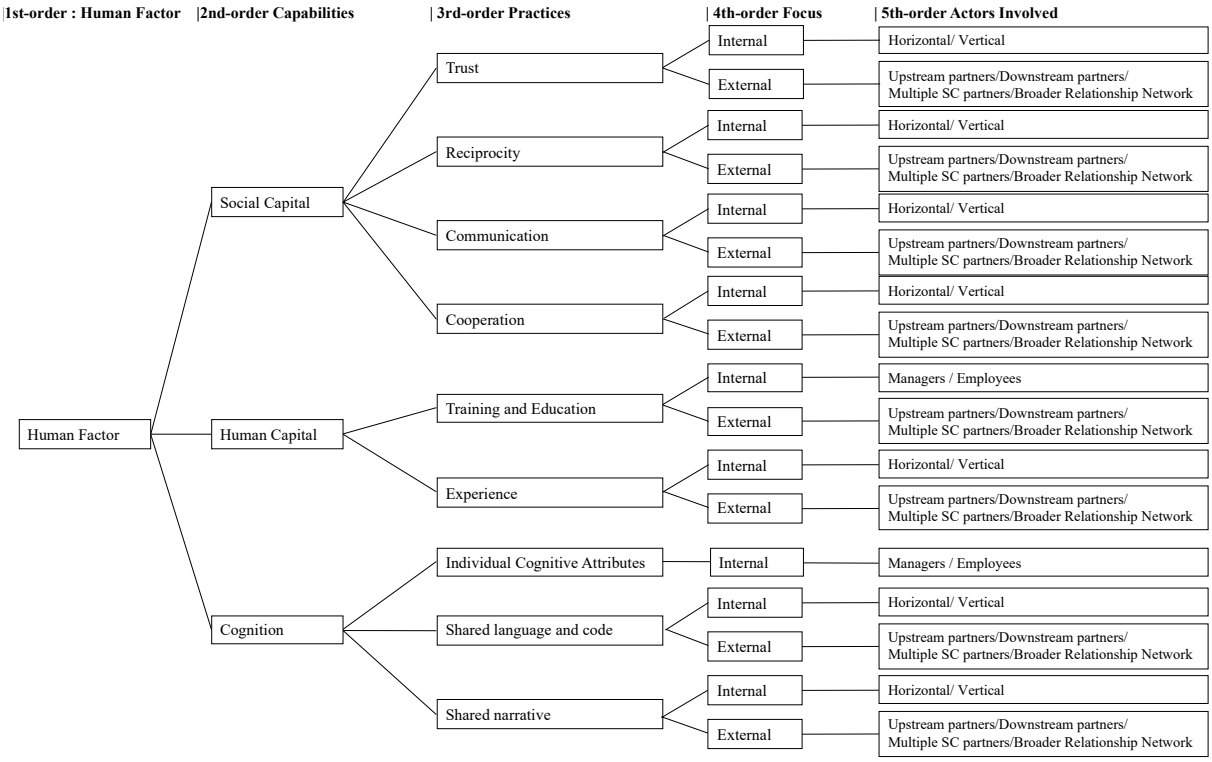
A year later, the second-wave interviews were conducted using updated interview protocols that reflected emerging themes from the first phase. The same transcription and cleaning procedure was followed (within 24–48 hours). After completing all interviews, a new cycle of coding commenced. The researcher iteratively compared new data with the existing coding

structure, refining and merging similar codes. In later coding cycles, deeper hierarchical coding was conducted, distinguishing between internal and external practices and capabilities. Each coding iteration was accompanied by extensive memo writing in NVivo 14, in which the researcher recorded analytical reflections, cross-links, and evolving interpretations for each node.

Appendices B-D collectively provide a transparent overview of the qualitative data-handling process. Appendix B summarises the sequential procedures for transcribing, cleaning, translating, coding, and verifying the interview data. Appendix C demonstrates the step-by-step transformation of a representative interview excerpt, from the original Chinese transcription through cleaning to English translation, illustrating the methodological rigour and transparency of the data-processing procedure. Appendix D presents the comprehensive five-level coding framework (1st-5th order) applied in NVivo 14, outlining how human-related themes were systematically organised into capabilities, practices, focuses, and actors to support the within-case and cross-case analyses discussed in Chapters 4 and 5.

Upon completing the within-case analyses, cross-case comparison was undertaken to identify similarities and differences across case firms and to detect recurring patterns of DHRCs for enhanced SCRES. Meta-matrices were constructed to juxtapose findings from each case (Miles and Huberman, 1994), assemble the evidence for emerging concepts, and ensure replication across cases (Eisenhardt, 1989). Additional mapping was performed in Excel to link emerging themes with the disruption phases of resilience, namely the pre-disruption, during-disruption, and post-disruption phases, and to examine how human-related capabilities were enacted across these phases. Throughout the entire process, the researcher iterated between the empirical data, the SLR-based framework, and the literature on resilience and social capital to refine interpretations and strengthen theoretical grounding (Strauss and Corbin, 1990; Gioia et al., 2013; Eisenhardt, 1989). The overall analytical procedure is illustrated in Figure 3.3.3.4, which summarises the iterative process from transcription and data cleaning to within-case coding, cross-case comparison, memo writing, and theoretical integration.

Figure 3.3.3.4 Framework for Analysing and Presenting Findings



3.3.3.5 Trustworthiness and Research Ethics

To ensure the trustworthiness of the findings, several strategies were employed based on Lincoln and Guba's (1985) criteria: credibility, transferability, dependability, and confirmability, while strictly adhering to the ethical guidelines of Cardiff University.

Ethical Conduct and Data Privacy

This research strictly followed Cardiff University's ethical guidelines for studies involving human participants. Ethical approval was granted by the Cardiff Business School Research Ethics Committee prior to data collection (Reference ID: 2173) (see Appendix E). All participants were provided with a Participant Information Sheet and signed an Informed Consent Form, ensuring their voluntary participation and right to withdraw. To uphold the highest ethical standards, all individual and organisational identities were strictly anonymised using coded identifiers (e.g., FA1, FB2, FC3). No personal or commercially sensitive information was disclosed in the final thesis or publications. This ethical commitment significantly influenced the data triangulation process; while the researcher cross-referenced interview accounts with secondary sources (e.g., official company websites, annual reports, and industry news) to verify the factual consistency of disruption events, these sources are not directly cited or listed in the references to prevent any inadvertent identification of the case

companies. During translation and data presentation, cultural sensitivity and linguistic fidelity were carefully maintained to ensure participants' perspectives were accurately represented. The research process complied with the UK General Data Protection Regulation and the university's Data Protection Policy.

Credibility and Data Triangulation

Credibility was established by ensuring that the voices of practitioners were accurately represented. The researcher conducted data triangulation by comparing primary interview data with the aforementioned secondary background materials. This process helped to mitigate recall bias and ensured that the described organisational responses aligned with the actual timelines of the disruptions.

Dependability and Peer Debriefing

To ensure dependability, a clear audit trail was maintained. The coding process and the development of the DHRCs framework were subject to regular peer debriefing through supervisory meetings. During these sessions, supervisors acted as external auditors, critically reviewing the coding logic and ensuring that the emerging themes were firmly grounded in the raw data rather than reflecting researcher bias.

Confirmability and Iterative Self-Checking

Confirmability was supported through iterative self-checking (intra-coder reliability). Over several months, the researcher repeatedly revisited the transcripts and coding protocol to verify that codes were applied consistently across all cases. This reflexive approach helped ensure that the interpretations remained grounded in the data and that the findings could be traced back to the original empirical material.

3.4 Chapter Summary

This chapter has established the methodological foundations of the thesis by first clarifying its philosophical positioning and then detailing the research approach and methods used to examine how DHRCs are developed and enacted to enhance SCRES. The study is situated within an interpretivist paradigm, adopting a relativist ontology and interpretivist epistemology, which recognises that resilience and capability enactment are socially constructed, context-dependent, and may vary across firms, roles, and SC settings. This positioning justifies

prioritising organisational actors' meanings, interpretations, and everyday practices when theorising DHRCs and SCRES.

Building on this philosophical stance, the chapter explained the research logic as a deductively informed, inductive theory-building approach. Here, "deductively informed" does not imply hypothesis testing; rather, it refers to using prior literature to establish an initial conceptual grounding and sensitising concepts, while "inductive theory building" refers to developing and refining explanations from empirical evidence through iterative interpretation and comparison.

Methodologically, the thesis adopts a qualitative, integrated multi-method design that combines a SLR and an interpretive multiple case study strategy. The SLR was conducted as the first phase to systematically locate, evaluate, and synthesise evidence on human related factors for enhanced SCRES, following established review procedures and PRISMA reporting logic. It drew on searches across Scopus, Web of Science, and EBSCOhost, applied transparent inclusion criteria and screening, and resulted in 77 included studies. The review then used an integration-based synthesis and iterative NVivo coding to consolidate three core DHRCs domains, social capital, human capital, and cognition, and to standardise "practices" as the organising term for sub-dimensions (e.g., trust, reciprocity, communication, cooperation). The SLR outputs are presented in Chapter 2 and were used to shape the empirical phase by informing the interview protocols, coding structure, and analytical focus.

The empirical component employed a multiple case study design to generate context-rich explanations of DHRCs enactment across three anonymised SC cases in China drawn from the beverage and alcoholic beverage sectors, using purposive sampling to capture functional and hierarchical diversity. Data collection followed established case study guidelines and used a research protocol, two-wave semi-structured interviews, and supplementary archival sources to support triangulation. In total, 27 interviews were conducted across 20 participants, supported by secondary materials (e.g., firm websites, internal documents, press releases, and news). The chapter also detailed the iterative data analysis procedures and measures for research rigour. Interviews were transcribed promptly and processed using a source-language-first approach (Chinese cleaning/refinement prior to English translation) to preserve meaning and reduce interpretive bias. Analysis proceeded through multi-cycle coding in NVivo, within-case write-ups, and cross-case comparison using meta-matrices and phase-based mapping

across the pre-disruption, during-disruption, and post-disruption phases, with continuous iteration between data, the SLR-derived framework, and relevant literature to strengthen theoretical integration. Ethical approval, informed consent, anonymisation, secure storage, and GDPR-aligned data handling were also specified to ensure trustworthiness and ethical integrity.

Chapter 4. Descriptive Findings

4.1 Chapter Overview

Chapter 4 presents the descriptive findings from the three case companies. The purpose of this chapter is to provide a case-grounded account of how disruptions were experienced by informants and how resilience-related practices were described within each organisational context. Rather than developing a detailed theoretical comparison at this stage, the chapter focuses on presenting the empirical case narratives with limited theoretical interpretation. It therefore lays the empirical foundation for the within-case and cross-case analysis developed in Chapter 5.

The findings are organised by company to reflect the specific operational contexts, SC structures, and disruption experiences of each firm. For each case, the chapter first outlines the types of disruptions commonly described by informants, before presenting how managers and employees prepared for, responded to, and learned from these disruptions. The descriptive findings are subsequently presented in relation to the main capability domains of social capital, human capital, and cognition and their associated practices, as outlined in Figure 3.3.3.4. This organisation provides consistency with the initial analytical framework while retaining a primary focus on participants' accounts and the specific disruption contexts of each case.

By presenting the cases in this way, Chapter 4 provides a transparent and detailed representation of the empirical evidence, showing how resilience-related practices were enacted in each case context. This descriptive chapter therefore provides the basis for Chapter 5, which moves from case narrative to a more analytical discussion of similarities, differences, and explanations across the three cases.

4.2 Case A - Findings

The descriptive findings for Case A present how managers and frontline employees described their operational routines and disruption-related experiences within a fast-paced beverage company. Drawing on interviews with staff from SC, procurement, logistics, store operations, and sales functions, this section reports the practices they recounted across daily coordination and disruption handling. The findings are organised around social capital, human capital, and cognition, reflecting participants' accounts with limited theoretical interpretation.

4.2.1 Background of Case A

Case A is a beverage chain in China, operating through a large network of franchised stores across multiple regions. The company follows a franchise-based operational model in which individual outlets are managed by franchisees but are required to comply with unified preparation standards, product specifications, and quality control procedures. Beverage products are prepared in small, on-demand batches at store level, supporting product freshness and enabling a diverse menu. To coordinate supply across its nationwide system, Case A uses a centralised procurement structure that consolidates demand and negotiates with key ingredient suppliers. The firm also relies on an integrated cold-chain logistics network to ensure that temperature-sensitive materials, such as dairy products, toppings, and fresh ingredients, are transported under appropriate conditions. Regional distribution centres play an essential role in consolidating inventory, scheduling outbound deliveries, and facilitating timely replenishment to franchise stores, thereby maintaining operational consistency across locations. Case A's SC therefore depends on a stable and trusted supplier base capable of providing a continuous supply of high-quality ingredients, as well as effective coordination among suppliers, distribution centres, and franchise stores. However, the combination of geographically dispersed outlets, freshness-sensitive products, short product life cycles, and fluctuating store-level demand also exposes the company to a range of recurring operational disruptions.

Against this operational background, informants described disruptions mainly in relation to demand volatility, delivery delays, stock shortages, cold-chain interruptions, freshness-related risks, and coordination difficulties involving stores and upstream suppliers. These disruptions were generally recurrent and operational rather than low-probability, high-impact catastrophic events. Nevertheless, even relatively localised disruptions could quickly affect product availability and service continuity because of the time-sensitive nature of the company's products and operations.

Within this operating environment, informants described resilience-related actions as unfolding across pre-, during-, and post-disruption stages. Before disruptions, Case A relied on demand monitoring, supplier communication, inventory preparation, and staff readiness to reduce its exposure to recurring operational problems. During disruptions, rapid internal communication,

frontline judgement, and coordination among stores, suppliers, and distribution centres were used to maintain product availability and service continuity. Following disruptions, managers and employees reflected on recurring problems and adjusted routines, communication practices, and coordination mechanisms to strengthen future preparedness and response.

Figure 4.2.1 Simplified Supply Chain Structure of Case A



Note: Yellow-highlighted labels represent functions specific to Case A.

4.2.2 Social Capital

Social capital refers to the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit (Nahapiet and Ghoshal 1998; Piriyawatthana 2020; Daghar et al., 2021; Aslam et al., 2022; Nikookar and Yanadori 2022a). The following sections illustrate specific real-world examples of the four core practices identified in the field of social capital: trust, reciprocity, communication, and cooperation. Each practice is illustrated with evidence from Case A, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors.

4.2.2.1 Trust

Internal Horizontal Trust

In Case A, horizontal trust among colleagues fostered a safe environment in routine operations, where employees could proactively seek advice and solve problems during disruption handling. Such trust supported rapid peer communication, enabling colleagues to act immediately and propose workable options under time pressure. In one case, a packaging problem was resolved after an employee consulted a colleague who suggested transferring stock from another warehouse. As a result, the disruption was contained and operations continued without delay.

> *"It is important for colleagues in a company to trust and help each other." "When you have difficulties at work, you can talk to colleagues, see what they think, and deal with it." "Once, a batch of goods had packaging issues; a colleague suggested transferring stock from another warehouse, and the problem was resolved." (Warehouse Manager, FA2)*

Internal Vertical Trust

In Case A, vertical trust between managers and employees activated employee-led problem-solving and informal resource mobilisation during disruptions. Managers' trust empowered employees to mobilise resources and respond swiftly in urgent situations. This delegated authority enabled proactive and autonomous action, allowing employees to leverage personal networks to resolve shortages. As a result, operational delays were reduced, improving overall responsiveness.

> *"When you trust someone, you naturally rely on them ... they won't let you down." "Sometimes we need urgent restocking ... One employee had built up a lot of customer contacts and was able to reach out to known channels and solve the issue." (Operation Manager, FA1)*

Additionally, employees are able to make decisions independently and report back to their managers afterwards to maintain timely responsiveness. This trust-based vertical relationship facilitates timely action without procedural delays, while ensuring information alignment and shared accountability, factors critical to operational continuity during disruptions.

"Even though I make the decisions myself, I always report to the leadership afterward... so they can be reassured and know that I can deal with such situations independently." (Warehouse Manager, FA2)

External Trust with Upstream partners

In Case A, mutual trust with long-term suppliers ensured priority supply allocation and flexibility during challenging periods. When facing tight supply or fluctuating demand, trusted suppliers proactively transferred goods from other outlets or adjusted delivery schedules to meet urgent needs. Trust also allowed temporary financial leniency, as suppliers accepted short-term payment delays without jeopardising the partnership. As a result, material shortages were quickly mitigated, maintaining stable production and distribution.

"The trust relationship with suppliers is very important." "Long-term suppliers with good relationships may prioritize supplies, but if the company faces cash flow issues...Short-term delays of one or two months are acceptable but prolonged overdue payments can damage trust." (Operation Manager, FA1)

However, in Case A, close personal relationships between lower-level managers and suppliers sometimes created risks of corruption and reduced transparency. Such familiarity occasionally resulted in preferential treatment for certain suppliers, weakening fairness in procurement and potentially undermining overall SCRES. To mitigate these risks, the company implemented a rotation system. While this policy reduced the possibility of collusion, it also caused short-term declines in collaboration and responsiveness during urgent situations.

"The headquarters has a dedicated team responsible for communicating with suppliers and various stores. The branches are not directly responsible for these matters." "A rotation system is implemented..., which can prevent corruption." "Unfamiliar relationship may not go out of their way to help in an emergency, and new managers may require time to acclimate." (Operation Manager, FA1)

External Trust with Broader Relationship Network

In Case A, trust with industry peers provided access to informal information channels. During the pre-disruption stage, managers used these trusted exchanges to anticipate changes and

adjust procurement decisions in advance. As a result, the firm reduced its exposure to potential supply risks and prepared more effectively for upcoming disruptions.

> *"Sometimes I'll ask a friend, like someone in sales, for advice, especially when prices fluctuate. I trust their judgment and weigh it when making purchasing decisions." (Operation Manager, FA1)*

4.2.2.2 Reciprocity

Internal Horizontal Reciprocity

Horizontal reciprocity among colleagues facilitated mutual support and timely problem resolution during disruptions. Employees engaged in everyday acts of reciprocal assistance, such as correcting mistakes and sharing workload, which strengthened collective reliability under operational pressure. When a delivery vehicle broke down, colleagues helped transfer goods to another vehicle to ensure on-time delivery. As a result, urgent tasks were completed without delay, maintaining service continuity.

> *"My truck broke down on the road and I urgently needed help. I contacted my colleagues, and they finished their own tasks and came over right away to help me transfer the goods to another vehicle. We delivered to the customer on time." "I help him too when he's busy... Even with things like loading the wrong goods, we remind each other." (Fleet and Transport Supervisor, FA3)*

External Reciprocity with Upstream partners

In Case A, external reciprocity with upstream partners enhanced SC flexibility by fostering mutual support arrangements that enabled timely adjustments and coordinated responses under disruption. When reciprocal relationships were well established, suppliers were more willing to prioritise the firm's needs and adjust resources under changing market conditions. Partners also adapted delivery arrangements or reallocated stock to help resolve urgent shortages. As a result, response times improved and order fulfilment became smoother during disruption periods.

> *"If you have a good relationship with them, they'll definitely prioritize your orders and try to reserve some stock for you first." "We'll help them sell those products... we can*

help recommend or distribute for them... this kind of mutual support has always been part of our cooperation." (Operation Manager, FA1)

Moreover, reciprocal understanding with upstream partners helped both parties absorb short-term shocks and maintain continuity under financial strain. For example, when Case A itself faced funding delays, suppliers offered financial flexibility.

"I just told him (supplier) directly... he said it was fine to pay part of it next month. With mutual trust, problems are easily resolved." (Operation Manager, FA1)

External Reciprocity with Downstream partners

In Case A, reciprocity also extended to interactions with franchise store staff, where frontline employees fostered goodwill through small supportive gestures. These informal exchanges, such as helping store staff with routine tasks or accommodating minor requests, strengthened day-to-day collaboration. Such reciprocal interactions reduced coordination friction at the customer interface and improved response times when urgent issues arose. As a result, communication with franchise stores became smoother and service problems were resolved more quickly.

"When we see them moving goods, we'll offer to lend a hand... These small gestures leave a good impression, and if they run into small issues, they tend to be more understanding and cooperative." (Fleet and Transport Supervisor, FA3)

4.2.2.3 Communication

Internal Horizontal Communication

In Case A, horizontal communication enhanced responsiveness by enabling real-time information sharing and collaborative problem-solving among colleagues. Through open exchanges, employees quickly addressed uncertainties and made informed decisions in unfamiliar situations. As a result, operational tasks were completed smoothly, and adaptive capability was reinforced at the frontline.

"When some raw material suppliers were moving into our warehouser... I was new and unsure if these materials could be stored directly, so I asked a colleague. He advised me on the matter ...." (Warehouse Manager, FA2)

In Case A, horizontal communication supported both proactive coordination before disruptions and collective learning afterward. Daily meetings and advance discussions helped employees anticipate potential issues and align tasks efficiently, reducing operational uncertainty. Following disruptions, colleagues exchanged feedback and shared experiences to turn individual lessons into common practices that improved future responses. As a result, task execution became more consistent, and employees handled subsequent disruptions more effectively.

"We have a short morning meeting every day to summarize problems encountered the previous day and share experiences. Then we plan the tasks for the day, everything is communicated in advance, and coordination among colleagues works well" (Operation Manager, FA1)

Internal Vertical Communication

In Case A, vertical communication enabled quick coordination and response during disruptions. Emergencies such as stock shortages, vehicle breakdowns, or delivery accidents were reported immediately to supervisors or senior leaders, who arranged rapid solutions including activating backup suppliers or dispatching spare vehicles. Employees also used direct phone calls to accelerate decision-making and provided their judgment to leaders before taking action. As a result, urgent issues were resolved promptly, ensuring continuity of delivery and inventory operations.

"Speed is important. In an emergency, direct phone calls are the fastest way to communicate." (Operation Manager, FA1)

"If the van breaks down on the road, communicate with the company leader in a timely manner, and then send a spare car to ensure that the goods are delivered in the shortest time." (Fleet and Transport Supervisor, FA3)

"If we're short on stock, we escalate the issue right away and contact management to see if shipment can be prioritized." (Warehouse Manager, FA2)

External Communication with Upstream partners

In Case A, external communication with upstream partners supported proactive coordination in the pre-disruption stage. Employees maintained regular contact with equipment and logistics suppliers to discuss operational needs, plan warehouse adjustments, and coordinate delivery schedules. Through early phone calls and WeChat communication, they secured advance arrangements such as prioritised shipments and early stockpiling when tighter supply was anticipated. As a result, the firm prepared earlier for potential shortages and reduced the risk of supply disruption.

"Communication with partners who provide warehousing-related equipment is very important in normal times... Understand their needs, such as what modifications they need when they move into the warehouse, and what matters require our cooperation, etc." (Warehouse Manager, FA2)

"They called me in advance to say their future delivery schedule might be tight ... asked if we wanted to stock up earlier." (Procurement Officer, FA4)

External Communication with Downstream partners

In Case A, communication with downstream franchise retailers promoted rapid information sharing, swift coordination and quick response during disruptions. When urgent replenishment requests arose, employees shared inventory and dispatch information instantly through group chats, allowing rapid decision-making and avoiding delays caused by information gaps. Moreover, when transportation issues such as traffic jams or vehicle breakdowns occurred, employees informed stores to explain the situation. This transparency helped retailers understand the problem and adjust their arrangements quickly, reducing potential conflicts and ensuring smoother coordination. As a result, this instant communication reduced information asymmetry, safeguarded continuity, and strengthened Case A's capacity to respond effectively under pressure.

"If a store suddenly requests a replenishment, everything is updated in our WeChat group, inventory, order dispatch, it's all shared in real time. We message or call immediately. Especially during holidays or peak seasons, good communication is crucial". (Procurement Officer, FA4)

"If there is a traffic jam or a vehicle breaks down on the road, we will notify the store ... and explain the reason. We will send the corresponding pictures or videos, and they can understand this special situation." (Fleet and Transport Supervisor, FA3)

<u>External Communication with Multiple SC partners</u>

In Case A, external communication with both upstream suppliers and downstream partners supported rapid coordination during disruptions. When urgent issues such as inventory shortages or delivery delays occurred, employees contacted the responsible person directly or requested managers to coordinate on their behalf. Information was shared instantly through phone calls and WeChat messages, enabling partners to act quickly on replenishment or delivery adjustments. As a result, operational disruptions were contained and alignment across the SC was maintained under pressure.

"We usually send our requests immediately, and if the other party finds it reasonable, they act quickly. Whether it's upstream suppliers or downstream stores, communication flows smoothly." (Warehouse Manager, FA2)

"Everything is updated in our WeChat group, inventory, order dispatch ... communication is especially important during peak periods." (Procurement Officer, FA4)

4.2.2.4 Cooperation

<u>Internal Horizontal Cooperation</u>

In Case A, internal cooperation during disruptions enabled rapid cross-functional coordination and collective problem-solving. When unexpected issues occurred, such as vehicle breakdowns, packaging defects, or warehouse overload, departments communicated immediately and mobilised resources to maintain operations. Teams jointly arranged solutions including reallocating inventory, rescheduling deliveries, and dispatching alternative vehicles. As a result,

disruptions were contained quickly and customer service levels were preserved under operational pressure.

> *"When disruptions occur, multiple departments are involved. The sales team contacts the customer, operations arrange vehicle repair or replacement, and if needed we coordinate temporary vehicle providers or reroute deliveries." (Operation Manager, FA1)*

> *"One time the warehouse had too much incoming stock and couldn't handle it during the day. We, purchasing, warehouse, and delivery teams, quickly held a temporary meeting to reschedule the delivery rhythm." (Procurement Officer, FA4)*

However, emotion affected cooperation in Case A. The escalation from conflict to physical confrontation indicates a breakdown in collaborative interaction between warehouse and delivery personnel. Rather than working together to handle disruption-related pressure, unmanaged emotion contributed to relationship breakdown and immediate coordination failure, which then disrupted the delivery schedule.

> "A new colleague in the warehouse … got into a fight with the delivery team … it disrupted the delivery schedule that day." (Procurement Officer, FA4)

External Cooperation with Upstream partners

In Case A, external cooperation with upstream partners strengthened preparedness in the pre-disruption stage by supporting early coordination. Through long-term collaboration and routine mutual assistance, employees and suppliers developed working relationships that enabled smoother communication and quicker agreement on emerging issues. This continuity of cooperation created familiarity and reduced uncertainty, making partners more willing to share early information and take pre-emptive actions when initial warning signs appeared. As a result, Case A was better positioned to prepare for potential shortages and adjust plans in advance.

> *"It's definitely the mutual trust gradually built up through daily cooperation." (Operation Manager, FA1)*

"I think that kind of trust is built gradually over time. Nothing special, just that we've worked together for a long time, help each other when needed, and have a mutual understanding." (Procurement Officer, FA4)

Additionally, proactive information sharing from long-term upstream partners supported early preparation in the pre-disruption stage. Suppliers with long-standing cooperative relationships often shared early warnings about potential risks or upcoming constraints, enabling employees to consider countermeasures in advance. Such early communication also helped the firm adjust plans ahead of time and coordinate more smoothly when disruptions emerged. As a result, the firm entered disruption periods with greater readiness and fewer unexpected operational gaps.

"If it's a long-term partner with a close relationship, they usually tell us in advance. But if it's a supplier we rarely work with or don't have a strong relationship with, they may not tell us proactively." "If they tell us early, we can prepare countermeasures and arrange our responses in advance, and communication will also go more smoothly." (Operation Manager, FA1)

In Case A, long-term cooperative relationships with suppliers supported rapid and flexible responses during disruptions. When urgent shortages occurred, trusted suppliers prioritised deliveries, arranged immediate shipments, or transferred goods from other outlets to help resolve the issue quickly. Employees noted that these partners acted proactively during peak periods or sudden demand spikes, offering faster replenishment based on their familiarity with the firm's needs. As a result, critical supply gaps were bridged rapidly, allowing operations to continue with minimal interruption.

"There was a time when another supplier was out of stock and we were in a hurry to get the goods. At that time, a supplier with whom we have cooperated for a long time and have a very good relationship volunteered to help us transfer goods from other outlets on his side." (Operation Manager, FA1)

"We are indeed long-term customers and have worked with them for many years. They usually agree to prioritize our deliveries and are very cooperative." (Warehouse Manager, FA2)

External Cooperation with Downstream partners

In Case A, external cooperation with long-term downstream partners supported financial flexibility during disruptions. When stable customers faced short-term cash flow difficulties, the firm considered their circumstances and allowed brief extensions on payment deadlines. This arrangement helped maintain ongoing transactions and avoided disruption to downstream relationships. As a result, cooperation continued smoothly and order fulfilment remained stable despite temporary financial pressures.

> *"If it's a long-term and stable partner, we usually take such situations (such situations refer to clients facing temporary financial difficulties, such as short-term cash flow problems) into consideration and offer some flexibility"(Operation Manager, FA1)*

4.2.3 Human Capital

Human capital refers to individual knowledge and skills applied to work (Adner and Helfat, 2003; Nikookar and Yanadori, 2022a). It evolves through experience and education, forming an organisation's competitive edge through its unique and inimitable attributes (Shela et al., 2023; Mubarik et al., 2022). The following sections illustrate specific real-world examples of the two core practices identified in the field of human capital: training & education, and experience. Each practice is illustrated with evidence from Case A, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors.

4.2.3.1 Training & Education

Employees' Training & Education

In Case A, employees received regular safety and emergency preparedness training as part of routine operations. The company organised annual fire safety sessions, transportation safety training, and professional lectures from external specialists, covering practical measures such as fire extinguisher use, designated warehouse safety zones, and safe driving behaviour in adverse weather. Employees noted that repeated drills and instructions improved their familiarity with emergency procedures and strengthened day-to-day safety practices. As a result, staff were better equipped to act appropriately when potential risks arose.

"We pay close attention to safety-related training, teaching them how to respond to emergencies. It's also part of the training assessment to ensure they really master these response skills" (Operation Manager, FA1)

"The company also provides safety training, like regular fire drills … . Sometimes we invite professional safety companies to give lectures on fire prevention and safety awareness to improve our risk awareness and reduce safety incidents." (Warehouse Manager, FA2)

During disruptions, Case A provided training focused on emergency response skills and operational procedures. Employees received instruction on handling vehicle malfunctions, equipment failures, and cold chain breakdowns, enabling drivers to resolve some issues on the road without waiting for company assistance. Training also emphasised timely incident reporting and following transfer procedures to maintain delivery schedules, while frequent meetings helped employees understand cross-departmental response processes such as stabilising inventory and arranging backup stock. As a result, staff reacted more quickly during disruptions and were able to maintain continuity under time pressure.

"We often conduct fire training, vehicle transportation, and equipment-related emergency training..." "Especially in summer, cold chain vehicles are prone to malfunction. After training, drivers can handle some problems without waiting for the company to send a vehicle." (Operation Manager, FA1)"

"When a supply interruption happens, I know which departments to notify first and how to respond... When it actually happens, I just follow the procedure, stabilize inventory, arrange backup stock, and finally report to operations." (Procurement Officer, FA4)

4.2.3.2 Experience

Managers Experience

In Case A, managers noted that experience played an important role in preventive practices before disruptions emerged. Warehouse staff relied on lessons learned through hands-on work to manage tasks such as fire prevention, material handling, and stock arrangement. One

manager recalled an incident in which a rack collapsed due to improper stacking, after which the team repeatedly reinforced height standards and the need to leave space near fire hydrants. As a result, these experiential lessons were incorporated into daily routines and reduced the likelihood of operational risks.

> *"It's mainly experience. In the warehouse, we deal with a lot of management tasks, like fire prevention and material handling, which are mostly learned through practice." (Warehouse Manager, FA2)*

> *"One day, an entire rack collapsed ... I emphasized again that everything must be stacked according to the height standards ... in real warehouse operations, we also rely on experience, for example, leaving space near fire hydrants and not stacking too high." (Warehouse Manager, FA2)*

During disruptions, managers relied on experience to judge situations quickly and respond flexibly. One operations manager described a case in which a long-term supplier delayed raw materials; based on past cooperation, he judged the issue to be temporary and chose to communicate and coordinate rather than escalate. The supplier then prioritised production and expedited delivery of key materials, allowing operations to continue without interruption. As a result, experience helped managers stabilise processes and resolve unexpected problems more confidently.

> *"I feel that with experience, I will be more flexible in dealing with problems. For example, once, there was a delay in the supply of raw materials from the supplier... based on my experience, I judged that we have been cooperating with this supplier for a long time and are quite familiar with each other ... I judged that they might have encountered some temporary problems, so I communicated and coordinated with them first. Later, they gave priority to completing the production of some of our key raw materials and expedited the delivery. Our business was not affected. In addition, ... , strengthen our relationship." (Operation Manager, FA1)*

> *"Communication and coordination with others also rely on methods developed over time through hands-on experience." (Warehouse Manager, FA2)*

Employees Experience

In Case A, employees' experience supported preparedness in the pre-disruption stage by helping staff anticipate operational problems and remain composed when uncertainty emerged. Senior employees drew on accumulated practical knowledge to judge early signs of potential issues and respond calmly, while newer staff were more likely to feel unsure in unfamiliar situations. These experiential insights were incorporated into daily routines and informed how teams prepared for potential risks. As a result, employees entered disruption periods with greater confidence and were less prone to panic when challenges arose.

> *"What matters most is work experience. People with rich experience handle problems more calmly and skilfully." (Operation Manager, FA1)*

> *"They have more experience, more knowledge, and are better able to deal with emergencies. New employees may be a little panicked at the beginning and don't know how to deal with it." (Fleet and Transport Supervisor, FA3)*

During disruptions, employees relied on experience to assess situations quickly and coordinate effective responses under pressure. In one incident, an experienced staff member reacted immediately when a delivery vehicle caught fire, shutting off the fuel and power, extinguishing the flames, and reporting the issue, while a newer employee panicked and did not know how to act. In another case, a procurement officer identified a strange smell in a batch of tea as a warning sign based on past experience and quickly coordinated with the warehouse and quality control to confirm the issue. As a result, disruptions were contained rapidly, and both operational continuity and product integrity were maintained.

> *"Once at one of our stores, ... a new employee was delivering goods ... , the vehicle suddenly caught fire. He panicked and didn't dare to do anything. Luckily, an experienced senior employee was nearby. He immediately shut off the fuel and power, grabbed a fire extinguisher, put out the fire, and called the company to report the situation. The new employee, lacking experience, just stood there not knowing what to do. So, in such cases, experienced staff can react quickly and handle things swiftly and properly." (Operation Manager, FA1)*

"I think for this purchasing role, especially when it comes to communication and coordination, I've mostly learned those through actual work experience." (Procurement Officer, FA4)

"There was one time a store suddenly reported that a batch of delivered tea had a strange smell … That immediately raised a red flag for me … Normally, tea having an off smell is rare, so when it does happen, you know something's wrong … That relied on both testing and experience … I quickly coordinated with the warehouse and quality control to confirm the problem." (Procurement Officer, FA4)

4.2.4 Cognition

Cognition in this study encompasses both individual mental representations, those that shape decision-making through perception by giving meaning to the environment (Adner and Helfat, 2003; Helfat and Peteraf, 2015; Nikookar and Yanadori, 2022a), and shared cognition, which emerges from collective interpretations and meanings that enable SC partners to interpret disruption signals and coordinate responses (Nahapiet and Ghoshal, 1998; Fan and Stevenson, 2018; Ozanne et al., 2022; Daghar et al., 2023). The following sections illustrate specific real-world examples of the three core practices identified in the field of Cognition: individual cognitive attributes, shared codes and language, and shared narratives. Each practice is illustrated with evidence from Case A, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors.

4.2.4.1 Individual Cognitive Attributes

Managers' Cognitive Attributes

In Case A, managers demonstrated risk awareness by monitoring market changes and identifying operational vulnerabilities in advance. They adjusted inventory levels according to sales patterns while avoiding excessive stockpiling, and carried out routine patrols to check safety conditions across the facility. These actions helped detect potential issues early and supported preventive measures before disruptions occurred. As a result, operational risks were reduced and continuity was better protected.

"We need to have some risk awareness. We usually arrange active patrols in the park and check the safety of various systems from time to time to minimize the source of danger." (Warehouse Manager, FA2)

During disruptions, managers demonstrated situational assessment by adjusting their actions according to the urgency and complexity of emerging issues. When problems involved multiple departments or unclear causes, they assessed the overall situation first and coordinated with other managers to decide the next steps. For simpler or safety-related incidents, managers acted immediately by giving direct instructions and explaining the risks to on-site staff. As a result, disruptions were handled in a timely and orderly manner.

"If it's urgent or complex, I'll consider the big picture first and then break it down step by step. For smaller, clearer issues, I just handle them in steps right away for higher efficiency." "If the problem is complex or involves multiple departments, we'll discuss it with other department heads and find the most appropriate solution together." (Operation Manager, FA1)

Employees' Cognitive Attributes

Employees in Case A demonstrated sensemaking by observing daily warehouse conditions and noticing early signs of potential safety hazards. They conducted regular inspections and maintenance checks, including during off-peak hours, to identify issues that could threaten the safe storage of goods. These observations guided their preventive actions and helped address risks before they developed into operational problems. As a result, safety conditions were stabilised and routine activities continued without disruption.

"Risk management and safety awareness of our employees are also very important and need to be continuously improved. We have a lot of goods in our warehouse and safety hazards cannot be ignored, so regular inspections and maintenance are required, even during off-peak hours." (Warehouse Manager, FA2)

4.2.4.2 Shared Language and Code

Internal Horizontal Shared Language and Codes

Shared language and codes in Case A enabled employees to communicate quickly and coordinate actions without lengthy explanation during disruptions. Commonly used terms, such as instructions for prioritising urgent deliveries or reminders for routine inventory checks, were immediately understood across teams and triggered corresponding actions. These shared expressions reduced ambiguity and allowed staff to adjust tasks rapidly under time pressure. As a result, operational decisions were executed more quickly and coordination across functions became more efficient.

> *"At the end of each month, we say, 'inventory check, inventory check,' and everyone knows it's time … they stay behind to input the data into the computer." (Warehouse Manager, FA2)*

> *"When we say, 'urgent order,' everyone immediately knows it means top priority … the delivery team instantly understands and handles that order first." (Procurement Officer, FA4)*

4.2.4.3 Shared Narrative

Internal Horizontal Shared Narrative

In Case A, shared narratives were developed through collective reviews and the retelling of past incidents, which embedded lessons into daily practices. Employees explained how regular discussions of disruptions created a common storyline that emphasised calmness, decisiveness, and minimising losses in future responses. Post-incident meetings reinforced the importance of learning from mistakes, ensuring that staff understood why particular improvements were necessary. Stories of supplier delays during peak seasons were repeatedly shared, shaping collective vigilance and motivating employees to double-check inventory and delivery schedules in subsequent high-demand periods. Such narratives were also passed on to newcomers, who inherited the organisational memory of past failures and absorbed preventive practices such as maintaining safety stock and securing backup suppliers.

> *"We also regularly go over these cases with them, so they can learn from the experience."*
> *"When they encounter similar problems again, they respond more decisively and calmly, trying to minimize losses." (Operation Manager, FA1)*

"During Double 11, one batch of goods was delayed ... the company reviewed the case ... then discussed what to improve next time." "So later, when Double 12 came around, everyone was extra careful to confirm inventory and supplier delivery schedules ahead of time." (Procurement Officer, FA4)

External Shared Narratives with Downstream Partners

In Case A, shared narratives with franchise retailers enhanced mutual expectations, coordination discipline, and contingency planning in the pre-disruption stage. Retailers routinely placed orders before their safety stock was depleted, and the firm scheduled deliveries according to these advance requests. This shared expectation helped both sides manage minor delays without affecting store operations. As a result, delivery pressures were reduced and franchise stores maintained stable service levels even when disruptions occurred.

"They start placing orders with us before their safety stock is exhausted... Even if there are some delays... it doesn't affect them much because they have emergency measures to ensure the normal operation of the stores." (Fleet and Transport Supervisor, FA3)

4.2.5 Summary of Case A

The descriptive findings for Case A outlined how managers and frontline employees described the human related factors that shaped their day-to-day coordination and responses to supply disruptions. Drawing on accounts from operations, warehouse, transport, procurement, and store-facing staff, these findings reported the concrete practices through which individuals and teams navigated routine operations, emerging risks, and unexpected incidents.

Across the data, participants recounted a range of social capital practices including internal and external trust, reciprocal exchanges with colleagues, suppliers, and franchise stores, and extensive communication and cooperation within and beyond the organisation. These practices illustrated how relationships and interactions were enacted in operational settings, without interpreting their broader implications. The findings also presented human capital elements such as safety training, emergency drills, role-specific instruction, and experience-based judgment, which interviewees described as shaping how they prepared for, recognised, and handled disruptions. In addition, the data highlighted cognitive aspects including risk awareness, situational assessment, sensemaking in daily checks, shared language for rapid

coordination, and collectively shaped narratives that circulated within teams and between the firm and retailers.

These practices were presented descriptively under the three themes of social capital, human capital, and cognition, reflecting participants' own accounts of how people acted, interacted, and interpreted situations in the context of SC operations. Together, the Case A findings offer a detailed empirical foundation for the cross-case comparison and theoretical interpretation in Chapter 5, where the role of human related factors in shaping SCRES is examined more explicitly.

4.3 Case B - Findings

The descriptive findings for Case B present how managers and frontline employees described their operational routines and disruption-related experiences within a liquor manufacturing and distribution network. Drawing on interviews with staff from SCM, procurement, production, quality control, logistics, and sales functions, this section reports the practices they recounted across daily coordination and disruption handling. The findings are organised around social capital, human capital, and cognition, reflecting participants' accounts with limited theoretical interpretation.

4.3.1 Background of Case B

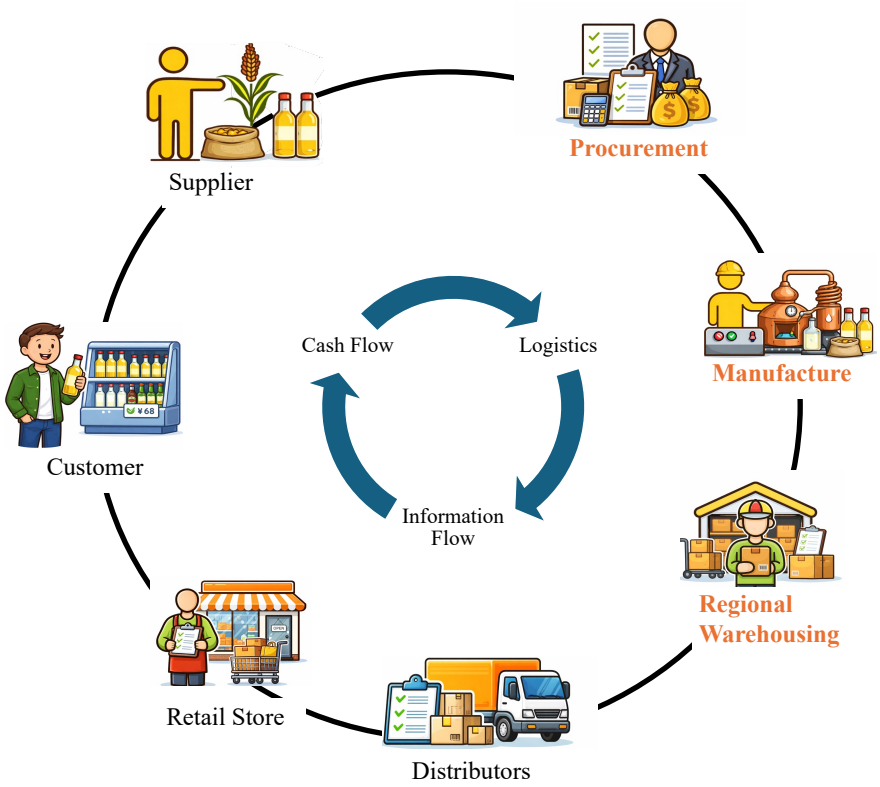
Case B is a liquor manufacturer in China that produces a diverse portfolio of liquor products, including base liquor, Baijiu, and various handcrafted Baijiu product lines. Its SC involves multiple upstream and downstream partners, while the production and distribution characteristics of liquor create a distinct set of operational requirements and coordination challenges. On the supply side, Case B sources key raw materials, such as sorghum and other grains, from a combination of contracted farms and long-term external suppliers. Ensuring continuity of raw material supply remains a central task, as the firm must manage seasonal fluctuations in crop availability, variations in quality across batches, and occasional logistical disruptions during harvesting and transportation. These conditions require close coordination with upstream partners to secure stable and timely deliveries. On the downstream side, Case B distributes finished liquor products across multiple regions, relying on both in-house logistics and long-standing third-party distribution partners. The firm faces several distribution-related challenges, including city-specific transport regulations for alcoholic products, compliance

requirements concerning the safe handling and movement of liquor, and storage requirements intended to prevent damage, leakage, or deterioration. Warehouse management also requires strict adherence to safety procedures to maintain product quality during storage. To manage these operational pressures, Case B maintains a network of trusted upstream and downstream partners, supporting stable material inflows and reliable distribution. However, the combination of seasonal supply and demand patterns, regulatory requirements, geographically dispersed distribution channels, and product quality risks expose the firm to recurring SC uncertainties.

Against this operational background, informants described disruptions mainly in relation to seasonal demand fluctuations, channel and sales uncertainty, logistics delays, inventory allocation difficulties, product quality risks, and coordination difficulties involving distributors and other downstream partners. Although some disruptions arose from wider market or regulatory uncertainty, many were experienced as recurring supply and distribution problems rather than isolated, low-probability, high-impact events. Even when relatively localised, these disruptions could affect inventory availability, delivery continuity, and channel performance across different markets.

Within these disruption contexts, informants described resilience-related actions as unfolding across pre-, during-, and post-disruption stages. Before disruptions, Case B relied on seasonal planning, raw material preparation, inventory monitoring, distributor communication, and experience-based judgement to anticipate supply, demand, and logistics pressures. During disruptions, internal coordination, flexible inventory allocation, logistics adjustments, and collaboration with distributors and other SC partners were used to maintain product availability and delivery continuity. Following disruptions, managers reflected on problems encountered during previous peak seasons, market changes, and logistics difficulties, and subsequently adjusted channel coordination, inventory arrangements, and future planning.

Figure 4.3.1 Simplified Supply Chain Structure of Case B



Note: Yellow-highlighted labels represent functions specific to Case B.

4.3.2 Social Capital

This section illustrates specific real-world examples of the four core practices identified in the field of social capital: trust, reciprocity, communication, and cooperation. Each practice is illustrated with evidence from Case B, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors. In this study, the analysis distinguishes between internal relationships, comprising horizontal and vertical ties, and external connections with upstream partners, downstream partners, multiple SC partners, and the broader relationship network.

4.3.2.1 Trust

Internal Horizontal Trust

In Case B, internal horizontal trust enabled employees to collaborate quickly when workloads increased or disruptions occurred. During routine situations, staff sought help directly from trusted colleagues, allowing tasks to be redistributed without managerial intervention. When extreme weather caused delivery delays, employees coordinated informally by prioritising support from colleagues they trusted, which helped stabilise operations.

"I'll immediately ask a trusted colleague to help and support me in completing the task." (Sales Manager, FB5)

"When coordinating internally, we prioritize working with colleagues we trust." (Channel Sales Specialist, FB7)

Internal Vertical Trust

In Case B, vertical trust shaped how urgent problems were assigned and resolved during disruptions. When unexpected issues emerged, managers selected employees they trusted to handle the situation, relying on them to act quickly and take responsibility. Trusted staff were dispatched immediately to address the problem without requiring close supervision. As a result, disruptions were resolved promptly and operational stability was maintained.

"When unexpected problems arise, we assign the right person based on the situation." "We must immediately send a trustworthy person to handle it.... The person we send must be trustworthy and take a proactive, responsible approach, no shirking or avoidance." (FB3-General Manager)

External Trust with Upstream Partners

In Case B, trust-based relationships with upstream suppliers influenced how seasonal shortages were managed during periods of low raw material yield. When adverse weather reduced production, the firm contacted long-term suppliers to discuss available quantities and request support. Suppliers who maintained strong relationships with the firm were more willing to allocate limited stock to them ahead of other customers. As a result, the firm secured essential raw materials and mitigated the impact of the shortage.

"Our raw materials are seasonal, ... due to climate or weather-related reasons, the production yield is low, ... the supply is insufficient, ... If we have a better relationship with them, we can get more raw materials." (General Manager, FB3)

Additionally, in Case B, long-term trust with upstream suppliers supported joint problem-solving when disruptions affected raw material supply. In one case, raw materials were damaged in transit and production was delayed, prompting the firm to seek a quick resolution

with the supplier. The supplier responded proactively by offering to replenish the materials at a reduced price, helping the firm recover from the loss. As a result, the disruption was contained and production moved forward with limited delay.

> *"There was an incident where our raw materials were damaged during transportation … which actually delayed our production schedule. In this situation, the supplier proactively negotiated with us and offered to replenish the raw materials at a lower price, which was essentially compensation for our loss … we've been working together for a long time and have built mutual trust." (Sales Manager, FB5)*

External Trust with Downstream Partners

In Case B, this point concerns trust-based relationships with downstream partners during disruption handling. Trusted clients, distributors, and logistics providers contacted the firm immediately when problems arose, enabling quick adjustments to production and delivery plans. Long-standing clients also shared surplus inventory to support other customers facing shortages, helping the firm maintain order fulfilment under production pressure. Logistics partners contributed by sharing reliable driver information, prioritising shipments. As a result, stock imbalances were mitigated, delivery continuity was maintained, and long-term cooperative ties were reinforced.

> *"There have indeed been times when long-term cooperation and trust have led our partners to proactively offer help during critical moments … our company was under a lot of pressure... Some clients or agents, because they trusted us, took the initiative to offer their surplus inventory to support other clients who were running short...This kind of proactive support mainly comes from close day-to-day cooperation and mutual trust...Sometimes, logistics providers... prioritize our shipments without us having to ask. Support like this from external partners really eases the pressure during unexpected events." (General Manager, FB3)*

> *"In a 2010 transport accident … the logistics provider took full responsibility and resolved the loss, which strengthened our long-term trust and cooperation … " (General Manager, FB6)*

4.3.2.2 Reciprocity

Internal Horizontal Reciprocity

In Case B, employees described reciprocal support as a routine practice that helped them manage uneven workloads during busy periods. This mutual assistance eased bottlenecks and enabled cross-area coordination during peak operational pressure.

> *"Sometimes the logistics team may be short-staffed and need support, and we'll help coordinate receiving or unloading the goods ... When you help others, they'll also be there when you need help." (Sales Specialist, FB8)*

External Reciprocity with Upstream partners

In Case B, reciprocal relationships with long-term suppliers supported stable access to raw materials during shortages and periods of high demand. The firm prioritised purchasing and timely payments for these partners, and also assisted them when they explored new business areas. In return, suppliers allocated limited raw materials to the firm ahead of other customers when seasonal yields were low. As a result, fluctuations in supply were managed more smoothly and production continuity was maintained.

> *"We prioritised purchasing and payments for long-term partners ... and supported them when they expanded into new business." (Logistics Manager, FB1)*

> *"Our raw materials are seasonal... if we have a better relationship with them, we can get more raw materials." (General Manager, FB3)*

Such priority allocation of resources is also reflected in mutual operational support with upstream logistics suppliers. For instance, the firm assisted logistics partners, and in return, providers prioritized vehicle allocation during urgent shortages, ensuring timely delivery. Such reciprocal exchanges fostered trust and flexibility in logistics coordination.

> *"We helped the logistics company by receiving the goods early... Later, when we were in urgent need of stock, they took the initiative to prioritize a vehicle for us and delivered the goods promptly." (Sales Specialist, FB8)*

Employees highlighted reciprocity in downstream relationships, where long-standing clients received preferential benefit allocation in the form of flexible payment terms, price concessions, and prioritised resources. Built on enduring trust, such exchanges encouraged mutual support , partners assisted Case B during difficulties, and the firm reciprocated when clients faced challenges.

> *"The longer the cooperation, the higher the trust … when we face difficulties, they help us; we also support them." (Sales Specialist, FB8)*

> *"Long-standing clients often receive better pricing and more flexible payment terms." (Sales Specialist, FB8)*

4.3.2.3 Communication

Internal Horizontal Communication

In Case B, horizontal communication centred on knowledge sharing through mentorship and routine peer exchanges. New employees were paired with senior staff who provided one-on-one guidance to help them quickly master essential tasks and avoid early mistakes. Teams also shared practical cases and daily reflections, allowing employees to learn from others' experiences and reduce repeated errors. As a result, operational preparedness improved and employees entered disruption periods with greater confidence and capability.

> *"New sales employees are guided by senior colleagues … most guidance happens one-on-one in private … helping them master issues they're likely to encounter early on." (Sales Manager, FB5)*

> *"Sharing cases helps colleagues avoid repeating the same mistakes and detours." (Channel Sales Specialist, FB7)*

In Case B, horizontal communication across departments and peers promoted coordination and problem-solving during disruptions. When production or logistics issues emerged, employees mmediately contacted colleagues in relevant functions to identify root causes and adjust resources. Cross-functional consultation also allowed the use of substitute products to fulfil urgent orders when clients agreed. In distribution, timely peer updates helped locate missing

goods and reassign them for the next delivery trip. As a result, disruptions were resolved with minimal delay and service continuity was maintained.

> *"After coordination between the two departments and consultation with the client … we used the substitute product to fulfill the order." (Sales Manager, FB5)*

> *"He immediately reported it to us, and we helped locate the goods in the warehouse. Then, when he came back from his current route, he could take the missing goods on his next trip and complete the delivery." (Warehouse Staff, FB9)*

In Case B, this point concerned employees' internal communication during the post-disruption stage. After disruptions, colleagues met informally to review past incidents and discuss preparation for future supplier adjustments. They also shared disruption cases with new and existing employees to transfer lessons learned across the team. These activities supported collective reflection and reduced repeated mistakes.

> *"Later, during an informal gathering, we reviewed the experience and discussed how we could prepare in advance if the supplier makes sudden strategy adjustments again in the future." (Sales Manager, FB5)*

Internal Vertical Communication

In Case B, internal vertical communication involved structured reporting and layered target allocation during the pre-disruption stage. Sales targets set by the company were broken down across business units, cities, teams, and individual stores, and reporting followed the same hierarchical flow. Managers relied on this structure to stay informed and adjust plans when risks or irregularities appeared. Continuous communication between managers and employees supported knowledge exchange and collaborative task completion.

> *"The company assigns me an overall sales target, which I then break down by business unit … My reporting … follows this layered structure … ensures the company can stay informed and respond in a timely manner." (General Manager, FB3)*

"Employees and managers share their knowledge and collaborate to complete tasks effectively." (General Manager, FB3)

In Case B, internal vertical communication enabled rapid escalation of frontline issues during the disruption stage. Employees immediately reported market changes, shortages, quality problems, and customer feedback to supervisors and specialised emergency teams following formal procedures. Staff clarified problems, documented reasons, and passed information step by step so emergency teams could investigate, visit sites when needed, and coordinate responses. Prompt upward reporting of missing or damaged goods then triggered systematic checks across departments and supported production continuity.

"If there is a shortage of goods, I report it immediately up the chain so that management can take the necessary steps, such as activating backup suppliers. Quick communication is key to minimizing any delays in production." (Sales Manager, FB2)

"When such issues arise, whether it's the sales team or another department that receives the customer feedback, they must immediately report to the Product Emergency team ... and they followed up accordingly." (General Manager, FB6)

"If I find any missing or damaged goods, I report it immediately." (Warehouse Staff, FB9)

In Case B, internal vertical communication supported systematic review and knowledge sharing during the post-disruption stage. Employees and managers discussed competitive intelligence, market experiences, and past incidents through regular meetings at different reporting intervals. The company also organised post-incident learning sessions to examine handling processes and identify areas for improvement. These structured reviews helped teams share experiences, avoid repeated mistakes, and reinforce effective practices.

"... we discuss it during daily or weekly meetings ... If we succeed ... we report this ... and ... promote the successful approach internally ..." "After each incident, the company organizes a learning session to review whether the handling process was appropriate ... and how similar issues can be avoided ..."(General Manager, FB6)

External Communication with Upstream partners

In Case B, communication with upstream partners supported early risk anticipation before disruption. Employees exchanged market information with suppliers to improve forecasting and adjust operations in advance. Suppliers and logistics partners also notified the firm of potential production shortfalls, product discontinuations, or delivery changes ahead of time. These early updates helped the firm make timely arrangements and reduce unexpected shocks.

> *"We exchange information about market developments with suppliers to improve the accuracy of our forecasts." "If they foresee that production might fall short or a product might be discontinued, they'll notify us in advance. ... Their advance notice allows us to make more reasonable arrangements." (Sales Manager, FB2)*

> *"Whether it's a regular or temporary driver, they always communicate with us in advance about delivery." (Logistics Manager, FB1)*

In Case B, communication with upstream 3PL providers supported rapid problem-solving during the disruption. When logistical issues such as vehicle breakdowns occurred, logistics partners informed the firm immediately. Managers and employees then coordinated transfers or arranged substitute vehicles to keep shipments moving. These actions helped ensure raw materials arrived on time and prevented production delays.

> *"We also communicate with the suppliers and logistics providers to discuss how to better solve and handle the problem." (General Manager, FB3)*

> *"If there is an issue during the transportation of goods ... the logistics provider will notify us promptly ... we may immediately arrange for a transfer or find another vehicle ..." (General Manager, FB3)*

However, in Case B, emotion clearly affected communication continuity and effectiveness during disruption. One employee's emotional distress after a breakup led him to switch off his phone and skip work, which made suppliers unreachable. This shows that unmanaged emotion disrupted communication channels with external partners and created confusion in operations.

"There was an employee who had emotional problems and shut down the phone and did not go to work because he was broken up in love. As a result, suppliers could not be contacted, and business interruption and confusion occurred." (General Manager, FB3)

External Communication with Downstream partners

In Case B, external communication with downstream partners helped anticipate risks in the pre-disruption stage. Employees monitored client behaviour through structured systems and contacted customers when anomalies appeared. Managers also issued seasonal notices and official documents before peak sales periods to ensure downstream partners were prepared. These actions strengthened customer readiness and supported stable relationships.

"We use this inventory warning system and the data tracking within our system to monitor client behavior. If we detect anomalies, we initiate communication early." (General Manager, FB3)

"Every year during major seasonal transitions or peak sales periods, our company issues internal notices or documents at least 20 days in advance, informing clients of weather conditions, seasonal production arrangements, and so on." (Channel Sales Specialist, FB7)

Additionally, employees used communication with downstream partners to build trust in the pre-disruption stage. When clients questioned product quality, sales staff explained production processes and raw material sources in detail. They also demonstrated the product to address customer concerns directly. These efforts gradually increased client confidence and supported long-term cooperation.

" ... a customer ... questioned its quality ... I explained our product's background in detail, how it's brewed, the source of raw materials ... he came to appreciate the quality and eventually agreed to work with us ... and help the customer gradually build trust." (Sales Specialist, FB8)

In Case B, downstream external communication enabled rapid problem-solving and helped maintain customer trust during the disruption stage. When goods were damaged, lost, or delayed, customers reported the issue immediately, and staff arranged prompt replacements or substitute shipments. Sales employees also contacted clients directly to explain transportation or payment-related problems as soon as they occurred. Long-term customers were usually understanding, while new clients required more patient and repeated communication. These timely interactions ensured continuity of deliveries and supported the development of customer loyalty despite service disruptions.

> *"We immediately contact the customer to inform them of the delay... we urgently dispatch new goods from the warehouse." (Logistics Manager, FB1)*

> *"Especially during the peak season … communicate well with the logistic company … so that they can provide some temporary additional vehicles." (Logistics Manager, FB1)*

> *" … we immediately call the client to explain what went wrong during transportation … After a few more communications, they gradually become our loyal customers … " (Sales Specialist, FB8)*

<u>*External Communication with Multiple SC partners*</u>

In Case B, external communication with multiple SC partners supported proactive adjustments in the pre-disruption stage. Advance notice from suppliers about delayed deliveries allowed staff to reschedule distribution and inform clients early. When suppliers expected price increases, employees relayed this information so clients could adjust inventories and sales plans in advance. In cases of shortages, coordination among suppliers, internal teams, and customers enabled the acceptance of substitute products to keep orders moving smoothly.

> *"If they inform us in advance, we can adjust our delivery schedule … we'll notify our clients in advance … Early communication helps ease dissatisfaction and gives us time to find alternatives … " (Sales Specialist, FB8)*

> *"The supplier informed us in advance that the price was about to increase … we immediately relayed it to our clients." (Sales Manager, FB5)*

In Case B, external communication with multiple SC partners supported coordinated problem-solving during the disruption stage. When a supplier made a sudden strategic change, employees immediately contacted both the supplier and the client to clarify the situation. Staff then mediated between the two sides to find a workable solution and keep operations on track. This rapid coordination helped the firm resolve the issue smoothly and avoid further disruption.

> *"We responded quickly upon receiving the information, coordinated both the client and supplier sides, and proactively addressed the issue." (Sales Manager, FB5)*

External Communication with Broader relationship network

In Case B, informal communication with broader industry networks supported early awareness in the pre-disruption stage. Sales staff regularly exchanged updates with friends and partners in the sector to stay informed about new policies and product launches. These conversations supplemented formal information channels and helped the firm anticipate potential changes. The shared market signals enriched employees' understanding of upcoming shifts.

> *"The company frequently communicates and exchanges with friends and partners in the industry." "Share new policy and new product information: Share and discuss information when new policies are introduced or new products are launched in the market." (Sales Manager, FB2)*

4.3.2.4 Cooperation

Internal Horizontal Cooperation

In Case B, internal horizontal cooperation operated through pre-disruption coordination across specialised departments and units. A formal Emergency Response Division channelled customer feedback and operational issues to product, accident, or public relations units. Cross-unit budgeting team pooled funds from several business units to support unified resource planning. The administrative department also inspected sales activities to align market operations and staffing. As a result, these pathways ensured structured communication and resource sharing before disruptions occurred.

"We also have a very specific department called the Emergency Response Division, which is subdivided into roles like Product Emergency, Accident Emergency, and ... receive customer feedback, they must immediately report to the Product Emergency team." (General Manager, FB6)

"The company has a team that manages budgeting and resource distribution." (General Manager, FB3)

Internal horizontal cooperation in Case B enabled joint problem-solving and resource sharing across sales, production, and logistics during the disruption stage. When damaged goods, quantity mismatches, or missing deliveries occurred, departments shared information immediately and coordinated replenishment, substitution, or stock adjustments. Teams also borrowed inventory from one another and discussed alternative products with clients when shortages arose. As a result, multi-department collaboration reduced the impact of local disruptions and ensured that orders were fulfilled smoothly.

"If our goods are damaged or there's a quantity mismatch during transportation, ... The company then contacts the production department and logistics provider... All parties work together to resolve the issue ..." (Zhang, FB8)

"Our usual approach is to coordinate and borrow stock to resolve the issue." (Channel Sales Specialist, FB7)

"Two departments each managed different but similar products. When one couldn't meet demand, we coordinated with the other department, discussed the substitution, and consulted the client ..." (Sales Manager, FB5)

Internal Vertical Cooperation

Internal vertical cooperation in Case B operated through structured hierarchical mechanisms during the disruption stage. When incidents occurred, employees gathered key information and escalated it immediately to supervisors and the emergency response team. Managers also assigned suitable staff to handle critical tasks and maintain control of the situation. As a result,

vertical coordination ensured timely information flow, accurate reporting, and organised responses across levels.

> *"If an issue arises ... we immediately activate the emergency response process ... company representatives to collect product samples ... Once the necessary information is gathered, we report directly to both our supervisor and the emergency response team." "Usually, the company sends someone who is emotionally stable and has strong communication skills ..." (General Manager, FB6)*

External Cooperation with Upstream partners

In Case B, cooperative relationships with upstream suppliers supported disruption management during the disruption stage. Long-term partners prioritised the firm in raw material allocation during shortages and mobilised trusted logistics providers to deliver urgently when supply was low. Suppliers also communicated promptly during transportation damage and negotiated replenishment at reduced cost to minimise production delays. As a result, these cooperative ties ensured timely material access, reduced downtime, and enabled smoother resolution of unexpected supply issues.

> *"We maintain good relationships with our suppliers. During shortages, they prioritize us, ensuring we have the materials we need to continue production." (Sales Manager, FB2)*

> *"Our raw materials are seasonal ... if we have a long-term cooperative relationship with them, we can get supply prioritisation." (General Manager, FB3)*

> *"There was an incident where our raw materials were damaged during transportation ... the supplier proactively negotiated with us and offered to replenish the raw materials at a lower price ... they place a strong emphasis on long-term partnerships. This makes them more proactive in communication and smoother in resolving issues." (Sales Manager, FB5)*

External Cooperation with Downstream partners

In Case B, downstream external cooperation with trusted 3PL providers supported safe and reliable operations before disruptions occurred. Managers relied on long-term cooperative drivers who were familiar with alcohol-specific transportation restrictions and safety protocols. These drivers handled large-volume shipments carefully, managed risks during rural deliveries, and responded effectively to emergencies. As a result, dependable logistics partners helped maintain SC security and reduced the likelihood of safety-related disruptions.

> *"We've been working with these 3PL providers for many years … we find them safer and more reliable." (Logistics Manager, FB1)*

> *"Through third-party logistics companies, we work with fixed drivers for transportation. These long-term drivers understand the procedures and handle emergencies well." (Logistics Manager, FB1)*

In Case B, downstream external cooperation supported resource relocation and joint problem-solving during the disruption stage. Distributors with surplus inventory voluntarily redistributed stock to help clients facing shortages, and familiar logistics providers prioritised the firm's shipments without being asked. Once problems were identified, staff also worked with clients to design tailored route strategies supported by financial inputs such as promotion subsidies. As a result, downstream partners provided both material assistance and adaptive solutions that reduced disruption pressures.

> *"Some clients or distributors, because they trusted us, took the initiative to offer their surplus inventory to support other clients who were running short... Logistics providers who know our business well will even prioritize our shipments..." (General Manager, FB3)*

> *"Once problems are identified, we meet with clients to create detailed route strategies and solutions." (General Manager, FB3)*

In Case B, downstream external cooperation included flexible payment arrangements that helped clients manage temporary financial pressures during the disruption stage. When customers experienced cash flow difficulties, employees extended payment deadlines or

allowed goods to be delivered before payment under agreed conditions. These concessions operated within formal contractual terms and were supported by long-term trust. As a result, such flexibility helped partners overcome short-term financial stress and reinforced stable cooperative relationships.

> *"If a client experience financial difficulty … we can offer flexibility with timing, such as extending deadlines … The broad principle is contractual integrity …" (Channel Sales Specialist, FB7)*

> *"… only after a long period of collaboration can trust be established, which then allows for flexible payment arrangements between companies." (Sales Specialist, FB8)*

4.3.3 Human Capital

The following sections illustrate specific real-world examples of the two core practices identified in the field of human capital: training & education, and experience. Each practice is illustrated with evidence from Case B, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors.

4.3.3.1 Training & Education

Employees' Training & Education

In Case B, employees' training and education strengthened multiple operational capabilities before disruptions occurred. Staff received safety training on transportation, warehouse management, fire prevention, and handling flammable alcohol, which improved their emergency response skills. They also completed structured programmes covering product knowledge, sales techniques, customer-handling skills, and business operations. Employees reported that these programmes enhanced their confidence, communication, and ability to address customer issues while reducing errors in daily tasks. As a result, training improved employees' readiness for routine operations and equipped them with the capabilities needed to respond effectively when disruptions arose.

> *"...all new hires undergo a structured training period. This includes product knowledge, sales techniques, and basic emergency response training." (General Manager, FB6)*

"Our company's sales department receives focused training on traffic safety and emergency handling during product transportation. In contrast, production staff are trained in process safety, like handling machinery, high-temperature areas, natural gas usage, and fermentation tanks." (General Manager, FB6)

"The training mainly focuses on vehicle safety ... we emphasize road safety and cargo protection." (Logistics Manager, FB1)

"The training on inventory management and inspection is mainly aimed at warehouse managers and staff, while the training on safety hazards involves all employees of the company." (Warehouse Manager, FB4)

"We receive training on business operations, such as logistics, shipping, and coordination." (Sales Specialist, FB8)

In Case B, employees' training and education enhanced their ability to handle customer issues during the disruption stage. When unexpected problems occurred, trained staff were better able to stay calm, communicate more clearly, and provide logical explanations to customers. These communication skills helped them resolve concerns more efficiently and maintain customer satisfaction under pressure. As a result, structured training translated directly into more effective frontline responses during disruptions.

> *"... after the company training, I'm able to handle these situations more quickly and rationally. I communicate more logically, which helps improve customer satisfaction." (Sales Specialist, FB8)*

In Case B, employees' training and education strengthened organisational learning after disruptions. Following a warehouse incident, the company repeatedly reviewed the case in training to examine strengths and shortcomings. Staff also relied on training sessions to quickly absorb lessons and apply them in daily work. As a result, employees improved their ability to correct mistakes and integrate practical experience into future operations.

"After the incident was fully handled, the company used it as learning material...reflected on and learned from the case...and it must be done in a systematic and ongoing manner to truly absorb the lessons and experiences." (General Manager, FB6)

"Training is a fast process, while work experience accumulates slowly. Training provides us with a quick way to absorb experience, especially the cases and techniques summarized by the company, which helps us avoid many detours. Work experience takes time to build, but learning accelerates that process." (Sales Specialist, FB8)

Training & Education with Downstream Partners

In Case B, training and education extended beyond the organisation to downstream partners during the pre-disruption stage. The firm organised focused training sessions and product appreciation meetings for distributors to explain new products, promotional materials, and brand stories. It also provided guidance on inventory checks and sales status when visiting local markets. As a result, Case B transferred its training capability to downstream partners, improving their operational knowledge and strengthening alignment across the SC.

"Whenever distributors visit, we hold focused training ... the training mainly covers newly released promotional materials, or new products on the market ... we also provide distributors with guidance on checking inventory and sales status." (Logistics Manager, FB1)

4.3.3.2 Experience

Managers' Experience

In Case B, managers' experience strengthened proactive risk identification during the pre-disruption stage. Drawing on industry knowledge, they recognised critical operational points and anticipated where problems were likely to emerge. As a result, managers applied these insights to plan tailored responses in advance and reduce the likelihood of future disruptions.

"Industry experience helps us recognize what's crucial and where problems are most likely to arise." (General Manager, FB3)

In Case B, managers relied on accumulated experience to guide rapid responses during the disruption stage. They used practical judgement to organise immediate meetings with clients and sales teams, coordinate with government agencies, and analyse market information beyond formal data. Experience also shaped their communication and negotiation approaches when working with drivers, 3PL providers, and channel partners. As a result, managers drew on experiential insight to expand problem-solving options and make more mature decisions under pressure.

> *"Communicating with both the drivers and the 3PL providers ... these skills are gradually accumulated through work experience..." (Logistics Manager, FB1)*

> *"Experience gives more ways to handle problems..." (General Manager, FB3)*

> *"By talking to sales reps and observing the field, combined with data reports...we rely not only on data, but also on experience and sensitivity when making market judgments." (General Manager, FB3)*

> *"We handle it based on our experience, relationships, communication skills, and negotiation tactics ..." (Channel Sales Specialist, FB7)*

In Case B, managers used past experience to support systematic learning after the disruption stage. They held review meetings following each emergency, documented minutes, and shared them across departments to encourage collective reflection. Managers also recognised effective response methods as internal "problem-solving intelligence," reinforcing knowledge sharing. With prior experience as a reference, they remained calm during reviews and analysed root causes rationally. As a result, managers strengthened learning from disruptions and reduced the likelihood of repeated mistakes.

> *"After handling any emergency, we hold a meeting, document the minutes, and distribute them ... so everyone can learn and reflect." (General Manager, FB3)*

> *"Having similar past experiences ... helps you stay calm and analyse the issue rationally to identify its root cause." (General Manager, FB3)*

"... we reviewed the experience and discussed how we could prepare in advance if the supplier makes sudden strategy adjustments again." (Sales Manager, FB5)

Employees' Experience

In Case B, employees' experience strengthened their practical capabilities during disruptions. When disruptions occurred, they relied on this accumulated experience to resolve minor issues independently, manage client concerns through patient communication, and process orders efficiently under pressure. They also applied rules flexibly to fit real situations while maintaining core principles. As a result, experience enabled employees to respond more confidently, systematically, and adaptively across routine and disruptive conditions.

"Work experience is developed gradually over time...These skills are built up bit by bit through hands-on work... which makes you more adept at handling emergencies." (Sales Manager, FB5)

"Communication skills are more about being developed over time. Training is helpful, but truly effective communication techniques are honed through real-world sales experience." (Sales Specialist, FB8)

"For minor issues, I rely on experience; for major ones, I follow leadership directives." (Channel Sales Specialist, FB7)

In Case B, employees strengthened their experience-based skills through structured reflection after disruptions. Sales staff described how past incidents taught them personal lessons, such as the importance of patience and persistence when rebuilding customer trust. Teams reviewed cases during monthly and semi-annual meetings, sharing mistakes and successful practices to support collective learning. Colleagues also exchanged insights at the end of each workday to help newcomers adapt and improve client interactions. As a result, employees transformed individual and team experiences into practical knowledge that improved future responses.

"The biggest lesson I learned from that experience was the importance of patience ... help the customer gradually build trust." (Sales Specialist, FB8)

"These sessions include case discussions, sharing of lessons learned … it helps prevent future issues by avoiding the same mistakes …" (Channel Sales Specialist, FB7)

4.3.4 Cognition

The following sections illustrate specific real-world examples of the three core practices identified in the field of Cognition: individual cognitive attributes, shared codes and language, and shared narratives. Each practice is illustrated with evidence from Case B, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors.

4.3.4.1 Individual Cognitive Attributes

Managers' Cognitive Attributes

In Case B, managers demonstrated strong risk awareness before disruptions occurred. They recognised potential problems early and prepared contingency plans with backup options to maintain flexibility. Managers also anticipated external threats such as extreme weather and took measures in advance to reduce their impact on logistics and production. They adjusted resource allocation using both fixed and mobile planning points to buffer against client-side disruptions. As a result, forward-looking risk perception strengthened organisational preparedness for potential disruptions.

"Managers should have such ability to perceive and assess potential risks, thereby to promptly address any problems that arise and choose appropriate alternatives." (Sales Manager, FB2)

"When it is foreseen that extreme weather such as freezing will affect logistics, managers will make preparations in advance to reduce the impact on production" (General Manager, FB3)

"If a client's sales are about to be disrupted … we need to have the ability to reallocate resources. I might allocate only 15 fixed points … and leave the remaining 5 flexible." (General Manager, FB3)

In Case B, managers demonstrated situational assessment during disruptions by responding quickly and coordinating resources to minimise operational impacts. When unexpected supplier policy changes occurred, they acted immediately to mediate between client and supplier sides. Managers also addressed safety hazards, inventory inaccuracies, and transportation failures by convening urgent meetings or arranging alternative vehicles to maintain continuity. Their decisions were guided by both data analysis and accumulated industry experience, which helped them stay calm, analyse root causes, and adjust operations under pressure. As a result, situational assessment enabled timely and adaptive responses during disruptive events.

> *"One time at the end of the year, a supplier suddenly released a new sales layout and policy adjustment. We responded quickly upon receiving the information, coordinated both the client and supplier sides …" (Sales Manager, FB5)*

> *"Industry experience helps us recognize what's crucial and where problems are most likely to arise … When problems arise, you won't panic... stay calm and analyse the issue rationally …" (General Manager, FB3)*

> *"By talking to sales reps and observing the field … we rely not only on data, but also on experience and sensitivity when making market judgments." (General Manager, FB3)*

<u>*Employees' Cognitive Attributes*</u>

In Case B, employees explained that effective sensemaking during disruptions depended on individual cognitive attributes. Those with stronger learning ability, comprehension, and emotional intelligence were able to interpret situations quickly and respond appropriately. By contrast, employees who lacked experience or initiative sometimes became passive or made mistakes when handling emergencies. As a result, sensemaking influenced the quality and timeliness of employee responses during disruptive events.

> "*Your ability to quickly grasp and digest things depends on your learning ability, comprehension, and emotional intelligence." (General Manager, FB3)*

"If someone lacks both experience and initiative, sending them to handle an emergency can be risky …" (General Manager, FB6)

Case B provides strong direct evidence that emotion affected situational assessment and judgement. Interviewees explicitly stated that poor emotional states could reduce rationality, lead to insufficient consideration of problems, and result in inappropriate decisions. They also noted that negative emotions hindered problem-solving. This indicates that unmanaged emotion shaped how employees cognitively interpreted situations and assessed response options during disruption.

"When an individual is in a poor state, it may lead to insufficient consideration and rationality when facing problems, thus making inappropriate decisions." (General Manager, FB3)

"Everyone has emotions. But if you bring negative emotions into your work, you won't do things well, and your problems won't get solved either." (Warehouse Staff, FB9)

4.3.4.2 Shared Language and Code

<u>*Internal Horizontal Shared language and codes*</u>

Employees in Case B described how the use of shared terms and informal codes simplified communication and coordination across departments and teams. Common phrases such as "high inventory" or "budget overage" immediately conveyed underlying problems, allowing staff to respond without lengthy explanations. Similarly, informal practices like placing rush orders on the outside of a load served as a code recognised by all delivery staff, ensuring urgent tasks were prioritised without verbal clarification.

"'High inventory,' which signals that stock levels are too high... Once these terms are used, everyone knows what to do, no need for lengthy explanations." "Similarly, terms like 'inventory overage' or 'budget overage' … truly make communication more direct and efficient." (General Manager, FB3)

"We have our own terms and labels. If it's placed outside, it's a rush order … delivery staff all know … there's no need to explain much." (Warehouse Staff, FB9)

4.3.4.3 Shared Narrative

Internal Horizontal Shared Narratives

In Case B, employees developed shared narratives by repeatedly reviewing incidents and retelling experiences after disruptions. Common events such as sudden supplier policy changes were discussed in both formal meetings and informal gatherings, allowing lessons to spread across teams. Staff also shared region-specific experiences that helped them anticipate future developments and prepare accordingly. As a result, shared narratives embedded past experiences into daily routines and supported more coordinated responses to future disruptions.

> *"After handling any emergency, we hold a meeting ... so everyone can learn and reflect." (General Manager, FB3)*

> *"One time at the end of the year, a supplier suddenly released a new sales layout and policy adjustment ... Later, during an informal gathering, we reviewed the experience and discussed how we could prepare in advance if the supplier makes sudden strategy adjustments again...especially in predicting what actions the supplier might take next." (Sales Manager, FB5)*

Internal Vertical Shared Narratives

In Case B, shared narratives were formed during disruptions through consensus-building between managers and employees. When supply shortages occurred, both sides discussed the situation to interpret whether the issue stemmed from pricing, service, or other causes. By agreeing on the underlying problem, the team aligned their understanding and coordinated their responses. As a result, shared narratives supported unified action and more focused problem-solving during disruptions.

> *"If we encounter a supply shortage, employees might believe it's due to unreasonable pricing or poor service. If management agrees and both sides reach a consensus, the key issue is identified. This helps the team work together more effectively, aligning their goals and solutions to form a united effort." (Sales Manager, FB2)*

4.3.5 Summary of Case B

The descriptive findings for Case B outlined how managers and frontline employees in a liquor manufacturing and distribution context described the human related factors that shaped their day-to-day coordination and responses to supply disruptions. Drawing on accounts from logistics, sales, general management, warehousing, and channel development roles, the section reported how people within the firm talked about managing routine operations, seasonal raw-material shortages, transportation incidents, and client-side issues.

Across the data, participants recounted a wide range of social capital practices, including internal horizontal and vertical trust, reciprocal support between colleagues, and mutual assistance with long-term upstream suppliers, 3PL providers, distributors, and clients. Employees also described intensive communication and cooperation, such as layered reporting structures, emergency response teams, cross-departmental coordination, early warning exchanges with partners, and collaborative problem-solving around damaged goods, shortages, or policy changes. The findings further presented human capital aspects, including safety, product, and customer-handling training, as well as experience-based judgement accumulated through repeated interactions with drivers, government agencies, and market actors. In addition, individual and collective cognitive elements appeared in the data, such as risk awareness, situational assessment, learning ability, emotional states, shared terms and shorthand codes, and shared narratives developed through post-incident reviews and discussions.

These practices were presented descriptively under the themes of social capital, human capital, and cognition, reflecting participants' own accounts of how people acted, interacted, and interpreted situations when facing SC disruptions. Together, the Case B findings provide a detailed empirical foundation for the cross-case comparison and theoretical interpretation in Chapter 5, where the role of human related factors in shaping SCRES is examined more explicitly.

4.4 Case C - Findings

The descriptive findings for Case C present how managers and frontline employees described their operational routines and disruption-related experiences within a cold-chain dependent dairy and beverage supply network. Drawing on interviews with staff from procurement, SCM, logistics operations, quality management, and sales functions, this section reports the practices they recounted across daily coordination and disruption handling. The findings are organised

around social capital, human capital, and cognition, reflecting participants' accounts with limited theoretical interpretation.

4.4.1 Background of Case C

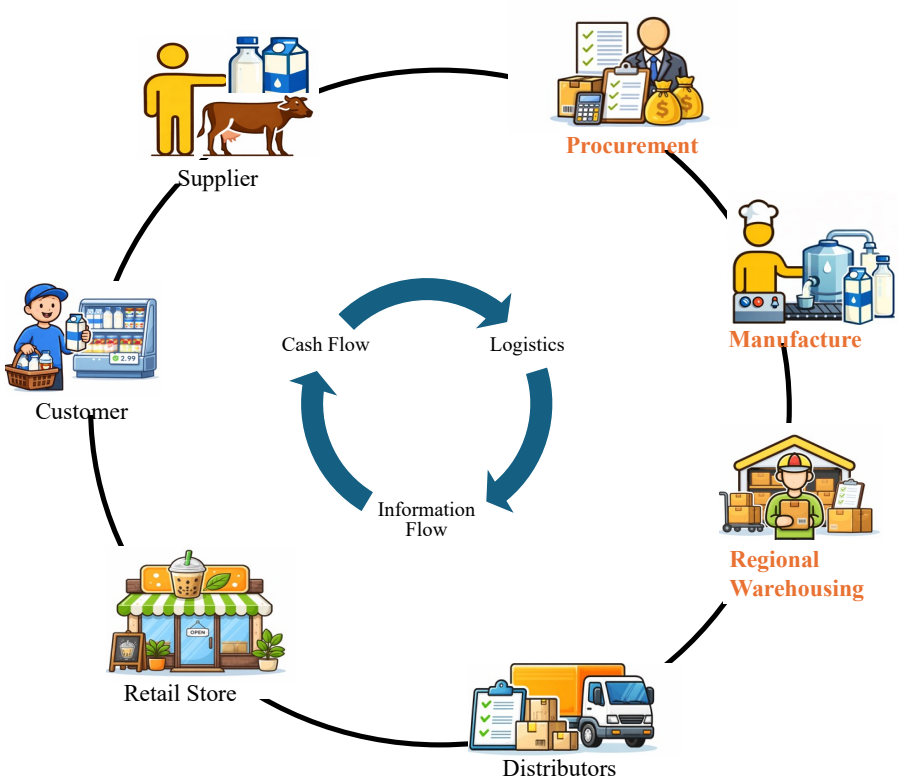
Case C is a dairy and beverage manufacturer in China with a diverse product portfolio spanning fresh dairy products, beverages, and snack products. Its SC is characterised by high operational complexity, as the freshness requirements of dairy products demand continuous cold-chain coordination, strict time control, and close alignment among upstream suppliers, internal processing activities, and downstream distributors. On the supply side, the perishability of dairy products necessitates stable sourcing arrangements and reliable cold-chain conditions. Although Case C operates its own farming bases, its in-house production capacity cannot fully meet market demand. The firm therefore maintains long-term partnerships with multiple external farms to secure a sufficient and timely supply of raw milk. On the downstream side, the company must respond to volatile market demand while ensuring that temperature-sensitive products are processed, transported, and delivered within short time frames. To manage these operational pressures, Case C adopts a regionally focused distribution strategy and prioritises rapid adjustments to sourcing, production, and transportation plans. This flexible system supports product quality and stable market coverage. However, the combination of uncertain raw material availability, fluctuating demand, short lead times, freshness requirements, and temperature-sensitive logistics exposes the firm to recurring SC disruptions.

Against this operational background, informants described disruptions mainly in relation to procurement delays, raw material shortages, demand variability, cold-chain interruptions, logistics coordination difficulties, delivery delays, and inventory shortages. These disruptions affected both the continuity of upstream supply and the firm’s ability to respond quickly to downstream demand. Although they were generally operational and recurrent rather than low-probability, high-impact events, even relatively short disruptions could quickly affect product freshness, inventory availability, and delivery continuity because of the perishable and time-sensitive nature of the products.

Within these disruption contexts, informants described resilience-related actions as unfolding across pre-, during-, and post-disruption stages. Before disruptions, Case C relied on procurement planning, supplier communication, inventory monitoring, cold-chain preparation,

and demand forecasting to reduce exposure to supply- and freshness-related uncertainty. During disruptions, cross-functional communication, supplier coordination, logistics adjustments, and employee situational judgement were used to address shortages, delivery delays, and cold-chain interruptions. Following disruptions, managers and employees reflected on recurring procurement, logistics, and demand-related problems and adjusted sourcing arrangements, coordination routines, and internal planning to strengthen future preparedness and responsiveness.

Figure 4.4.1 Simplified Supply Chain Structure of Case C



Note: (i) Yellow-highlighted labels represent functions specific to Case C.
(ii)In Case C, warehousing is only applied to long shelf-life products, whereas short shelf-life products are distributed shortly after processing through cold-chain logistics.

4.4.2 Social Capital

This section illustrates specific real-world examples of the four core practices identified in the field of social capital: trust, reciprocity, communication, and cooperation. Each practice is illustrated with evidence from Case C, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors. In this study, the analysis distinguishes between internal relationships, comprising horizontal and vertical ties,

and external connections with upstream partners, downstream partners, multiple SC partners, and the broader relationship network.

4.4.2.1 Trust

Internal Horizontal Trust

In Case C, internal trust supported swift collaboration during the disruption stage. When sudden supplier failures occurred, employees instinctively turned to trusted colleagues to diagnose the problem and secure support. These long-standing relationships enabled them to bypass delays and coordinate actions quickly. As a result, internal trust helped mobilise capable staff and facilitated rapid responses to operational disruptions.

> *"When a supplier suddenly stopped supplying raw materials, my first reaction was to find … he/she stepped in, negotiated, and helped us secure extra inventory." (SC Manager, FC1)*

External Trust with Upstream Partners

In Case C, long-term trust with upstream suppliers enabled proactive information sharing before disruptions occurred. Trusted partners voluntarily communicated critical updates, such as anticipated price increases, giving the firm time to place orders early and avoid cost pressures. This kind of unsolicited support was offered only by close suppliers who valued the relationship. As a result, external trust strengthened preparedness and helped secure supply continuity.

> *"One packaging supplier called in advance to say upstream prices might rise and reminded us to order early … only a few suppliers would volunteer such information … it depends on how close the relationship is." (Procurement Officer, FC3)*

In Case C, external trust enabled upstream partners to provide preferential support and flexible resource mobilisation during disruptions. Long-term trust with upstream suppliers meant they were willing to prioritise raw material deliveries, accelerate production schedules, and fill capacity gaps when emergencies arose. Similarly, trusted cold-chain logistics partners proactively adjusted internal resources, such as adding trucks or assigning dedicated staff, to protect temperature control and ensure timely delivery. Annual supplier evaluations reinforced reliability and cooperative behaviour, further strengthening these trust-based relationships. As

a result, trusted partners acted quickly during disruptions to safeguard operational continuity and enhance the firm's flexibility in securing critical resources.

> *"Once, during severe weather, ..., and we were at the peak of production..., our supplier did not hesitate or take advantage but prioritized delivering the necessary raw materials to keep our production line running. This was based on long-term mutual support and understanding that built a strong foundation of trust." (Sales Manager, FC2)*

> *"When our milk sells very well and demand spikes suddenly, our suppliers prioritize us to ensure uninterrupted delivery ... Although we have our own dairy base, if an emergency occurs and production capacity can't keep up, they help make up the shortfall." (Procurement Manager, FC7)*

> *"We've worked with this cold chain logistics company for five or six years ... At first, we worried about transport temperature and timeliness, but they always handled it well and communicated promptly when issues occurred ..." (Procurement Officer, FC3)*

> *"our company evaluates suppliers annually, not just on price and delivery but also on soft indicators like integrity and cooperation." (SC Manager, FC1)*

<u>*External Trust with Broader Relationship Network*</u>

In Case C, external trust with a broader network of long-standing industry contacts provided essential decision support during disruption events. When managers faced uncertain sourcing decisions, such as whether to switch to alternative suppliers during shortages, they relied on trusted contacts with deep cross-border experience to validate information and reduce ambiguity. As a result, these trusted relationships offered practical advice that complemented fragmented formal data, helping managers make faster and more confident decisions under pressure.

> *"We were debating whether to switch to new suppliers ... I reached out to an old friend who's worked in cross-border supply chains for years ... mainly because we have a good relationship and I trust his judgment." (SC Manager, FC1)*

4.4.2.2 Reciprocity

Internal Horizontal Reciprocity

In operational crises such as peak-season order surges or urgent procurement issues, colleagues proactively assisted in prioritising shipments, which significantly improved efficiency under pressure. Small, routine acts of assistance, such as helping with documentation or reminders, also reinforced trust and dependable working relationships. As a result, reciprocal support enhanced collective efficiency and improved team responsiveness during disruptions.

> *"During Double Eleven, our warehouse was overwhelmed … A colleague I have a good relationship with proactively helped prioritize shipments … things get resolved much more efficiently." (SC Manager, FC1)*

> *"There's a colleague in finance who often helps me fill in procurement documents … We help each other with these little things." (Procurement Officer, FC3)*

External Reciprocity with Upstream Partners

In Case C, external reciprocity with upstream partners involved mutual support that extended beyond routine transactions into shared marketing and technical cooperation. The interviewee explained that the firm promoted suppliers' products and exchanged market information, while suppliers reciprocated through preferential pricing and technical assistance that improved production efficiency. Similar reciprocal arrangements were formed with a packaging machinery supplier, where upgraded equipment enhanced automation and Case C supported the partner's market expansion in return. As a result, these reciprocal practices strengthened operational capability and deepened relationships in the pre-disruption stage.

> *FC1: "We and our suppliers also support each other in marketing and provide technical assistance … we help them promote their products … while they offer us better pricing or technical support to improve our production efficiency." (SC Manager, FC1)*

> *"The equipment provided by this company has helped us improve the level of automation of the production line. We use our own market channels to help them promote their products in the industry." (Sales Manager, FC2)*

In Case C, reciprocity with upstream partners during disruptions was expressed through mutual support that helped stabilise operations under pressure. Employees described offering financial relief and business opportunities to long-term suppliers when they experienced production difficulties, and these suppliers later reciprocated by prioritising high-quality materials once capacity recovered. Similar reciprocal exchanges occurred with logistics partners, where the firm introduced new clients to support their growth, and during the pandemic these partners returned the favour by allocating scarce refrigerated trucks to Case C. As a result, reciprocal assistance strengthened resource prioritisation and enhanced continuity during disrupted conditions.

> *"Once, a long-term milk supplier faced production issues. We gave them a cash rebate to ease their pressure. Later, they prioritized giving us the best milk after recovering capacity." (Procurement Officer, FC3)*

> *"A supplier who has cooperated with us for about five or six years. ...take a part of the sales rebate and other subsidies to this supplier... every year, this supplier's products must be provided to us first." (Procurement Manager, FC7)*

> *"A long-term logistics partner set aside two refrigerated trucks for us ... Back then, resources were extremely scarce, but they prioritized us because we had previously introduced new clients to them when they were expanding." (SC Manager, FC1)*

External Reciprocity with Downstream Partners

In Case C, external reciprocity with downstream partners was demonstrated through mutual support during routine operations and periods of pressure. Employees explained that long-term clients were granted additional flexibility, such as delayed payment or priority access to stock, which helped maintain stable commercial relationships. In return, these trusted partners provided assistance when the firm faced sales pressure, including helping distribute excess inventory to ease operational strain. As a result, reciprocal benefit exchange strengthened cooperative ties and enhanced continuity during demanding periods.

"We always give our long-term clients a bit more leeway … and when we have targets to hit or are under pressure, they'll also help us sell off some stock." (SC Manager, FC1)

"If it's a long-term downstream partner … we can let them sell first and collect payment later." (Sales Manager, FC6)

4.4.2.3 Communication

Internal Horizontal Communication

In Case C, internal horizontal communication was supported by peer-to-peer guidance that clarified daily communication channels. Experienced employees taught newcomers practical rules, such as whom to contact first when issues occurred and how to confirm deliveries with the warehouse, which reduced ambiguity and improved coordination across routine operations. As a result, informal communication norms helped maintain clarity and efficiency in daily tasks.

"When new colleagues join, I'll tell them who to contact first when something happens, or how to confirm delivery with the warehouse." (Procurement Officer, FC3)

"If someone is uncertain about a product, colleagues with more experience will offer advice … frequent communication makes cooperation smoother." (Sales Manager, FC6)

In Case C, internal horizontal communication enabled rapid coordination during the disruption stage. When urgent issues arose, departments immediately held meetings to divide responsibilities, such as assigning sales to handle external contacts while logistics arranged replenishment. Real-time information sharing through phone calls, screenshots, and WeChat groups helped employees assess the severity of problems and respond quickly. Colleagues also exchanged advice and transparent feedback across departments to support aligned and timely action. As a result, disruptions were contained through fast, cross-departmental cooperation.

"When coordination is needed, we immediately hold a meeting … once, a product had a slight batch issue and had to be recalled … sales handled external communication, I coordinated replenishment … the recall was fast and impact controlled." (SC Manager, FC1)

"The truck broke down on the highway ... the logistics manager sent screenshots of location and temperature ... this helps us quickly assess the severity." (Procurement Officer, FC3)

"Each department has a designated contact person ... problems are communicated directly by phone and synchronized in the WeChat group." (SC Manager, FC1)

"The supplier's raw material didn't arrive ... we confirmed the delay, then our supervisor coordinated the fastest replenishment ... I also informed warehouse ... we adjusted production without major impact." (Procurement Officer, FC3)

In Case C, internal horizontal communication supported collective reflection during the post-disruption stage. Employees described sharing practical lessons in department meetings, including how to handle emergencies and maintain customer communication. As a result, individual insights were converted into shared narratives that guided team understanding of effective post-disruption responses.

"I often share these little experiences in department meetings ... how to handle emergencies and maintain customer communication." (SC Manager, FC1)

Internal Vertical Communication

In Case C, internal vertical communication enabled rapid escalation and resolution of frontline issues during the disruption stage. Employees immediately reported problems such as label mismatches, packaging delays, or raw material shortages to supervisors and relevant specialist teams. Managers then coordinated with quality teams, suppliers, or production units to arrange emergency maintenance, secure replenishment, or adjust schedules. As a result, structured upward reporting supported quick decision-making and prevented operational interruptions.

"We directly escalated it to the department leader and started emergency maintenance ... if not for this timely internal reporting, the cold chain could have broken down." (SC Manager, FC1)

"A batch label didn't match our system ... I immediately contacted the milk source station, then reported it to our department head and the quality team." (Procurement Officer, FC3)

"If an order exceeds the authorisation limit or the supplier cannot deliver, we must report it to the supervisor ... they decide whether to accept the supplier's solution." (Procurement Officer, FC5)

External Communication with Upstream partners

In Case C, external communication with upstream suppliers supported trust-building in the pre-disruption stage. Managers maintained close contact with small, family-operated suppliers through frequent updates and informal interactions such as shared meals. These trust-based relationships encouraged suppliers to prioritise Case C's orders when capacity was limited. As a result, supply continuity was strengthened before disruptions occurred.

"We need to contact them at any time ... have meals, drinks, and fun together ... small suppliers are often family-operated ... we maintain close contact, so their goods are sent to us, not others, because our production capacity is limited." (Procurement Manager, FC7)

In Case C, external communication with upstream suppliers enabled early anticipation of risks in the pre-disruption stage. Suppliers proactively informed the firm about issues such as unstable milk supply, stock shortages, or upcoming price increases, allowing managers to adjust plans before problems escalated. They also suggested interim solutions, such as partial deliveries or alternative warehouse options, to minimise potential impact. As a result, advance communication supported timely adjustments and strengthened preparedness.

"Their salesperson called in advance and said upstream prices were about to rise ... reminded us to place orders earlier." (Procurement Officer, FC3)

"They usually inform us in advance and sometimes even offer solutions ... like shipping from a closer warehouse." (Procurement Officer, FC5)

" ... if cows are sick or the farm has problems, they must tell us in advance so we can contact other sources." (Procurement Manager, FC7)

"We regularly visit and communicate ... to understand their production conditions and quality control processes." (Logistics Manager, FC4)

In Case C, external communication with upstream suppliers and logistics partners enabled rapid information exchange and coordinated responses during the disruption stage. When extreme weather or transport failures occurred, teams held online meetings to share updates on orders, inventory, and vehicle status. Cold chain partners sent real-time screenshots of GPS locations and cargo temperatures, allowing the firm to judge severity and arrange replacement trucks within minutes. As a result, disruptions were resolved quickly and deliveries were completed without losses.

"They called me as soon as possible and sent real-time monitoring screenshots to our WeChat group ... we quickly determined the problematic batches, arranged emergency re-delivery, and notified customers to minimize the impact." (SC Manager, FC1)

"The truck stalled on the highway ... they sent screenshots of the location and cargo temperature ... within ten minutes they dispatched a spare truck ... the temperature remained within range, and the warehouse accepted the goods." (Procurement Officer, FC3)

"A few years ago, the original logistics plan couldn't be carried out because of the weather ... the supplier quickly arranged backup vehicles and safer routes ... throughout the process, we shared real-time information on inventory, order demands, and transport progress with the supplier...without any delays or losses." (Logistics Manager, FC4)

<u>*External Communication with Downstream partners*</u>

In Case C, external communication with downstream partners supported coordinated problem-solving during the disruption stage. In weather-related disruptions, managers activated backup

routes and informed customers in advance to secure their understanding. As a result, timely communication enabled smooth fulfilment and reduced negative impacts.

> *"Heavy rain blocked all shipments ... I immediately activated a backup route ... and communicated the delay to customers to gain their understanding." (SC Manager, FC1)*

External Communication with Multiple SC partners

In Case C, external communication with multiple SC partners helped prevent potential disruptions in the pre-disruption stage. Managers maintained close ties with downstream business owners and supermarket staff through regular updates and informal interactions to ensure smooth product stocking. They also shared early information about industry standard changes or new technologies, allowing partners to adjust in advance and explore collaboration opportunities. As a result, proactive communication strengthened alignment and reduced the likelihood of future interruptions.

> *"Maintaining client relationships is essential ... we keep in touch with downstream business owners or suppliers to ensure our dairy products can be smoothly stocked ... we also have casual interactions, meals, chats..." (Sales Manager, FC6)*

> *"When industry standards change or new technologies emerge, we promptly share this information with our partners." (Sales Manager, FC2)*

External Communication with Broader relationship network

In Case C, external communication with the broader relationship network expanded information access in the pre-disruption stage. Managers attended peer exchange meetings and industry exhibitions to share updates and establish cooperative ties with suppliers and customers. They also consulted peers for reliable supplier recommendations when urgent sourcing needs arose and regularly exchanged views on market conditions. As a result, wider network communication strengthened early awareness of industry changes and supported proactive preparation.

"We regularly hold or participate in a peer exchange meeting to share the latest industry information ... we have established good cooperative relations with our partners." (SC Manager, FC1)

"If we are in a hurry to find a new supplier ... I'll ask friends in the same industry if they have any stable channels to recommend." (Procurement Officer, FC3)

However, In Case C, communication during disruptions was influenced by employees' emotional states. Interviewees indicated that anxiety and stress could reduce clarity and effectiveness in communication, whereas emotionally stable employees were better able to communicate clearly under pressure.

"Emotionally stable employees can stay clear-headed under pressure, making communication and problem-solving more effective." (Sales Manager, FC2)

"If our employees feel anxious and stressed, it may affect their work efficiency and quality. If they maintain a positive attitude, they will be more motivated to solve problems." (Procurement Officer, FC3)

4.4.2.4 Cooperation

<u>Internal Horizontal Cooperation</u>

In Case C, internal horizontal cooperation strengthened pre-disruption coordination through structured planning and clear communication routines. Early coordination meetings to be held in advance during peak season to assign departmental responsibilities for contacting suppliers and logistics partners. Digital communication groups and designated liaisons further enabled direct notification during urgent situations. As a result, these cooperative practices reinforced preparedness and maintained operational consistency.

"During Double Eleven, we held early coordination meetings to assign who contacts suppliers, who follows up with logistics, and so on. Everyone knew their responsibilities." (Procurement Officer, FC3)

"Each department has a liaison in a chat group... In emergencies we @ the right people directly. Everyone is cooperative." (Procurement Officer, FC5)

In Case C, internal horizontal cooperation operated through rapid cross-departmental coordination during the disruption stage. The firm held emergency meetings and online discussions to clarify responsibilities, with sales managing client communication while warehouse and logistics arranged replenishment. Real-time updates through WeChat groups enabled quick resolution of issues such as delayed deliveries or mislabelled goods. Colleagues also stepped in to cover absent roles or reprioritised shipments across units to maintain workflow. As a result, departments shared information and mobilised resources collectively, sustaining operations under disrupted conditions.

> *"When something happens, we hold an emergency meeting. Everyone has clear roles, for example, sales handles external appeasement, I coordinate replenishment." (SC Manager, FC1)*

> *"We immediately held an online meeting and directly discussed the problems, inventory, and alternative plans … communication was smooth, and decision roles were clear … " (SC Manager, FC1)*

> *"For delayed goods, warehouse, procurement, logistics, and customer service quickly set up a WeChat group … Everyone knew their tasks and acted fast." (Procurement Officer, FC3)*

> *"I was coordinating with the supplier. The delivered items didn't match the order … We contacted the supplier, but they weren't familiar with stock availability.... the tech department had dealt with local electronics suppliers before and helped coordinate … the issue was resolved within the day." (Procurement Officer, FC5)*

<u>*External Cooperation with Upstream partners*</u>

In Case C, cooperation with long-term suppliers and logistics providers supported stable operations during the pre-disruption stage. These partners provided timely communication, early warnings of potential issues, and consistent service, which reinforced trust in their reliability. The firm also collaborated with a food technology institute to resolve product and packaging challenges, engaging in sustained joint problem-solving. This cooperation led to the

development of an eco-friendlier packaging solution and strengthened long-term partner relationships. As a result, external cooperation simultaneously deepened trust and enhanced capability building before disruptions occurred.

> *"Suppliers who choose to participate in our tenders are doing so with sincerity... in our experience, they are highly responsive, both in routine coordination and in handling emergencies." (Procurement Officer, FC5)*

> *"They didn't delay, once the problem was found, they immediately notified us … helped us check the batches … we were able to adjust our packaging plan." (SC Manager, FC1)*

> *"We have been cooperating with this cold chain logistics company for about five or six years... they always did a good job and were willing to communicate in time when there were problems. In the long run, we trusted them more." (Procurement Officer, FC3)*

> *"We … collaborated with a long-term partner … and found an eco-friendlier packaging solution" (Sales Manager, FC2)*

In Case C, cooperation with upstream suppliers and logistics partners enabled rapid problem solving during the disruption stage. Long-term breeding bases prioritised the firm's orders by reallocating scarce milk supplies and informing staff early about potential quality risks. Suppliers further supported urgent requirements by working with the firm to optimise production schedules and meet tight delivery timelines. Logistics partners also facilitated fast recovery from transport failures by adjusting vehicle arrangements, dispatching additional drivers, and mobilising backup refrigerated trucks within hours. As a result, upstream cooperation ensured preferential resource access and accelerated the firm's operational responses during disruptions.

> *"I contacted our long-term logistics company … they responded quickly, adjusted the vehicle schedule, and helped us dispatch additional drivers … the delivery went smoothly." (SC Manager, FC1)*

"We have some breeding bases we've cooperated with for many years … they will give priority to our needs … our orders suddenly increased … they gave the batch of milk to us first and then to others." (Procurement Officer, FC3)

"In summer, a delivery truck broke down … we called another long-term logistics partner … they sent a truck within an hour … the goods were accepted as usual." (Procurement Officer, FC3)

<u>*External Cooperation with Downstream partners*</u>

In Case C, cooperation with downstream partners helped relieve operational pressure during the disruption stage. Distributors supported the firm by reallocating inventory across warehouses to reduce overstock risks and by assisting with product sales when pressure increased. Long-term clients were also given flexible payment arrangements, allowing them to sell goods first and settle payments later. These cooperative practices reflected mutual trust and enabled both sides to maintain continuity during periods of strain.

"Facing overstock risk, we transferred goods across warehouses with help from other distributors, smooth cooperation that solved the problem." (Sales Manager, FC6)

"If it's a long-term downstream partner … we can let them sell first and collect payment later." (Sales Manager, FC6)

4.4.3 Human Capital

The following sections illustrate specific real-world examples of the two core practices identified in the field of human capital: training & education, and experience. Each practice is illustrated with evidence from Case C, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors.

4.4.3.1 Training & Education

<u>*Internal Managers' Training & Education*</u>

In Case C, managers strengthened their preparedness in the pre-disruption stage through formal training and structured management education. Emergency response training equipped them with clear procedures, enabling swift actions such as switching suppliers when raw material

shortages occurred. Management programmes also introduced conceptual models to address cost and time challenges and offered frameworks to guide procurement and sales decisions. Educational experiences further enhanced managers' systematic thinking and learning ability, supporting more proactive planning before disruptions emerged.

> *"Our training is mainly about emergency plan formulation and activation … once the supplier stopped raw material supply, I immediately switched to Class B suppliers, this was specifically covered in the training." (SC Manager, FC1)*

> *"Management training covers concepts and models, solving cost and time issues … " (Procurement Manager, FC7)*

> *"My education has made me more capable of understanding, and my learning ability at work has improved." (SC Manager, FC1)*

In Case C, managers strengthened their decision-making and problem-solving during the disruption stage through education. Higher education helped them analyse issues more systematically and make more accurate market judgments. As a result, education enhanced managers' ability to respond effectively during disruptions.

> *"Those with higher education handle problems more systematically … have broader knowledge and better market judgment …" (Sales Manager, FC6)*

<u>*Internal Employees' Training & Education*</u>

In Case C, employees strengthened their preparedness in the pre-disruption stage through structured training and educational activities. Internal lectures, external workshops, and disruption preparedness sessions equipped staff with practical skills to identify and address potential operational problems. As a result, these programmes enhanced employees' professional capabilities and increased the team's confidence in handling complex challenges.

> *"Our company does have some training programs...last year we organized a special training on risk management to teach our employees how to prevent and deal with these potential risks and problems." (Logistics Manager, FC4)*

In Case C, employees enhanced their preparedness in the pre-disruption stage through training that focused on emergency response, incident reporting, and adherence to operational rules. Annual sessions on food safety and emergency procedures provided protocols that staff could recall when logistics delays or stockouts occurred. Regular policy briefings and reporting mechanisms reinforced compliance, while posted operational documents reminded employees of standard procedures. The firm also offered weekly meetings, monthly training, and external lectures to broaden their knowledge. As a result, structured learning and standardised responses became embedded in daily operations.

> *"We do have annual sessions on emergency response and food safety … when logistics gets disrupted or stockouts happen, recalling those training procedures still helps." (Procurement Officer, FC3)*

> *"Every year the company organizes training on emergency response and incident reporting mechanisms … we also hold internal policy briefings and learning sessions." (Procurement Officer, FC5)*

> *"The company organizes system-wide training annually … even daily operations have policy documents posted, and compliance is mandatory." (Sales Manager, FC6)*

> *"There are weekly meetings and monthly training … sometimes external teachers are invited …" (Procurement Manager, FC7)*

However, the relevance of training content varies across functions. While channel and management personnel benefit directly from procedural frameworks, sales roles often rely more heavily on experiential learning.

> *"Training mostly covers interpersonal relations, sales models, and concepts … in sales, experience outweighs training, which just provides a framework to work within." "For channels and management, the training framework is much more important than for sales." (Procurement Manager, FC7)*

Despite such variation, standardized training plays a vital role in reinforcing institutional expectations and embedding routines that can be recalled when early disruptions emerge. These shared cognitive and procedural references improve coordination and enable faster response initiation, enhancing organisational preparedness.

4.4.3.2 Experience

Managers' Experience

In Case C, managers relied on accumulated experience to anticipate risks and make higher-quality decisions in the pre-disruption stage. Experience provided industry common sense, such as recognising seasonal sales patterns and identifying actions that required immediate attention. Long-term familiarity with dairy farms informed procurement decisions, including diversifying suppliers and purchasing above requirements as a precaution. As a result, practical experience strengthened managers' judgement and preparedness before disruptions occurred.

> *"Experience helps, knowing which actions must be taken quickly in similar situations, and having industry common sense, like seasonal sales patterns." (SC Manager, FC1)*

> *" ... if I need 10,000 tons of milk, I'll source from suppliers that can provide 12,000–13,000 to buffer against quality issues ...Our judgment is based on decades of experience dealing with dairy farms in one region ... "(Procurement Manager, FC7)*

In Case C, managers relied on accumulated experience to guide their responses during the disruption stage. Past events, such as the COVID-19 pandemic, helped them diversify suppliers and procurement channels to reduce exposure to risks. Experience also enabled managers to analyse difficulties calmly, identify root causes, and mobilise resources to coordinate timely solutions. As a result, experience supported calm diagnosis, quick adjustments, and coordinated actions under pressure.

> *"My past experiences also influence my decisions. During the COVID-19 pandemic, I actively sought suppliers and diversified procurement channels to mitigate supply chain disruption risks. This awareness of risk affects my decision-making." (SC Manager, FC1)*

"Whenever the company faces difficulties, experienced managers … quickly assess the situation and formulate effective response strategies. They not only analyse problems calmly but also mobilize resources and coordinate efforts, ensuring that issues are resolved properly." (Sales Manager, FC2)

"When the company faces challenges, experienced managers and senior employees can often quickly identify the root cause of the problem and come up with various solutions." (Logistics Manager, FC4)

Employees' Experience

In Case C, employees strengthened their preparedness in the pre-disruption stage through accumulated experience that improved sensemaking, knowledge management, and risk mitigation. With years of practice, procurement staff quickly assessed new suppliers' capabilities and judged operational details such as confirming arrivals with warehouses or checking raw material status in advance. Senior employees also passed on practical lessons about managing supplier price changes and coordinating daily interdepartmental tasks, enabling newcomers to adopt effective working styles more quickly. As a result, accumulated employee experience translated into collective preparedness before disruptions occurred.

"With experience, you can assess new suppliers' strength and background with just a brief contact." (Procurement Officer, FC5)

"Senior employees also shared with new employees their experience in handling supplier price increases and coordinating with other departments on daily tasks, so that everyone is better prepared and won't be at a loss when facing similar issues in the future." (Procurement Officer, FC3)

In Case C, employees used accumulated experience to support situational assessment and coordination during the disruption stage. When urgent procurement issues occurred, such as supplier delays or orders exceeding authorisation, staff escalated major cases through reporting mechanisms while relying on their own experience to resolve smaller routine problems. Senior employees also drew on extensive operational familiarity to maintain team morale and

coordinate emergency measures effectively. As a result, experience enabled sound judgement in uncertain situations and collective coordination under pressure.

> *"... if an order exceeds the authorized amount or the supplier cannot deliver on time, we must report it to our direct supervisor... for smaller, less urgent routine orders, we usually make decisions based on our standard operating procedures and experience." (Procurement Officer, FC5)*

> *"Senior employees played an important role during the crisis. With their extensive experience and familiarity with the company's operations, they were able to maintain team morale and efficiently implement various measures." (SC Manager, FC1)*

4.4.4 Cognition

Thee following sections illustrate specific real-world examples of the three core practices identified in the field of Cognition: individual cognitive attributes, shared codes and language, and shared narratives. Each practice is illustrated with evidence from Case C, illustrating how these relevant events manifested themselves at different stages of disruption and for different types of actors.

4.4.4.1 Individual Cognitive Attributes

Managers' Cognitive Attributes

In Case C, managers strengthened preparedness before disruptions by recognising risks early and planning countermeasures in advance and rapid decision-making during disruptions. They identified potential supplier vulnerabilities and established alternative sources, which allowed operations to continue when events such as flooding disrupted primary suppliers. As a result, managers' risk awareness and rapid decision-making supported continuity under adverse conditions.

> *"Only when management can keenly identify risks and develop effective countermeasures can the company quickly resume normal operations in the face of emergencies." (SC Manager, FC1)*

“I believe that management's understanding of risks plays a crucial role when problems arise. If management can anticipate risks and prepare contingency plans in advance, they can respond quickly when issues occur, minimizing unnecessary losses … one time our key supplier couldn't deliver due to flooding, but management had already established alternative suppliers, allowing us to quickly secure continuity in production.” (Procurement Officer, FC3)

“We experienced a similar situation with logistics delays due to extreme weather... Management quickly communicated with affected areas, sought solutions, and activated backup plans to ensure market supply.” (Sales Manager, FC2)

In Case C, managers demonstrated situational assessment before and during the disruption stage by combining accumulated industry knowledge with structured problem-solving. They relied on accumulated industry knowledge and common sense, such as seasonal sales rules, to anticipate which actions needed to be taken quickly in advance. When disruptions occurred, they avoided impulsive reactions by breaking down problems systematically and evaluating operational priorities. As a result, managers’ situational assessment maintained continuity under pressure.

“The first is experience, knowing which actions must be taken quickly in similar situations; the second is industry common sense, such as seasonal sales rules.” (SC Manager, FC1)

“I did not rush to replenish the goods directly but first broke down the problem … then prioritized which product lines were the most critical.” (SC Manager, FC1)

In Case C, managers described how emotional pressure influenced their decision-making during the disruption stage. Sustained periods of poor sales created stress that was difficult to avoid, at times affecting their ability to make fully rational choices. As a result, emotions directly shaped managerial behaviour when facing challenging conditions.

"Sometimes it's hard to avoid emotional influence, especially after several months of poor sales, the pressure may lead you to make less rational decisions." (Sales Manager, FC6)

Employees' Cognitive Attributes

In Case C, employees demonstrated sensemaking in the pre-disruption stage by developing shared interpretations of operational risks. Lessons from experienced supervisors shaped how they understood supply priorities, emphasising that shortages were far more damaging than high prices. These meaning structures also guided employees' monitoring of daily activities, prompting them to treat issues such as damaged packaging as early warning signals. By reporting anomalies immediately, they enabled preventive actions to be taken before problems escalated. As a result, collective sensemaking supported consistent and risk-aware behaviour across routine procurement and logistics work.

"I had a supervisor who taught me, 'The most fearful thing in purchasing is not the high price, but the shortage.' That is to say, the price can be negotiated, but the shortage of goods is a fatal flaw... Every time I make a purchasing decision, the first thing I consider is whether the supply can be guaranteed." (Procurement Officer, FC3)

"Once during logistics, an employee noticed damaged packaging and reported the issue... preventing further damage… especially since we handle dairy products." (Procurement Officer, FC3)

"We identify potential risk factors during daily work and provide early warnings to management … so that measures can be taken to prevent damage." (Logistics Manager, FC4)

In Case C, employees demonstrated situational assessment during disruptions by quickly evaluating response options when operational issues occurred. When problems such as leaking bottles or incorrect labels arose, they assessed whether the issue could be resolved by changing batches or using available inventory. They escalated the matter to supervisors when delivery schedules were at risk. As a result, employees' situational assessment enabled timely adjustments and protected order fulfilment during disruptions.

"If the goods arrive but the label is wrong or the milk bottle leaks, we must immediately determine whether we can temporarily change the batch or use inventory to make up for it ... but if it affects delivery, I will immediately report it to the supervisor." (Procurement Officer, FC3)

Case C also shows a clear effect of emotion on situational assessment during disruption. Employees explained that anxiety and stress reduced efficiency and hindered problem-solving, whereas emotional stability helped them stay clear-headed under pressure. This indicates that emotional regulation supported better cognitive processing of disruption conditions, enabling more effective assessment of problems and response actions.

"Emotionally stable employees can stay clear-headed under pressure, making communication and problem-solving more effective." (Sales Manager, FC2)

"If our employees feel anxious and stressed, it may affect their work efficiency and quality. If they maintain a positive attitude, they will be more motivated to solve problems." (Procurement Officer, FC3)

4.4.4.2 Shared Language and Code

<u>Internal Horizontal Shared language and codes</u>

In Case C, horizontally, employees used shared language and code during the disruption stage to support fast and efficient coordination. Repeated daily interactions created abbreviated terms that allowed staff to understand operational priorities without detailed explanation. Expressions such as "red line order" immediately signalled urgent tasks, while routine phrases like "labeling" or "scanning three certificates" helped employees align actions quickly. As a result, shared language reduced ambiguity and enabled timely responses under pressure.

"As long as we hear 'red line order (hong xian dan)' on the intercom, we know that it is a particularly urgent and must be handled first." (SC Manager, FC1)

"Like 'labeling (tie biao)' and 'scanning three certificates (sao san zheng)' ... many times everyone understands what the other person means halfway through." (Procurement Officer, FC3)

"A few words can replace a long project title, which greatly improves communication efficiency." (Procurement Officer, FC5)

4.4.4.3 Shared Narrative

Internal Horizontal Shared Narratives

In Case C, employees developed shared narratives in the post-disruption stage through review meetings that translated past incidents into collective learning. After supplier quality issues, staff summarised lessons and adopted stricter practices such as trial orders and tighter inspections. Delivery delays were also discussed in regular meetings, reinforcing vigilance on delivery dates and encouraging logistics teams to build time buffers during peak periods. Negative project cases were shared across teams to clarify preventive measures and avoid repeated mistakes. As a result, shared narratives helped employees internalise lessons and integrate preventive actions into routine work.

"After a supplier quality issue, the company held a review meeting ... summarized lessons ... later everyone automatically became more vigilant, requesting small batch trial orders and stricter inspection standards." (SC Manager, FC1)

"Once a supplier delayed delivery, which made us passive later. Later in the regular meeting, ..., emphasizing that we should keep an eye on the delivery date, and the logistics side should also reserve time and... especially when encountering important nodes and peak periods, everyone will prepare in advance and pay attention to communication." (Procurement Officer, FC3)

"After identifying the issue, we held a small meeting to review and discuss it, and clarified how to prevent such mistakes in the future." (Procurement Officer, FC5)

Internal Vertical Shared Narratives

In Case C, managers created vertical shared narratives during the disruption stage by framing emergencies clearly and establishing a unified understanding across teams. When sudden demand surges or transport blockages occurred, managers immediately convened meetings to explain the urgency and outline expected responses. This top-down communication helped

employees recognise the seriousness of the situation and coordinate adjustments quickly across sales, production, and logistics. As a result, shared narratives aligned departments and accelerated joint action under pressure.

> *"Once the company faced a very big challenge … encountered an unprecedented surge in demand, which almost exhausted our inventory … our management quickly convened a meeting with the heads of all relevant departments … After the meeting, all departments took action immediately. Everyone knew what they should do and why they did it. Our sales team also strengthened the communication between our distributors and terminal sales... production department worked overtime … logistics to mobilize and coordinate transportation capacity...." (Sales Manager, FC2)*

> *"Managers and employees reach a consensus ... When emergencies require quick logistics adjustments, the management immediately calls employees to a meeting. They explain the situation, adjust arrangements, and employees actively cooperate." (Logistics Manager, FC4)*

4.4.5 Summary of Case C

The descriptive findings for Case C showed how managers and frontline employees in a cold-chain dependent dairy and beverage network talked about the human related factors underpinning their day-to-day coordination and responses to supply disruptions. Based on interviews with staff from procurement, SCM, logistics, quality, and sales, the section reported how people described handling routine operations, cold-chain risks, supplier failures, demand surges, and transport incidents.

Across the data, participants recounted a range of social capital practices, including internal horizontal and vertical trust, reciprocal support between colleagues, and mutual assistance with long-term upstream farms, packaging and logistics providers, and downstream distributors and retailers. Employees emphasised dense communication and cooperation arrangements, such as WeChat groups, designated liaisons, emergency meetings, and joint planning for peak seasons, that enabled real-time information sharing and rapid cross-departmental coordination. These practices were visible in the pre-disruption stage (early warnings, joint planning), during disruptions (emergency adjustments, resource reallocation), and after disruptions (reviews and

shared lessons), and were described as central to keeping the cold chain intact and orders fulfilled. The findings also highlighted human capital and cognitive dimensions. Formal training and management education provided emergency procedures, structured decision aids tools, and standard operating rules, while accumulated experience at managerial and employee level informed supplier diversification, buffer planning, and calm decision-making under pressure. Cognitive elements, such as risk awareness, situational assessment, emotional regulation, shared shorthand codes (e.g. “red line order”), and horizontal and vertical shared narratives, shaped how staff interpreted events and aligned responses.

These practices were presented descriptively under the themes of social capital, human capital, and cognition, reflecting participants’ own accounts. Together, the Case C findings offer a rich empirical basis for the cross-case comparison and theoretical interpretation in Chapter 5 on how human related factors enhance SCRES.

4.5 Chapter Summary

This chapter has presented the descriptive findings from three case firms, a beverage chain (Case A), a liquor producer (Case B), and a dairy and beverage manufacturer (Case C), showing how managers and frontline employees described their operational routines and disruption-related experiences. Drawing on interview data across procurement, SC, logistics, production, quality, store operations, and sales, the chapter reported how participants recounted real events in their own words, rather than offering theoretical explanation.

Across all three cases, the findings were organised around the three core themes of social capital, human capital, and cognition. Under social capital, the chapter illustrated how trust, reciprocity, communication, and cooperation operated through internal horizontal and vertical relationships, as well as external ties with upstream suppliers, downstream partners, logistics providers, and broader relationship networks. Under human capital, the cases described how training, education, and accumulated experience at both managerial and employee level shaped preparedness, response, and post-disruption learning. Under cognition, the chapter highlighted individual cognitive attributes,(managers’ risk awareness and situational assessment, employees’ sensemaking and situational assessment) and shared cognitive structures (shorthand codes, shared language, and internal and external narratives) that guided how people interpreted and responded to disruption-related events.

Overall, the three cases depict a rich picture of human-related practices that support supply continuity, cold-chain integrity, and customer service across pre-disruption, disruption, and post-disruption stages. The material in this chapter is intentionally descriptive and case specific. It provides the empirical basis for Chapter 5, where these findings are compared across cases, linked back to the literature, and interpreted through the lens of social capital, human capital, and cognition as human related factors for enhanced SCRES.

Chapter 5. Cases Analysis

5.1 Chapter Overview

This chapter provides a deeper analysis of how Cases A, B, and C develop and activate social capital, human capital, and cognition to support SCRES. While Chapter 4 presented descriptive, case-grounded findings concerning informants' disruption experiences and resilience-related practices, Chapter 5 moves from description to explanation. It examines how and why DHRC practices were enacted differently across pre-, during-, and post-disruption stages.

The analysis considers how product characteristics, disruption types, operational requirements, SC relationship structures, and actor roles shaped the enactment of DHRCs across the three cases. Rather than treating the nine practices as fixed or uniformly applied categories, the chapter explains their different meanings, functions, and resilience contributions across case contexts.

Sections 5.2–5.4 present the within-case analyses. These sections examine how social capital, human capital, cognition, and their associated practices operate within each firm's internal organisational setting and wider SC relationships, and how they contribute to preparedness, response, and post-disruption learning and adaptation.

Section 5.5 presents the cross-case analysis, synthesising common patterns while explaining key differences in how DHRCs are enacted. In particular, Section 5.5.4 identifies the sources of cross-case variation and explains how disruption contexts, product characteristics, operational requirements, actor roles, and SC relationship structures shape the salience and functions of DHRC practices.

Overall, Chapter 5 bridges the descriptive case evidence presented in Chapter 4 and the theoretical discussion developed in Chapter 6. It explains the processes through which social capital, human capital, and cognition contribute to SCRES and why their enactment varies across the three empirical contexts.

5.2 Within-Case Analysis: Case A

Case A is a national beverage chain that relies on centralised procurement, stable upstream ingredient suppliers, and an integrated cold-chain logistics system to preserve product

freshness. Its SC requires regional distribution to numerous franchised stores, coordinated scheduling, temperature control, and continuous communication with downstream outlets.

The analysis in this section follows a unified structure that examines three categories of human related factors: social capital, human capital, and cognition. Social capital is analysed through practices of trust, reciprocity, cooperation, and communication, covering both internal relationships (e.g., vertical and horizontal collaboration) and external relationships with upstream suppliers, downstream partners, and broader multi-tier SC actors. Human capital focuses on training, education, and accumulated experience at both managerial and employee levels. Cognition is analysed through individual cognitive attributes of managers and employees, shared language and codes, and shared narratives. For each category, the analysis traces how relevant practices function across the pre-disruption, during-disruption, and post-disruption stages to identify their contributions to SCRES.

5.2.1 Social Capital

Social capital refers to the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit (Nahapiet and Ghoshal, 1998), and has been widely recognised as an important relational resource in SCRES research (Fan and Stevenson, 2019; Daghar et al., 2021; Aslam et al., 2022; Nikookar and Yanadori, 2022a). In this study, the analysis distinguishes between internal relationships, comprising horizontal and vertical ties, and external connections with upstream partners, downstream partners, multiple SC partners, and the broader relationship network (see Table 5.2.1). The following subsections examine four core practices identified within the social capital domain: trust, reciprocity, communication, and cooperation. Each practice is presented with evidence from Case A, illustrating how these social capital's practices contribute to SCRES across different disruption stages and actor types.

Table 5.2.1 Social Capital's Practices and Its Contributions on SCRES: Case A

Social capital's practices	Focus	Actors	Contribution to SCRES	Phases of SCRES
Trust	Internal	Horizontal	Communication; joint problem-solving	During-disruption
		Vertical	Empowered decision-making; employee-led problem-solving; informal resource mobilisation; rapid coordination	During-disruption

	External	Upstream partners	Priority supply allocation; supply flexibility; financial flexibility	During-disruption
		Broader relationship network	Information channel; anticipation	Pre-disruption
Reciprocity	Internal	Horizontal	Coordination, responsiveness	During-disruption
	External	Upstream partners	Priority resource allocation; financial flexibility	During-disruption
		Downstream partners	Collaboration	During-disruption
Communication	Internal	Horizontal	Information sharing	Pre-disruption
		Horizontal	Organisational learning	Post-disruption
		Vertical	Coordination and responsiveness	During-disruption
	External	Upstream partners	Contingency planning; preparedness	Pre-disruption
		Downstream partners	Information sharing; collaborative problem-solving	During-disruption
		Multiple SC partners	Information sharing; coordination	During-disruption
Cooperation	Internal	Horizontal	Coordination; problem-solving.	During-disruption
	External	Upstream partners	Coordination; proactive information sharing: early warning	Pre-disruption
		Upstream partners	Priority resource allocation; flexible responses	During-disruption
		Downstream partners	Stabilising demand; preserving long-term commercial ties; robustness	During-disruption

5.2.1.1 Trust

Internal Horizontal Trust

In Case A, internal horizontal trust enables proactive peer communication, rapid information exchange, and collaborative problem-solving when unexpected issues arise. Such trust relationship's role are reinforced by the firm's decentralised operational structure, where daily coordination among warehouse, sales, and logistics staff relies heavily on interpersonal relationships and informal communication. As a result, horizontal trust strengthens SCRES by enhancing robustness through swift issue stabilisation and improving responsiveness by allowing colleagues to propose and execute feasible adjustments under time pressure.

Internal Vertical Trust

In Case A, vertical trust between employees and managers enables autonomous decision-making, informal resource mobilisation, and employee-led problem-solving during disruptions.

Trust from leadership empowers employees to take initiative, mobilise informal resources, and solve problems without waiting for formal approval. For example, when urgent restocking was required, an employee leveraged personal customer contacts to secure supply through trusted channels, resolving the issue promptly. Such trust-based vertical relationships reduce procedural delays, enhance agility, and ensure that decision-making remains both decentralised and coordinated, factors that are critical for timely responsiveness in the face of SC disruptions.

External Trust with Upstream Partners

In Case A, trust-based relationships with upstream suppliers provide critical advantages during disruption periods, including priority supply allocation, enhanced supply flexibility, and temporary financial leniency. Such trust encourages suppliers to go beyond contractual obligations, offering timely support, reallocating inventory, and accommodating short-term payment delays, thereby sustaining operational continuity under volatile demand or constrained supply conditions.

However, the firm recognised that excessively close personal ties between lower-level managers and suppliers could undermine transparency and fairness, potentially leading to preferential treatment and weakened overall SCRES. To address this risk, Case A implemented a supplier–manager rotation system and established a dedicated department for supplier communication, thereby limiting branch-level involvement. Although effective in reducing the risk of corruption, this measure introduced short-term trade-offs: unfamiliarity between newly assigned managers and suppliers sometimes reduced suppliers' willingness to provide additional assistance in emergencies, and collaboration efficiency temporarily declined until relationships were re-established.

External Trust with Broader Relationship Network

In Case A, external trust with broader relationship networks, such as industry friends, facilitates access to informal information channels, supporting early detection of market shifts in the pre-disruption stage and enabling proactive adjustment of SC decisions.

5.2.1.2 Reciprocity

Internal Horizontal Reciprocity

Horizontal internal reciprocity strengthened Case A's resilience by embedding mutual obligation and problem-solving practices into daily operations. During disruptions, such reciprocity transformed into a coordination process whereby colleagues mobilised support without managerial intervention, enabling rapid recovery and fulfilment of customer commitments. By institutionalising a culture of mutual assistance, reciprocity reduced disruption costs and enhanced the firm's adaptive capacity under resource-constrained conditions.

External Reciprocity with Upstream Partners

In Case A, external reciprocity with upstream partners acted as a relational buffer that enhanced SC flexibility during disruptions. Reciprocal exchanges, such as prioritizing orders, providing market support, or extending payment terms, embedded a system of mutual obligation that reduced coordination frictions and shared risk across firm boundaries. These reciprocal practices enabled faster adaptation to market changes and financial pressures, ensuring continuity of operations and strengthening the firm's capacity to absorb shocks through collaborative problem-solving.

External Reciprocity with Downstream Partners

In Case A, reciprocity with downstream partners fostered goodwill and smoother coordination. Small acts of mutual assistance between employees and franchise staff reduced friction and improved coordination and response times when urgent issues arose.

5.2.1.3 Communication

Internal Horizontal Communication

In Case A, horizontal communication enhanced SCRES by enabling employees to share information before disruption. Employees quickly addressed uncertainties and made informed decisions even in unfamiliar situations by seeking advice from colleagues. This instant communication promoted information sharing, safeguarded continuity, and strengthened Case A's capacity to respond effectively under pressure.

Furthermore, horizontal communication strengthened SCRES by supporting organisational learning at post-disruption stage. Following disruptions, peer feedback and experience sharing

transformed individual lessons into shared narratives, reinforcing collective knowledge and improving future responses.

However, in Case A, emotion affected cooperation during disruption. Interview evidence shows that unmanaged emotion escalated conflict between warehouse and delivery personnel into a physical confrontation, causing an immediate breakdown in collaborative interaction and coordination, which disrupted the delivery schedule for that day. This suggests that emotional instability weakened frontline cooperation under disruption pressure.

Internal Vertical Communication

Vertical internal communication strengthened Case A's SCRES by embedding information sharing and rapid coordination into disruption management. Clear reporting channels and direct access to supervisors enable employees to relay urgent issues immediately and receive swift guidance without procedural delays. This top-down responsiveness is reinforced by the firm's operational structure, where frontline staff are expected to consult leaders when resource shortages or service interruptions arise, allowing managers to activate backup options or reallocate capacity quickly. As a result, vertical communication reduces decision lags, accelerates problem resolution, and sustains continuity in delivery and inventory operations under time pressure.

External Communication with Upstream partners

External communication with upstream partners enhanced Case A's resilience by embedding proactive coordination and contingency planning into pre-disruption practices. Through continuous dialogue and advance planning, the firm aligned operational needs with suppliers, anticipated constraints, and created time buffers before issues escalated. As a result, external communication reduces uncertainty, facilitates early planning, and reinforced its preparedness for future disruptions.

External Communication with Downstream partners

External communication with downstream partners strengthened Case A's resilience by embedding real-time information sharing and collaborative problem-solving into disruption management. During crises, instant updates to retailers enabled collaborative responses that reduced delays and maintained service continuity. Through these timely and open

communication flows, Case A minimises coordination frictions, maintains continuity at the customer interface, and strengthens its capacity to respond effectively under pressure.

External Communication with Multiple SC partners

External communication with multiple SC partners strengthened Case A's resilience by institutionalising rapid coordination and real-time information exchange across organisational boundaries. During disruptions, such communication facilitated fast decision-making, ensured alignment of actions among suppliers and retailers, and prevented delays from escalating into wider operational breakdowns. By leveraging direct outreach, delegated coordination, and digital tools, Case A enhanced responsiveness and maintained continuity under pressure, underscoring the pivotal role of multi-partner communication in disruption management.

5.2.1.4 Cooperation

Internal Horizontal Cooperation

Internal horizontal cooperation strengthened Case A's resilience by embedding cross-functional coordination and collective problem-solving. During disruptions, sales, operations, purchasing, and warehouse units worked jointly to mobilise resources, reallocate inventory, and adjust delivery schedules. This collaborative approach enabled swift decision-making and operational continuity, ensuring that customer service levels were preserved despite shocks.

External Cooperation with Upstream Partners

In Case A, before disruptions, long-term cooperative relationships with upstream partners facilitated smoother coordination by embedding familiarity, mutual understanding, and routine assistance into daily interactions. These stable working relationships reduced uncertainty and enabled partners to reach quick agreements when early warning signs appeared, thereby enhancing the firm's preparedness. Cooperative ties also encouraged proactive information sharing: suppliers with long-standing relationships voluntarily communicated early signals about potential constraints, allowing employees to prepare countermeasures in advance and adjust operational plans ahead of time. This ensured that emerging risks were identified earlier and coordination proceeded more smoothly once disruptions began.

During disruptions, these cooperative relationships supported rapid and flexible responses. Trusted suppliers prioritised deliveries arranged urgent shipments, and even transferred stock

from other outlets to bridge unexpected shortages. Their familiarity with the firm's needs enabled swift action during peak periods or sudden demand spikes, ensuring that supply gaps were resolved quickly, and operational continuity was maintained with minimal interruption.

External Cooperation with Downstream partners

In Case A, external cooperation with long-term downstream enhanced SC robustness by stabilising demand and preserving long-term commercial ties. When stable clients experienced temporary cash flow difficulties, the firm accommodated delayed payment requests to prevent order cancellations and maintain transaction flow. This cooperative practice reduced financial strain on downstream partners and ensured that product distribution proceeded without interruption. By stabilising demand and avoiding service disruption at the customer interface, downstream cooperation supported operational continuity and reinforced Case A's ability to manage disruption pressures.

5.2.2 Human Capital

Human capital refers to individual knowledge and skills applied to work (Adner and Helfat 2003; Nikookar and Yanadori 2022a). It evolves through experience and education, forming an organisation's competitive edge through its unique and inimitable attributes (Shela et al., 2023; Mubarik et al., 2022). In this section, we analyse the human capital of Case A at both managerial and employee levels. The following subsections examine two core practices identified within this domain, training and education, and experience. Each practice is discussed with supporting evidence from Case A, demonstrating how these practices of human capital contribute to SCRES across different disruption stages and actor groups (See Table 5.2.2).

Table 5.2.2 Human Capital's Practices and Its Contributions on SCRES: Case A

Human capital's practices	Focus	Actor	Contribution to SCRES	Phases of SCRES
Training and education	Internal	Employees	Sensemaking; security compliance; preparedness	Pre-disruption
		Employees	Problem-solving; coordination; responsiveness	During-disruption
Experience	Internal	Manager	Risk awareness; anticipation; preparedness	Pre-disruption
		Manager	Situational assessment; adaptive decision-making; coordination; problem-solving; responsiveness	During-disruption

	Employees	Early-signal recognition; sensemaking; preparedness	Pre-disruption
	Employees	Situation assessment; problem-solving; responsiveness; responsiveness; operational continuity	During-disruption

5.2.2.1 Training & Education

Employees' Training & Education

In Case A, routine safety training enhances employees' sensemaking, security compliance, and ability to identify early warning signs in the pre-disruption stage. The case shows that employees regularly received fire, warehouse, and transportation safety instructions, reinforced through drills and professional guidance, which helped them internalise correct safety behaviours and recognise abnormalities more quickly in daily operations. As a result, routine safety training enhances SCRES by strengthening preparedness and robustness through proactive hazard prevention and quicker recognition of potential risks before they escalate.

During disruption, training and education strengthened Case A's by enhancing responsiveness, coordination, and continuity while reducing operational vulnerability. Emergency response training enabled employees to quickly repair or transfer goods when vehicles or equipment failed, ensuring delivery commitments were met. Procedural training and regular cross-departmental meetings improved coordination, allowing staff to notify relevant departments, mobilise backup resources, and stabilise inventory under pressure. Furthermore, by integrating training with accumulated experience, employees were able to stay calm, act decisively, and minimise disruption impacts. As a result, training further enabled responsiveness, coordination, and continuity while reducing operational vulnerability, ensuring that operations remained stable under pressure.

5.2.2.2 Experience

Managers' Experience

In Case A, managers' experience strengthened SCRES in the pre-disruption stage by enhancing risk awareness and security compliance through embedding preventive practices into daily warehouse operations. Through accumulated learning from incidents and repeated tasks, managers were able to translate tacit knowledge into practical rules, such as proper stacking or spacing protocols, that complemented formal regulations. By institutionalising these

experiential insights, managers reduced the likelihood of accidents and created an operational environment more capable of withstanding potential shocks.

In Case A, managers' experience enhances situation assessment, flexible judgement, and problem-resolution capability during disruptions. The case shows that managers drew on accumulated operational and relational experience to quickly interpret the cause of disruptions, choose appropriate response strategies, and coordinate with partners more effectively. Such experience-enabled judgement also supported smoother coordination with internal teams, as managers relied on methods and problem-solving approaches developed through years of hands-on practice. As a result, managers' experience enhances SCRES by enabling responsiveness through faster interpretation of disruption signals and more confident, adaptive decision-making under pressure.

Employees' Experience

In Case A, employees' experience supported preparedness in the pre-disruption stage by enhancing early-signal judgement, emotional composure, and anticipatory problem awareness. The case shows that experienced staff relied on accumulated practical knowledge to recognise subtle signs of operational issues, stay calm when uncertainty emerged, and guide routine preparations based on past lessons, whereas newer employees were more likely to feel unsure or overwhelmed when facing unfamiliar situations. These experiential insights were embedded in daily practices and shaped how teams anticipated and prepared for potential risks. As a result, employees' experience enhances SCRES through proactive readiness and steadier reactions and greater confidence when challenges arise.

In Case A, employees' experience enhanced rapid situation assessment, calm decision-making, and effective coordination during disruption. Experienced staff could immediately judge the severity of unexpected incidents, such as a delivery vehicle catching fire, take decisive actions to control the situation, and follow correct reporting procedures, while less experienced employees were more likely to panic or hesitate. Experience also enabled staff to detect atypical product-related signals, such as recognising an unusual smell in delivered tea as a warning sign and quickly coordinate with warehouse and quality teams to verify and address the issue. As a result, employees' experience enhances SCRES by strengthening robustness through swift

containment of operational incidents and by enabling responsiveness through faster, more confident coordination that protects both continuity and product integrity during disruptions.

5.2.3 Cognition

Cognition in this study encompasses both individual mental representations that shape decision-making through perception, giving meaning to the environment (Adner and Helfat 2003; Helfat and Peteraf 2015; Nikookar and Yanadori 2022a), and shared cognition, which emerges from collective representations, meanings, and values that enhance mutual understanding and collaboration in SC relationships (Nahapiet and Ghoshal, 1998; Fan and Stevenson, 2018; Ozanne et al., 2022; Daghar et al., 2023). In this section, we analyse the cognition of Case A across managerial, employee, and collective levels. The following subsections examine three core practices identified within this domain, individual cognitive attributes (among both managers and employees), shared language and code, and shared narratives. Each practice is discussed with supporting evidence from Case A, illustrating how these cognitive components contribute to SCRES across different disruption stages and actor groups.

Table 5.2.3 Cognition's Practices and Its Contributions on SCRES: Case A

Cognition's practices	Focus	Actors	Contribution to SCRES	Phases of SCRES
Individuals' cognitive attributes	Managers' cognitive attributes	Risk awareness	Anticipation; contingency planning; preparedness	Pre-disruption
		Situational assessment	Adaptive decision making; problem-solving; responsiveness	During-disruption
	Employees' cognitive attributes	Sensemaking	Early risks identification; robustness	Pre-disruption
Shared language and code	Internal	Horizontal	Communication; coordination; responsiveness	During-disruption
Shared narrative	Internal	Horizontal	Preparedness; communication; coordination; responsiveness; post-disruption knowledge management	Pre-; During; Post-disruption
	External	Downstream partners	Coordination; preparedness	Pre-disruption

5.2.3.1 Individual Cognitive Attributes

Managers' Cognitive Attributes

In Case A, managers' risk awareness strengthened pre-disruption preparedness by enabling early detection of vulnerabilities. They monitored market changes, adjusted inventory levels

according to sales patterns, and conducted routine safety patrols across the facility. These activities helped identify potential issues before they escalated and supported timely preventive measures. As a result, operational risks were reduced and continuity was better protected.

During disruptions, managers' situational assessment strengthened responsiveness by adjusting their actions to the urgency and complexity of emerging issues. For multi-departmental or ambiguous problems, they first assessed the overall situation and coordinated with other managers to determine appropriate responses. For simpler or safety-related issues, they acted immediately by giving clear instructions and explaining risks to frontline staff. As a result, disruptions were handled in a timely, structured, and orderly manner. As a result, managers' situational assessment improved the organisation's capacity to react swiftly, coordinate effectively, and safeguard operational continuity under pressure.

Employees' Cognitive Attributes

In Case A, employees' sensemaking strengthened pre-disruption preparedness by enabling early risk identification. Their proactive attention to potential safety hazards and preventive maintenance practices reduced the likelihood of warehouse accidents, protecting both inventory and operations. By embedding safety awareness into daily routines, employees strengthened the firm's ability to anticipate risks and mitigate disruptions before they occurred.

5.2.3.2 Shared Language and Code

Internal Horizontal Shared Language and Code

Shared language and code strengthened Case A's resilience by reducing ambiguity, streamlining communication, and enabling rapid coordination during disruptions. In urgent situations, phrases such as "urgent order" or "inventory check" conveyed clear and shared meanings, allowing employees to instantly understand priorities and act without delay. These cognitive shortcuts ensured rapid collective action, minimised miscommunication, and secured continuity under time pressure.

5.2.3.3 Shared Narrative

Internal Horizontal Shared Narratives

In Case A, internal shared narratives developed through routine reflection at the post-disruption stage, which acted as informal organisational memory that enhanced future preparedness and

responsiveness. By repeatedly reviewing these incidents and circulating the lessons across teams, employees transformed past experiences into informal organisational memory. These narratives strengthened pre-disruption preparedness by sharpening collective vigilance and encouraging more careful monitoring of inventory and delivery schedules, including among newer staff who inherited these shared expectations. They also supported during-disruption responsiveness, providing reference points that enabled calmer and more coordinated action when similar problems reoccurred. Overall, internal shared narratives in Case A operate as post-disruption learning that enhances both future readiness and real-time response.

External Shared Narratives with Downstream Partners

In Case A, external shared narratives with downstream franchise retailers enhanced mutual expectations, coordination discipline, and contingency readiness in the pre-disruption stage. The case shows that both sides developed a common understanding that retailers should place orders before safety stock was exhausted, and the firm would schedule deliveries accordingly. This shared expectation, reinforced through routine interactions, enabled retailers to prepare buffer stock and mitigated the impact of minor delays on store operations. As a result, external shared narratives enhance SCRES by strengthening robustness through improved inventory preparedness and enabling responsiveness by reducing delivery pressure and maintaining stable service levels during disruptions.

5.2.4 Summary of Case A

Overall, Case A's resilience emerges from the combined effects of its social capital, human capital, and cognitive practices across the pre-, during-, and post-disruption stages. Internally, horizontal trust, reciprocity, and communication enable early information sharing and coordinated responses, while external ties with upstream and downstream partners support early warnings, priority resource allocation, and collaborative problem-solving. Human capital, shaped by employees' training, preparedness, and the accumulated experience of both managers and frontline staff, enhances early-signal recognition before disruptions and strengthens adaptive decision-making and operational continuity during disruptions. Cognitive elements, including managers' and employees' individual cognitive attributes, shared language, and shared narratives, further reinforce preparedness, guide situational assessment under pressure, and support learning after disruptions. Together, these layered human-related

capabilities form Case A's distinctive resilience logic, enabling rapid coordination and responsive adjustment within a fast-paced, cold-chain-dependent beverage SC.

5.3 Within-Case Analysis: Case B

Case B is a distillery that depends on a continuous supply of raw materials to sustain liquor production and on safe storage conditions to protect product quality. Its SC combines in-house logistics with outsourced transport providers, requiring careful management of alcohol-related transport safety and downstream distribution to different regions.

The analysis in this section follows a unified structure that examines three categories of human related factors: social capital, human capital, and cognition. Social capital is analysed through practices of trust, reciprocity, cooperation, and communication, covering both internal relationships (e.g., vertical and horizontal collaboration) and external relationships with upstream suppliers, downstream partners, and broader multi-tier SC actors. Human capital focuses on training, education, and accumulated experience at both managerial and employee levels, including cases where training extends to external distributors. Cognition is analysed through individual cognitive attributes of managers and employees, shared language and codes, and shared narratives. For each category, the analysis traces how relevant practices function across the pre-disruption, during-disruption, and post-disruption stages to identify their contributions to SCRES.

5.3.1 Social Capital

In this section, the analysis of Case B's social capital distinguishes between internal relationships, comprising horizontal and vertical ties, and external connections with upstream partners, downstream partners, multiple SC partners, and the broader relationship network. The following subsections examine four core practices identified within the social capital domain: trust, reciprocity, communication, and cooperation. Each practice is presented with evidence from Case B, illustrating how these social capital's practices contribute to SCRES across different disruption stages and actor types (see Table. 5.3.1).

Table 5.3.1 Social Capital's Practices and its Contribution on SCRES: Case B

Social capital's practices	Focus	Actors	Contribution to SCRES	Phases of SCRES

Trust	Internal	Horizontal	Communication; joint problem-solving	During-disruption
		Vertical	Empowered decision-making; coordination	During-disruption
	External	Upstream partners	Priority supply allocation; supply flexibility; joint-problem-solving	During-disruption
		Downstream partners	Resources redistribution; real-time communication; coordinated response and joint problem-solving	During-disruption
Reciprocity	Internal	Horizontal	Coordination; responsiveness	During-disruption
	External	Upstream partners	Priority resource allocation	During-disruption
Communication	Internal	Horizontal	Knowledge sharing	Pre-disruption
		Horizontal	Coordination; problem-solving	During-disruption
		Horizontal	Organisational learning	Post-disruption
		Vertical	Proactive coordination; preparedness	Pre-disruption
		Vertical	Coordinated response; problem-solving	During-disruption
		Vertical	Organisational learning	Post-disruption
	External	Upstream partners	Information sharing; anticipation	Pre-disruption
		Upstream partners	Problem-solving and coordination	During-disruption
		Downstream partners	Information sharing; anticipation; trust-building	Pre-disruption
		Downstream partners	Problem-solving; coordination; trust-building	During-disruption
		Multiple SC partners	Information sharing, anticipation, and contingency planning	Pre-disruption
		Multiple SC partners	Coordination; joint problem-solving	During-disruption
		Broader relationship network	Information sharing; anticipation	Pre-disruption
Cooperation	Internal	Horizontal	Preparedness; coordination	Pre-disruption
		Horizontal	Cross-departmental collaboration; joint problem-solving; flexible resources relocation	During-disruption

		Vertical	Coordination; problem-solving	During-disruption
	External	Upstream partners	Priority supply allocation; joint problem-solving	During-disruption
		Downstream partners	Operational security; preparedness	Pre-disruption
		Downstream partners	Stabilising demand; preserving long-term commercial ties; robustness	During-disruption

5.3.1.1 Trust

Internal Horizontal Trust

In Case B, internal horizontal enables rapid joint diagnosis, swift mobilisation of capable colleagues, and cross-functional coordination when unexpected supply failures arise. When sudden supplier failures occur, employees instinctively engage trusted colleagues to co-diagnose problems and mobilise solutions, bypassing hierarchical delays. These long-term, trust-based relationships provide psychological safety and ensure that capable actors are identified quickly, enabling immediate negotiation and resource acquisition. As a result, horizontal trust enhances SCRES by facilitating joint problem-solving and collaboration during disruptions.

Internal Vertical Trust

In Case B, vertical trust facilitates rapid coordination and accountability during disruptions. By delegating urgent tasks to trusted employees, managers reduce delays that would otherwise arise from monitoring or formal approval processes. This trust-based delegation arrangement ensures that problems are addressed quickly and effectively, reinforcing the firm's responsiveness and maintaining operational continuity under pressure.

External Trust with Upstream Partners

External trust with upstream partners enhances priority supply allocation and joint problem-solving during disruption. By leveraging long-term trust, Case B secures preferential access to limited raw materials in periods of climate-induced shortages, thereby safeguarding operational continuity and reducing the risk of severe SC disruption. Moreover, in the transportation damage incident, the trusted supplier engaged in collaborative resolution and offered replacement materials at discounted prices. This trust-based responsiveness allowed both parties to share losses, restore supply quickly, and maintain operational continuity.

External Trust with Downstream Partners

External trust with downstream partners strengthened resources reconfiguration, real-time communication, coordinated response and joint problem-solving during disruptions. Trust-based downstream partners shared surplus inventory, reflected joint problem-solving and collective resource mobilisation across the network. Moreover, trust with downstream logistics partners strengthened real-time communication, cooperative problem resolution, and responsive coordination during disruptions. By providing candid information on operational reliability and prioritizing shipments in times of pressure, logistics partners enhanced responsiveness. Together, these trust-based external networks enhanced Case B's ability to coordinate responses, redistribute resources, and sustain SC operations under disruption conditions.

5.3.1.2 Reciprocity

Internal Horizontal Reciprocity

In Case B, horizontal reciprocity strengthened resilience by embedding mutual assistance into everyday coordination. This fairness-based exchange enabled flexible redistribution of effort, enhancing responsiveness during surges and reinforcing robustness through a culture of shared responsibility.

External Reciprocity with Upstream partners

In Case B, external reciprocity with both raw material suppliers and 3PL providers enhanced resilience through enabling priority supply allocation. With suppliers, mutual support was embedded in preferential purchasing, advance payments, and business development assistance, which secured priority access to scarce raw materials during disruptions. Similarly, by assisting logistics partners, the firm obtained reciprocal benefits in the form of priority vehicle allocation when urgent deliveries were required. Across both types of upstream partners, reciprocity reduced supply risks, improved responsiveness under pressure, and reinforced continuity of operations under disruptive conditions.

External Reciprocity with Downstream partners

In Case B, horizontal reciprocity strengthened resilience by embedding mutual assistance into everyday coordination. This mutual assistance enabled flexible redistribution of effort,

enhancing cross-area coordination during peak operational pressure, reinforcing robustness through a culture of shared responsibility.

5.3.1.3 Communication

Internal Horizontal Communication

Horizontal communication fostered knowledge sharing in Case B by embedding structured mentorship and experience sharing into daily operations. These practices enabled the systematic transfer of knowledge, transforming individual lessons into collective routines that enhanced preparedness for future uncertainties.

Additionally, horizontal internal communication strengthened SCRES by enabling collaborative problem-solving during disruptions. Through real-time information exchanges across departments, employees mobilised expertise and coordinated alternative solutions without prolonged escalation. Thus horizontal communication accelerated responsiveness, maintained service continuity, and thereby enhanced the firm's adaptive capacity under pressure.

Furthermore, horizontal internal communication fostered organisational learning in the post-disruption phase by transforming individual experiences into shared narratives. Through informal discussions and case sharing, employees co-constructed collective memory, embedding lessons into daily practices and training new staff. These shared stories not only reduced the likelihood of repeating mistakes but also strengthened preparedness for future disruptions, thereby reinforcing Case B's adaptive resilience.

Internal Vertical Communication

In Case B, Internal vertical communication supported SCRES by enabling proactive coordination in the pre-disruption stage. Operational directives flow systematically from headquarters through business units, teams, and stores, while reporting follows the same hierarchical path. This layered communication structure enables managers to monitor emerging risks, maintain visibility over operational anomalies, and adjust plans proactively. Continuous information exchange between managers and employees further supports knowledge alignment and collaborative task execution. Together, vertical communication enhance preparedness by

ensuring early detection of issues and maintaining organisational coherence before disruptions occur.

During disruptions, vertical communication in Case B operates as a rapid escalation mechanism that facilitates coordinated response. Frontline employees report market fluctuations, shortages, service issues, and customer feedback immediately through formal reporting channels, enabling supervisors and specialised emergency teams to activate corrective actions without delay. The step-by-step escalation process standardises problem clarification and ensures that relevant departments can investigate, mobilise resources, and coordinate solutions effectively. By reducing information gaps and accelerating managerial response, vertical communication supports timely problem resolution and sustains production and delivery continuity under pressure.

In the post-disruption stage, internal vertical communication supports learning and review, enabling Case B to translate disruption experiences into shared narratives and organisational learning. Regular meetings across organisational levels provide structured opportunities for employees and managers to reflect on market intelligence, operational experiences, and incident-handling outcomes. Formal review meetings and post-incident debriefs create routinised spaces for reflection, consolidating collective memory and informing improved responses to future disruptions. Beyond reinforcing procedural discipline, these practices strengthen adaptive capacity by ensuring that lessons from past crises shape subsequent strategies, decision-making, and coordination.

External Communication with Upstream Partners

External communication with upstream partners strengthened Case B's resilience before disruption through promoting information sharing and anticipation. By serving as early-warning channels, suppliers provided critical signals about potential risks, which allowed the firm to prepare and adjust proactively. This practice not only enhanced forecasting accuracy but also reduced uncertainty, enabling the firm to anticipate challenges, plan contingencies, and safeguard operational continuity.

In addition, external communication with 3PL partners strengthened Case B's resilience during disruptions by facilitating rapid problem-solving and coordination. Timely information

exchange allowed the firm to mobilize alternative transport options and maintain production continuity. By leveraging these responsive communication channels, the firm reduced vulnerability to logistical shocks and safeguarded operational stability.

However, in Case B, emotion affected communication continuity during disruption. One employee's emotional distress led him to switch off his phone and skip work, which made suppliers unreachable and caused business interruption and confusion. This indicates that unmanaged emotion disrupted communication channels with external partners at a critical moment.

External Communication with Downstream Partners

External communication with downstream partners enhanced resilience through helping anticipate risks before disruption. Case B track customer behaviour through structured systems and initiate early communication when irregularities arise, while managers disseminate advance notices ahead of seasonal demand shifts to align expectations and ensure downstream readiness. These proactive exchanges enhance visibility into emerging risks, strengthen customer preparedness, and support stable downstream relationships before disruptions occur. In Case B, external communication also promoted trust-building in the pre-disruption stage. Sales employees address customer concerns through detailed explanations and transparent information about product characteristics and processes, helping clients develop confidence in the firm's offerings. This open communication fosters long-term cooperation and establishes a relational foundation that supports smoother coordination during future disruptions.

During disruptions, external communication with downstream partners enables rapid problem-solving, coordination and maintains customer trust. Customers report service interruptions immediately, and employees coordinate replacement shipments, clarify causes, and provide timely updates to prevent misunderstandings. Direct communication with clients, particularly during delays, quality issues, or logistical constraints, reduces uncertainty and supports ongoing orders, with long-term customers responding more flexibly and newer clients requiring additional reassurance. These timely interactions minimise disruption impact and sustain operational continuity across the downstream interface.

External Communication with Multiple SC Partners

External communication with multiple SC partners strengthened Case B's resilience by enabling information sharing, anticipation, and contingency planning before disruptions. Early warning and proactive adjustment became embedded in routine interactions, as advance communication with suppliers and clients reduced uncertainty, eased dissatisfaction, and allowed timely strategy adaptation. When shortages occurred, coordination across multiple actors facilitated the use of substitutes to maintain supply continuity. As a result, external communication with multiple SC partners enhanced preparedness and minimised the disruptive impact of upstream constraints.

External communication with multiple SC partners strengthened Case B's resilience by enabling effective coordination during disruptions. By rapidly mediating between upstream suppliers and downstream clients, the firm transformed potential conflicts into collaborative problem-solving, ensuring business continuity. Moreover, post-event reflection created shared learning on how to anticipate similar risks, allowing the firm to improve preparedness. Therefore, external communication can promote coordination, reduce uncertainty, and enhance adaptability in turbulent environments.

External Communication with Broader Relationship Network

External communication with the broader relationship network strengthened Case B's resilience by enabling informal information-sharing and anticipation at the pre-disruption stage. Through these exchanges, the firm gained access to timely intelligence on market and regulatory developments, which supported proactive adjustments before disruptions escalated. By broadening the scope of information beyond direct SC partners, these networks enhanced environmental scanning and improved preparedness under uncertain conditions.

5.3.1.4 Cooperation

Internal Horizontal Cooperation

In Case B, internal horizontal cooperation strengthened preparedness in the pre-disruption stage through structured coordination across specialised departments. A formal Emergency Response Division served as the central channel for escalating customer feedback and operational anomalies to appropriate units, enabling early alignment across product, accident-handling, and public relations teams. The cross-unit budgeting arrangement embedded collaborative resource allocation, reducing competition among departments and facilitating

unified contingency planning. Together, these practices embedded routine communication and resource sharing across departments, reducing uncertainty and ensuring that the organisation was aligned and operationally coherent before disruptions emerged.

During disruptions, internal horizontal cooperation enabled rapid joint problem-solving and flexible resource mobilisation across sales, production, and logistics teams. Departments shared information immediately when damaged goods, missing quantities, or delivery issues arose, coordinating replenishment, substitute products, or stock transfers to stabilise order fulfilment. These cooperative behaviours reduced bottlenecks, accelerated corrective actions, and ensured that disruptions in one area did not cascade across the organisation. As a result, multi-department collaboration supported Case B's ability to maintain delivery continuity and minimise disruption impact.

Internal Vertical Cooperation

Vertical cooperation enables Case B to have an effective information flow, resource allocation, and role assignment across hierarchical levels, thereby ensuring timeliness and accuracy in disruption management. Standardised reporting and layered timelines reduced ambiguity and enabled rapid mobilisation of resources. Central coordination aligned production and logistics responses, while targeted staff deployment stabilised incident handling. Thus, vertical coordination accelerated problem-solving, thereby sustaining continuity during disruptive conditions.

External Cooperation with Upstream Partners

In Case B, external cooperation with upstream suppliers strengthened SCRES during the disruption stage by enabling priority access to materials and collaborative problem-solving. Long-term cooperative relationships ensured that suppliers prioritised the firm in raw material allocation during seasonal shortages, reducing the risk of production stoppages when supply was tight. These partners also mobilised trusted logistics providers to deliver urgently when inventories were low, supporting timely replenishment under pressure. In disruption events such as transportation damage, suppliers communicated promptly and negotiated replenishment at reduced cost, helping the firm minimise downtime and stabilise production. Through these cooperative practices, upstream partners played an active role in securing material continuity and facilitating smooth resolution of unexpected supply issues.

External Cooperation with Downstream Partners

In Case B, before disruptions, cooperation with downstream logistics partners strengthened operational safety and reliability. The firm relied on long-term 3PL drivers who possessed specialised knowledge of alcohol-specific transport regulations, handled large-volume shipments carefully, and responded effectively to emergencies. This dependable logistics capacity reduced the likelihood of safety-related incidents and enhanced the firm's preparedness.

During disruptions, long-term distributors and clients actively collaborated to address shortages by redistributing surplus inventory to support affected customers, while familiar logistics providers prioritised shipments without formal requests. Employees also partnered with clients to develop tailored route strategies, supported by promotion subsidies, enabling adaptive responses that eased operational pressure. These cooperative behaviours provided both material and strategic support, reducing disruption impact and ensuring continuity in customer service.

In addition, during disruptions, downstream cooperation extended to financial flexibility that supported customers facing short-term cash flow constraints. Through long-term trust and established contractual arrangements, employees granted temporary extensions or allowed delivery before payment, helping clients overcome financial stress without interrupting orders. This flexibility stabilised downstream demand and reinforced continuous cooperation under pressure.

5.3.2 Human Capital

In this section, we examine the human capital of Case B across both managerial and employee levels. The analysis identifies two core practices within this domain, training and education, and experience. Notably, Case B's training practices extend beyond internal staff development to include external training and education with downstream partners, reflecting a broader approach to capability building. Each subsection presents evidence from Case B, illustrating how different practices of human capital enhance SCRES across disruption stages and actor groups (See Table 5.3.2).

Table 5.3.2 Human Capital's Practices and Its Contributions on SCRES: Case B

Human capital's practices	Focus	Actors	Contribution to SCRES	Phases of SCRES
Training and education	Internal	Employees	Sensemaking; security compliance; preparedness	Pre-disruption
		Employees	Communication; responsiveness	During-disruption
		Employees	Post-disruption knowledge management, organisational learning	Post-disruption
	External	Distributors	Alignment and operational readiness	Pre-disruption
Experience	Internal	Managers	Risk awareness; anticipation; preparedness	Pre-disruption
		Managers	Situational assessment; adaptive decision-making; coordination; problem-solving; responsiveness	During-disruption
		Managers	Knowledge management and organisational learning	Post-disruption
		Employees	Situation assessment; communication skills; coordination; responsiveness	During-disruption
		Employees	Knowledge management and organisational learning	Post-disruption

5.3.2.1 Training & Education

Employees' Training & Education

In Case B, routine safety training strengthened SCRES in the pre-disruption stage by improving risk awareness, security compliance, and contingency planning. Safety-focused programmes enhanced employees' ability to recognise hazards across sales, production, and warehousing. Emphasis on responsibilities and correct handling procedures reinforced compliance with safety protocols, reducing the likelihood of operational failures. Fire and emergency response training further contributed to contingency planning, equipping employees to act promptly in emergencies. Together, these practices enhanced robustness and preparedness by embedding safety culture into daily operations.

During disruptions, employee training played a direct role in strengthening responsiveness of Case B. Training sessions provided staff with structured communication techniques, enabling them to stay composed and communicate more clearly when unexpected customer issues emerged. This improved their ability to respond quickly and manage emotional interactions, ensuring that service continuity and customer satisfaction were maintained even under pressure. As a result, training transformed knowledge and communication skills into more effective response behaviours during disruption events.

In Case B, employee training supporting organisational learning in the post-disruptions. After major incidents, the company systematically incorporated real cases into training sessions to review mistakes, extract lessons, and reinforce improved practices. Employees used these sessions to absorb experience more quickly and translate it into routine operations, reducing repeated errors and accelerating learning across the organisation. As a result, training transformed disruption experiences into actionable knowledge that enhanced future operational performance.

External Training & Education with Downstream Partners

In Case B, training and education were extended to downstream partners at the pre-disruption stage to enhance alignment and operational readiness. The firm regularly organised training sessions and product briefings for distributors, providing guidance on new products, promotional materials, and inventory management. By transferring internal knowledge to downstream partners, Case B improved partners' operational capability and ensured more consistent execution across the SC.

5.3.2.2 Experience

Managers' Experience

In Case B, managers' experience enhances proactive risk identification in the pre-disruption stage of SCRES. Managers accumulated industry experience enabled them to identify critical operational points and anticipate where risks were likely to occur. By recognising early warning signs, they developed tailored preventive actions in advance, reducing the likelihood of future disruptions. As a result, managerial experience functioned as a human capital resource that underpinned preparedness and improved the firm's ability to withstand potential disruptions.

Managers' experience improved their situational assessment and coordination capability, enabling rapid response during disruptions. Industrial experience helped them filter unreliable information, prioritise the most urgent issues, and identify a wider set of feasible response options. Drawing on accumulated practical knowledge, managers used their judgement to coordinate immediately with clients, sales teams, government agencies, drivers, and 3PL providers, integrating field observations with formal data. As a result, managerial experience enhanced responsive action, cross-partner coordination, and adaptive decision-making under pressure, thereby reinforcing SCRES.

Managers' experience enhanced Case B's resilience in the post-disruption stage by strengthening knowledge management and organisational learning. Their experience enabled them to analyse issues calmly, identify root causes, and translate lessons into improved operational practices. Managers led review meetings and converted individual insights into collective knowledge that could be shared across teams, ensuring that learning was institutionalised rather than retained by individuals. These post-incident reviews created a feedback loop in which knowledge gained after crises informed pre-disruption preparedness. As a result, managerial experience helped reduce repeated mistakes and reinforced collective learning, thereby supporting long-term resilience.

Employees' Experience

In Case B, employees' experience strengthened SCRES by facilitating problem-solving and enabling rapid response during disruptions. Accumulated experience allowed employees to distinguish between minor problems that could be handled immediately and major ones that required managerial intervention, ensuring timely action without unnecessary delays. Frontline experience in customer engagement provided employees with the interpersonal skills to maintain client trust through clear communication, even under pressure. Operational experience enabled warehouse staff to act quickly and accurately in order processing, while also applying rules flexibly to suit real-world conditions. As a result, employee experience can be transformed into practical problem-solving capacity during disruptions, strengthening the firm's responsiveness, coordination, and adaptive capability.

In Case B, employees' experience strengthened resilience in the post-disruption stage through knowledge management and organisational learning. On the one hand, individual lessons, such as developing patience in customer relations, were internalised as practical wisdom that employees could draw on in future disruptions. On the other hand, structured meetings and informal daily exchanges transformed these individual insights into collective knowledge, preventing the repetition of past mistakes and accelerating newcomer integration. These practices ensured that employee experience was not only preserved but also disseminated across the organisation, building a shared knowledge base and enhancing collective preparedness for future disruptions.

5.3.3 Cognition

In this section, we analyse the cognition of Case B across managerial, employee, and collective levels. The following subsections examine three core practices identified within this domain, individual cognitive attributes (among both managers and employees), shared language and code, and shared narratives (see Table 5.3.3). Each practice is discussed with supporting evidence from Case B, illustrating how these cognitive components contribute to SCRES across different disruption stages and actor groups.

Table 5.3.3 Cognition's Practices and Its Contributions on SCRES: Case B

Cognition's practices	Focus	Actors	Contribution to SCRES	Phases of SCRES
Individuals' cognitive attributes	Managers' cognitive attributes	Risk awareness	Anticipation; contingency planning; preparedness	Pre-disruption
		Situational assessment	Adaptive decision making; problem-solving; responsiveness	During-disruption
	Employees' cognitive attributes	Sensemaking	Adaptive decision making; responsiveness	During-disruption
Shared language and code	Internal	Horizontal	Communication; coordination; responsiveness	During-disruption
Shared narrative	Internal	Horizontal	Preparedness; communication; coordination; responsiveness; post-disruption knowledge management	Pre-; During; Post-disruption
	Internal	Vertical	Coordination; responsiveness	During-disruption

5.3.3.1 Individual Cognitive Attributes

Managers' Cognitive Attributes

In Case B, managers' risk awareness enhanced early risk identification and contingency planning before disruptions. Their ability to perceive risks and proactively prepare contingency measures ensured flexibility and rapid adjustment when problems arose. For example, preparing backup options and anticipating the impact of extreme weather enabled managers to safeguard production continuity by reducing vulnerabilities before disruptions materialised. As a result, risk awareness strengthened the firm's capacity to anticipate and withstand potential shocks.

During disruptions, managers' situational assessment fostered adaptive decision-making and coordinated action. By swiftly responding to supplier changes and operational failures, they ensured continuity of production and logistics flows. Grounding their responses in both

experience and data, managers stayed calm, identified root causes, and implemented rational solutions, thereby reducing escalation risks. Through continuous observation and adjustment, responsiveness became embedded in daily operations, while cross-departmental and partner coordination reinforced collective problem-solving. As a result, situational assessment enables Case B to react effectively under pressure and sustain SC performance.

Employees' Cognitive Attributes

In Case B, employees' sensemaking, grounded in their cognitive attributes, was crucial for enhancing SCRES. By rapidly interpreting ambiguous and urgent situations, employees enabled adaptive decision-making and prioritised responses, which minimised escalation risks and maintained continuity of operations during disruptions. As a result, employees' sensemaking influenced the quality and timeliness of responses during disruptive events.

In Case B, emotion affected situational assessment and judgement during disruption. Poor emotional states could reduce rationality, limit careful consideration of problems, and lead to inappropriate decisions, while negative emotions also hinder problem-solving. This suggests that emotion shaped how employees cognitively interpreted and responded to disruption conditions.

5.3.3.2 Shared Language and Code

Internal Horizontal Shared Language and Code

Shared language and codes in Case B enhanced SCRES by streamlining communication and coordination across departments and teams. By compressing complex information into commonly understood expressions and practices, employees reduced ambiguity, accelerated collective responses, and ensured resources were aligned efficiently. As a result, shared language and codes improved the firm's responsiveness during disruptions and safeguarded operational continuity.

5.3.3.3 Shared Narrative

Internal Horizontal Shared Narrative

Post-disruption shared narratives in Case B enhanced SCRES by supporting organisational learning and promoting cross-functional coordination. Through collective storytelling and systematic reviews, employees translated past disruptions into shared frameworks for action.

These narratives strengthened robustness by embedding preventive measures, such as anticipating supplier adjustments or adapting to market heterogeneity, and improved responsiveness by ensuring that staff could react more quickly and decisively to similar challenges in the future. By converting individual experiences into collective meaning, Case B transformed fragmented responses into coordinated organisational capacity.

Internal Vertical Shared Narrative

Vertical shared narratives in Case B enhanced SCRES by strengthening coordination and responsiveness under pressure. By jointly constructing a shared understanding of disruption causes, managers and employees eliminated ambiguity and unified their goals. This process enabled faster agreement on solutions and more cohesive action, demonstrating how vertical shared narratives transformed communication into collective responsiveness during crises.

5.3.4 Summary of Case B

Overall, Case B's resilience emerges from the combined effects of its social capital, human capital, and cognitive practices across the pre-, during-, and post-disruption stages. Internally, horizontal and vertical trust, reciprocity, and communication support coordination, proactive preparation, and joint problem-solving, while external ties with upstream suppliers, downstream distributors, and broader multi-tier partners enable priority supply allocation, information sharing, anticipation, and coordinated responses during disruptions. Human capital, shaped by employee and manager training, preparedness, and extensive operational experience, enhances early awareness and readiness before disruptions and strengthens adaptive decision-making, cross-departmental coordination, and responsiveness during disruptions. Cognitive elements, including managers' and employees' individual cognitive attributes, shared language, and shared narratives, reinforce preparedness, guide situational assessment under pressure, and support organisational learning after disruptions. Together, these layered human-related capabilities form Case B's distinctive resilience logic, enabling coordinated action and effective resource mobilisation within a regulated, multi-partner liquor SC.

5.4 Within-Case Analysis: Case C

Case C is a dairy producer that sources fresh milk from both self-owned farms and long-term external pasture partners, requiring strict cold-chain conditions to maintain freshness and

quality. As a fast-moving consumer goods manufacturer, its SC depends on steady downstream demand, timely replenishment, and temperature-controlled regional distribution.

The analysis in this section follows a unified structure that examines three categories of human related factors: social capital, human capital, and cognition. Social capital is analysed through practices of trust, reciprocity, cooperation, and communication, covering both internal relationships (e.g., vertical and horizontal collaboration) and external relationships with upstream suppliers, downstream partners, and broader multi-tier SC actors. Human capital focuses on training, education, and accumulated experience at both managerial and employee levels. Cognition is analysed through individual cognitive attributes of managers and employees, shared language and codes, and shared narratives. For each category, the analysis traces how relevant practices function across the pre-disruption, during-disruption, and post-disruption stages to identify their contributions to SCRES.

5.4.1 Social Capital

In this section, the analysis of Case C's social capital distinguishes between internal relationships, comprising horizontal and vertical ties, and external connections with upstream partners, downstream partners, multiple SC partners, and the broader relationship network. The following subsections examine four core practices identified within the social capital domain: trust, reciprocity, communication, and cooperation (see Table 5.4.1). Each practice is presented with evidence from Case C, illustrating how these social capital's practicess contribute to SCRES across different disruption stages and actor types.

Table 5.4.1 Social Capital's Practices and Its Contributions On SCRES, Case C

Social capital's practices	Focus	Actors	Contribution to SCRES	Phases of SCRES
Trust	Internal	Horizontal	Communication; joint problem-solving	During-disruption
	External	Upstream partners	Information sharing; anticipation	Pre-disruption
		Upstream partners	Priority supply allocation; flexibility	During-disruption
		Broader relationship network	Informal information channel; information reliability for decision-making	During-disruption
Reciprocity	Internal	Horizontal	Coordination; responsiveness	During-disruption
	External	Upstream partners	Non-financial support	Pre-disruption

		Upstream partners	Priority resource allocation; financial flexibility	During-disruption
		Downstream partners	Cooperation	During-disruption
Communication	Internal	Horizontal	Proactive coordination	Pre-disruption
		Horizontal	Information sharing; coordination	During-disruption
		Horizontal	Organisational learning	Post-disruptions
		Vertical	Information sharing; coordination	During-disruption
	External	Upstream partners	Trust-building; information sharing, anticipation, and contingency planning	Pre-disruption
		Upstream partners	Real-time information sharing and coordinated responses	During-disruption
		Downstream partners	Cooperation; joint problem-solving	During-disruption
		Multiple SC partners	Information sharing; anticipation	Pre-disruption
		Broader relationship network	Information sharing; cooperative relationship-building	During-disruption
Cooperation	Internal	Horizontal	Proactive coordination; preparedness	Pre-disruption
		Horizontal	Cross-functional collaboration; joint problem-solving	During-disruption
	External	With upstream partners	Information sharing; trust-building; co-developing innovation capabilities	Pre-disruption
		With upstream partners	Priority resource allocation; joint problem-solving	During-disruption
		With downstream partners	Stabilising demand; preserving long-term commercial ties; robustness	During-disruption

5.4.1.1 Trust

Internal Horizontal Trust

In Case C, horizontal trust serves as a critical practice for rapid cross-functional coordination during disruptions. When sudden supplier failures occur, employees instinctively engage trusted colleagues to co-diagnose problems and mobilize solutions, bypassing hierarchical delays. These long-term, trust-based relationships provide psychological safety and ensure that capable actors are identified quickly, enabling immediate negotiation and resource acquisition. By reducing coordination frictions and accelerating problem resolution, horizontal trust

strengthens Case C's agility in addressing supply shortages and sustaining operational continuity.

External Trust with Upstream Partners

In Case C, external trust with upstream suppliers enhances anticipation by enabling proactive information sharing and early risk visibility before disruptions occur. Long-term, trusted partnerships encourage suppliers to voluntarily disclose critical updates, such as anticipated price changes or raw material constraints, allowing the firm to place early orders and adjust procurement plans in advance. Trust reduces uncertainty, safeguards cost stability, and strengthens preparedness against disruption.

During disruptions, external trust with upstream partners enables preferential support, flexible resource configuration, and rapid operational adjustment. Long-term relational reliability leads suppliers to prioritise raw material deliveries, accelerate production schedules, or temporarily expand capacity when Case C faces sudden shortages or demand spikes. Trusted logistics partners also reallocate transport resources and adjust cold-chain arrangements to maintain temperature control and delivery timeliness. Building trust-based relationship with upstream partners are shaped by Case C's reliance on consistent cold-chain performance and interdependent supplier relationships built over years of cooperation. Consequently, external trust enhances SCRES by strengthening robustness through reliable supply assurance and improving responsiveness through rapid mobilisation of upstream and logistics resources under time pressure.

External Trust with Broader Relationship Network

In Case C, trust with a broader network of long-standing industry contacts provided reliable information channels and access to alternative supply options. When facing uncertain sourcing decisions, managers turned to trusted external experts to validate fragmented information and reduce ambiguity. These trusted exchanges helped the firm assess risks more accurately and avoid poorly informed supplier switches. As a result, external trust supplemented formal channels with credible insights, strengthening Case C's ability to make stabilising decisions under pressure and enhancing its overall resilience.

5.4.1.2 Reciprocity

Internal Horizontal Reciprocity

In Case C, horizontal internal reciprocity enhanced resilience by embedding mutual support into daily coordination and crisis response. Reciprocal assistance enabled colleagues to mobilise quickly during workload surges, ensuring faster problem resolution without reliance on formal escalation. By reinforcing cooperation across functions, reciprocity created a self-sustaining cycle of support that reduced operational bottlenecks and strengthened the firm's adaptive capacity during disruptions.

External Reciprocity with Upstream Partners

In Case C, external reciprocity with upstream partners enhanced resilience promotes reciprocal exchanges of knowledge, technology, and market access. Such collaborations enabled suppliers to expand their business opportunities while providing Case C with cost advantages and technical upgrades. Operating mainly in the pre-disruption stage, these practices institutionalised mutual support in both commercial and operational domains, reducing dependency risks, strengthening supply relationships, and enhancing adaptive capacity before disruptions occurred.

In Case C, external reciprocity with upstream suppliers and 3PL providers enhanced resilience through reciprocal support allocation, combining financial assistance, market facilitation, and resource prioritisation. By easing suppliers' financial strain and supporting logistics partners' client development, the firm cultivated long-term loyalty and secured priority in critical supplies and transportation during disruptions. Operating across both pre-disruption (financial and market support) and during-disruption (priority allocation of milk or vehicles), these reciprocal exchanges reduced supply risk, stabilised critical resources, and strengthened the firm's adaptive capacity under conditions of scarcity.

External Reciprocity with Downstream partners

In Case C, external reciprocity with downstream partners enhanced SCRES through preferential benefit allocation. By offering flexibility to long-term clients, the firm fostered loyalty and secured reciprocal. Operating in the during-disruption stage, reciprocity reduced financial strain, promoted cooperation stabilised sales performance, and reinforced continuity in downstream operations.

5.4.1.3 Communication

Internal Horizontal Communication

In Case C, horizontal communication practices supported proactive coordination before disruptions. By clarifying contact points and delivery confirmation procedures, employees reduced ambiguity and secured reliable communication pathways, strengthening preparedness in the pre-disruption stage.

Moreover, horizontal communication enabled real-time information sharing and rapid coordination during disruptions. By providing instant feedback, sharing operational data, and activating cross-departmental linkages, employees reduced delays and misalignment, enabling rapid joint problem-solving. This flow of information and advice allowed Case C to minimise disruption impacts and sustain operational continuity under time pressure.

In the post-disruption stage, horizontal communication facilitated the creation of shared narratives and organisational learning. By turning individual experience into collective lessons, employees reinforced organisational learning, which enhanced preparedness and strengthened Case C's long-term resilience against future disruptions.

Internal Vertical Communication

In Case C, vertical communication strengthened SCRES during disruptions by enabling information sharing and rapid coordination. Clear reporting channels ensured that frontline issues were promptly escalated to managers, who mobilised cross-functional responses and engaged suppliers where necessary. This swift flow of information and action reduced delays, safeguarded operational continuity, and enhanced the firm's ability to contain disruption impacts.

External Communication with Upstream partners

In Case C, communication with upstream partners fostered trust-based relationship that enhanced SCRES in the pre-disruption stage. By strengthening personal and relational bonds, the firm secured preferential treatment and resource commitment from suppliers, reducing the likelihood of shortages and reinforcing preparedness against potential disruptions.

Moreover, communication with upstream partners enhanced SCRES in the pre-disruption stage by supporting information sharing, anticipation, and contingency planning. Early warnings from suppliers enabled the firm to adjust packaging plans, secure alternative sourcing, or reschedule production, while regular inspections strengthened situational awareness. Therefore, it reduced uncertainty and allowed Case C to prepare responses in advance, thereby safeguarding supply continuity and mitigating potential disruption impacts.

During disruptions, communication with upstream partners strengthened SCRES by enabling real-time information sharing and coordinated responses. Through continuous updates on logistics conditions, inventory status, and shipment progress, the firm and its upstream partners adjusted routes, dispatched backup vehicles, and resolved operational bottlenecks in time. This effective communication flow reduced uncertainty, accelerated joint problem-solving, and safeguarded supply continuity under disruption pressures.

External Communication with Downstream partners

In Case C, effective communication with downstream partners facilitated cooperative problem-solving during disruptions. Established communicative relationships with downstream logistics providers enabled rapid capacity adjustments to meet urgent demands, while timely updates to clients helped maintain trust and reduce conflict under delay conditions. Therefore, downstream communication transformed relational ties into coordinated responses that safeguarded continuity and reinforced customer confidence during disruptions.

External Communication with Multiple SC partners

Multi-tier external communication facilitated information sharing before disruption. Regular contact with downstream partners cultivated trust that safeguarded distribution flows, while timely sharing of market and technological changes with broader partners supported collective preparedness. By embedding trust and transparency into these upstream and downstream interactions, Case C reduced uncertainty and strengthened its ability to mitigate potential disruptions before they materialised.

External Communication with Broader relationship network

In Case C, engagement with the broader relationship network enhanced SCRES by expanding information channels in the pre-disruption stage. Industry meetings, exhibitions, and informal

peer ties created multiple avenues for timely knowledge sharing, enabling the firm to anticipate changes and access new partners quickly when needed. By embedding itself in wider industry exchanges, Case C cultivated both trust and information transparency, which reduced uncertainty and improved preparedness. In this way, broader external communication functioned as a relational capability that provided critical information flows before disruptions materialised.

However, in Case C, communication is affected by emotion during disruption. Interviewees indicated that anxiety and stress could reduce communication effectiveness, whereas emotionally stable employees were better able to stay clear-headed and communicate clearly under pressure. This suggests that emotional regulation supported more effective communication in disruption response.

5.4.1.4 Cooperation

Internal Horizontal Cooperation

In Case C, internal horizontal cooperation strengthened SCRES by facilitating proactive coordination and preparedness before disruption. Structured coordination meetings were held ahead of peak seasons to assign departmental responsibilities for supplier contact, logistics follow-up, and contingency preparations. These cooperative arrangements were reinforced through digital communication groups with designated liaisons, enabling direct notifications and faster alignment when early issues emerged. This systematic coordination reduced ambiguity and enhanced preparedness, ensuring that departments entered high-pressure periods with shared understanding and operational consistency.

During disruptions, horizontal cooperation enabled rapid cross-departmental mobilisation. Emergency meetings and online discussions clarified roles, with sales managing customer communication while warehouse and logistics coordinated replenishment and corrective actions. Real-time updates through WeChat groups facilitated swift problem-solving for delayed deliveries, mismatched orders, and inventory discrepancies, while proactive mutual assistance ensured that operational gaps were quickly filled. Through these collaborative practices, departments shared information, coordinated resources, and maintained workflow continuity under disrupted conditions.

External Cooperation with Upstream partners

External cooperation enhanced SCRES in the pre-disruption stage by fostering early information sharing, trust-building and co-developing innovation capabilities. Before disruptions, long-term cooperation with suppliers and logistics providers ensured consistent service quality, timely communication, and early warnings of emerging issues, which enhanced the firm's ability to anticipate risks and adjust plans in advance. Collaborative problem-solving with a partnering food technology institute further supported capability building, enabling the firm to improve product packaging and develop more sustainable solutions. These cooperative practices deepened relational trust and expanded technical and operational capabilities, thereby reinforcing preparedness ahead of potential disruptions.

During disruptions, upstream cooperation enabled rapid resource mobilisation and effective joint problem-solving. Long-standing breeding bases prioritised the firm in raw material allocation and informed employees early about potential quality risks, while suppliers accelerated production schedules to meet urgent timelines. Logistics partners supported recovery by reallocating vehicles, dispatching additional drivers, and providing backup refrigerated trucks on short notice, ensuring that deliveries proceeded despite operational failures. Through these cooperative pratices, Case C secured preferential access to critical resources and accelerated its response speed, reducing disruption severity and sustaining operational continuity.

External Cooperation with Downstream partners

In Case C, external cooperation with downstream partners strengthened SCRES during the disruption stage by easing operational pressure and stabilising demand-side continuity. Distributors supported the firm by reallocating inventory across warehouses, helping to reduce overstock risks and smooth imbalances arising from fluctuating sales. Cooperation also extended to product sales when market pressure increased, with partners actively assisting in moving excess stock. In addition, long-term clients received flexible payment arrangements, allowing them to sell goods first and settle payment later, which helped them manage short-term cash flow constraints without interrupting orders. These cooperative practices reflected mutual trust and enabled both sides to maintain stable transactions, thereby reducing disruption impacts and supporting operational continuity.

5.4.2 Human Capital

In this section, we analyse the human capital of Case C at both managerial and employee levels. The following subsections examine two core practices identified within this domain, training and education, and experience. Each practice is discussed with supporting evidence from Case C, demonstrating how these practices of human capital contribute to SCRES across different disruption stages and actor groups (See Table 5.4.2).

Table 5.4.2 Human Capital's Practices and Its Contributions On SCRES, Case C

Human capital's practices	Focus	Actors	Contribution to SCRES	Phases of SCRES
Training and education	Internal	Managers	Risk awareness; situational assessment; preparedness	Pre-disruption
		Employees	Sensemaking; security compliance; preparedness	Pre-disruption
Experience	Internal	Manager	Risk awareness; anticipation; preparedness	Pre-disruption
		Manager	Situational assessment; adaptive decision-making; coordination; problem-solving; responsiveness	During-disruption
		Employees	Early-signal recognition; sensemaking; preparedness	Pre-disruption
		Employees	Situation assessment; problem-solving; responsiveness; responsiveness; operational continuity	During-disruption

5.4.2.1 Training & Education

Managers' Training & Education

Managers' training and education strengthened Case C's SCRES by enhancing managers' risk awareness and situational assessment before disruptions. Formal training on emergency plan formulation equipped managers with structured tools to anticipate and respond to supplier disruptions, while management frameworks improved systematic approaches to cost, time, and market challenges. Higher education reinforced cognitive capacity, supporting the ability to plan and evaluate potential risks. As a result, managers' training and education ensured that them were better prepared to detect early warning signals, design preventive measures, and mitigate disruptions before they escalated.

Employees' Training & Education

In Case C, employees strengthened their sensemaking, security compliance, and overall preparedness through structured training and educational activities before disruptions. Internal

lectures, external workshops, and disruption preparedness programmes equipped staff with the ability to identify potential operational problems and interpret early warning signals. Annual sessions on emergency response and food safety provided clear protocols that employees could draw upon during logistics delays or stockouts, while policy briefings and posted operational documents reinforced adherence to standardised procedures, reducing the risk of errors or non-compliance. Weekly meetings, monthly training, and incident-reporting mechanisms further encouraged vigilance and consistent compliance. As a result, training became embedded in daily routines, enhancing employees' professional capability and strengthening organisational preparedness and robustness before disruptions.

However, the relevance of training content varies across functions. For example, sales staff noted that experience outweighed formal training, which only provided a basic framework, whereas channel and management personnel found structured training more directly applicable. Despite these differences, standardised training reinforced institutional expectations and shared routines, enabling faster response initiation and strengthening organisational preparedness.

5.4.2.2 Experience

Managers' Experience

In Case C, managers' accumulated experience strengthened pre-disruption preparedness by improving risk anticipation and decision quality. Practical industry knowledge enabled managers to identify seasonal sales patterns, recognise which operational issues required immediate action, and make precautionary procurement decisions based on long-term familiarity with dairy farms. This experiential judgement supported actions such as diversifying suppliers and purchasing above required quantities to create buffers against potential quality problems. As a result, experiential insight enhanced managers' ability to foresee risks and prepare proactively before disruptions occurred.

In Case C, Managers' experience strengthened SCRES during disruptions by fostering rapid situational assessment, problem-solving, and adaptive decision-making. Lessons from past events guided managers to diversify suppliers and procurement channels to reduce exposure to emerging risks. Experience also enabled them to assess disruptions calmly, identify root causes, and mobilise resources across departments to implement timely solutions. Furthermore, combining experiential judgement with real-time data enabled managers to adapt decisions

dynamically to changing conditions. As a result, managerial experience functions as a dynamic capability during disruptions, transforming tacit knowledge into rapid and coordinated responses that mitigate impacts and maintain SC continuity.

Employees' Experience

In Case C, employees accumulated experience strengthened pre-disruption preparedness by improving sensemaking, operational judgement, and risk mitigation. With years of practice, procurement staff were able to quickly assess new suppliers' capabilities and verify logistics details such as warehouse confirmations or raw material availability. Senior employees also transferred experiential knowledge, such as handling supplier price fluctuations and coordinating interdepartmental tasks, helping newcomers adopt effective working practices more quickly. As a result, accumulated employee experience translated into shared preparedness and reduced vulnerability before disruptions occurred.

During disruptions, employees relied on accumulated experience to support situational assessment and collective coordination. When urgent issues arose, practical knowledge allowed staff to judge which problems required escalation and which could be resolved independently, reducing delays and maintaining operational flow. Senior employees also drew on extensive operational familiarity to stabilise team morale and coordinate emergency measures efficiently. As a result, experiential knowledge enabled sound judgement under uncertainty and strengthened coordinated responses during disruption events.

5.4.3 Cognition

In this section, we analyse the cognition of Case C across managerial, employee, and collective levels. The following subsections examine three core practices identified within this domain, individual cognitive attributes (among both managers and employees), shared language and code, and shared narratives. Each practice is discussed with supporting evidence from Case C, illustrating how these cognitive components contribute to SCRES across different disruption stages and actor groups (see Table 5.4.3).

Table 5.4.3 Cognition's Practices and Its Contributions on SCRES, Case C

Cognition's practices	Focus	Attributes /Actors	Contribution to SCRES	Phases of SCRES
	Managers' cognitive attributes	Risk awareness	Anticipation; contingency planning; preparedness	Pre-disruption

Individuals' cognitive attributes		Situational assessment	Adaptive decision making; problem-solving; responsiveness	During-disruption
	Employees' cognitive attributes	Sensemaking	Early risks identification; robustness	Pre-disruption
		Situational assessment	Adaptive decision making; responsiveness	During-disruption
Shared language and code	Internal	Horizontal	Communication; coordination; responsiveness	During-disruption
Shared narrative	Internal	Horizontal	Preparedness; communication; coordination; responsiveness; post-disruption knowledge management	Pre-; During; Post-disruption
	Internal	Vertical	Coordination; responsiveness	During-disruption

5.4.3.1 Individual Cognitive Attributes

Managers' Cognitive Attributes

Managers' risk awareness enhanced Case C's resilience by supporting both pre-disruption anticipation and during-disruption responsiveness. Before disruptions, risk awareness enabled managers to foresee supplier failures and integrate contingency planning, such as securing alternative sources of supply, thereby reducing vulnerability to shocks. During disruptions, this awareness facilitated timely activation of backup plans and coordination of solutions, ensuring continuity when disruptions such as natural disasters or logistics delays occurred. By embedding risk awareness into both forward-looking planning and real-time decision-making, Case C strengthened its ability to withstand and recover from SC disruptions.

Managers' situational assessment enhanced Case C's resilience across both pre- and during-disruption stages. Before disruptions, reliance on experience and industry knowledge improved anticipation and preparedness, enabling managers to identify time-critical actions and foresee seasonal demand shifts. During disruptions, their structured approach to problem analysis and prioritisation supported responsiveness, ensuring that scarce resources were allocated to the most critical product lines. By combining foresight with structured decision-making under pressure, managers reinforced Case C's capacity to sustain operations during uncertain conditions.

However, negative emotions among managers undermined rational decision-making and led to less effective strategic responses. This emotional vulnerability weakened the firm's resilience by increasing the risk of poor judgments during critical periods.

Employees' Cognitive Attributes

In Case C, employees' sensemaking enhanced shared risk interpretation and anomaly recognition in the pre-disruption stage. Employees developed a common understanding of operational risks through guidance from experienced supervisors, shaping how they judged supply reliability and monitored routine activities. They treated irregularities in daily operations as potential warning signals and reported them promptly to prevent problems from escalating. As a result, sensemaking enhances SCRES by strengthening robustness through proactive detection and enabling responsiveness through timely preventive action.

Moreover, employees' situational assessment enhanced rapid evaluation and adaptive decision-making during disruptions. When operational issues emerged, employees quickly assessed whether the situation could be resolved using available resources or required supervisory intervention, and adjusted response options to protect delivery schedules. As a result, situational assessment enhances SCRES by strengthening robustness through timely operational adjustments and enabling responsiveness through fast, informed reactions under pressure.

However, in Case C, emotion affected situational assessment during disruption. Employees explained that anxiety and stress reduced efficiency and hindered problem-solving, whereas emotional stability helped them remain clear-headed under pressure. This indicates that emotional regulation supported better cognitive processing and more effective assessment of response actions.

5.4.3.2 Shared Language and Code

Internal Horizontal Shared Language and Code

In Case C, shared language and codes enhanced SCRES by improving communication and coordination during disruptions. Standardised expressions such as "red line order" or "scanning three certificates" reduced ambiguity and cognitive load, allowing employees to reach mutual understanding rapidly. This linguistic shorthand enabled swift prioritisation and cohesive action across teams, particularly under high operational pressure. By minimising delays and sustaining clarity during disruptions, shared language and code strengthened responsiveness and safeguarded operational continuity.

5.4.3.3 Shared Narrative

Internal Horizontal Shared Narrative

Shared narratives enhanced SCRES by supporting organisational learning in Case C. Through collective reflection and repeated discussion of negative cases after disruption, employees embedded lessons into supplier management, scheduling, and project execution practices. This process strengthened robustness by preventing repeat mistakes and reinforced responsiveness by ensuring that staff could act more quickly and in a coordinated manner when facing similar disruptions in the future.

Internal Vertical Shared Narrative

In Case C, vertical shared narratives enhanced SCRES by promoting rapid coordination between managers and employees under pressures. Through crisis-framing communication, managers transformed disruptive events into collective stories of urgency and joint responsibility. This shared narrative reduced ambiguity, prevented fragmented responses, and ensured that employees across functions acted with a common purpose. As a result, resources were mobilised swiftly and operations sustained, illustrating how vertical shared narratives convert communication into coordinated responsiveness during disruptions.

5.4.4 Summary of Case C

Overall, Case C's resilience emerges from the combined effects of its social capital, human capital, and cognitive practices across the pre-, during-, and post-disruption stages. Internally, horizontal and vertical trust, reciprocity, and communication enable proactive coordination and real-time problem-solving, while external relationships with upstream farms, downstream partners, and broader network actors support early information sharing, priority resource allocation, contingency planning, and coordinated responses. Human capital, developed through managers' and employees' training, preparedness, and accumulated experience, strengthens early-signal recognition and risk awareness before disruptions and supports adaptive decision-making, problem-solving, and operational continuity during disruptions. Cognitive elements, including individual cognitive attributes, shared language, and shared narratives, reinforce preparedness, guide situational assessment under pressure, and facilitate post-disruption knowledge consolidation. Together, these layered human-related capabilities form Case C's distinctive resilience logic, enabling coordinated adjustment and continuous stability within a highly time-sensitive, cold-chain-dependent dairy SC.

5.5 Cross-Case Analysis

The cross-case analysis compares and integrates evidence from Cases A, B, and C to explain how human related factors are developed and enacted to support SCRES across different operational contexts. Table 5.5 provides a contextual comparison of the three cases, clarifying the structural and operational conditions under which these factors are enacted and establishing an analytical baseline for interpreting cross-case similarities and differences. Sections 5.5.1–5.5.3 then synthesise recurring patterns and identify key variations in how social capital, human capital, and cognition are enacted in practice. Finally, Section 5.5.4 develops a consolidated cross-case visual framework that integrates the findings across cases and disruption stages, summarising how each capability and its associated practices contribute to SCRES. Overall, the cross-case analysis highlights both shared patterns of resilience building and case-specific enactments that shape different resilience outcomes.

Table 5.5 Cross-Case Context Overview

Item	Case A (Beverage chain)	Case B (Liquor manufacturer)	Case C (Dairy and beverage manufacturer)
Sector and products	Freshly prepared beverages (e.g., milk tea/fruit tea)	Distilled liquor products (e.g., grain-based spirits)	Dairy and beverage products (e.g., fresh milk, drinks, snack lines)
Focal setting and access level	Regional operating units (non-HQ)	Multiple regional operating units (non-HQ)	Regional operating units (non-HQ)
Operational profile	High-mix/low-volume; time-sensitive fulfilment	Low-mix/high-volume; standardised processes	Medium-mix/medium-volume; temperature constraints
SC features	Coordinated procurement; regional warehousing; scheduled distribution; cold-chain logistics	Seasonal/variable inputs; compliance-sensitive transport; strict storage/handling; in-house + 3PL logistics	Highly perishable inputs; strong cold-chain dependence; tight processing-storage-distribution windows; regional replenishment
Main upstream conditions	Stable ingredients and packaging upstream; temperature-control requirements	Contracted growers and suppliers plus external sourcing; seasonal shortages and quality fluctuations	Combination of internal supply capacity and long-term external sourcing; high perishability and timing requirements
Main downstream conditions	Distributed outlet network requiring freshness and coordination	Multi-area distribution with regulatory and logistics constraints	Predominantly regional distribution with rapid replenishment needs
Typical SCRES challenges	Cold-chain cost and stability; demand volatility; regional coordination	Seasonal volatility and quality risk; transport regulation; storage safety	Perishability and short lead times; supply fluctuations; cold-chain failure risk

Notes: HQ = headquarters. To protect anonymity, the thesis reports organisational characteristics at the operating-unit level and omits identifying indicators (e.g., locations, store counts, revenue, and total headcount). Cases are described qualitatively using operational and SC features relevant to the study.

5.5.1 Cross-Case Analysis: Social Capital

This section conducts a cross-case analysis of how social capital contributes to SCRES. Specifically, the analysis focuses on the practices of trust, reciprocity, communication, and cooperation (see Table 5.5.1), examining their shared contributions to SCRES as well as case-specific variations.

Table 5.5.1 Social Capital's Practices and Its Contributions on SCRES

Social Capital's Practices	Focus	Actors	Contribution To SCRES	Phases of SCRES	Cases
Trust	Internal	Horizontal	Communication; joint problem-solving	During-disruption	A; B; C
	Internal	Vertical	Empowered decision-making; coordination; responsiveness	During-disruption	A; B
	External	Upstream partners	Information sharing; anticipation	Pre - disruption	C
			Priority supply allocation; financial and non-financial support; joint-problem-solving	During-disruption	A; B; C
		Downstream partners	Resources redistribution, real-time communication, coordinated response and joint problem-solving	During-disruption	B
		Broader relationship network	Information channel; anticipation	Pre-disruption	A; C
Reciprocity	Internal	Horizontal	Coordination; responsiveness	During-disruption	A; B; C
	External	Upstream partners	Non-financial support	Pre-disruption	C
			Priority resource allocation; financial flexibility	During-disruption	A; B; C
		Downstream partners	Cooperation; responsiveness	During-disruption	A; C
Communication	Internal	Horizontal	Information and knowledge sharing; Proactive coordination	Pre - disruption	A; B; C
			Information sharing; coordination	During - disruption	B; C
			Organisational learning	Posts-disruption	A; B; C
		Vertical	Proactive coordination; preparedness	Pre-disruption	B
			Information sharing; coordination; responsiveness	During - disruption	A; B; C
			Organisational learning	Post-disruption	B
	External	Upstream partners	Information sharing, anticipation; proactive coordination.	Pre-disruption	A; B; C
			Trust-building	Pre-disruption	C

			Information sharing; coordinated responses	During - disruption	B; C
		Downstream partners	Information sharing; anticipation; trust-building	Pre-disruption	B
			Information sharing; joint problem-solving; coordination	During-disruption	A; B; C
		Multiple SC Partners	Information sharing; anticipation	Pre-disruption	B; C
			Information sharing; coordination	During-disruption	A; B
		Broader Relationship Network	Information sharing; anticipation	Pre-disruption	B
			Information sharing; Cooperative relationship-building	During - disruption	C
Cooperation	Internal	Horizontal	Preparedness; coordination	Pre-disruption	B; C
			Coordination; problem-solving.	During-disruption	A; B; C
		Vertical	Coordination; problem-solving	During-disruption	B
	External	Upstream partners	Information sharing; anticipation	Pre-disruption	A; C
			Trust-building; co-developing innovation capabilities	Pre-disruption	C
			Priority resource allocation; flexible responses	During-disruption	A; B; C
		Downstream partners	Operational security; preparedness	Pre-disruption	B
			Stabilising demand; preserving long-term commercial ties; robustness	During-disruption	A; B; C

5.5.1.1 Trust

Internal Horizontal Trust

Across all three cases, internal horizontal trust enhances SCRES by improving responsiveness through rapid information exchange and cooperative problem-solving. In Cases A and C, this trust-based interaction fostered psychological safety, encouraging individuals to seek advice, share resources, and engage in collaborative problem-solving under time pressure. As a result, cross-departmental and cross-functional cooperation was activated swiftly, reducing coordination frictions and accelerating decision-making (Cases B&C). Overall, by transforming interpersonal goodwill into collective action, horizontal trust enhanced responsiveness and ensured operational continuity, underscoring its role as a relational capability that converts informal peer ties into resilience during disruptions.

Internal Vertical Trust

Across the Cases A and B, internal vertical trust enabled managers to activate rapid, employee-led responses to disruptions by delegating authority to staff perceived as capable and reliable.

In both contexts, trusted employees were empowered to diagnose issues, make independent decisions, and implement corrective actions without procedural delays, reducing coordination frictions during urgent situations. While Case A relied more on self-initiated action and informal resource mobilisation, and Case B emphasised manager-driven task assignment to trusted individuals, the underlying logic remained consistent: vertical trust transformed hierarchical relationships into a fast-response coordination channel. Overall, vertical trust enhanced SCRES by improving responsiveness through accelerated decision-making and strengthening robustness through clear responsibility allocation during disruptions.

External Trust with Upstream Partners

Across the three cases, external trust with upstream partners consistently enhanced SCRES during disruption periods by enabling preferential resource allocation, flexible operational support, and rapid joint problem-solving. Trusted suppliers prioritised deliveries, expedited production schedules, and collaborated on solution development when shortages, quality issues, or transport-related problems emerged. These trust-based relationship reduced coordination delays and strengthened both robustness and responsiveness across all cases.

Case C demonstrated an additional role of external trust with upstream partners not observed in the other cases, pre-disruption preparedness, where trusted suppliers provided early warnings and proactive information about upcoming risks, enabling advance ordering and cost stabilisation.

However, Case A, experienced an additional complexity: while strong personal ties with suppliers facilitated rapid support, overly close relationships at the branch level created risks of reduced transparency and inconsistent treatment, prompting the firm to introduce rotation practices and centralised supplier communication. While this reduced corruption risk, it created short-term trade-offs, as unfamiliarity between new managers and suppliers initially hindered emergency support and collaboration efficiency until trust was re-established.

External Trust with Downstream partners

Among the three cases, trust-based relationships with downstream partners emerged only in Case B, offering a complementary pathway through which external trust contributes to SCRES. In this case, trusted clients, distributors, and logistics providers acted as resource-sharing

collaborators, and prioritised logistics coordinators, thereby enabling rapid adjustments to production and delivery decisions. While upstream trust across all cases supported supply-side stability, downstream trust in Case B extended to the demand and distribution side of the SC. Overall, this finding highlight that external trust can also enhance SCRES by strengthening responsiveness and delivery continuity through reciprocal support and coordinated action with downstream partners.

External Trust with Broader Relationship Network

Across both Case A and Case C, external trust with broader relationship networks functioned as an important channel for timely and reliable information during disruptions. However, the role of these trusted networks manifested differently across the two cases. In Case A, trust with industry peers offered early market signals that enhanced anticipation before disruption, enabling proactive procurement adjustments. In contrast, in Case C, trusted personal networks supported managers during disruptions by providing credible judgement and validating uncertain information. Together, these cases show that external trust strengthens resilience both by improving anticipatory capabilities before disruptions and by enhancing information reliability during crisis decision-making.

5.5.1.2 Reciprocity

Internal Horizontal Reciprocity

Across the three cases, internal horizontal reciprocity emerged as an everyday relational practice that strengthened operational continuity during disruptions. A common pattern across all three cases was the presence of routine mutual assistance, such as sharing workloads, correcting mistakes, or helping colleagues complete time-critical tasks, which collectively enhanced team reliability and enabled rapid coordination when disruptions occurred. These reciprocal exchanges reduced bottlenecks and supported faster problem resolution under pressure, thereby improving team responsiveness.

External Reciprocity with Upstream Partners

Across all three cases, external reciprocity with upstream partners functioned as a social capital's practices that deepened interdependence and supported resource stability during disruption. A common pattern observed across Cases A, B, and C was the presence of mutual benefit exchanges, such as market support, business referrals, preferential pricing, or

operational assistance, that strengthened relational commitment and encouraged suppliers to prioritise the focal firm when shortages, capacity constraints, or logistical pressures arose. These reciprocal practices reduced coordination frictions, enabled preferential resource allocation, and improved both responsiveness and continuity during disruptions.

Case C demonstrate a unique role of reciprocity, by extending beyond operational exchanges into technical and marketing collaboration, enhancing production efficiency pre-disruption and enabling resource prioritisation during crises. Case C promoted a packaging supplier's products through its channels and received advanced equipment support. Such practices institutionalised mutual support enhanced adaptive capacity before disruptions.

External Reciprocity with Downstream Partners

Across Cases A and C, external reciprocity with downstream partners strengthened collaboration at the customer interface and supported continuity under pressure. A shared pattern across both cases was the exchange of small but meaningful benefits, such as flexible arrangements, supportive gestures, or preferential access, that reinforced mutual goodwill and reduced coordination frictions. These reciprocal interactions improved day-to-day cooperation and enabled faster resolution of customer-facing issues, thereby enhancing responsiveness during routine operations and high-pressure periods. Despite these commonalities, the form of reciprocity differed across the two cases. In Case A, reciprocity primarily emerged through informal, frontline assistance that eased interactions with franchise store staff and smoothed operational coordination. In Case C, reciprocity took the form of commercial flexibility and mutual sales support, where long-term partners received preferential terms and, in return, helped the firm navigate demand pressures. Overall, external reciprocity with downstream partners in both cases deepened cooperative ties and supported SCRES by reducing interface frictions, stabilising commercial relationships, and facilitating timely adjustments during periods of operational strain.

5.5.1.3 Communication

Internal Horizontal Communication

Across the three cases, internal horizontal communication supported preparedness in the pre-disruption stage by reducing uncertainty and enabling employees to clarify tasks before risks materialised. A shared pattern across Cases A, B, and C was the use of peer exchanges to

anticipate potential issues, align expectations, and strengthen day-to-day coordination. While Case A relied on informal peer advice to interpret unfamiliar operational situations, Case B embedded structured peer mentorship and knowledge sharing into routine work, creating systematic channels for distributing experience. In Case C, horizontal communication took the form of clear coordination procedures that reduced ambiguity and improved readiness for upcoming operational demands. Overall, horizontal communication enhanced pre-disruption preparedness by improving clarity, building shared understanding, and facilitating early alignment across teams.

During disruptions, internal horizontal communication served as information sharing and rapid coordination across Cases B and C. Employees relied on real-time peer exchanges to address emerging issues, mobilise expertise, and coordinate solutions without waiting for hierarchical escalation. Case B leveraged cross-departmental communication to accelerate collaborative problem-solving, and Case C used instantaneous information flows to synchronise actions across functions under time pressure. The common outcome was enhanced responsiveness: horizontal communication reduced delays, supported fast decision-making, and helped maintain service continuity during disruption events.

In the post-disruption stage, horizontal communication promotes organisational learning across Cases A, B, and C. Employees transformed individual experiences into shared lessons through peer feedback, informal discussions, and routine knowledge exchange. Case A used peer learning to build shared understanding following unfamiliar events; Case B integrated experience sharing into structured routines, embedding lessons into training and practice; and Case C converted operational experiences into collective narratives that informed future responses. Across all three cases, these horizontal learning processes reduced the likelihood of repeated mistakes, strengthened preparedness for future disruptions, and contributed to long-term SCRES

Internal Vertical Communication

Across all three cases, internal vertical communication consistently strengthened SCRES during disruptions by enabling rapid escalation, timely information sharing, and coordinated managerial response. Clear reporting channels and direct access to supervisors allowed frontline employees to relay urgent issues immediately, reducing decision lags and supporting

swift mobilisation of resources. This shared reliance on vertical communication under pressure ensured that disruptions were contained quickly and that operational continuity was maintained across Cases A, B, and C.

Only Case B demonstrated additional functions of vertical communication in the pre- and post-disruption stages. Before disruptions, its hierarchical communication structure facilitated proactive coordination: directives flowed systematically from headquarters to local units, while reporting followed the same layered pathway. This structure enhanced risk visibility supported early detection of anomalies, and maintained organisational coherence prior to disruptions. After disruptions, Case B further utilised vertical communication as a structured learning process. Regular multi-level review meetings provided opportunities for reflecting on incidents, consolidating lessons, and embedding improvements into organisational routines, thereby strengthening future preparedness.

Taken together, the three cases illustrate that vertical communication primarily enhances responsiveness during disruptions, while Case B additionally shows that well-structured vertical communication systems can also reinforce preparedness beforehand and organisational learning afterward. Collectively, these communication structures reduce information frictions, accelerate coordinated action, and cumulatively enhance SCRES across disruption stages.

External Communication with Upstream Partners

In the pre-disruption stage, across the three cases, external communication with upstream partners primarily strengthened SCRES enabling anticipation, information sharing, and proactive coordination. Continuous dialogue with suppliers served as an early-warning function, allowing Cases A, B, and C to identify emerging constraints, adjust procurement or production plans, and secure time buffers before risks escalate. Through these forward-looking communication practices, uncertainty was reduced, operational alignment improved, and preparedness was reinforced across all cases.

A distinct pattern observed in Case C was the additional relational dimension embedded within its external communication practices. Communication not only transmitted operational information but also reinforced trust-based relationships that secured preferential treatment, reliable support, and enhanced responsiveness from suppliers. Through this relational

reinforcement, Case C gained access to priority resource allocation and strengthened preparedness even before disruptions occurred. This relational effect was less pronounced in Cases A and B, where communication served primarily informational and coordination-focused functions.

During the disruption stage, Cases B and C also demonstrated the role of external communication in facilitating rapid problem-solving and coordinated responses. Real-time updates between cases and their upstream partners, such as information regarding transport delays, capacity shortages, or inventory fluctuations, enabled timely route adjustments, activation of backup vehicles, and rapid resource reallocation. These communication flows reduced disruption-related ambiguity, accelerated joint action, and supported continuity in supply and logistics operations.

Collectively, the three cases illustrate that external communication with upstream partners enhances SCRES by improving anticipatory capabilities prior to disruptions and enabling coordinated responses during disruptions. Case C further demonstrates that when communication is embedded in trust-based relational ties, it can generate additional strategic advantages by strengthening supplier commitment and resource assurance.

External Communication with Downstream Partners

Across all three cases, downstream communication primarily supported responsiveness during disruptions. Cases A, B, and C all relied on real-time updates to customers and downstream partners to reduce information gaps, clarify causes of delays, and coordinate rapid corrective actions. These timely communications helped minimise misunderstanding, maintain customer confidence, and sustain continuity across the delivery interface. Downstream communication therefore functioned as a critical coordination mechanism that enabled fast adjustment and reduced disruption impact across all cases.

Case B was the only case where downstream communication played a clear pre-disruption role by promoting information sharing, anticipation, and trust-building. Through structured monitoring and early outreach, employees shared information with clients when irregular demand patterns appeared, which enhanced anticipation of potential risks. Managers also issued advance notices before seasonal shifts, aligning expectations and preparing downstream

partners ahead of peak periods. Additionally, transparent explanations about product characteristics helped build trust with new clients, strengthening relational stability before disruptions occurred.

Overall, while downstream communication served a shared role across all three cases in strengthening responsiveness during disruptions, Case B uniquely demonstrated its anticipatory value before disruptions, reflecting its more structured systems and stronger customer monitoring mechanisms.

External Communication with Multiple SC partners

Across Cases B and C, external communication with multiple SC partners enhanced resilience in the pre-disruption stage by supporting information sharing, anticipation, and contingency planning. In Case B, early communication with both suppliers and clients provided timely warnings about demand anomalies or supply tightness, enabling advance adjustments that stabilised operations. Case C similarly maintained frequent exchanges with upstream and downstream partners, which strengthened transparency, facilitated early identification of risks, and reduced the likelihood of shortages or service interruptions. Together, these practices embedded shared situational awareness across partners and supported proactive coordination before disruptions occurred.

During disruptions, across Cases A and B, external communication with multiple SC partners strengthened resilience by enabling real-time information flow and cross-boundary coordination. In Case A, rapid exchanges with suppliers and retailers supported swift decision-making, alignment of actions, and timely adjustments that contained disruption impacts. In Case B, the Case Acted as a communication hub between upstream suppliers and downstream clients, coordinating replacement shipments, clarifying causes of delays, and preventing misunderstandings. These responsive communication flows minimised uncertainty, accelerated joint problem-solving, and reinforced adaptive capacity during disruption periods.

Collectively, communication with multiple SC partners strengthened resilience by broadening cases' access to timely information and enabling coordinated adjustments across upstream and downstream actors. These mechanisms ensured smoother responses to both anticipated risks and real-time disruptions, reinforcing operational continuity.

External Communication with Broader Relationship Network

Across Cases B and C, external communication with broader relationship networks served a similar function of expanding information channels and improving the reliability of market signals. Both cases relied on informal ties, industry contacts, and wider peer exchanges to obtain timely insights that were not accessible through direct SC partners. However, the timing and resilience role of these broader networks differed across cases.

In Case B, broader network communication enhanced resilience primarily in the pre-disruption stage. Informal exchanges with industry peers and regulatory contacts provided early intelligence on market fluctuations and policy developments, enabling the firm to anticipate emerging risks and adjust plans before disruptions materialised.

In Case C, broader network communication played a stronger role during disruptions. Through industry associations, exhibitions, and long-standing peer ties, managers accessed credible judgments and validated uncertain information when facing ambiguous conditions. These external contacts helped reduce information asymmetry during crises and supported more confident, rapid decision-making.

Overall, while both cases benefited from information expansion through broader networks, Case B leveraged these ties to strengthen anticipatory preparedness before disruptions, whereas Case C relied on them to enhance information reliability and decision quality during disruptions.

However, across Cases A and B, emotion affected communication during disruption, but in different ways. In Case A, unmanaged emotion contributed to conflict escalation between warehouse and delivery personnel, which weakened communication quality and disrupted coordination in the immediate operational context. In Case B, emotional distress disrupted communication continuity more directly, as an employee switched off his phone and skipped work, leaving suppliers unreachable and causing interruption and confusion.

5.5.1.4 Cooperation

Internal Horizontal Cooperation

Before disruptions, internal horizontal cooperation enhanced preparedness in Cases B and C through structured coordination and clear task alignment. In Case B, specialised units, such as the Emergency Response Division, product teams, and public relations teams, collaborated through formal reporting channels, ensuring that emerging operational issues were escalated early and addressed collectively. Cross-unit budgeting also embedded coordinated resource planning, reducing internal competition and enabling unified contingency preparation. Similarly, in Case C, horizontal cooperation was established through early coordination meetings and predefined roles ahead of peak seasons. Departments jointly planned supplier communication, logistics follow-up, and operational adjustments, supported by digital communication groups that enabled immediate cross-departmental contact. These practices reduced ambiguity, strengthened shared situational awareness, and ensured that both cases entered high-pressure periods with aligned expectations and operational coherence.

During disruptions, all three cases relied on horizontal cooperation to mobilise resources rapidly and stabilise operations. In Case A, coordination across sales, warehouse, purchasing, and operations units enabled joint problem-solving, quick inventory reallocations, and timely delivery adjustments, preserving customer service continuity. In Case B, real-time information sharing among sales, production, and logistics teams facilitated rapid replenishment, substitution decisions, and stock transfers, preventing localised issues from cascading across the organisation. In Case C, emergency meetings and digital communication channels supported immediate cross-departmental response, with teams collaboratively addressing delayed deliveries, inventory mismatches, and client communication needs. These practices enabled coordinative response and sustained operational continuity under pressure.

Together, these cases show that horizontal cooperation supports SCRES by fostering early coordination before disruptions and enabling rapid, collective action during disruptions, thereby reducing bottlenecks and sustaining operational continuity under pressure. However, Case A demonstrates that cooperation was affected by emotions. Uncontrolled emotions escalated conflict between warehouse and delivery personnel, leading to disrupted collaboration and coordination failures, ultimately disrupting delivery plans. This indicates that, in Case A, emotional instability weakened the cooperation of frontline personnel in responding to emergencies.

Internal Vertical Cooperation

Case B was the only case where vertical cooperation contributed to enhanced SCRES by enabling effective information flow, resource allocation, and role assignment across hierarchical levels. Standardised reporting procedures, layered escalation timelines, and centralised coordination structures supported rapid mobilisation and aligned responses, while targeted staff deployment stabilised incident handling. Together, these vertically embedded coordination arrangements strengthened cross-level alignment and problem-solving, ensuring timely action and sustaining operational continuity during disruptions.

External Cooperation with Upstream Partners

Across Cases A and C, external cooperation with upstream partners enhanced SCRES before disruptions by enabling proactive information sharing and strengthening anticipatory capabilities. In Case A, long-term cooperative relationships embedded familiarity, mutual understanding, and routine assistance into day-to-day coordination, making suppliers more willing to share early warning signals and jointly adjust plans. This early information exchange reduced uncertainty and allowed the firm to prepare countermeasures in advance. Case C demonstrated a similar preparatory role, with long-standing suppliers and logistics providers offering timely communication, consistent service, and early alerts about potential issues.

Furthermore, a distinct pattern observed in Case C was cooperation extended to capability-building partnerships, such as co-developing packaging solutions with a food technology institute, which enhanced technical readiness and reinforced trust. Collectively, pre-disruption cooperation in both cases deepened relational reliability, broadened informational visibility, and strengthened preparedness.

During disruptions, all three cases relied on upstream cooperation to secure priority access to critical resources and stabilise operations. In Case A, trusted suppliers prioritised deliveries, arranged urgent shipments, and transferred stock from other outlets to support rapid recovery from shortages. Case B similarly benefited from priority allocation during seasonal raw-material constraints, while suppliers and logistics partners worked collaboratively to resolve transportation damage and ensure timely replenishment. In Case C, upstream cooperation enabled accelerated production scheduling, early identification of quality risks, and rapid mobilisation of additional vehicles and refrigerated trucks. Across all three cases, these

coordinated responses reduced downtime, prevented cascading operational failures, and sustained operational continuity under pressure.

Together, the cases show that while Cases A and C leveraged upstream cooperation to strengthen early preparedness, all three cases depended on these cooperative relationships during disruptions to secure preferential resource access, accelerate joint problem-solving, and maintain stable operations.

External Cooperation with Downstream Partners

Only Case B demonstrated a clear pre-disruption role of downstream cooperation. Long-term partnerships with specialised 3PL drivers enhanced transport safety and reliability by ensuring compliance with alcohol-specific regulations and effective handling of large-volume deliveries. This dependable logistics support reduced the likelihood of safety-related incidents and strengthened operational preparedness ahead of potential disruptions.

During disruptions, all three cases relied on downstream cooperation to stabilise demand-side operations and reduce disruption impact. In Case A, financial flexibility toward long-term clients helped preserve commercial continuity by preventing order cancellations and maintaining stable transaction flows despite customer cash flow difficulties. In Case B, cooperation with downstream distributors and clients supported rapid resolution of shortages through inventory redistribution, shipment prioritisation, and collaborative route planning that eased operational pressure and maintained customer service levels. Case C likewise benefited from downstream partners that assisted in managing demand fluctuations by reallocating inventory, supporting excess stock sales, and accepting flexible payment terms, enabling the firm to sustain delivery continuity and mitigate disruption pressures.

Taken together, downstream cooperation enhanced SCRES by stabilising demand, enabling joint problem-solving, and supporting financial and operational flexibility across customer interfaces. While Case B leveraged downstream partnerships to strengthen preparedness before disruptions, all three cases depended on downstream cooperation to maintain continuity and reduce operational strain during disruptions.

5.5.2 Cross-Case Analysis: Human Capital

This section presents a cross-case analysis of the role of human capital in enhancing SCRES. The analysis focuses on the practices of training and education and experience (see Table 5.5.2), tracing how these practices contribute to SCRES within and across case firms. By examining shared effects and firm-specific differences, this section aims to provide an integrated understanding of how human capital supports resilience in diverse organisational environments.

Table 5.5.2 Human Capital's Practices and Its Contributions on SCRES

Human Capital's Practices	Focus	Actors	Contribution To SCRES	Phases of SCRES	Cases
Training and Education	Internal	Managers	Risk awareness; situational assessment; preparedness	Pre-disruption	C
		Employees	Sensemaking; security compliance; preparedness	Pre-disruption	A; B; C
			Coordination; responsiveness	During-disruption	A; B
			Post knowledge management, organisational learning	Post-disruption	B
	External	Distributors	Alignment and operational readiness	Pre-disruption	B
Experience	Internal	Managers	Risk awareness; anticipation; preparedness	Pre-disruption	A; B; C
			Situational assessment; adaptive decision-making; coordination; problem-solving; responsiveness	During-disruption	A; B; C
			Knowledge management and organisational learning	Post-disruption	B
		Employees	Early-signal recognition; sensemaking; preparedness	Pre-disruption	A; C
			Situational assessment; coordination; responsiveness	During-disruption	A; B; C
			Knowledge management and organisational learning	Post-disruption	B

5.5.2.1 Training &Education

Managers' Training &Education

Across the three cases, only Case C exhibited explicit evidence of managers receiving formal training and higher education that strengthened their risk awareness and situational assessment in pre-disruption stage. Structured training on emergency plan development provided managers with systematic tools to anticipate supplier-related risks and to formulate clear response procedures. In addition, exposure to management frameworks improved their ability to evaluate cost, time, and market trade-offs in a more analytical and disciplined manner. Higher educational backgrounds further enhanced cognitive capacity, enabling managers to assess potential vulnerabilities and plan proactively. As a result, this practice enhanced SCRES by

ensuring that managers were better prepared to detect early warning signals, design preventive measures, and mitigate disruptions before they escalated.

Employees' Training &Education

Across the three cases, training and education consistently strengthened pre-disruption preparedness by enhancing employees' sensemaking, security compliance, and ability to identify early warning signs. In Case A, fire and safety training improved employees' sensemaking and compliance with safety rules, while regular drills reinforced contingency planning and organisational learning. In Case B, safety and risk-prevention programmes strengthened compliance and emergency preparedness, while structured onboarding, inventory checks, and target-focused training promoted operational alignment and adaptability. In Case C, disruption preparedness programmes and practical exercises enhanced sensemaking and anticipation, fostering vigilance, proactive problem identification, and preventive action before risks escalate. Collectively, the cross-case evidence shows that all three firms used training to strengthen risk awareness, compliance, and early detection in the pre-disruption stage.

During disruption, across Cses A and B, training contributed to SCRES primarily by enhancing responsiveness, coordination, and behavioural stability under pressure. Case A translated emergency and procedural training into rapid repairs, resource mobilisation, and cross-departmental coordination, enabling employees to act decisively and maintain continuity when failures occurred. Case B, by contrast, benefited from communication-focused training that helped staff stay composed, communicate clearly with customers, and respond effectively to unexpected issues. These different emphases reflect distinct resilience pathways: operational coordination in Case A and communication stability in Case B. Despite these variations, training in both cases reduced vulnerability and supported timely, effective responses during disruptions.

Furthermore, only Case B demonstrated that training enhanced post-disruption knowledge management and organisational learning. For example, after a fire incident, managers and employees jointly reviewed successes and failures, turning the event into a shared story that reinforced risk awareness, reduced the chance of repeated mistakes, and strengthened preparedness for future disruptions.

While training generally strengthened preparedness and response across the three cases, evidence from Case C shows that its effectiveness varied across functions. Sales staff reported that practical experience played a more decisive role than formal training, which they viewed as providing only a basic framework. In contrast, channel and management personnel found structured training directly applicable to their operational tasks and decision-making. Despite these functional differences, standardised training still reinforced shared routines and institutional expectations, enabling quicker response initiation and supporting overall organisational preparedness.

Downstream Partners' Training &Education

A distinct pattern observed only from Case B, training for downstream partners enhanced preparedness in the pre-disruption stage. For example, product appreciation meetings and training sessions equipped distributors with knowledge of new products and inventory management, reducing information errors and improving alignment. Repeated interactions also fostered trust and cooperation, ensuring stronger commitment and support from distributors when disruptions arose.

5.5.2.2 Experience

Managers' Experience

Across the three cases, managers' accumulated experience consistently strengthened pre-disruption preparedness by enhancing risk awareness and proactive prevention. In Case A, experiential learning helped managers translate tacit knowledge from past incidents into practical operating rules that reduced hazards in daily warehouse work. In Case B, industry experience enabled managers to identify critical operational points and anticipate risks early, allowing them to implement preventive actions in advance. In Case C, long-term familiarity with suppliers and seasonal patterns improved managers' ability to recognise emerging issues and make precautionary procurement decisions. Despite contextual differences, experiential judgment across all cases enhanced risk anticipation and helped build robustness before disruptions occurred.

During disruptions, across all three cases, managers' accumulated experience played a critical role in strengthening SCRES by enhancing situational assessment and adaptive decision-making. In Case A, hands-on operational and relational experience enabled managers to

quickly diagnose the causes of disruptions, select appropriate response strategies, and coordinate smoothly with internal teams and external partners. In Case B, industry experience helped managers filter unreliable information, prioritise urgent issues, and mobilise coordinated actions with clients, sales teams, government agencies, and logistics providers. In Case C, past lessons guided managers to diversify suppliers, assess disruption impacts calmly, and combine experiential judgement with real-time data to implement timely solutions. Despite contextual differences, experiential knowledge across the three cases consistently supported rapid interpretation, coordinated action, and flexible problem-solving, thereby enhancing responsiveness and maintaining continuity during disruptions.

In the post-disruption stage, only Case B demonstrated that managers' accumulated experience supported knowledge management and organisational learning after disruptions. Their practical knowledge enabled them to analyse incidents calmly, identify root causes, and translate lessons into improved operational routines. Managers also facilitated structured review meetings, converting individual insights into collective knowledge and embedding learning across teams. This institutionalised learning created a feedback loop through which post-incident insights strengthened future preparedness. As a result, managerial experience reduced repeated mistakes and reinforced long-term SCRES.

Employees' Experience

Across the Case A and C, employees' accumulated experience strengthened pre-disruption preparedness by improving early-signal recognition and sensemaking. In Case A, experienced employees could detect subtle operational anomalies, stay composed under uncertainty, and guide routine preparations, while newer staff were more prone to confusion in unfamiliar situations. In Case C, long-term practice enhanced employees' sensemaking and operational judgement, enabling procurement and logistics staff to assess suppliers, verify information, and mitigate risks more effectively. Senior employees also transferred experiential insights to newcomers, accelerating capability development. Taken together, employee experience in both cases enhanced shared preparedness and reduced vulnerability before disruptions occurred.

During disruptions, across the three cases, employees' accumulated experience consistently strengthened SCRES by improving situational assessment and adaptive response. In Case A, experienced employees could quickly judge the severity of incidents, act decisively, and

coordinate with relevant teams, while newer staff were more prone to panic or hesitation. In Case B, frontline experience enabled employees to distinguish minor issues from major ones, respond promptly to customer-facing problems, and handle operational tasks flexibly without compromising accuracy. In Case C, practical knowledge supported rapid judgement on which issues required escalation and helped senior employees stabilise team morale and coordinate emergency measures. Despite contextual differences, experiential knowledge across all cases enhanced responsiveness, coordinated action, and confident decision-making under pressure, thereby strengthening SCRES during disruptions.

In the post-disruption stage, only Case B demonstrated a clear pathway through which employees' accumulated experience supported knowledge management and organisational learning. Individual lessons from handling disruptions were internalised as practical insights that employees could apply in future situations. Through structured review meetings and regular workplace exchanges, these insights were shared across teams and transformed into collective knowledge. This process reduced repeated mistakes and helped new employees integrate more quickly. As a result, experiential learning became an organisational resource that strengthened preparedness for future disruptions.

5.5.3 Cross-Case Analysis: Cognition

This section provides a cross-case analysis of cognitive factors and their contributions to SCRES. The analysis concentrates on individual cognitive attributes (managers' and employees'), shared language and codes, and shared narratives (see Table 5.5.3), highlighting both cross-case similarities and case-specific variations in how these practices influence SCRES. By synthesising common and firm-level perspectives, this section offers a comprehensive understanding of how cognitive practices shape resilience across different organisational settings.

Table 5.5.3 Cognition's Practices and Its Contributions on SCRES

Cognition's Practices	Focus	Attributes /Actors	Contribution To SCRES	Phases of SCRES	Cases
Individuals' cognitive attributes	Managers' cognitive attributes	Risk awareness	Anticipation; contingency planning; preparedness	Pre-disruption	A; B; C
		Situational assessment	Adaptive decision making; problem-solving; responsiveness	During-disruption	A; B; C
		Sensemaking	Early risks identification; robustness	Pre-disruption	A; C

	Employees' cognitive attributes	Sensemaking	Adaptive decision making; responsiveness	During-disruption	B
		Situational assessment	Adaptive decision making; responsiveness	During-disruption	C
Shared language and code	Internal	Horizontal	Communication; coordination; responsiveness	During-disruption	A; B; C
Shared narrative	Internal	Horizontal	Preparedness; communication; coordination; responsiveness; post-disruption knowledge management	Pre -, During-, and Post-disruption	A; B; C
	Internal	Vertical	Coordination; responsiveness	During-disruption	B; C
	External	Downstream partners	Coordination; preparedness	Pre-disruption	A

5.5.3.1 Individual Cognitive Attributes

Managers' Cognitive Attributes

Across the three cases, managers' risk awareness strengthened SCRES by improving early detection of vulnerabilities and enabling timely preventive action. In Case A, managers monitored market trends, sales patterns, and facility conditions to identify risks in advance and implement routine preventive measures. In Case B, heightened risk perception supported early contingency planning, allowing managers to prepare backup options and anticipate weather-related or operational disruptions before they materialised. In Case C, risk awareness shaped both pre-disruption anticipation, such as preparing alternative suppliers, and during-disruption responsiveness through timely activation of contingency plans. Despite these contextual differences, risk-aware managers across all cases reduced vulnerabilities and enhanced both preparedness and continuity.

Across the three cases, managers' situational assessment strengthened SCRES during disruptions by fostering responsiveness. In Case A, managers judged issues by urgency and complexity, adapting problem-solving approaches and taking decisive action on safety-related risks to prevent escalation. In Case B, situational assessment supported adaptive decision-making and coordinated action, as managers used experience and data to implement rational solutions and sustain production and logistics flows. In Case C, structured prioritisation enabled managers to allocate scarce resources to critical product lines, ensuring continuity under pressure. Collectively, these practices illustrate how situational assessment underpinned swift, adaptive, and coordinated responses that safeguarded operations during crises.

During disruptions, only Case B showed that managers' negative emotions impaired resilience. Heightened emotional strain reduced cognitive clarity and led to suboptimal strategic responses at critical moments. Consequently, negative affect operated as a vulnerability that constrained timely decision-making and weakened disruption response capability.

Employees' Cognitive Attributes

Across Cases A and C, employees' sensemaking strengthened pre-disruption preparedness by enabling early interpretation of potential risks. In Case A, employees identified safety hazards and undertook preventive maintenance, reducing the likelihood of warehouse accidents. In Case C, shared sensemaking, shaped by supervisors' guidance, supported anomaly recognition and timely reporting of irregularities. Together, these practices enhanced robustness by embedding proactive risk detection into daily routines.

Only Case B demonstrated the role of employees' sensemaking during disruptions. Employees rapidly interpreted ambiguous and urgent situations, enabling adaptive decisions and prioritised actions that prevented escalation and sustained operational continuity. As a result, sensemaking functioned as a cognitive attribute that strengthened responsiveness under pressure.

In Case C only, employees' situational assessment strengthened disruption-stage resilience by enabling rapid judgements about whether issues required escalation or could be resolved with available resources. This capability supported timely operational adjustments and protected delivery continuity under pressure. As a result, situational assessment functioned as a key attribute of robustness and responsiveness during disruptions.

Across Cases B and C, emotion shaped employees' cognition during disruption, particularly in relation to situational assessment, judgement, and problem-solving. In Case B, unmanaged negative emotions were described as reducing rationality, limiting careful consideration, and leading to inappropriate decisions, indicating impaired cognitive processing under disruption pressure. In contrast, Case C shows that emotional stability supported clearer thinking under pressure, helping employees maintain problem-solving effectiveness and make better response assessments during disruptions.

5.5.3.2 Shared Language and Code

Internal Horizontal Shared Language and Code

Across all three cases, shared language and codes strengthened disruption-stage resilience by reducing ambiguity and enabling faster coordination. In Case A, commonly understood terms allowed employees to grasp priorities instantly and act without hesitation during urgent events. In Case B, shared expressions compressed complex information into simple cues, supporting rapid cross-departmental alignment and efficient resource mobilisation. In Case C, standardised phrases helped employees quickly reach mutual understanding, prioritise tasks, and maintain clarity under pressure. Despite differences in specific terminology, shared language across all cases improved responsiveness, minimised delays, and safeguarded operational continuity during disruptions.

5.5.3.3 Shared Narrative

Horizontal Shared Narrative

Across the three cases, horizontal shared narratives consistently emerged as a post-disruption learning practice that transformed individual experiences into collective organisational memory. Although generated after disruptions through reviews and storytelling, these narratives primarily enhanced resilience in future stages. In Case A, repeatedly retelling disruption cases, such as peak-season supplier delays, embedded lessons into daily routines, strengthening anticipatory vigilance and enabling more composed responses when disruptions recurred. Cases B and C exhibited similar patterns: post-disruption reflection and cross-functional storytelling converted fragmented experiences into shared action frameworks, promoting preventive adjustments in supplier management, scheduling, and coordination. These narratives enhanced pre-disruption preparedness by fostering collective alertness and reducing the likelihood of repeated mistakes, while also supporting during-disruption responsiveness by providing behavioural scripts that enabled quicker, more aligned reactions under pressure.

Vertical Shared Narrative

Across Cases B and C, vertical shared narratives strengthened during-disruption responsiveness by aligning managers and employees around a common understanding of unfolding events. In both cases, crisis-framing communication transformed disruptions into shared stories that reduced ambiguity, unified goals, and prevented fragmented actions. These narratives enabled quicker agreement on solutions, faster cross-functional coordination, and more decisive mobilisation of resources. Together, the cases show that vertical shared

narratives convert hierarchical communication into shared sensemaking, supporting rapid and coordinated responses that enhance SCRES during disruptions.

External Shared Narratives with Downstream Partners

External shared narratives were only observed in Case A, where shared expectations with downstream franchise retailers strengthened preparedness and coordination. In Case A, routine interactions fostered a mutual understanding of ordering discipline, specifically, that retailers should place orders before safety stock was depleted, allowing the firm to schedule deliveries proactively. This shared narrative improved pre-disruption robustness by helping retailers maintain buffer stock and reducing their exposure to minor delays. Thus, while not a cross-case pattern, Case A illustrates how external shared narratives with downstream partners enhanced pre-disruption preparedness.

5.5.4 Explaining Cross-Case Variation in DHRCs' Practices

The cross-case analysis shows that differences across the three cases were not merely descriptive, but were shaped by the disruption contexts, operational requirements, product characteristics, and SC relationship structures of each firm. This is reflected in Tables 5.5.1, 5.5.2 and 5.5.3, which show that the three cases shared the same broad DHRC practice categories, but differed in how these practices contributed to SCRES. In Case A, rapid communication, frontline judgement, and flexible coordination were particularly salient because the firm faced frequent store-level demand volatility, short product life cycles, cold-chain requirements, and franchise-based coordination pressures. In Case B, relationship-based coordination with distributors was more prominent because seasonal demand patterns, channel uncertainty, transport regulations, and reliance on downstream distribution relationships made trust, reciprocity, and adaptive allocation central to maintaining product flow. In Case C, procurement coordination, cross-functional communication, and employee situational judgement were especially important because the firm faced raw material uncertainty, short lead times, freshness requirements, and temperature-sensitive logistics.

These differences also explain why the same DHRC practices performed different resilience functions across the cases. Social capital practices, such as trust, communication, reciprocity, and cooperation, were common across all three cases, but their roles varied according to relational and operational conditions. In Case A, communication and cooperation supported

rapid coordination between stores, distribution centres, and suppliers. In Case B, trust and reciprocity were more closely tied to distributor relationships and channel coordination. In Case C, social capital was especially important for upstream supplier coordination and internal cross-functional alignment.

Human capital practices were also contextually configured. In Case A, frontline experience and staff readiness supported quick responses to store-level shortages, changing demand, and freshness-related problems. In Case B, experience-based judgement was more closely linked to seasonal planning, distributor coordination, and inventory allocation. In Case C, human capital was particularly connected to procurement, logistics, and cold-chain knowledge because disruptions often involved time-sensitive sourcing and delivery decisions.

Similarly, cognition varied across cases because managers and employees interpreted disruption signals within different operational contexts. In Case A, cognition was closely linked to real-time judgement and rapid interpretation of store-level problems. In Case B, it was associated with anticipating seasonal patterns, market changes, and channel uncertainty. In Case C, it was linked to recognising procurement, freshness, and logistics risks before they affected downstream responsiveness. This suggests that cognition contributes to SCRES not as a generic individual attribute, but as a context-sensitive capability shaped by disruption type, operational urgency, and actor position.

Taken together, these findings show that DHRC practices are contextually configured rather than uniformly enacted across SCs. Although the same broad practices appeared across the three cases, their salience, meaning, and resilience functions varied according to product characteristics, disruption type, operational urgency, actor roles, and the relational structure of the SC. The novel insight is therefore that the resilience contribution of a DHRC practice is not inherent or fixed, but is shaped by the context in which it is enacted. The same practice may support rapid response in one case, relationship continuity in another, and anticipatory coordination or learning in a third.

In this way, the empirical analysis refines the initial DHRC framework by showing that the nine practices are not simply fixed categories derived from the literature, but contextually configured and empirically grounded practices whose contributions vary across actors,

relationships, disruption stages, and SC settings. The framework is therefore developed beyond the SLR by explaining not only which human-related capabilities and practices support SCRES, but also why their functions and relative salience differ across empirical contexts.

5.5.5 Summary of Cross-Case Analysis

In conclusion, the cross-case analysis synthesised how social capital, human capital, and cognition operate across Cases A, B, and C to enhance SCRES.

Across Cases A, B, and C, the cross-case analysis shows that resilience is built through recurring but contextually enacted practices within social capital, human capital, and cognition. At the level of social capital, trust consistently enabled faster coordination and joint problem-solving during disruptions, especially through internal horizontal ties and upstream partner relationships. Reciprocity functioned as an everyday relational buffer that reduced coordination frictions and increased willingness to provide support under pressure, particularly in resource allocation and commercial flexibility. Communication emerged as the most pervasive practice across all stages, supporting anticipation before disruptions, coordination during disruptions, and organisational learning afterward. Cooperation translated relational quality into coordinated action, with internal cooperation strengthening cross-functional alignment and external cooperation securing priority access, flexibility, and continuity across supply-side and demand-side interfaces.

Within human capital, training and education improved preparedness by strengthening compliance, risk awareness, and role clarity, and in some cases improved response quality during disruptions. However, the cross-case evidence also shows that the value of training was conditional rather than uniform. Its effectiveness varied by function, task type, and organisational role: in some contexts, training provided directly applicable routines and response discipline, whereas in others it mainly offered a basic framework that required practical experience to become operationally useful. By contrast, experience showed stronger and more consistent contributions across cases, especially in risk anticipation before disruptions, situational assessment during disruptions, and adaptive problem-solving under pressure. In Case B, both managerial and employee experience also supported post-disruption learning through structured reflection and lesson institutionalisation.

Within cognition, managers' and employees' cognitive attributes supported resilience by improving risk awareness, situational assessment, and sensemaking, while shared language and codes reduced ambiguity and accelerated response coordination during disruptions. Shared narratives played a broader temporal role than other cognitive practices: although often formed through post-disruption reflection, they supported future preparedness, guided response alignment during subsequent disruptions, and helped convert fragmented experiences into collective action frames. Across cases, cognition therefore functioned not only as an individual interpretive resource but also as a collective organising resource that linked learning, coordination, and response consistency.

Taken together, the cross-case findings also reveal three broader patterns. First, social capital was highly effective in enabling rapid support and flexible response, but in some situations, it also created overdependence risks. Case A shows that overly close ties, especially when concentrated at branch level, could reduce transparency, produce inconsistent treatment, and generate governance trade-offs, indicating that relational strength must be balanced with formal controls. Second, training and experience are complementary rather than substitutable, with conditional effects across contexts. Training often strengthens baseline preparedness by building common routines, role clarity, and response discipline, while experience is especially important in situations that require rapid situational assessment, adaptive judgement, and context-specific problem-solving. However, the cross-case evidence also shows that in some functions and tasks, structured training can be more directly applicable than experience alone. Third, emotion shaped both social capital and cognition during disruptions. Negative emotion weakened communication continuity, cooperation quality, and cognitive clarity in Cases A and B, whereas emotional stability in Case C supported clearer judgement and more effective problem-solving. This suggests that resilience is shaped not only by relational, skill-based, and cognitive resources, but also by the emotional conditions under which these resources are enacted.

Overall, the cross-case analysis demonstrates that human-related factors enhance SCRES not as isolated attributes, but as interconnected and context-sensitive practices whose effects vary across disruption stages, organisational roles, and operational environments.

5.6 Chapter Summary

This chapter synthesised how dynamic human-related capabilities, social capital, human capital, and cognition, and their underlying practices collectively shape SCRES across pre-disruption, during-disruption, and post-disruption stages. Drawing on evidence from the three case firms, the chapter demonstrated that SCRES emerges not from isolated routines but from the interaction of individual, team, and cross-organisational practices that enable sensing, responding, and learning.

Social capital practices (trust, reciprocity, communication, cooperation) formed the relational foundation for coordinated preparedness and agile response. Internally, horizontal and vertical ties enabled resource mobilisation, rapid information flow, and cross-functional problem-solving, while externally, enduring relationships with suppliers, logistics partners, and distributors facilitated priority resource access, joint planning, and adaptive recovery. Importantly, these practices proved mutually reinforcing trust strengthened information sharing and reciprocal support; communication amplified coordinated action; and cooperation institutionalised joint routines. However, in some situations it also created overdependence risks, that could reduce transparency, indicating that relational strength must be balanced with formal controls. Additionally, emotion shaped social capital during disruptions. Negative emotion weakened communication continuity and cooperation quality.

Human capital practices, expressed through training & education and experience, enhanced cognitive readiness and operational agility. Training built preventive awareness, common protocols, and cross-functional alignment, while experience deepened judgement, guided real-time decision-making, and institutionalised learning. These capabilities transformed tacit knowledge and structured learning processes into collective preparedness and rapid, coordinated action. However, training and experience are complementary rather than substitutable, and their relative value is context dependent. In some situations, training is more effective because it provides standardised routines, shared expectations, and behavioural discipline that support preparedness and coordinated response. In other situations, experience becomes more critical because it enables faster judgement, situational assessment, and context-sensitive problem-solving under disruption pressure.

Cognition practices, individuals' cognitive attributes (managers' risk awareness and situational assessment; employees' sensemaking and situational assessment), shared language, and shared narratives, functioned as the interpretive and sensemaking infrastructure enabling actors to recognise disruption signals, align priorities, and act decisively. Shared codes and narratives compressed decision-making time and translated meaning into coordinated action, while emotional regulation shaped the effectiveness of decision-making under pressure. Together, these mechanisms illustrate cognition as both an individual and collective capability underpinning dynamic adaptation.

The integrative framework presented in this chapter consolidates these insights, showing that SCRES arises through the interplay of relational, human, and cognitive capabilities and their embedded micro-practices. These capabilities reinforce one another through iterative cycles of sensing, responding, and learning, creating a resilience system that is simultaneously relationally grounded, knowledge-enabled, and cognitively aligned. The propositions developed clarify these mechanisms, laying the empirical and theoretical foundation for the next chapter, which articulates broader theoretical and managerial contributions.

Chapter 6. Discussion

6.1 Chapter Introduction

This chapter discusses and interprets the empirical findings from Chapters 4 and 5 in relation to existing literature to address the three research questions guiding this thesis. Drawing on the SLR (Chapter 2) and the multiple case study evidence (Chapters 4 and 5), it integrates theoretical and empirical insights to develop a consolidated conceptual understanding of how DHRCs enhance SCRES.

Across Sections 6.2 to 6.4, this study introduces DHRCs as a process-oriented lens for explaining how human-related factors are developed and enacted to support SCRES. In this study, the three DHRCs identified, namely social capital, human capital, and cognition, are discussed in relation to prior literature and industry context to identify convergence, divergence, and theoretical extension, from which a set of propositions is developed to clarify how DHRCs support SCRES. Importantly, the discussion does not treat these capabilities as static attributes. Rather, it examines how the practices through which DHRCs are enacted vary across disruption stages (pre-disruptions, during disruptions, and post-disruptions), and how their contribution shifts as organisations move from preparedness to response and recovery. In this sense, the chapter develops a stage-based explanation of resilience by theorising how human-related capabilities are enacted, combined, and reconfigured across disruption phases and under changing disruption conditions. Specifically, Section 6.2 examines the contribution of social capital in enhancing SCRES through four practices: trust, reciprocity, communication, and cooperation. For each practice, the discussion is organised around internal and external social capital. Internal social capital is further differentiated into horizontal and vertical relationships. External social capital is examined across upstream partners, downstream partners, multiple SC actors, and broader relationship networks. Section 6.3 examines human capital, focusing on training and education, and experience that strengthen competence and judgement among organisational members and relevant external SC actors. Section 6.4 focuses on cognition at both individual and team levels, encompassing individual cognitive attributes, through which managers and employees perceive, interpret, and assess situations, as well as how shared codes and language, and shared narratives shape collective cognition.

Section 6.5 then explicitly addresses the three research questions by synthesising the key insights from Sections 6.2 to 6.4 on how DHRCs and their associated practices enhance SCRES

across disruption stages. It further clarifies how these capabilities and practices interact, reinforce, and at times constrain one another, and how their combined enactment contributes to resilience outcomes across the pre-disruption, during-disruption, and post-disruption phases. In doing so, the section moves beyond case-specific description to develop a more generalised and theoretically integrated explanation of how DHRCs support SCRES. Finally, the chapter concludes with a brief summary in Section 6.6.

6.2 Social Capital, its Practices, and Supply Chain Resilience

Social capital refers to the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit (Nahapiet and Ghoshal, 1998), and has been widely recognised as an important relational resource in SCRES research (Fan and Stevenson, 2019; Daghar et al., 2021; Aslam et al., 2022; Nikookar and Yanadori, 2022a).

Building on the SLR, this study conceptualises social capital as being operationalised through four core practices, trust, reciprocity, communication, and cooperation (see Figure 6.2). These practices were identified as recurrent and theoretically grounded dimensions of social capital in the resilience literature and provide an analytically consistent basis for examining how relational resources are enacted in practice. The analysis further indicates that these four practices represent the main practices through which social capital becomes visible and consequential in supporting SCRES.

While prior SCRES research has predominantly emphasised external SC ties, our analysis suggests that both internal and external relational resources constitute important DHRCs that support firms in anticipating, responding to, and recovering from disruptions. In this sense, social capital provides a relational foundation that shapes coordination, information sharing, and access to support across organisational and inter-organisational boundaries. Importantly, its contribution is dynamic rather than static: before disruptions, social capital supports preparedness by strengthening early warning sensitivity, mutual awareness, and coordination readiness; during disruptions, it enables timely communication, joint problem-solving, and flexible access to support; after disruptions, it supports reflection, relational reinforcement, and the consolidation of lessons for future disruptions.

For the internal dimension, the analysis considers intra-organisational social capital embedded in horizontal ties among peers, teams, and departments, as well as vertical ties between managers and employees, drawing on prior research and interview evidence (McCauley and Kuhnert, 1992; Ergeneli et al., 2007; Vanhala and Tzafrir, 2021). For the external dimension, the analysis distinguishes between upstream partners, downstream partners, multiple SC actors, and broader relationship networks. Taken together, these distinctions enable a more fine-grained examination of how internal and external relational configurations shape social capital, how relational resources are accessed and deployed, and how their effects vary across preparedness, response, and post-disruption learning. They also show that social capital should not be understood merely as the presence of relationships, but as a set of enacted relational practices through which resilience is progressively built, mobilised, and renewed.

Figure 6.2 Social Capital Practices and its Contribution on Supply Chain Resilience

DHRCs	Actors	Pre-disruptions	During-disruptions	Post-disruptions
Social Capital	Horizontal		**Trust**: Communication; joint problem-solving	
	Horizontal		**Reciprocity**: Coordination; responsiveness	
	Horizontal	**Communication**: Information and knowledge sharing; proactive coordination	**Communication**: Information sharing; coordination	**Communication**:Organizational learning
Internal	Horizontal	**Cooperation**: Preparedness; coordination	**Cooperation**: Coordination, problem-solving	
	Vertical		**Trust:** Empowered decision-making; coordination; responsiveness	
	Vertical	**Communication**: Proactive coordination; preparedness	**Communication**: Information sharing; coordination; responsiveness	**Communication**:Organizational learning
	Vertical		**Cooperation**: Coordination; problem-solving	
	Upstream Partners	**Trust**: Information sharing; anticipation	**Trust**: Priority supply allocation; financial and non-financial support; joint problem-solving ; Increase the risk of corruption; reduce transparency	
	Upstream Partners	**Reciprocity**: Non-financial support	**Reciprocity**: Priority resource allocation; financial flexibility	
	Upstream Partners	**Communication**: Information sharing; anticipation; proactive coordination; Trust building	**Communication**: Information sharing; coordinated responses	
	Upstream Partners	**Cooperation**: Information sharing; anticipation; Trust-building; co-developing innovation capabilities	**Cooperation**: Priority resource allocation; flexible responses	
	Downstream Partners		**Trust**: Resources redistribution, real-time communication, coordinated response and joint problem-solving	
External	Downstream Partners		**Reciprocity**: Cooperation; responsiveness	
	Downstream Partners	**Communication**: Information sharing; anticipation; trust-building	**Communication**: Information sharing; joint problem-solving; coordination	
	Downstream Partners	**Cooperation**: Operational security; preparedness	**Cooperation**: Stabilising demand; preserving long-term commercial ties; robustness	
	Multiple SC Partners	**Communication**: Information channels, anticipation	**Communication**: Information sharing; Coordination	
	Broader Relationship Network	**Communication**: Information channels, anticipation	**Trust**: Information sharing; cooperative relationship-building	

6.2.1 Trust

Trust is the belief in partners' good intentions and concern, combined with confidence in their competence, reliability, and transparency (Cheng et al., 2012). Prior studies show that trust

fosters commitment, knowledge sharing, and cross-functional collaboration within organisations (Ozanne et al., 2022) and strengthens information credibility and facilitates faster decision-making during disruptions (Herbane, 2019; Nikookar and Yanadori, 2022a). Externally, prior research links inter-organisational trust to more transparent information flows, deeper collaboration, and more adaptive disruption responses (Grötsch et al., 2013; Dubey et al., 2017; Chowdhury et al., 2019; Giannoccaro and Iftikhar, 2022; Aslam et al., 2022). Building on this literature, the following discussion examines in greater depth how trust operates across internal and external relationships, and how its contribution varies across disruption stages.

6.2.1.1 Internal Trust

Internal Horizontal Trust

Existing research suggests that internal trust supports stable interpersonal relationships and intra-organisational coordination by strengthening information reliability and shared commitment (Collins and Smith, 2006; Stahl et al., 2011; Fainshmidt and Frazier, 2017). It also facilitates deeper information exchange and resource sharing across boundary-spanning roles, enhancing collaborative capacity under uncertainty (Seville et al., 2015; Ozanne et al., 2022). Building on this work, our analysis clarifies that horizontal trust within firms strengthens SCRES by enabling employees to share information, mobilise support, and solve problems collaboratively without waiting for formal approval. Before disruptions, such trust embeds preparedness by fostering mutual awareness and reliable peer-level information exchange. During disruptions, it becomes especially important because it enables rapid coordination when formal processes are strained, thereby strengthening organisational responsiveness and continuity.

Internal Vertical Trust

Prior research highlights vertical trust as foundational to managerial empowerment, shaping employees' autonomy, motivation, and willingness to take responsible action under uncertainty (Mayer et al., 1995; Mishra and Spreitzer, 1998; Robbins et al., 2002; Ergeneli et al., 2007). When managers trust subordinates, oversight decreases and discretion increases, supporting smoother coordination and faster decision-making. However, this literature rarely explains how vertical trust operates in SC disruption contexts or how it contributes to SCRES. Our analysis addresses this gap by showing that vertical trust supports SCRES by accelerating sensing,

decision-making, and action during operational shocks. In particular, trust-based delegation and accountability reduce procedural delays and enable quicker enactment of frontline responses. This suggests that vertical trust is not merely a background condition for empowerment, but an enacted governance practice through which organisations can respond more rapidly and coherently under disruption.

6.2.1.2 External Trust

External Trust with Upstream Partners

Externally, trust-based relationships with upstream partners extend beyond contractual arrangements, translating social capital into operational safeguards that strengthen preparedness and responsiveness. Prior SCM research shows that long-term, trust-based buyer–supplier relationships foster commitment, cooperation, and coordination, helping firms prevent SC incidents and pursue shared objectives (Acar et al., 2022; Yu et al., 2022; Chowdhury et al., 2024; Yang and Hsu, 2018). Trust also supports timely information exchange, access to critical knowledge and resources (Herbane, 2019), and joint risk identification (Fan and Stevenson, 2018). Consistent with this literature, the analysis indicates that trusted suppliers can provide early warnings and proactively share risk-related information before disruptions, which is particularly important in perishable and time-sensitive settings where early anticipation enables effective preparation (Lusiantoro et al., 2018).

The findings further suggest that trust in buyer–supplier collaboration facilitates access to reliable resources during disruptions (Prasad et al., 2015; Herbane, 2019). Under constrained supply conditions, trusted suppliers may prioritise resource allocation, provide temporary financial flexibility, and extend other forms of non-financial support. Together, these patterns indicate that upstream trust supports SCRES by enabling anticipatory information sharing before disruptions and priority resource access during disruption response under high uncertainty.

However, the findings also reveal potential downsides of upstream trust. Excessively close personal ties with upstream partners may reduce transparency and fairness. This aligns with Pettit et al., (2013), who argue that social capital may heighten vulnerability when it creates dependence on external actors. Similarly, Mitręga and Zolkiewski (2012) caution that intensive relational ties, while facilitating collaboration, can increase costs and expose firms to supply

instability if partners behave opportunistically. Overall, these results underscore the double-edged nature of inter-organisational trust: while it supports responsiveness, overly embedded or personalised ties can introduce governance risks and temporarily weaken resilience when dependence or power imbalances arise.

External Trust with Downstream Partners

Trust with downstream partners shapes how firms coordinate disruption response with distributors, clients, and logistics providers. While existing OSCM research shows that long-term trust promotes cooperation, flexibility, and information exchange among SC partners (Grötsch et al., 2013; Dubey et al., 2017; Chowdhury et al., 2019), it has largely centred on upstream supplier relationships, with limited attention to downstream ties. The analysis highlights the value of downstream trust for SCRES during disruptions. Trusted distributors, clients, and logistics providers can communicate emerging issues in real time, adjust inventory and financial arrangements to stabilise operations, and support resource redistribution when shortages occur. This aligns with evidence from the distillery industry that disruption-related losses can be substantial and that effective response depends heavily on cross-partner coordination, while weak coordination is a key risk in such contexts (Raghuram et al., 2021). Taken together, the findings suggest that downstream trust supports SCRES by enabling real-time communication, coordinated response, resource redistribution, and joint problem-solving during disruptions.

External Trust with Broader Relationship Networks

Trust within broader relationship networks can strengthen SCRES by providing credible information and guidance beyond formal channels. Prior OSCM research similarly shows that trust in personal and inter-organisational ties shapes managerial judgement under uncertainty (Herbane, 2019; Nikookar and Yanadori, 2022a), and that managers often rely on trusted networks as reliable sources of advice, sometimes ahead of formal analysis (Nikookar and Yanadori, 2022b). The analysis suggests that this operates in at least two ways. Before disruptions, trusted contacts can serve as informal information channels, offering early insights into market conditions, such as price movements or potential constraints, which enable proactive adjustments to procurement and planning. During disruptions, these networks can improve information reliability by providing credible assessments and interpretations, thereby reducing ambiguity and supporting faster, more confident decision-making under pressure.

Overall, broader trust-based networks complement formal information channels and strengthen adaptive responses across disruption stages.

6.2.2 Reciprocity

Reciprocity in this study is defined as a norm and practice of mutual exchange through which supportive actions are returned in fair and expected ways within and across social relationships. In OSCM research, reciprocity is typically examined at the inter-organisational level as mutual exchanges embedded in partner networks, emphasising fair interactions and the expectation that a firm's actions will be reciprocated by its partners (Saglam et al., 2022; Yang et al., 2024). In organisational behaviour research, reciprocity is more often conceptualised as a social norm that obliges individuals to return benefits to those who have previously supported them (Gervasi et al., 2022), consistent with Gouldner's (1960) principle that people should help those who have helped them and should not injure those who have helped them. This study incorporates both perspectives because the empirical evidence shows reciprocity operating not only between firms, but also between individuals and between teams, and therefore requires a definition that captures both interpersonal obligation and inter-organisational exchange. In particular, the analysis suggests that reciprocity is enacted both through person-to-person support and through reciprocal collaboration between internal teams, as resources and assistance are exchanged across roles and functional boundaries. The following discussion further theorises how reciprocity operates across internal and external relationships, and how its contribution varies across disruption stages.

6.2.2.1 Internal Reciprocity

Internal Horizontal Reciprocity

Prior research emphasises that peer-to-peer reciprocity supports workplace cooperation and organisational commitment (Gervasi et al., 2022). Reciprocal exchanges, such as helping with tasks or sharing burdens, create informal obligations that improve coordination and support group functioning. However, this literature has paid limited attention to how everyday intra-organisational reciprocity contributes to SCRES. Our analysis suggests that internal horizontal reciprocity strengthens SCRES by enabling rapid peer support that absorbs workload shocks and helps resolve time-critical tasks. Before disruptions, such reciprocity embeds preparedness by cultivating expectations of mutual help and reinforcing informal coordination routines. During disruptions, it becomes particularly valuable because it allows employees to redistribute

effort quickly, reduce bottlenecks, and sustain task execution under pressure. In this way, reciprocity supports team responsiveness not only as a social norm, but as an enacted relational mechanism for operational continuity.

6.2.2.2 External Reciprocity

External Reciprocity with Upstream Partners

Externally, reciprocity refers to mutual exchanges between SC partners (Saglam et al., 2022; Chowdhury et al., 2024; Yang et al., 2024). Such exchanges cultivate shared norms and mutual trust that can strengthen SCRES (Yang et al., 2024) and support tacit knowledge sharing and long-term commitment (Saglam et al., 2022). Before disruptions, the analysis indicates that reciprocity with upstream partners may be expressed through non-financial support, such as technical assistance, market support, and information sharing, thereby strengthening interdependence and operational efficiency, consistent with evidence from perishable product supply networks (Pérez Mesa and Galdeano-Gómez, 2015). In dairy and cold-chain contexts, where shelf life is short and temperature control is critical, tight partner coordination is essential because temperature loss of control is a major risk (Stringer and Hall, 2007; Sahin et al., 2007; Ali et al., 2018). During disruptions, reciprocity can become visible through priority resource allocation and financial flexibility, as suppliers may prioritise the focal firm under shortages, allocate scarce materials or logistics capacity, and tolerate short-term payment adjustments. Overall, reciprocity supports preparedness through non-financial support before disruptions and strengthens response through priority allocation and financial flexibility during disruptions, thereby sustaining continuity and responsiveness under pressure.

External Reciprocity with Downstream Partners

Reciprocity is associated with relational commitment and high-quality communication, fostering cooperation and coordination among SC partners (Chang et al., 2015; Tsai and Kang, 2019; Saglam et al., 2022). However, OSCM research has paid limited attention to reciprocity with downstream partners. Addressing this gap, the analysis suggests that downstream reciprocity strengthens SCRES through preferential benefit allocation. Long-term clients may be offered flexible payment terms, favourable pricing, and prioritised resources, which in turn help secure loyalty and reciprocal support during disruptions. These arrangements can reduce partners' financial strain, stabilise demand, and support continuity under disruptive conditions. Prior research cautions that extended payment terms can strain manufacturers' finances and

increase bankruptcy risk, particularly during disruptions (Chan et al., 2010; Esenduran et al., 2022). The present analysis nuances this view by suggesting that, when embedded in reciprocal relationships, delayed payments operate as mutual exchanges rather than unilateral concessions, thereby supporting interdependence and sustained collaboration that strengthen continuity and trust across the SC.

6.2.3 Communication

Communication refers to the timely and meaningful transmission of information through formal and informal channels, with personal ties facilitating frequent contact and knowledge exchange (McFadyen et al., 2009; Wieland and Wallenburg, 2013). Prior research shows that internal communication among employees supports information and knowledge sharing, enabling firms to assess disruption impacts and develop contingency plans more rapidly (Polyviou et al., 2020; Ozanne et al., 2022). It also enhances the sensing of external signals and supports recovery by enabling the reconfiguration of operational routines (Zhou et al., 2021). Externally, communication with SC partners promotes collaboration and supports the interpretation of disruption signals and early risk identification (Bhattacharjya, 2018; Fan and Stevenson, 2018), which in turn facilitates joint decision-making and proactive disruption preparedness (Faruquee et al., 2021). Regular information sharing improves risk awareness and coordinated crisis response (Cheng et al., 2012; Hu, 2022), while frequent and open exchanges strengthen cooperation and collective problem solving (Grötsch et al., 2013; He et al., 2022). Building on these perspectives, this study distinguishes communication routines across internal horizontal and vertical ties, and across external relationships with upstream partners, downstream partners, broader relationship networks, and multi-tier SC actors. These distinctions enable a fine-grained examination of how different communication structures support early warning, rapid coordination, resource reallocation, and post-disruption learning, thereby strengthening SCRES.

6.2.3.1 Internal Communication

Internal Horizontal Communication

Prior research shows that internal communication supports organisational learning (Argyris and Schön, 1996; Senge et al., 1994; García-Morales et al., 2011) and strengthens preparedness by enabling information and knowledge exchange within firms (Lengnick-Hall et al., 2011; Polyviou et al., 2020; Ozanne et al., 2022). Our analysis extends this literature by showing that

horizontal, rather than purely hierarchical, communication plays a distinct role in pre-disruption preparedness. Before disruptions, peer-to-peer communication reduces uncertainty and clarifies responsibilities before risks materialise. This may take the form of informal peer advice that supports sensemaking in unfamiliar situations, structured mentorship and experience-sharing that enable the systematic transfer of tacit knowledge, or predefined coordination routines that align expectations ahead of high-pressure periods. Taken together, these patterns indicate that horizontal communication enhances preparedness by building shared understanding, anticipatory alignment, and role clarity.

During disruptions, the findings are consistent with prior work linking internal communication to responsiveness and coordination (Cheng et al., 2012; Grötsch et al., 2013; Bhattacharjya, 2018; Yang and Hsu, 2018; Hu, 2022; Chowdhury et al., 2024), but they further show that horizontal communication often becomes the dominant coordination mode when rapid adjustment is required. Real-time peer exchanges enable teams to mobilise expertise, synchronise actions, and coordinate alternatives without waiting for managerial approval. Cross-departmental communication supports joint problem-solving, while rapid information sharing enables timely operational adjustments under pressure. These findings illustrate how horizontal communication sustains responsiveness and service continuity by reducing coordination delays during disruptions.

Beyond immediate response, prior studies recognise communication as central to organisational learning, while also warning that rigid or fragmented communication can inhibit learning and adaptation (Stata, 1989; Davenport et al., 2001). Our analysis shows that horizontal communication also underpins post-disruption learning. After disruptions, employees can convert individual experiences into shared lessons through peer feedback, informal discussion, and routine knowledge exchange. Such peer-based learning processes reduce repeated mistakes, reinforce shared understanding, and strengthen preparedness for future disruptions, thereby contributing to longer-term SCRES.

Internal Vertical Communication

Internal vertical communication supports coordination across hierarchical levels by enabling guidance, feedback, and managerial support (Conduit and Mavondo, 2001; García-Morales et al., 2011). Prior research shows that effective vertical communication strengthens preparedness

and responsiveness by improving clarity, aligning expectations, and enabling timely managerial intervention (Piriyawatthana, 2020). However, OSCM studies have paid limited attention to how vertical communication contributes to SCRES across disruption stages, particularly in shaping risk sensing, escalation, and organisational learning.

Before disruptions, vertical communication can strengthen preparedness by creating early visibility into emerging risks. Structured upward and downward exchanges allow managers to detect anomalies in sales, operations, and customer behaviour and to initiate proactive adjustments. This extends prior work on vertical communication as managerial support by showing how reporting and feedback structures can enhance early anticipation and organisational alignment (García-Morales et al., 2011). This is particularly important in tightly coordinated and process-sensitive supply chains, where weak coordination can increase vulnerability to disruption (Raghuram et al., 2021).

During disruptions, across all three cases, vertical communication enabled rapid escalation and managerial coordination, reinforcing evidence that manager–subordinate communication supports responsiveness and continuity during crises (Piriyawatthana, 2020). Frontline employees reported shortages, logistics failures, or quality issues in real time, allowing managers to mobilise resources and authorise urgent decisions without procedural delay. By reducing decision lags, vertical communication supported continuity under crisis conditions.

After disruptions, vertical communication can also contribute to organisational learning by converting disruption experiences into shared understanding and improved practices. Building on research linking communication to learning and adaptation (Conduit and Mavondo, 2001; García-Morales et al., 2011; Stata, 1989), the analysis suggests that formal reporting and review routines provide a channel through which experience-based judgements can be translated into organisation-wide learning and more standardised future responses. This may be particularly important in process- and quality-critical settings, where disciplined and standardised operating procedures are central to maintaining operational consistency (Block and Miller, 2021).

6.2.3.2 External Communication

External Communication with Upstream Partners

External communication with upstream partners supports collaboration and the interpretation of disruption signals, enabling earlier risk identification and facilitating joint decision-making and proactive disruption preparedness (Bhattacharjya, 2018; Fan and Stevenson, 2018; Faruquee et al., 2021). Prior research shows that regular interactions improve risk awareness and crisis response (Cheng et al., 2012; Hu, 2022), while frequent and open communication strengthens cooperation and joint problem-solving across supply actors (Grötsch et al., 2013; He et al., 2022). Building on this work, our analysis suggests that upstream communication supports SCRES by strengthening anticipation, information sharing, and coordination across disruption stages.

Before disruptions, upstream communication strengthens preparedness by enabling early information sharing and proactive coordination. Consistent with evidence that communication reduces ambiguity, builds supply network visibility, and improves risk awareness (Barratt and Oke, 2007; Cheng et al., 2012; Hu, 2022), suppliers can provide early warnings about tightening delivery schedules, raw-material constraints, and quality concerns. Continuous interaction helps firms identify emerging constraints, adjust procurement or production plans, and create time buffers before risks escalate, thereby reducing uncertainty and improving operational alignment.

Upstream communication also supports trust-based relationships that further strengthen preparedness. This aligns with Cheng et al., (2012), who argue that closer communication can help buyers build Guanxi with Chinese suppliers, facilitating proactive information exchange and reducing supply risks. This role is particularly salient for perishable and time-sensitive products, where upstream transparency and traceability are essential for early risk anticipation, timely preparation, and preventing quality deterioration and waste (Lusiantoro et al., 2018; Aung and Chang, 2014). In short-lifecycle settings, communication therefore needs to be transparent and frequent, supporting both information sharing and relationship stability.

During disruptions, upstream communication supports rapid problem-solving and coordinated response. Real-time updates on transport delays, capacity shortages, and inventory fluctuations can enable route adjustments, activation of backup vehicles, and timely resource reallocation. By maintaining rapid information flow and coordinated action, these practices support supply continuity during crises and reinforce adaptive resilience (Wieland and Wallenburg, 2013).

External Communication with Downstream Partners

Prior research emphasises that communication underpins collaborative capabilities for proactive disruption preparedness (Faruquee et al., 2021) and that frequent, open dialogue strengthens cooperation and facilitates the interactive interpretation of potential supply risks (Grötsch et al., 2013; He et al., 2022; Fan and Stevenson, 2018). Our analysis suggests that downstream communication supports SCRES in stage-specific ways.

Existing studies further indicate that communication underpins higher-level collaboration and shapes the social dimension of inter-organisational relationships by creating and sustaining trust (van Riel and Fombrun, 2007; C. Gambetti and Giovanardi, 2013). The evidence in this study refines this view by suggesting that the pre-disruption role of downstream communication may be more context-dependent than that of upstream communication. In settings characterised by seasonal transitions, demand variability, or relationship-sensitive downstream interfaces, routine and transparent downstream communication can widen early-warning channels, align expectations, and stabilise demand-side relationships before disruptions. Within the shared context of alcohol manufacturing supply chains, this insight extends Forbes et al.'s (2010) correlational evidence on information sharing and trust by showing how systematic early notices, patient explanation, and transparent communication with downstream partners can enhance operational readiness before disruption onset. In this sense, downstream communication contributes to SCRES not only by transmitting information, but also by preparing downstream partners for volatility and strengthening relational stability in advance.

Frequent and open communication promotes cooperative behaviour and enables flexible dialogue and the joint interpretation of disruption signals among SC partners (Grötsch et al., 2013; He et al., 2022; Fan and Stevenson, 2018; Faruquee et al., 2021). During disruptions, continuous communication allows critical information to circulate rapidly, which becomes essential under crisis conditions (Hu, 2022). Across the cases, downstream communication played a central role in enhancing responsiveness. Real-time updates to customers and logistics partners reduced information gaps, clarified the sources of delays, and facilitated timely corrective actions. These transparent exchanges prevented misunderstandings, reassured customers under uncertainty, and helped preserve order continuity. Consequently, downstream

communication supported rapid adjustment, mitigated disruption impacts, and maintained operational stability at the delivery interface across all cases.

External Communication with Multiple SC Partners

External communication with multiple SC partners supports SCRES by enabling timely information sharing, joint decision-making, and collaborative monitoring across the supply network (Wieland and Wallenburg, 2013; Bhattacharjya, 2018; Faruquee et al., 2021; Yang and Hsu, 2018; Hu, 2022; Chowdhury et al., 2024). The analysis indicates that communication spanning both upstream and downstream partners strengthens resilience by improving early risk detection, supporting joint problem-solving, and integrating contingency considerations into routine interactions.

Before disruptions, proactive, trust-based communication across multiple partners reduces uncertainty and strengthens collective preparedness. Regular information sharing and interaction with suppliers and customers enable earlier identification of emerging constraints and timely operational adjustments, consistent with prior work highlighting the role of communication in multi-tier risk awareness and anticipation (Cheng et al., 2012; Fan and Stevenson, 2018). These practices support coordinated responses across tiers and mitigate the downstream effects of upstream disruptions.

During disruptions, external communication supported resilience by enabling real-time information sharing and cross-boundary coordination. Prior research similarly suggests that frequent and open communication strengthens cooperation and supports flexible dialogue and joint interpretation of disruption signals and coordinated responses among partners (Grötsch et al., 2013; He et al., 2022; Fan and Stevenson, 2018; Faruquee et al., 2021). Consistent with this view, rapid exchanges among suppliers, retailers, and clients enable timely decision-making, conflict mediation, and aligned action. These practices minimise delays and contain disruption impacts while also generating learning that strengthens preparedness for future risks. Overall, the findings highlight how multi-partner communication safeguards continuity and supports adaptive resilience in disruption management.

External Communication with Broader Relationship Network

Broader relationship networks, including personal and non-business ties, provide additional information bridges that give managers access to knowledge and resources beyond formal SC relationships (Seibert et al., 2001; Adler and Kwon, 2002; Gligor and Autry, 2012). Such weak ties expand information flow and support earlier detection of market and environmental changes (Granovetter, 1973, 1985; Gligor and Autry, 2012). The analysis in this study suggests that these broader networks contribute to SCRES in stage-specific ways. Before disruptions, informal contacts with industry peers can strengthen early sensing by providing advance signals that enable proactive procurement and planning adjustments, which may be especially important in complex supply networks where early risk awareness supports timely managerial action (Raghuram et al., 2021). During disruptions, broader networks can support decision-making by helping managers verify ambiguous information, reduce information asymmetry, and respond with greater confidence. They may also provide access to alternative supply channels and contingency options when primary sources become unreliable. This role is especially valuable in cold-chain and other perishable-product settings, where disruptions can rapidly escalate into quality deterioration and waste (Ali et al., 2018). Overall, the findings indicate that broader relationship networks support SCRES by strengthening early anticipation before disruptions and improving decision reliability and resource flexibility during disruptions.

However, the findings also suggest that employees' emotional states influence communication during disruptions, affecting not only communication quality (e.g., clarity and effectiveness) but also communication continuity at critical moments. Although prior research has recognised that emotions influence interpersonal behaviour and social interaction (e.g., Forgas, 2002), and management research has also recognised the importance of emotions in workplace contexts (Brotheridge and Lee, 2008), their role in shaping communication during SC disruption response remains underexplored. In SCM, communication is more often treated as a coordination process, information-sharing routine, or integration mechanism (Wieland and Wallenburg, 2013; Yang and Hsu, 2018). The analysis suggests that communication effectiveness in disruption response depends not only on formal channels and coordination structures but also on employees' emotional stability under stress and uncertainty. Future research could further investigate how emotional regulation, stress exposure, and organisational support mechanisms shape disruption-stage communication effectiveness across different SC roles and contexts.

6.2.4 Cooperation

Cooperation refers to the process through which individuals and organisations interact and form psychological connections for mutual benefit (Smith et al., 1995). It involves active participation by actors to sustain and maintain relationships over time (Morris and Carter, 2005). Beyond information exchange, cooperation focuses on aligning and coordinating processes across the SC to ensure continuity of operations (Frohlich and Westbrook, 2001; Flynn et al., 2010). Unlike collaboration, which emphasises joint problem-solving and collective value creation, cooperation is primarily concerned with relational maintenance and process alignment (Wieland and Wallenburg, 2013). Such coordination enhances information processing capacity, enabling organisations to perform intra and inter-organisational tasks more efficiently and achieve superior performance (Cohen and Levinthal, 1990; Grant, 1996). Building on these perspectives, this study distinguishes cooperation across internal horizontal and vertical structures and across external relationships with upstream suppliers, downstream partners, broader relationship networks, and multiple SC actors. These distinctions enable a fine-grained examination of how different cooperative ties support resilience outcomes, including cross-functional contingency routines, joint resource mobilisation, and adaptive logistics orchestration, thereby illustrating the varied ways in which cooperation contributes to SCRES. Importantly, the analysis suggests that cooperation contributes to SCRES in dynamic and stage-specific ways: before disruptions, it embeds coordination routines and preparedness structures; during disruptions, it enables rapid resource alignment and collective response; and after disruptions, it helps stabilise recovery and consolidate lessons into repeatable organisational routines.

6.2.4.1 Internal Cooperation

Internal Horizontal Cooperation

Internally, cross-functional coordination is widely recognised as a complex organisational capability that develops through sustained interaction and learning across functions (Kogut and Zander, 1992; Carr et al., 2008). Prior resilience research indicates that early coordination, such as structured planning and timely information sharing, helps build preparedness and strengthens firms' ability to respond to and recover from emerging disruptions (Blackhurst et al., 2011; Ambulkar et al., 2015). This preparedness is reinforced when such routines are formalised through contingency planning and supported by adequate resources and managerial commitment (Norrman and Jansson, 2004; Macdonald and Corsi, 2013; Scholten et al., 2014).

However, existing studies largely emphasise formal cross-functional teams, offering limited insight into how everyday horizontal cooperation among departments develops into a resilience-enabling capability. Addressing this gap, the analysis suggests that preparedness often stems from systematic coordination routines rather than ad hoc interactions. Practices such as predefined task alignment, early-season planning, and digital communication groups embed shared expectations and improve situational awareness, thereby strengthening pre-disruption coherence and organisational robustness (Yu et al., 2022). In this sense, horizontal cooperation supports SCRES before disruptions by transforming routine cross-functional interaction into a more durable preparedness capability.

Resilience research highlights the importance of cross-functional collaboration and coordination in developing countermeasures and enabling rapid recovery during disruptions (Sheffi and Rice, 2005; Ambulkar et al., 2015). Effective collaboration can limit performance losses, whereas weak coordination may amplify disruption impacts and prolong operational breakdowns (Ali et al., 2017; Manhart et al., 2020). However, prior work pays limited attention to how horizontal cooperation functions outside formal team structures in real-time crisis settings. The findings suggest that, during disruptions, horizontal cooperation enables firms to mobilise resources quickly and stabilise operations. Cross-department coordination, supported by real-time information sharing, emergency meetings, and digital communication channels, enables rapid problem-solving, inventory and stock reallocation, replenishment and substitution decisions, delivery adjustments, and timely client communication. Taken together, these observations indicate that horizontal cooperation operates as an adaptive routine that strengthens responsiveness and continuity, thereby extending understandings of cross-functional coordination as a dynamic capability for SCRES.

However, the findings also indicate that employees' emotional states can shape the quality of cooperation during disruptions, particularly when frontline interactions are conducted under time pressure and operational strain. While prior literature has widely acknowledged that emotions influence interpersonal behaviour, conflict dynamics, and cooperative functioning in organisations (e.g., Barsade, 2002; Barsade and Gibson, 2007; Ashkanasy and Dorris, 2017), their role in disrupting or enabling cooperation in SC disruption response remains comparatively underexplored. In the SCM context, cooperation is often examined through structural and relational lenses, such as coordination mechanisms, collaboration practices, and integration arrangements (e.g., Flynn et al., 2010; Cao and Zhang, 2011; Scholten and Schilder,

2015), yet less attention has been paid to how emotional instability may weaken the enactment of cooperation in real-time disruption situations. This suggests that the resilience effects of cooperation depend not only on formal coordination structures, but also on whether actors remain emotionally able to sustain cooperative behaviour when disruption pressure intensifies.

Internal Vertical Cooperation

Prior research emphasises the importance of adequate resources and top management support, together with the codification of standardised procedures within contingency plans (Ponomarov and Holcomb, 2009; Jüttner and Maklan, 2011; Scholten et al., 2014). Vertical cooperation is critical for effective disruption response because it enables internal organisation, resource alignment, and structured mitigation (Molinaro et al., 2023). The analysis suggests that vertical cooperation is enacted through formal escalation procedures, structured reporting lines, and central coordination mechanisms that align operational and managerial responses under pressure. Incidents may be reported through layered timelines, while central units coordinate production, logistics, replenishment, or substitution, and designated staff manage disruptions on site. This is particularly salient in distillery operations, where weak hierarchical coordination can intensify operational instability (Raghuram et al., 2021). Such arrangements institutionalise accountability and systematic resolution, embedding vertical cooperation as a repeatable capability under pressure. Similar practices are reported in prior studies, including Ericsson's detailed response and recovery plans with clear roles and coordination procedures after a major disruption (Norrman and Jansson, 2004), and the creation of dedicated response teams highlighted by Macdonald and Corsi (2013). Taken together, these patterns indicate that vertical cooperation across hierarchical levels supports timely, accurate, and coordinated responses that sustain continuity under disruptive conditions.

6.2.4.2 External Cooperation

External Cooperation with Upstream Partners

Prior studies suggest that cooperative SC members are generally perceived as more trustworthy (Wieland and Wallenburg, 2013). Cooperative partners are also more likely to proactively share signals about environmental or operational changes and accept screening by other members; together, these practices enhance visibility and reduce the risks of adverse selection and moral hazard (Sanders and Boivie, 2004). Reduced behavioural uncertainty further reinforces the trust–cooperation relationship (Dubey et al., 2017). Consistent with this view, the analysis

suggests that cooperation with upstream partners strengthens SCRES in the pre-disruption stage by supporting proactive information sharing, coordinated anticipation, and early adjustment. Long-term cooperative ties with suppliers and logistics providers embed familiarity and routine support into day-to-day coordination, thereby increasing willingness to provide early warnings, share emerging concerns, and adjust plans before risks escalate. This early exchange reduces uncertainty and allows firms to formulate countermeasures in advance.

The analysis also suggests that upstream cooperation may extend beyond transactional coordination to include joint innovation and capability development. For example, co-developing packaging solutions with suppliers can strengthen trust while simultaneously expanding technical knowledge and adaptive capacity, thereby embedding innovation capability within upstream cooperative relationships. This upstream co-development echoes evidence from perishable product supply networks, where cooperation can extend beyond transactional exchanges to include research ventures and new-product R&D activities (Pérez Mesa and Galdeano-Gómez, 2015). Such functional coordination enhances information exchange and reduces uncertainty in joint decision-making, aligning with studies emphasising coordination as a foundation for innovation (Lawrence and Lorsch, 1967; Galbraith, 1977; Carr et al., 2008).

Prior studies suggest that, during disruptions, external cooperation enhances information sharing, joint problem-solving, and adaptive capacity among SC members (Chowdhury et al., 2024), and that cooperative problem-solving supports proactive risk disruption preparedness and win-win strategies (Faruquee et al., 2021). Strong supplier relationships can also secure premium service and preferential support (Bruce et al., 2004; Wieland and Wallenburg, 2013). Consistent with this view, the findings suggest that, during disruptions, upstream cooperation can secure priority access to critical resources and stabilise operations. Suppliers may support response efforts by prioritising deliveries, reallocating stock, and coordinating logistics arrangements, thereby reducing downtime and preventing escalation. These observations indicate that upstream cooperation translates relational capital into operational continuity under pressure, strengthening SCRES in line with cooperation and risk-management research.

External Cooperation with Downstream Partners

Previous OSCM research has largely overlooked cooperation with downstream partners, although a small body of work shows that cooperative buyer–supplier relationships build mutual commitment and support joint performance improvement (Bruce et al., 2004; Wieland and Wallenburg, 2013). Such cooperation signals shared responsibility, which can strengthen joint risk anticipation (Jacobs and Subramanian, 2012; Wieland and Wallenburg, 2013). Conversely, non-cooperative behaviour undermines information reliability and weakens organisational readiness (Cohen et al., 2003). Building on this foundation, the analysis suggests that downstream cooperation also matters before disruptions. Long-term cooperation with specialised logistics providers can foster shared commitment to safe, compliant transport under product- and industry-specific regulatory requirements, thereby reducing operational safety risks and strengthening preparedness. This is particularly salient in distillery supply chains, where weak coordination across partners is a key risk (Raghuram et al., 2021).

Prior research suggests that cooperative SC partners are perceived as more trustworthy (Wieland and Wallenburg, 2013) and that strong buyer–supplier relationships support organisational capabilities and long-term stability through shared responsibility and joint risk mitigation (Yang and Hsu, 2018; Acar et al., 2022). However, existing studies mainly stress the strategic value of cooperative relationships, offering limited insight into how downstream cooperation operates during disruptions to stabilise demand-side operations. Addressing this gap, the findings suggest that downstream cooperation stabilises demand and supports robustness by preserving commercial ties during disruptions. Long-term partners may help prevent order cancellations and maintain transaction flows, redistribute inventory and prioritise shipments to resolve shortages, and absorb demand fluctuations by taking excess stock or accepting flexible payment terms. Together, these actions ease operational pressure and sustain delivery continuity, showing how downstream cooperation converts relational stability into disruption buffering that protects customer-facing continuity.

The empirical findings show that trust, reciprocity, communication, and cooperation collectively supported SCRES by strengthening relational confidence and coordinated action. Trust enabled actors to share information and rely on others under conditions of uncertainty, while reciprocity supported mutual assistance and resource exchange. Communication improved disruption visibility and real-time coordination, whereas cooperation translated relational willingness into joint action and problem-solving. However, the findings also suggest

that overly embedded external relationships may create governance risks, including dependence and reduced transparency. Social capital therefore contributes most effectively to SCRES when relational closeness is balanced with appropriate governance and information visibility.

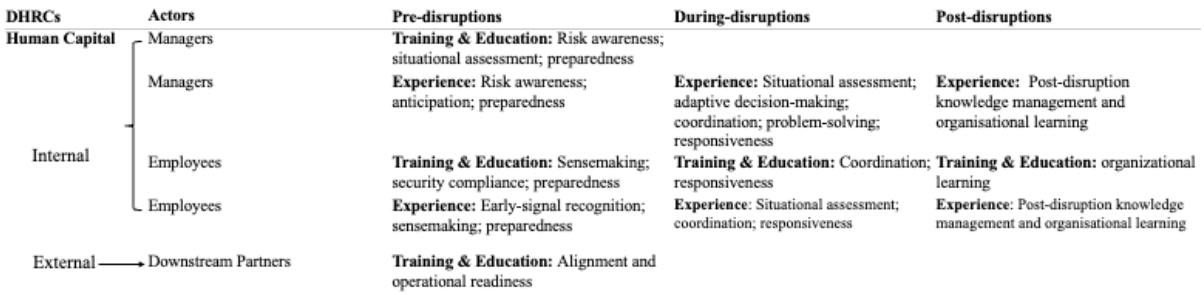
> *Proposition 1: Social capital practices enhance SCRES by enabling information exchange, mutual support, and coordinated action.*

6.3 Human Capital, its Practices, and Supply Chain Resilience

Human capital refers to the knowledge and skills that individuals apply in their work (Adner and Helfat, 2003; Nikookar and Yanadori, 2022a). Building on the SLR, human capital can be grouped into two practices: skills acquired through formal training and education, and experience (Shela et al., 2023). Training and education-based skills are generally transferable rather than firm- or industry-specific (Nikookar and Yanadori, 2022a). By contrast, experience reflects practical knowledge, skills, and abilities gained through direct observation or participation in activities and events (Gerschberger et al., 2023). The analysis further indicates that training and education, together with experience, represent the main practices through which human capital becomes visible and consequential in supporting SCRES across disruption stages (see Figure 6.3). Formal training and education shape preparedness, procedural discipline, and analytical capability, while accumulated experience supports situational judgement, rapid problem diagnosis, and adaptive action under uncertainty. Together, these practices capture how human capital is mobilised before, during, and after disruptions to support proactive vigilance, responsive execution, and post event learning. In this sense, human capital contributes to SCRES not simply through the possession of skills or knowledge, but through the staged enactment of preparedness, response, and learning capabilities under changing disruption conditions.

Accordingly, this section examines human capital through these two practices and distinguishes how they operate across different organisational roles and SC relationships, including managers, employees, and relevant external SC actors where the evidence indicates their involvement. This structure enables a systematic discussion of how different forms of human capital are developed and deployed in practice and how they support SCRES.

Figure 6.3 Human Capital Practices and its Contribution on Supply Chain Resilience



DHRCs	Actors	Pre-disruptions	During-disruptions	Post-disruptions
Human Capital	Managers	**Training & Education:** Risk awareness; situational assessment; preparedness		
Internal	Managers	**Experience:** Risk awareness; anticipation; preparedness	**Experience:** Situational assessment; adaptive decision-making; coordination; problem-solving; responsiveness	**Experience:** Post-disruption knowledge management and organisational learning
	Employees	**Training & Education:** Sensemaking; security compliance; preparedness	**Training & Education:** Coordination; responsiveness	**Training & Education:** organizational learning
	Employees	**Experience:** Early-signal recognition; sensemaking; preparedness	**Experience**: Situational assessment; coordination; responsiveness	**Experience**: Post-disruption knowledge management and organisational learning
External	Downstream Partners	**Training & Education:** Alignment and operational readiness		

6.3.1 Training & Education

Training and education are widely recognised as enablers of SCRES, strengthening disruption sensing, cross-functional coordination, and response capability (Lengnick-Hall et al., 2011; Riley et al., 2016; Hohenstein et al., 2015; Koronis and Ponis, 2018). Prior studies indicate that structured training familiarises managers and employees with risk scenarios, improves multitasking and analytical skills, and supports innovation and proactive problem-solving (Mubarik et al., 2022; Yu et al., 2023; Gu et al., 2023; Shela et al., 2023). Building on this literature, the present study adopts an actor-specific perspective by differentiating the effects of training across managers, employees, and downstream partners. The analysis suggests that training contributes to SCRES not only through technical knowledge transfer but also by shaping proactive mindsets, coordinated routines, and organisational learning across disruption stages.

6.3.1.1 Internal Training & Education

Managers' Training & Education

Prior research provides mixed evidence on managerial training and SCRES: some studies suggest that data-analysis skills and training improve managers' ability to interpret information and make rapid, low-disruption decisions (Shela et al., 2023), while others report no significant association between formal training and SC-related skills (Nikookar and Yanadori, 2022a). The analysis helps clarify this inconsistency by suggesting that managerial training supports SCRES most clearly when it is specific, applied, and embedded in operational routines. In such cases, training in emergency-plan development can provide structured tools for anticipating supplier risks, while management education can improve analytical judgement regarding cost, time, and market trade-offs. This pattern aligns with evidence from perishable cold-chain contexts, where exposure to complex logistics risks, such as temperature breakdowns and quality deterioration, makes resilient performance dependent on early contingency recognition

and timely resource mobilisation (Ali et al., 2018). Accordingly, managerial training appears most consequential before disruptions, when it sharpens risk awareness, improves situational assessment, and strengthens preventive planning.

Employees' Training & Education

Prior research suggests that employee training strengthens disruption sensing by improving sensemaking and preventive awareness (Lengnick-Hall et al., 2011; Riley et al., 2016; Hohenstein et al., 2015). It also indicates that cross-departmental training supports shared problem recognition and earlier preventive action (Koronis and Ponis, 2018). Consistent with this view, the findings suggest that structured training and education improve pre-disruption preparedness by strengthening situational assessment, compliance, and the early identification of warning signs. Fire-safety training, regular drills, risk-prevention programmes, targeted onboarding, and risk-management exercises cultivate anticipatory vigilance and preventive action across operational settings. Overall, these practices indicate that training supports early warning rather than serving only as operational skill building, sharpening employees' ability to detect anomalies and respond before risks escalate.

Research suggests that employee training strengthens responsiveness and multitasking during crises (Koronis and Ponis, 2018; Gu et al., 2023). Consistent with this, the findings suggest that during disruptions, training supports behavioural stability and coordination in different ways. Emergency and procedural training can enable employees to mobilise resources quickly, address failures, and coordinate across departments under pressure, while communication-focused training can help staff remain composed, provide clear updates, and handle unexpected issues effectively. Although these pathways differ, they together indicate that training supports faster and more reliable crisis response by reducing hesitation and improving collective action.

Previous work suggests that training supports post-event learning and continuous improvement by embedding knowledge into organisational routines (Mubarik et al., 2022; Yu et al., 2023). The analysis suggests that training can also support structured post-disruption learning when managers and employees jointly review actions taken, extract lessons, and translate these lessons into more disciplined operating routines. This role appears particularly consequential in spirits operations, where the process- and quality-critical nature of production increases reliance on disciplined and standardised procedures (Block and Miller, 2021). In this sense,

training contributes not only to preparedness and response, but also to post-disruption retention of lessons that can reduce the likelihood of recurrence.

6.3.1.2 External Training & Education

Downstream partners' Training & Education

Downstream partner training can strengthen pre-disruption preparedness by improving knowledge alignment and relational commitment, yet OSCM research has paid limited attention to this form of training. The analysis suggests that product appreciation meetings and training sessions can equip distributors with knowledge of new products and inventory management, thereby reducing information errors and improving downstream alignment. Repeated interactions may also foster trust and cooperation, supporting stronger commitment and assistance from distributors when disruptions occur. This evidence aligns with channel research showing that supplier firms invest in channel partner-sponsored training to enhance downstream partners' product knowledge and selling capabilities, reduce information errors, and improve alignment and execution in indirect channels (Satornino et al., 2023). Taken together, these observations suggest that downstream partner training contributes to SCRES primarily before disruptions by aligning expectations, strengthening demand-side preparedness, and reinforcing relational commitment that can later support disruption response.

6.3.2 Experience

Experience is a vital component of human capital that supports decision making under uncertainty, improves disruption interpretation, and strengthens organisational responsiveness and learning (Nikookar and Yanadori, 2022a; Akkermans et al., 2018; Gerschberger et al., 2023; Shela et al., 2023). Managerial experience supports rapid situational assessment and proactive execution, while employee experience contributes practical knowledge, cross-functional coordination, and error reduction during crises (Pereira et al., 2020; Mubarik et al., 2022; Gu et al., 2023). Experience also facilitates post-disruption learning by linking past disruptions to current signals and helping avoid repeated mistakes (Gerschberger et al., 2023). Building on this literature, this study examines how individual experience shapes resilience across roles and disruption stages. More specifically, the analysis suggests that experience contributes to SCRES by supporting anticipatory judgement before disruptions, adaptive action during disruptions, and lesson retention after disruptions.

6.3.2.1 Internal Experience

Managers' Experience

Prior research shows that managerial experience within the same firm or industry enables more accurate information interpretation and flexible decision-making under uncertainty (Akkermans et al., 2018; Nikookar and Yanadori, 2022a). The analysis extends this view by suggesting that accumulated managerial experience enables earlier risk recognition and proactive prevention at the pre-disruption stage. Managers draw on tacit lessons from past failures, industry knowledge, and long-term familiarity with suppliers to identify emerging issues, adjust procurement plans, refine warehouse rules, and anticipate seasonal vulnerabilities. In this sense, accumulated managerial experience translates into pre-disruption preparedness by strengthening firms' ability to sense and mitigate risks before they escalate.

Research suggests that experience-driven decision-making should be institutionalised to prevent knowledge loss (Akkermans et al., 2018). The findings further suggest that managerial experience supports long-term SCRES most effectively when it is institutionalised after disruptions through structured reviews and knowledge codification, rather than remaining as isolated individual judgement. Experienced managers can facilitate post-incident reviews, identify root causes, and translate individual experience into shared organisational knowledge, thereby strengthening preparedness and reducing repeated errors. This is particularly salient in spirits supply chains, where operations depend on repeatable and tightly specified unit operations, meaning that the value of experience is realised when it is codified into routines that can be enacted consistently (Block and Miller, 2021).

Employees' Experience

Prior research suggests that employees' accumulated experience increases awareness of critical situations and strengthens proactive disruption preparedness and learning capabilities (Polyviou et al., 2020; Gerschberger et al., 2023). Consistent with this view, the findings suggest that employee experience supports pre-disruption preparedness by helping staff recognise weak signals, interpret operational anomalies, and assess supplier- or process-related risks more accurately. Accumulated practice also supports routine preparation, stabilises behaviour under uncertainty, and facilitates tacit knowledge transfer to newer employees. Overall, employee experience reduces pre-disruption vulnerability by strengthening early-warning interpretation and shared situational readiness.

Experience is widely viewed as a source of practical, industry-specific knowledge that supports performance in complex environments (Pereira et al., 2020) and can reduce errors and improve cross-functional coordination during crisis response (Hohenstein et al., 2015; Mubarik et al., 2022; Gu et al., 2023). Building on this view, the findings suggest that accumulated experience supports adaptive operational response during disruptions by translating individual expertise into collective responsiveness that mitigates disruption impacts and safeguards continuity. Experienced employees enhance situational assessment and response by judging incident severity, coordinating with relevant teams, stabilising operations, and remaining calm under pressure. Overall, despite contextual variation, employee experience strengthens responsiveness and coordinated action, supporting more confident decision-making during disruptions and enhancing SCRES.

Experience helps employees connect past events to new situations, supporting post-disruption learning and reducing repeated mistakes (Gerschberger et al., 2023). The findings further suggest that employee experience strengthens SCRES after disruptions most clearly when it is captured and diffused through formal reflection routines that convert individual lessons into collective learning. Experienced employees can interpret disruption outcomes, identify root causes, and share practical lessons through review meetings and day-to-day exchanges, thereby helping prevent recurrence. This is particularly salient in spirits supply chains, where tightly specified and repeatable unit operations mean that experience creates value only when it is codified into routines that can be enacted consistently (Block and Miller, 2021).

However, training effects were not uniform across functions. The evidence suggests that some roles may perceive experience as more useful than formal training, particularly where formal programmes provide only a basic framework while task demands require more situated judgement. By contrast, other roles may find structured training directly relevant to their tasks. This variation suggests that training effectiveness depends on task fit and employees' ability to apply what they learn, consistent with evidence that training alone does not always improve resilience (Riley et al., 2016; Nikookar and Yanadori, 2022a). Even so, standardised programmes helped establish shared routines and expectations, enabling quicker and more consistent action during disruptions. Thus, despite uneven effects across roles, training still supports common understanding and preparedness that contribute to SCRES.

The empirical findings show that training and education strengthened risk awareness, operational knowledge, and response preparedness, particularly where managers and employees needed to apply established procedures under uncertain conditions. Experience complemented formal training by providing practical judgement developed through repeated exposure to operational problems and previous disruptions. Together, these human capital practices enabled actors to recognise disruption signals, make informed decisions, and adapt their responses as disruption conditions evolved.

> *Proposition 2: Human capital practices enhance SCRES by strengthening the knowledge, skills, and experience needed to anticipate, interpret, and respond to disruptions.*

6.4 Cognition, its Practices, and Supply Chain Resilience

Cognition in this study includes both individual mental representations that shape decision-making by influencing how actors perceive and interpret their environment (Adner and Helfat, 2003; Helfat and Peteraf, 2015; Nikookar and Yanadori, 2022a) and shared cognition, which emerges from collective interpretations, meanings, and values that enhance mutual understanding and collaboration in SC relationships (Nahapiet and Ghoshal, 1998; Fan and Stevenson, 2018; Ozanne et al., 2022; Daghar et al., 2023). Building on the SLR, this study conceptualises cognition as being operationalised through three core practices: individual cognitive attributes, shared codes and language, and shared narratives. The analysis further indicates that these three practices represent the primary mechanisms through which cognition is mobilised to support SCRES across disruption stages. Individual cognitive attributes shape situational assessment, judgement, and adaptive action, while shared codes and language facilitate rapid collective interpretation and coordination. Shared narratives support collective learning, reinforce common frames of reference, and sustain resilience-oriented meaning structures across disruption episodes. This structure enables a systematic discussion of how individual (managers and employees) and shared (internal and external) cognitive processes are enacted in practice and how they jointly contribute to SCRES. More broadly, the findings suggest that cognition contributes to SCRES in stage-specific ways: before disruptions, it sharpens anticipation and early interpretation; during disruptions, it supports rapid appraisal,

prioritisation, and adaptive response; and after disruptions, it helps preserve lessons and sustain shared interpretive frameworks for future action.

Figure 6.4 Cognition Practices and its Contribution on Supply Chain Resilience

DHRCs	Actors	Pre-disruptions	During-disruptions	Post-disruptions
Cognition	Managers	**Managers' Cognitive Attributes:** Risk Awareness: Anticipation; contingency planning; preparedness	**Managers' Cognitive Attributes:** Situational Assessment: Adaptive decision making; problem-solving; responsiveness	
Internal	Horizontal		**Shared Language and Code:** Communication; coordination; responsiveness	
	Horizontal	**Shared Narrative**: Preparedness	**Shared Narrative**: communication; coordination; responsiveness	**Shared Narrative**: Post-disruption knowledge management: preparedness
	Employees	**Employees' Cognitive Attributes**: Sensemaking: Early risks identification; robustness	**Employees' Cognitive Attributes:** ***Sensemaking:*** Adaptive decision making; responsiveness ***Situational assessment:*** Adaptive decision making; responsiveness	
	Vertical		**Shared Narrative:** Coordination; responsiveness	
External	Downstream Partners	**Shared Narrative:** Coordination; preparedness		

6.4.1 Individual Cognitive Attributes

In this study, individual cognition refers to mental representations that shape decision-making by influencing how actors perceive and interpret their environment (Adner and Helfat, 2003; Helfat and Peteraf, 2015; Nikookar and Yanadori, 2022a). Building on this foundation, we examine individual cognition through two role-specific lenses: managers and employees, to capture how organisational members interpret risks, assess threats, and make strategic and operational decisions under dynamic environmental conditions. We focus on two cognitive components for managers, risk awareness and situational assessment, and two for employees, sensemaking and situational assessment.

In this study, risk awareness is defined as managers' forward-looking recognition and evaluation of potential risks, including their likely consequences and organisational implications. This choice is grounded in the empirical data: during interviews, managers repeatedly referred to "risk awareness" when describing their responsibility for anticipating emerging threats, interpreting early warning signals, and deciding whether preventive action or resource mobilisation was required. Sensemaking refers to the process through which individuals understand and interpret events and situations, particularly when confronted with ambiguity or novelty (Gerschberger et al., 2023). It is especially important for employees in helping them comprehend unusual and unprecedented events and determine appropriate courses of action as situations unfold (Lengnick-Hall et al., 2011). Situational assessment is

defined as a cognitive process characterised by alertness and heightened sensitivity to environmental cues, enabling individuals to maintain a realistic and updated understanding of evolving conditions (Lengnick-Hall et al., 2011; Gerschberger et al., 2023). To clarify how individual cognition is conceptualised and differentiated across roles in this study, Table 6.4.1 summarises the key cognitive elements examined at the managerial and employee levels.

Table 6.4.1 Individual Cognitive Attributes in this Study

Individual Cognitive Attributes	Function	Key question addressed
Situational assessment (Managers and Employees)	Accurate appraisal of evolving conditions through alertness to cues and anomalies	What is happening right now?
Risk awareness (Managers)	Forward-looking evaluation of potential threats, their likelihood and impact, and implications for preventive action	Does this situation constitute a risk that requires early intervention or resource commitment?
Sensemaking (Employees)	Interpretive construction of meaning from ambiguous cues to guide immediate action	What does this situation mean for what we should do next?

Managers' Cognitive Attributes

Prior studies identify managerial risk perception as a key antecedent of SCRES, shaping how firms interpret vulnerabilities and anticipate potential failures (Nikookar and Yanadori, 2022a; Huang and Farboudi Jahromi, 2021). Consistent with Fan and Stevenson (2018), heightened risk awareness enhances firms' ability to interpret disruption signals and identify emerging risks by increasing managers' accuracy in recognising weak signals. The findings suggest that risk awareness strengthens pre-disruption preparedness across cases. Risk-aware managers actively monitor market, operational, and environmental cues and take precautionary action by adjusting procurement routines, preparing backup options, reinforcing safety checks, and activating supplier-related contingencies. Despite contextual variation, these practices consistently reduce vulnerability through earlier detection, better-aligned preventive measures, and continuity before disruptions materialised.

Prior research also emphasises that managerial perception shapes how decision-makers interpret cues and formulate responses under uncertainty (Zsidisin and Wagner, 2010; Nikookar and Yanadori, 2022a). In line with Dane and Pratt (2007) and Adner and Helfat (2003), the findings indicate that situational assessment supports sensing and evaluation during disruptions, guiding threat identification, trade-off appraisal, and response mobilisation. Across the cases,

managers used situational assessment to judge incident severity, prioritise actions, and implement adaptive responses that maintained continuity. They filtered unreliable information, stabilised team behaviour, allocated scarce resources to critical tasks, and coordinated with internal units and external partners to prevent escalation. Together, these observations indicate that situational assessment enables swift, coordinated, and rational responses during crises, strengthening SCRES.

Notably, the findings also suggest that negative emotions can impair managerial situational assessment during disruptions. This aligns with psychological research indicating that negative affect restricts information processing and reduces cognitive flexibility (Schwarz and Bless, 1991; Lerner and Tiedens, 2006). While prior SCM studies note that cognitive biases may distort risk judgement (Namdar et al., 2018; Ambulkar et al., 2016), they offer limited insight into how emotional strain affects real-time decision-making. The analysis suggests that unmanaged frustration can reduce cognitive clarity and lead to suboptimal choices when rapid assessment is required. This was particularly evident in the perishable cold-chain context, where compressed decision windows require rapid assessment to avoid quality deterioration and waste (Ali et al., 2018).

Employees' Cognitive Attributes

Prior studies define sensemaking as the cognitive process through which individuals interpret uncertain events and construct meaning for action (Gerschberger et al., 2023). Research further suggests that effective sensemaking enables employees to comprehend unprecedented disruptions and formulate appropriate responses (Lengnick-Hall et al., 2011; Gerschberger et al., 2023). The findings extend this view by suggesting that employee sensemaking also supports pre-disruption preparedness. Employees can draw on accumulated experience and shared interpretations to notice anomalies, detect hazards, and conduct preventive maintenance, thereby embedding early risk detection into routine work. During disruptions, sensemaking becomes especially important when employees must rapidly interpret ambiguous situations, prioritise urgent tasks, and adjust actions to prevent escalation. This pattern is particularly plausible in spirits operations, where tightly specified and repeatable unit operations make vigilance to deviations and rapid corrective action central to maintaining process stability (Block and Miller, 2021). Overall, employee sensemaking operates across stages by

strengthening both anticipation before disruptions and rapid interpretation and adjustment during disruptions.

Situational assessment is commonly conceptualised as a cognitive process of heightened alertness and accurate interpretation of changing operational conditions (Lengnick-Hall et al., 2011; Gerschberger et al., 2023). It provides lead time for response preparation (Prasad et al., 2015) and supports real-time responsiveness during crises (Gerschberger et al., 2023). However, existing studies often treat situational assessment as a general capability and offer limited insight into how it is enacted unevenly across organisational contexts. The findings suggest that situational assessment becomes especially salient in contexts where operational conditions are highly time sensitive and failure consequences escalate quickly. In perishable cold-chain operations, for example, temperature control is critical to maintaining shelf life, yet breakdowns can occur due to negligence or insufficiently trained operators (Ali et al., 2018). Under such conditions, employees must rapidly distinguish issues requiring escalation from those solvable with available resources, thereby enabling timely adjustments and safeguarding delivery continuity. Overall, this evidence indicates that situational assessment, expressed through rapid threat appraisal and prioritisation, strengthens responsiveness during disruptions and can also support robustness where rapid evaluation helps contain escalation.

The findings further suggest that emotions shape employees' cognitive attributes during disruption, particularly in relation to situational assessment, judgement, and problem-solving. Unmanaged negative emotions were described as reducing rationality and limiting careful consideration. In contrast, emotional stability supported clearer thinking and more accurate response assessments under pressure. This finding aligns with affect-cognition research showing that negative emotions distort cognitive processing and impair judgement under uncertainty (Lerner and Tiedens, 2006; Schwarz and Bless, 1991). Overall, employee emotions shape how cognitive capabilities are enacted during disruptions, with unmanaged negative affect constraining responsiveness and regulated emotions supporting accurate interpretation and continuity. However, research on employee sentiment in the SCM field is very limited, and further in-depth research is possible in the future.

6.4.2 Shared Codes and Language

Shared codes and language refer to commonly understood terms and cues that support communication, information exchange, and consistent interpretation of operational conditions (Nahapiet and Ghoshal, 1998; Johnson et al., 2013; Daghar et al., 2021, 2023). Prior research suggests that shared goals, values, and sector-specific terminology facilitate collaboration and alignment and help distinguish strategic issues from routine tasks, strengthening preparedness and coordination under disruption (Ozanne et al., 2022; Prasad et al., 2015; Chowdhury et al., 2019). The analysis suggests that evidence of shared codes and language was primarily internal, likely reflecting repeated interaction and shared operational experience within firms, which enabled shorthand cues that reduced ambiguity and supported rapid coordination during disruptions.

6.4.2.1 Internal Shared Codes and Language

The findings indicate that shared codes and language were primarily internal rather than inter-organisational. A plausible explanation is that repeated interaction, stable membership, and shared operational experience within firms make it easier to develop shorthand terms and cues that are immediately understood. Internally, shared codes and language help employees distinguish strategic issues from routine tasks, strengthening preparedness and response effectiveness in volatile conditions (Ozanne et al., 2022). Across the cases, internal shared language also supported rapid coordination during disruptions by reducing ambiguity, signalling priorities quickly, and enabling alignment without lengthy explanation. Before disruptions, such shared cognitive shorthand strengthens preparedness by embedding common interpretive cues into routine work. During disruptions, it becomes especially valuable because it enables frontline staff to mobilise resources and coordinate actions more rapidly, thereby supporting responsiveness and operational continuity.

6.4.3 Shared Narrative

Shared narratives, including stories, myths, and metaphors, underpin communal meaning and encompass elements such as past adaptive responses, corporate culture, values, philosophies, and management styles (Nahapiet and Ghoshal, 1998; Johnson et al., 2013; Daghar et al., 2021; Daghar et al., 2023; Chowdhury et al., 2019). Prior research shows that narratives can internalise past adaptive responses, strengthen collective identity, and reduce opportunism, thereby supporting cross-organisational collaboration and problem solving (Johnson et al., 2013; Aman and Seuring, 2023). Such shared narratives also contribute to tacit understanding

and mutual interpretation among SC partners (Fan and Stevenson, 2018). By embedding shared experience into common storylines, narratives can also accelerate learning and coordinated responses during crises. Building on this literature, the findings suggest that shared narratives vary across internal and external relationships and operate across different phases of resilience. Rather than serving only as cultural symbols or post hoc reflections, shared narratives support real-time interpretation and collective action under pressure. Their value depends on continuous renewal and reflexive dialogue, which help avoid cognitive lock-in and support ongoing adaptation as disruptions unfold.

6.4.3.1 Internal Shared Narrative

Internal Horizontal Shared Narrative

Internal horizontal shared narratives play a role throughout all phases of disruption and enhance SCRES by converting post-disruption experiences into collective organisational memory that improves pre-disruption preparedness and supports faster, more aligned responses in subsequent disruptions. Prior research suggests that shared stories of adaptive responses facilitate collaboration and coordinated problem-solving (Chowdhury et al., 2019; Aman and Seuring, 2023; Daghar et al., 2023). Related studies also show that shared understandings developed through buyer-supplier relationships support coordination and risk interpretation between SC partners (Fan and Stevenson, 2018). Across the cases, employees routinely reviewed incidents, reconstructed failures, and retold these events in cross-functional settings, distilling complex experiences into shared lessons. Repeated storytelling helped employees internalise common scripts for effective practices, such as verifying inventory, anticipating supplier delays, tightening inspection routines, and maintaining time buffers. In this sense, internal horizontal narratives support SCRES dynamically by converting post-disruption experience into collective memory, which then strengthens preparedness before future disruptions and enables more aligned responses when new disruptions emerge. The findings therefore shift attention to intra-organisational, cross-functional narratives and clarify how such shared accounts support learning and coordination within firms.

Internal Vertical Shared Narrative

Internal vertical shared narratives enhance SCRES by aligning managers' and employees' interpretations of unfolding events, thereby supporting timely and coordinated responses during disruptions. Prior research indicated that shared narratives enable collective

sensemaking, coordinated action, collective identity, and joint learning, but this work largely concentrates on inter-organisational relationships between SC partners (Daghar et al., 2021; Ozanne et al., 2022; Johnson et al., 2013; Aman and Seuring, 2023; Daghar et al., 2023; Chowdhury et al., 2019). The findings shift attention to intra-organisational, hierarchical narratives and clarify how vertical shared accounts support alignment and coordinated response within firms. Across the cases, narratives developed through ongoing vertical interactions translated managerial assessments into shared frames of reference for employees, enabling faster sensemaking and real-time coordination as disruptions escalated. These shared accounts strengthened tacit and explicit understanding across hierarchical levels, reduced misinterpretation under pressure, and improved crisis communication within firms. At the same time, consistent with cautions in the literature, overly tight cognitive alignment can introduce rigidity, underscoring the need for reflexivity and open dialogue in vertical crisis communication (Uzzi, 1997; Villena et al., 2011).

6.4.3.2 External Shared Narrative

External Shared Narratives with Downstream Partners

External shared narratives with downstream partners enhance pre-disruption preparedness by aligning expectations, synchronising planning behaviours, and reducing uncertainty in demand-related coordination. Prior research suggests that shared narratives provide a shared interpretive basis that aligns goals and coordinated action between SC partners (Daghar et al., 2021; Ozanne et al., 2022), while also reducing opportunistic behaviour, strengthening collective learning and joint problem-solving (Johnson et al., 2013; Aman and Seuring, 2023), and supporting tacit understanding and the interpretation of disruption signals during disruptions (Fan and Stevenson, 2018; Chowdhury et al., 2019). The findings suggest that routine interactions with downstream partners can cultivate clear behavioural norms, such as when orders should be placed or when contingencies should be triggered. Such shared understanding synchronises planning cycles, reduces forecasting uncertainty, and prevents avoidable service delays, thereby strengthening robustness before disruptions. This is consistent with franchising evidence on aligned interpretations between headquarters and local units (Langenmayr, 2019). The analysis therefore extends attention to downstream relationships by showing the anticipatory value of shared narratives in demand-side coordination.

The empirical findings show that cognitive practices operated at both individual and shared levels. At the individual level, managers' and employees' cognitive attributes supported risk awareness, sensemaking, situational assessment, and adaptive judgement. At the shared level, shared codes and language reduced ambiguity and enabled faster coordination, while shared narratives transformed previous disruption experiences into collective memory. Cognition therefore supported SCRES not only through individual judgement, but also through collective interpretation and shared understanding.

> *Proposition 3: Cognitive practices enhance SCRES by supporting disruption sensemaking, situational judgement, and shared understanding.*

Emotional stability also emerged as a relevant condition affecting individual cognition during disruptions. However, it is not treated as a core DHRC practice in this thesis. Instead, emotional stability is understood as a potential enabling or moderating condition that may influence how effectively cognition, communication, and cooperation are enacted under pressure. Emotional stability may help actors maintain clear judgement, timely communication, and constructive coordination during uncertain and time-sensitive situations. Nevertheless, the empirical evidence was insufficient to establish it as a separate core practice. Future research could therefore examine its enabling or moderating role more explicitly.

6.5 Synthesising Key Insights and Addressing the Research Questions

Building on the preceding discussion, this section synthesises the key insights to explicitly address RQ1 to RQ3 and consolidate the overall argument of the study. It integrates the SLR and case evidence by identifying the three capability pillars (social capital, human capital, and cognition), summarising the nine practices through which they are enacted, and explaining how these practices contribute across disruption stages and interact to sustain SCRES across preparedness, response, and post-disruption learning (see Figures 6.5.3.1 and 6.5.3.2).

6.5.1 Dynamic Human-Related Capabilities

Addressing RQ1 (*What dynamic human-related capabilities are relevant to supply chain resilience from an individual and team perspective?)*, this study identifies three core DHRCs that underpin SCRES: social capital, human capital, and cognition. These capabilities capture

distinct but complementary dimensions of how human related resources shape firms' ability to anticipate, respond to, and recover from SC disruptions.

Social capital represents the relational capability through which firms access and mobilise support, coordinate action, and align expectations across internal and external relationships. Human capital reflects the knowledge and skills embodied in individuals, capturing how training, education, and experience enhance judgement, preparedness, and adaptive execution. Cognition captures how individuals and teams perceive, interpret, and make sense of disruption related information, and how shared cognitive structures support collective understanding, coordination, and learning. Taken together, these three capabilities constitute the core human-related foundations of SCRES because they explain how resilience is enacted in practice through relational resources, skill-based competences, and interpretive processes across individual and team levels. Rather than operating as isolated attributes, they function as interdependent capability domains that collectively support anticipation before disruptions, adaptive response during disruptions, and learning after disruptions.

6.5.2 Dynamic Human-Related Capability Practices

Addressing RQ2 (What are the practices needed to support these dynamic human-related capabilities from an individual and team perspective?). From an individual and team perspective, this study conceptualises social capital, human capital, and cognition as complementary human-related capabilities that support SCRES (see Table 6.5.2). Social capital is relational and enacted through ties between individuals and teams, both internally and externally, and is reflected in trust, reciprocity, communication, and cooperation. Human capital resides within individuals, including both organisational members and external SC actors, and captures training and education, and experience that enhance personal competence and judgement in ways that strengthen resilience. Cognition spans both individual and team levels, encompassing individual cognitive attributes, how managers and employees perceive, interpret, and assess situations, as well as how shared codes and language, and shared narratives shape collective understanding and coordinated action. Together, these nine practices show how the three DHRCs are enacted in supporting preparedness, response, and post-disruption learning.

Table 6.5.2 Dynamic Human-Related Capabilities (Individual and Team Perspective)

Capabilities	Perspective	Where It Resides	Internal / External
Social Capital	Individual and Team (Relational)	Between individuals and between teams	Internal and External
Human Capital	Individual	Within individuals	Internal and External
Cognition	Individual and Team	Within individuals and within teams	Internal and External

6.5.3 Dynamic Human-Related Capability Practices and Supply Chain Resilience

Addressing RQ3 (*How do dynamic human-related capabilities and relevant practices contribute to supply chain resilience),* this section first theorises how DHRCs are enacted through nine practices that operate across internal and external boundaries and vary systematically across the pre-, during-, and post-disruption stages (Section 6.5.3.1). It then shows that these practices interact as a recursive capability system (Section 6.5.3.2), where social capital mobilises coordination, human capital strengthens execution capacity, and cognition governs interpretation and prioritisation, jointly converting human-related resources into preparedness, responsiveness, and post-disruption renewal.

6.5.3.1 Dynamic Human-Related Capability Practices across Disruption Stages

Social capital operates internally and externally and is enacted at the team and network levels, reflecting its fundamentally relational nature based on repeated interactions and shared relationships rather than individual attributes. Internally, before disruptions, horizontal communication accelerates cross-functional information and knowledge sharing to create early alignment and proactive coordination, while horizontal cooperation institutionalises cross-functional coordination and task alignment, thereby embedding preparedness. While horizontal practices support peer-level alignment, in high-regulated distillery SCs preparedness also depends on vertical communication for early risk visibility and pre-disruption coordination. Once disruptions unfold, horizontally, trust and reciprocity sustain rapid alignment, communication enables real-time information sharing, and cooperation supports joint problem-solving, thereby strengthening responsiveness. Vertically, trust enables empowered decisions, communication provides rapid updates for coordinated action, and cooperation supports cross-level problem-solving, thereby sustaining effective disruption response. In highly regulated distillery SCs, high coordination demands mean disruption response relies more on vertical cooperation for rapid escalation and cross-level coordination through formal procedures, while post-disruption vertical communication further supports organisational learning by formalising reflection and knowledge sharing.

External social capital supports anticipation and preparedness in the pre-disruption stage. With upstream partners, trust, communication, reciprocity, and cooperation facilitate early information sharing, proactive coordination, and non-financial support while reinforcing trust-building. With downstream partners, communication and cooperation strengthen information sharing and trust-building and enhance operational security and preparedness. Across multiple SC partners, communication broadens information flows to improve anticipation, and within the broader relationship network, trust and communication widen information channels that strengthen early anticipation. Contextually, highly regulated distillery SCs rely mainly on downstream/network communication to widen early-warning channels and strengthen early sensing, and on downstream cooperation with specialised logistics partners to sustain compliant transport coordination and operational security (Forbes et al., 2010; Raghuram et al., 2021), whereas perishable and time-sensitive SCs depend more on upstream trust and reciprocity for early warnings and non-financial support, reinforced by upstream communication for transparency and traceability and upstream cooperation for joint development and adaptive capacity (Aung and Chang, 2014; Pérez Mesa and Galdeano-Gómez, 2015; Lusiantoro et al., 2018).

Human capital operates primarily internally and is enacted at the individual level, highlighting how personal capabilities contribute to SCRES. Pre-disruption, training and education strengthen managers' risk awareness and situational assessment and employees' sensemaking and security compliance, thereby embedding preparedness, while experience enhances anticipation by improving managers' judgement and employees' early-signal recognition and frontline sensemaking (Shela et al., 2023; Gu et al., 2023; Yu et al., 2023). This pre-disruption role is especially salient in perishable cold-chain SCs given high temperature-control and quality-deterioration risks (Ali et al., 2018). During disruptions, employee training and education support coordination and responsiveness by enabling timely sensemaking and compliant execution, while experience strengthens real-time situational assessment and adaptive action, enhancing managers' adaptive decision-making, coordination, and problem-solving, and improving employees' situational assessment and coordinated response, thereby sustaining responsiveness (Riley et al., 2016; Hohenstein et al., 2015; Gu et al., 2023; Yu et al., 2023; Akkermans et al., 2018; Gerschberger et al., 2023; Mubarik et al., 2022). In highly regulated distillery SCs, post-disruption knowledge management formalises lessons to reduce

repeat errors, with experience translating incidents into shared learning. Employee training and education embed learning by translating disruption experience into updated procedures and training content, while managers' and employees' experience support knowledge capture and sharing, thereby strengthening organisational learning (Akkermans et al., 2018; Polyviou et al., 2020; Pereira et al., 2020; Gerschberger et al., 2023; Mubarik et al., 2022). Externally, in alcohol manufacturing SCs external training and education with distributors further enhance pre-disruption alignment and operational readiness by reducing information errors and improving inventory execution. However, the value of training and experience may be contingent on contextual factors such as industry volatility, task relevance, firm size, and the pace of digital transformation (Nikookar and Yanadori, 2022a).

Cognition operates primarily internally and is enacted at both the individual level and the collective level, shaping how risks are interpreted, anticipated, and coordinated for SCRES. Internally, in the pre-disruption stage, managers' risk awareness supports anticipation and contingency planning, strengthening preparedness (Nikookar and Yanadori, 2022a; Adner and Helfat, 2003). In parallel, employees' sensemaking enhances early risk identification, contributing to robustness by enabling frontline detection of emerging issues (Gerschberger et al., 2023). During disruptions, at the individual level, managers' situational assessment supports adaptive decision-making and problem-solving, while employees' sensemaking and situational assessment enable rapid interpretation of unfolding events, strengthening coordinated and responsive action (Nikookar and Yanadori, 2022a; Gerschberger et al., 2023).

In relation to individual cognition, emotional stability also emerged as a relevant condition during disruptions. Under time pressure and uncertainty, low emotional stability may constrain judgement and weaken responsiveness by disrupting attention, prioritisation, and coordination. However, emotional stability is not treated as a separate core DHRC practice in this thesis. Instead, it is conceptualised as a potential enabling or moderating condition that may influence how effectively cognition, communication, and cooperation are enacted during disruptions. Further research is required to examine and test this moderating role more explicitly. At the collective level, horizontal shared language and codes facilitate rapid communication and coordination, and vertical shared narratives align interpretations and authority for coordinated response, thereby supporting responsiveness during disruptions. In perishable cold-chain SCs, compressed decision windows shift greater importance to employees' situational assessment

(Ali et al., 2018), while managers' situational judgement becomes more constrained by time pressure. In spirits operations, employees' sensemaking becomes central to recognising abnormal conditions and preventing escalation (Block and Miller, 2021). Post-disruption, shared narratives within horizontal teams support knowledge management by translating disruption experiences into collectively understood lessons, which in turn embed preparedness for future disruptions (Daghar et al., 2023; Aman and Seuring, 2023). Externally, in franchising and multi-unit retail SCs, shared narratives with downstream partners support pre-disruption coordination and robustness by aligning ordering norms and planning cycles (Langenmayr, 2019).

Figure 6.5.3.1 Integrated Framework Linking DHRCs, Practices and SCRES Outcomes

DHRCs	Actors	Pre-disruptions	During-disruptions	Post-disruptions
Social Capital	Horizontal		**Trust**: Communication; joint problem-solving	
	Horizontal		**Reciprocity**: Coordination; responsiveness	
	Horizontal	**Communication**: Information and knowledge sharing; proactive coordination	**Communication**: Information sharing; coordination	**Communication**:Organizational learning
	Horizontal	**Cooperation**: Preparedness; coordination	**Cooperation**: Coordination, problem-solving	
	Vertical		**Trust:** Empowered decision-making; coordination; responsiveness	
	Vertical	**Communication**: Proactive coordination; preparedness	**Communication**: Information sharing; coordination; responsiveness	**Communication**:Organizational learning
	Vertical		**Cooperation**: Coordination; problem-solving	
	Upstream Partners	**Trust**: Information sharing; anticipation	**Trust**: Priority supply allocation; financial and non-financial support; joint problem-solving ; Increase the risk of corruption; reduce transparency	
	Upstream Partners	**Reciprocity**: Non-financial support	**Reciprocity**: Priority resource allocation; financial flexibility	
	Upstream Partners	**Communication**: Information sharing; anticipation; proactive coordination; Trust building	**Communication**: Information sharing; coordinated responses	
	Upstream Partners	**Cooperation**: Information sharing; anticipation; Trust-building; co-developing innovation capabilities	**Cooperation**: Priority resource allocation; flexible responses	
	Downstream Partners		**Trust**: Resources redistribution, real-time communication, coordinated response and joint problem-solving	
	Downstream Partners		**Reciprocity**: Cooperation; responsiveness	
	Downstream Partners	**Communication**: Information sharing; anticipation; trust-building	**Communication**: Information sharing; joint problem-solving; coordination	
	Downstream Partners	**Cooperation**: Operational security; preparedness	**Cooperation**: Stabilising demand; preserving long-term commercial ties; robustness	
	Multiple SC Partners	**Communication**: Information channels, anticipation	**Communication**: Information sharing; Coordination	
	Broader Relationship Network	**Communication**: Information channels, anticipation	**Trust**: Information sharing; cooperative relationship-building	
Human Capital	Managers	**Training & Education:** Risk awareness; situational assessment; preparedness		
	Managers	**Experience:** Risk awareness; anticipation; preparedness	**Experience:** Situational assessment; adaptive decision-making; coordination; problem-solving; responsiveness	**Experience:** Post-disruption knowledge management and organisational learning
	Employees	**Training & Education:** Sensemaking; security compliance; preparedness	**Training & Education:** Coordination; responsiveness	**Training & Education:** organizational learning
	Employees	**Experience:** Early-signal recognition; sensemaking; preparedness	**Experience**: Situational assessment; coordination; responsiveness	**Experience**: Post-disruption knowledge management and organisational learning
	Downstream Partners	**Training & Education:** Alignment and operational readiness		
Cognition	Managers	**Managers' Cognitive Attributes:** Risk Awareness: Anticipation; contingency planning; preparedness	**Managers' Cognitive Attributes:** Situational Assessment: Adaptive decision making; problem-solving; responsiveness	
	Horizontal		**Shared Language and Code:** Communication; coordination; responsiveness	
	Horizontal	**Shared Narrative**: Preparedness	**Shared Narrative**: communication; coordination; responsiveness	**Shared Narrative**: Post-disruption knowledge management: preparedness
	Employees	**Employees' Cognitive Attributes**: Sensemaking: Early risks identification; robustness	**Employees' Cognitive Attributes:** ***Sensemaking:*** Adaptive decision making; responsiveness ***Situational assessment:*** Adaptive decision making; responsiveness	
	Vertical		**Shared Narrative:** Coordination; responsiveness	
	Downstream Partners	**Shared Narrative:** Coordination; preparedness		

The preceding discussion and Figure 6.5.3.1 show that DHRC practices contribute to SCRES differently across disruption stages. Before disruptions, these practices primarily supported preparedness through risk awareness, relationship building, training, information sharing, and

anticipation. During disruptions, they supported responsiveness through real-time communication, situational judgement, resource coordination, and joint problem-solving. Following disruptions, they supported recovery and learning by enabling actors to reflect on disruption experiences, adjust routines, and strengthen future preparedness.

Proposition 4: The contribution of DHRC practices to SCRES varies across pre-, during-, and post-disruption stages.

The cross-case findings further show that the same DHRC practices did not perform identical resilience functions across the three cases. For example, communication in Case A was closely associated with rapid store-level coordination and cold-chain responsiveness. In Case B, it supported distributor alignment and channel coordination, while in Case C, it facilitated procurement, logistics, and cross-functional responsiveness. These differences indicate that DHRC practices are contextually configured and that their resilience value is shaped by disruption type, product characteristics, operational urgency, actor roles, and SC relationship structures.

Proposition 5: The salience and resilience contribution of DHRC practices vary across SC contexts.

6.5.3.2 Interactions among Dynamic Human-Related Capabilities and Practices

From an individual and team perspective, and within wider SC relationships, the nine practices operate as an integrated configuration through which DHRCs are enacted and translated into SCRES across disruption stages (see Figure 6.5.3.2). At the core of this configuration, social capital provides the relational foundation that stabilises expectations and enables collective action. Trust and reciprocity are mutually reinforcing: trust encourages reciprocal behaviour, while reciprocity strengthens trust through repeated interaction and, together with communication, enhances the openness, credibility, and timeliness of information exchange. These relational conditions make cooperation more executable by reducing hesitation, enabling faster coordination, and supporting joint problem-solving when disruptions strain routine processes. In this sense, social capital does not function as isolated ties; rather, its practices jointly shape how resources, support, and information circulate within and across organisational boundaries.

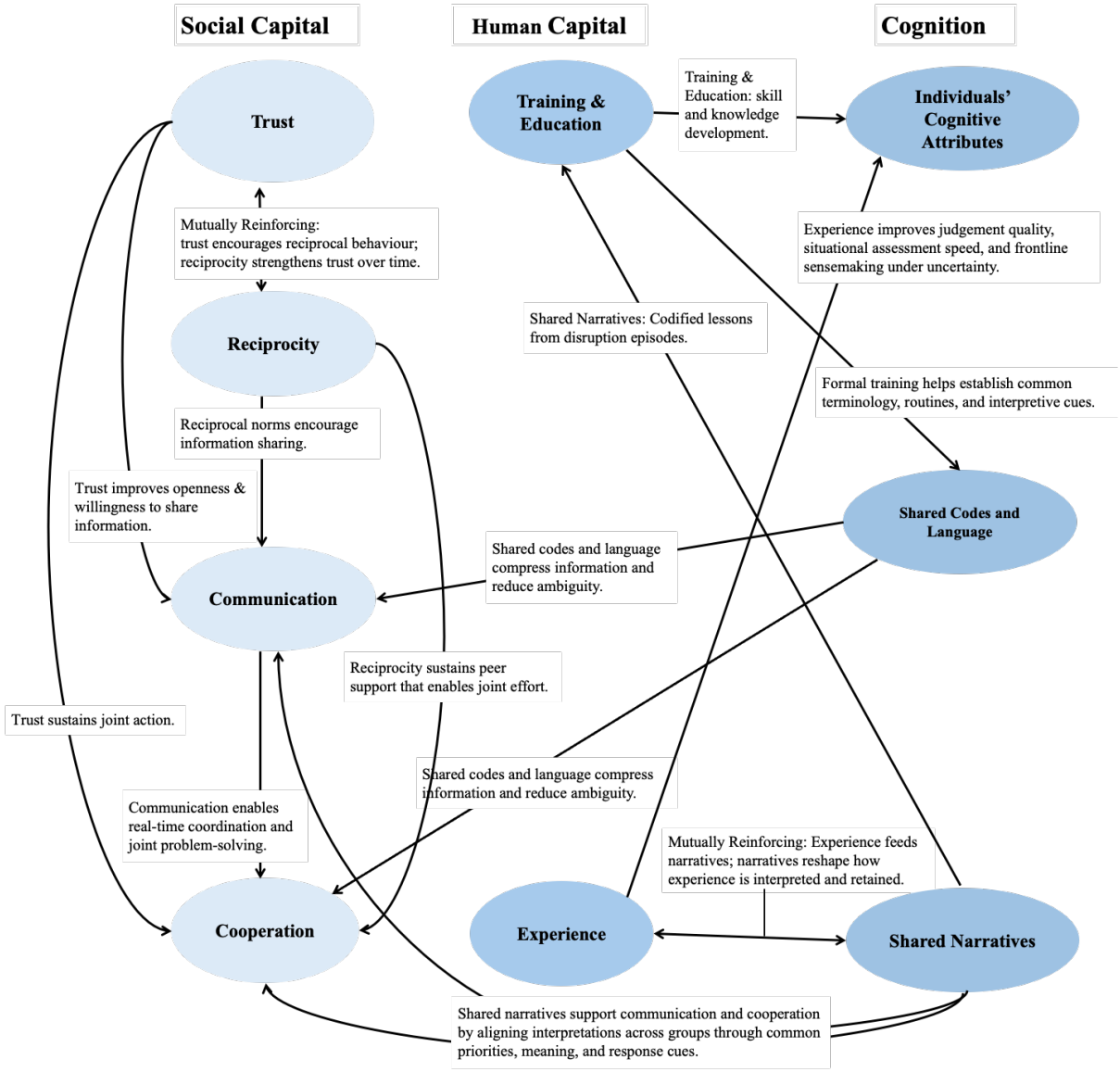
Human capital then strengthens this relational foundation by improving what organisational members and SC actors know and can do through training and education and experience. These practices enhance individual competence and task readiness, but their value becomes most visible when they sharpen cognition. Training and education strengthen risk awareness, sensemaking, and situational assessment, while experience improves judgement quality, speed of interpretation, and the recognition of weak signals. As a result, individuals can prioritise tasks more effectively, execute compliant actions more reliably, and coordinate with others with less ambiguity. In turn, stronger cognition conditions how well social capital practices work in real settings, shaping whether communication is interpreted consistently, whether cooperation is carried out smoothly, and whether trust and reciprocity are sustained through difficult episodes.

Cognition further consolidates these interactions through shared codes and language, as well as shared narratives. Shared codes and language compress complex information into concise cues, thereby accelerating real-time coordination by reducing explanation time and limiting misinterpretation. Shared narratives align interpretations across hierarchical and cross-functional groups by providing common reference points for what matters, why it matters, and how to respond. Furthermore, disruption episodes are translated into shared accounts and codified understandings, and the lessons derived from them are embedded in subsequent training, communication routines, and coordinated response practices. Across repeated disruption experiences, this creates a reinforcing cycle in which experience is captured, interpreted, and embedded into shared cognitive resources, thereby improving preparedness for subsequent disruptions and supporting renewal.

Taken together, the findings show that DHRCs operate as an integrated system rather than as separate capability domains. Social capital provides the relational foundation for information exchange, support, and coordinated action. Human capital strengthens competence, practical judgement, and task readiness, while cognition enables actors to interpret disruption signals, develop shared understanding, and translate experience into future preparedness. Their interaction creates a reinforcing process in which relational resources enable knowledge and expertise to be mobilised, practical experience supports interpretation and response, and shared cognition consolidates learning across disruption episodes.

Proposition 6: Mutually reinforcing interactions among social capital, human capital, and cognition strengthen SCRES.

Figure 6.5.3.2 Interactions among DHRCs and Associated Practices



6.6 Chapter Summary

This chapter has discussed and synthesised the empirical findings from the multiple case studies in relation to the SLR to develop a consolidated explanation of how DHRCs enhance SCRES. Rather than treating human-related factors as static attributes, the chapter developed DHRCs as a process-oriented and practice-based framework by showing how social capital, human capital, and cognition are enacted through nine practices across the pre-disruption, during-disruption, and post-disruption stages. In doing so, the chapter integrated prior literature,

industry context, and case evidence to identify convergence, divergence, and theoretical extensions, and translated these insights into a set of propositions.

Structurally, Sections 6.2 to 6.4 examined the three DHRCs in turn and clarified how each capability contributes to SCRES through specific practices. Section 6.2 developed social capital as a relational capability enacted through trust, reciprocity, communication, and cooperation across internal and external relationships, including horizontal and vertical internal ties and multiple forms of external ties (upstream, downstream, multiple SC actors, and broader relationship networks). Section 6.3 developed human capital as an individual-level capability enacted through training and education, and experience, showing how these practices strengthen competence, judgement, preparedness, and adaptive response among managers, employees, and selected external actors. Section 6.4 developed cognition as both an individual- and team-level capability enacted through individual cognitive attributes, shared codes and language, and shared narratives, thereby explaining how interpretation, prioritisation, and coordinated action are shaped in disruption contexts.

Section 6.5 then synthesised these findings to explicitly address RQ1 to RQ3 and demonstrated that DHRCs are not only distinct capability pillars but also interdependent and recursively reinforcing. The chapter showed that, within social capital, trust, reciprocity, communication, and cooperation function as an interconnected set of practices rather than isolated relational elements. It further showed that human capital strengthens cognition by improving risk awareness, sensemaking, situational assessment, and judgement through training, education, and experience. In turn, cognition shapes how effectively social capital practices are enacted in real settings and supports renewal by embedding disruption experience into shared codes, language, narratives, training routines, and coordinated response practices. Taken together, the chapter develops DHRCs as an integrated capability system through which relational resources, human skills, and cognitive processes are continuously mobilised and reconfigured to support preparedness, responsiveness, and post-disruption learning.

Importantly, the chapter also identified several boundary conditions and tensions that qualify the positive effects of DHRCs practices. First, excessively embedded external trust may create governance risks, dependence, and reduced transparency, indicating that trust can be resilience-enhancing but also vulnerability-inducing under some conditions. Second, the effectiveness of

communication and cooperation during disruptions was shown to be contingent on emotional stability, as unmanaged negative emotions can undermine communication continuity and clarity and weaken the enactment of coordinated action under pressure. Third, the effects of training and education were not uniform across roles and functions, suggesting that their resilience value depends on task relevance, contextual fit, and opportunities for practical application. Fourth, shared narratives supported coordinated interpretation and learning, but their effectiveness depended on maintaining reflexivity to avoid cognitive rigidity.

Overall, this chapter advances a human-centric, process-oriented, and practice-based understanding of SCRES by explaining not only which human-related capabilities matter, but also how they are developed, enacted, and interconnected across disruption stages and repeated disruption experiences. It shows that resilience is not produced by isolated ties, skills, or perceptions; rather, it emerges from the combined enactment and interaction of DHRCs practices across actors, relationships, and disruption stages.

These findings also open several directions for future research (detailed in Chapter 7). Future studies could further examine the emotional conditions under which communication and cooperation remain effective during disruptions, including the roles of emotion regulation, stress exposure, leadership support, and team climate. Additional research could test the propositions in larger samples and across industries to assess the generalisability of the stage-specific and context-specific patterns identified here, particularly in highly regulated and perishable supply chains. Future work could also examine the further development of DHRCs more explicitly, including how practices evolve, become institutionalised, or decay over repeated disruption episodes, and how tensions among trust, governance, reflexivity, and coordination are managed across such episodes.

Table 6.6 Summary of Propositions Linking DHRCs, Practices, and SCRES

Proposition 1: Social capital practices enhance SCRES by enabling information exchange, mutual support, and coordinated action across internal and external SC relationships.
Proposition 2: Human capital practices enhance SCRES by strengthening the knowledge, skills, and experience needed to anticipate, interpret, and respond to disruptions.
Proposition 3: Cognitive practices enhance SCRES by supporting disruption sensemaking, situational judgement, and shared understanding across actors and disruption stages.
Proposition 4: The contribution of DHRC practices to SCRES varies across pre-, during-, and post-disruption stages.

Proposition 5: DHRC practices are contextually configured, such that their salience and resilience contribution vary according to disruption type, product characteristics, operational urgency, actor roles, and SC relationship structures.
Proposition 6: The interaction of social capital, human capital, and cognition strengthens SCRES by combining relational resources, practical expertise, and shared interpretation across actors and disruption stages.

Chapter 7. Contributions, Future Research Agenda and Limitations

7.1 Chapter Overview

Chapter 7 concludes the thesis by consolidating what has been learned from integrating the SLR and the multiple case studies, and by clarifying why these insights matter for both scholarship and practice. Building on the preceding chapters, this chapter brings together the core argument that SCRES is developed, enacted, and renewed through three human related capability domains, namely social capital, human capital, and cognition, and through the concrete practices that activate them across disruption phases.

The chapter is structured as follows. Section 7.2 outlines the overarching, theoretical, and practical contributions. It first explains the overarching contribution of the thesis, namely the development of a human-centred, process-oriented, and practice-based explanation of SCRES through the DHRCs framework. It presents the more specific theoretical and practical contributions of the study for managers, organisations, and policymakers seeking to strengthen resilience through people centred actions. Section 7.3 presents a future research agenda that identifies promising directions for extending and testing the DHRCs framework, including deeper attention to internal relationships, cross organisational learning, cognition, emotion, and the dynamic development of capabilities across disruption stages and repeated disruption episodes. Section 7.4 acknowledges the limitations of the study, clarifies the boundaries of interpretation, and identifies the key boundaries within which the findings should be interpreted. Section 7.5 summarises the chapter, and Section 7.6 offers closing remarks.

7.2 Theoretical and Practical Contributions

This section presents the theoretical and practical contributions of the study. The theoretical contributions explain how the research advances current knowledge by introducing the DHRCs framework and extending existing perspectives on dynamic capabilities and SCRES. The practical contributions translate these insights into implications for managers, organisations, and policymakers seeking to strengthen resilience in real-world SCs. Together, these contributions clarify the academic significance and applied relevance of the study.

7.2.1 Overarching Contribution of the Thesis

The overarching contribution of this thesis is the development of a human-centred, process-oriented, and practice-based explanation of SCRES. Specifically, the thesis shows that SCRES is not supported only by structural arrangements, formal routines, or generic organisational capabilities, but is enacted through dynamic human-related capabilities, namely social capital, human capital, and cognition, across managers, employees, and teams. By integrating these three capability domains and identifying nine associated practices, the thesis provides a more comprehensive explanation of how resilience is built before disruptions, enacted during disruptions, and reinforced through post-disruption learning. In doing so, it advances existing SCRES and dynamic capability research by showing that resilience depends on how human-related capabilities are developed, coordinated, and enacted in practice across organisational roles, relational contexts, and disruption stages.

7.2.2 Theoretical Contributions

Building on this overarching contribution, the thesis makes six more specific theoretical contributions to SCRES research. These contributions concern theory development, framework construction, stage-based explanation, conceptual refinement, interaction among practices, and boundary conditions.

Contribution 1: Development of Dynamic Human-Related Capabilities (DHRCs) Theory for SCRES

A major theoretical contribution of this thesis is the development of DHRCs theory as a human-centred explanation of SCRES. While this theorisation is informed by the DMC perspective, it is not presented as a simple extension of DMC. Rather, this thesis re-specifies, enriches, and recontextualises the core human-related capability domains of social capital, human capital, and cognition to explain how resilience is developed and enacted across SC settings.

DMC theory recognises social capital, human capital, and cognition as central components of managerial capability (Adner and Helfat, 2003). However, its conceptualisation remains largely manager-centred and abstract, with limited attention to how these capabilities are enacted through concrete practices, how they operate beyond individual managers, and how they function across organisational and inter-organisational relationships in disruption contexts. In SCRES research, related insights on training, experience, behavioural responses, and

relational coordination have emerged, but they remain fragmented and are rarely integrated into a coherent human-related capability explanation of resilience.

This thesis addresses these gaps by developing DHRCs theory as a multi-actor, multi-level, and practice-oriented theoretical account of SCRES that explains how human-related capabilities are enacted across organisational boundaries and disruption phases. The theory shifts the analytical focus from managerial agency alone to the distributed contributions of managers, employees, and teams, showing that resilience is co-created through their interactions within and across organisational boundaries. In this way, the thesis explains SCRES not as the outcome of isolated managerial decisions or static organisational attributes, but as the outcome of dynamically enacted human-related capabilities.

A key contribution of DHRCs theory is the substantive redevelopment of the three capability domains. Social capital is theorised not merely as a general relational resource, but as a set of enacted practices including trust, reciprocity, communication, and cooperation across internal horizontal and vertical relationships as well as external upstream, downstream, multi-actor, and broader network ties. Human capital is re-specified as role- and context-sensitive, showing that training, education, and experience contribute unevenly across functions, actors, and disruption stages, and can extend beyond the focal firm through cross-organisational learning and downstream partner training. Cognition is developed as both an individual and collective capability domain, differentiating managerial and employee cognitive attributes and incorporating shared codes and language, and shared narratives as resilience-relevant cognitive practices.

Importantly, the thesis also shows that the effects of human-related capabilities are conditional rather than uniformly positive, which adds behavioural and contextual realism to DHRCs theory. The interaction among capability domains and these conditional effects are developed further in later contributions.

Overall, this thesis establishes DHRCs theory as a distinct theoretical contribution for explaining the human origins of SCRES. By offering a richer, more practice-based, and more empirically grounded account of social capital, human capital, and cognition in disruption

settings, it strengthens a human-centred theoretical foundation for understanding how SCRES is developed, enacted, and renewed across disruption stages and repeated disruption episodes.

Contribution 2: Development of a DHRCs Framework and Practice Architecture

A second theoretical contribution of this thesis is the development of a DHRCs framework and practice architecture that translates the broader DHRCs theory into a structured and operationally useful analytical model for SCRES research. While Contribution 1 establishes DHRCs theory as a human-centred explanation of resilience, this contribution clarifies how the theory can be organised, observed, and analysed across actors, relationships, and disruption stages.

Specifically, the thesis develops a framework that organises DHRCs into three capability domains (social capital, human capital, and cognition) and nine associated practices through which these capabilities are enacted in SC settings. Social capital is structured through trust, reciprocity, communication, and cooperation; human capital through training and education, and experience; and cognition through individual cognitive attributes, shared codes and language, and shared narratives. This practice architecture provides a clearer level of analytical precision than existing high-level human-related categories in SCRES research, which often identify relevant factors but do not specify them in a systematic and comparable way.

Importantly, this framework was not only derived from the SLR but was further refined through the empirical multiple case study. While the SLR identified social capital, human capital, and cognition as the three core capability domains, the empirical findings clarified how these capabilities are enacted through specific practices across actors, relationships, and disruption stages. The case evidence further refined the framework by sharpening the distinction between horizontal and vertical internal relationships, clarifying external SC relationship dimensions, and consolidating the initial practices into nine empirically grounded practices. The empirical analysis also showed that these practices do not operate independently but interact and reinforce one another across disruption stages. In this way, the empirical work developed the framework beyond the literature review by making it more process-oriented, actor-sensitive, relationally differentiated, and grounded in case evidence.

Beyond this, the framework does more than classify practices. It also maps where these practices reside and how they operate, distinguishing individual- and team-level processes, internal and external relationships, and different relational configurations (e.g., internal horizontal and vertical ties; upstream, downstream, multi-actor, and broader network relationships). In doing so, it offers a consistent structure for comparing how the same capability domain is enacted differently across roles and contexts. For example, communication and cooperation can be analysed not as generic constructs, but as practices whose functions and value vary by actor position, relational setting, and disruption stage.

The framework also provides a structured basis for analysing how practices vary across disruption phases, an issue developed further in Contribution 3. It also consolidates these insights into a proposition-based structure, making the DHRCs framework not only theoretically grounded but also analytically portable for future qualitative and quantitative research. In this sense, the contribution lies in providing a usable architecture for studying human-related capability enactment in SCRES, including its internal structure, relational scope, and dynamic application across disruption conditions.

Overall, this framework and practice architecture strengthens the explanatory and analytical utility of DHRCs theory by translating a broad human-related capability perspective into a coherent model that can guide empirical analysis, cross-case comparison, and future theory testing.

Contribution 3: A Stage-Based Human-Centred Explanation of SCRES across Disruption Phases

A third theoretical contribution of this thesis is the development of a stage-based human-centred explanation of SCRES that clarifies how human-related capabilities and practices contribute differently across the pre-disruption, during-disruption, and post-disruption phases. While prior SCRES research often recognises the importance of anticipation, response, and recovery, human-related factors are frequently discussed in broad or static terms, without clearly specifying how their roles shift across disruption stages. This thesis addresses that gap by showing that the contribution of DHRCs is differentiated across disruption stages and changes as disruption conditions unfold.

Specifically, the findings show that different practices become more salient at different stages. In the pre-disruption phase, human-related capabilities contribute primarily to preparedness through early risk visibility, anticipatory alignment, contingency preparation, and preventive action. In the during-disruption phase, the same capability domains are enacted differently, supporting real-time coordination, situational judgement, prioritisation, communication continuity, and adaptive problem-solving under pressure. In the post-disruption phase, their contribution shifts towards reflection, knowledge retention, shared interpretation, and the embedding of lessons into subsequent routines, training, and coordinated practices. This stage-based explanation therefore shows not only that human-related capabilities matter, but also when and in what ways they matter for resilience.

The contribution is also important because it demonstrates that stage-specific roles are not fixed at the level of broad capability domains alone. Rather, variation appears at the level of practices, actors, and relational settings. For example, communication and cooperation support all three phases, but their functions differ across phases and across internal and external ties; similarly, training, experience, and shared narratives contribute in distinct ways depending on whether the firm is preparing for disruption, responding in real time, or consolidating learning afterwards. By making these temporal differences explicit, the thesis provides a more fine-grained explanation of how SCRES is built and sustained across disruption stages and repeated disruption episodes.

In addition, the stage-based analysis highlights that resilience development involves not only stage-specific enactment but also stage-to-stage carryover. Post-disruption learning feeds forward into future preparedness, while pre-existing relational and cognitive conditions shape the effectiveness of response during disruptions. This temporal connectedness helps explain how resilience is progressively strengthened, weakened, or renewed across repeated disruption episodes, rather than being treated as a one-time response outcome.

Overall, this contribution advances SCRES research by providing a human-centred and process-oriented account of disruption management across stages and repeated disruption episodes. It adds greater depth to the DHRCs perspective and shows how preparedness, responsiveness, and renewal emerge from the shifting but interconnected roles of human-related practices across disruption phases.

Contribution 4: Reconceptualising SCRES as a Dynamic, Human-Centred Multi-Stage Process

A fourth theoretical contribution of this thesis lies in the reconceptualisation of SCRES as a dynamic, human-centred, and multi-stage process. While existing SCRES research has generated important insights, resilience is often treated as a relatively stable organisational attribute, a broad capability bundle, or an outcome observable after disruption. This thesis advances a different view by conceptualising SCRES as a process that is continuously built, enacted, and renewed through human-related capabilities and practices within and across organisational boundaries.

Whereas Contribution 3 explains how DHRCs and their practices vary across disruption phases, this contribution operates at the conceptual level by redefining SCRES itself as a dynamic, human-centred, and multi-stage process. This reconceptualisation shifts attention from resilience as something a firm simply has to resilience as something that is actively produced through people, their relationships, and their interpretations across disruption stages and repeated disruption episodes. In this perspective, SCRES is not reducible to structural redundancy, formal plans, or generic adaptive capacity alone. Rather, it depends on how managers, employees, and teams develop and enact social capital, human capital, and cognition in context, and how these human-related capabilities are mobilised under changing disruption conditions.

The thesis further contributes by embedding this human-centred understanding of SCRES within a multi-stage temporal structure. Specifically, resilience is conceptualised as a process whose human-related foundations are expressed differently across pre-disruption, during-disruption, and post-disruption phases, with shifting emphases on preparedness, responsive coordination, and learning-based renewal. This adds greater process clarity to the SCRES concept and clarifies that resilience is not a single response capability, but a dynamic process of capability activation and reconfiguration across disruption stages.

In addition, the reconceptualisation highlights the importance of multi-level and relational enactment. SCRES is shaped not only by managerial judgement, but also by employee sensemaking, team coordination, and inter-organisational relationship practices. By

foregrounding these distributed human contributions, the thesis offers a more behaviourally grounded and socially embedded understanding of resilience than conceptions that privilege firm-level structures or managerial agency alone.

This systemic, relational, and temporal reconceptualisation responds to calls for broader and more transformative understandings of SCRES. It builds on Wieland and Durach's (2021) distinction between narrow, recovery-oriented and broader social-ecological perspectives on resilience by showing how resilience is enacted through social capital, human capital, and cognition across actors and disruption stages. It also complements Wieland's (2021) view of SCs as dynamic and interdependent systems by providing a human-centred account of how adaptation, coordination, and learning are enabled within such systems.

Overall, this contribution offers a conceptually richer understanding of SCRES by integrating its temporal, relational, and human foundations within a single process-oriented view. In doing so, it provides a foundation for future resilience research that connects capability-based, relational, and cognitive perspectives.

Contribution 5: Revealing Interaction and Reinforcement Among DHRCs Practices

A fifth theoretical contribution of this thesis is the identification of interaction and reinforcement among DHRCs practices, showing that the nine practices function as an integrated configuration through which DHRCs are enacted and translated into SCRES across disruption stages. Rather than operating as separate capability domains, social capital, human capital, and cognition reinforce one another, and their resilience value depends partly on these cross-domain interactions.

First, the findings reveal relational reinforcement within social capital. Trust and reciprocity are mutually reinforcing, and together with communication they improve the openness, credibility, and timeliness of information exchange, which in turn makes cooperation more executable under disruption pressure. This shows that social capital supports SCRES through an interconnected set of practices, rather than isolated relational elements.

Second, the findings show that human capital strengthens social capital practices through cognition. Training, education, and experience strengthen individual cognitive attributes,

including risk awareness, sensemaking, situational assessment, and judgement. Stronger cognition then improves how consistently communication is interpreted, how smoothly cooperation is enacted, and whether trust and reciprocity can be sustained under pressure.

Third, shared cognition consolidates and renews this system across disruption episodes. Shared codes and language support faster coordination, while shared narratives align interpretations and capture disruption experience for reuse. By embedding lessons into subsequent training, communication routines, and coordinated response practices, cognition creates a reinforcing cycle that strengthens future preparedness and response consistency.

Taken together, the findings show a reinforcing chain and cycle linking social capital, human capital, and cognition. This interactional perspective advances SCRES theorisation by explaining resilience as the outcome of a co-evolving system of human-related practices, rather than the sum of separate capability effects.

Contribution 6: Identifying Trade-Offs, Boundary Conditions, and Contingent Effects in Human-Related Capability Enactment

A further theoretical contribution of this thesis is the identification of trade-offs, boundary conditions, and contingent effects in the enactment of human-related capabilities for SCRES. Rather than assuming that social capital, human capital, and cognition are uniformly beneficial, the findings show that their effects depend on relational governance, role-task fit, emotional conditions, and contextual alignment.

First, the findings reveal a trade-off within social capital: while trust and reciprocity can improve coordination and responsiveness, excessively personalised or overembedded relationships may reduce transparency, create perceptions of favouritism, and introduce corruption or governance risks, thereby weakening resilience under certain conditions.

Second, the findings show that the value of training and education and experience is contingent on role and task fit. Their contribution to resilience is strengthened when learning forms are aligned with operational demands and applied in context, but weaker when training content is too general or poorly matched to frontline realities.

Third, the findings show that emotion conditions the enactment of both social capital practices and individual cognition during disruptions. Emotional instability can weaken communication and cooperation and reduce the quality of managerial and employee situational assessment by impairing cognitive clarity, attention, and judgement under pressure.

Together, these findings nuance the DHRCs perspective by showing that human-related capabilities are not inherently resilience-enhancing in all circumstances. Their effects are conditional, and resilience outcomes depend on how these capabilities are governed, aligned, and enacted in context.

7.2.3 Practical Contributions

This study offers several practical contributions for managers and organisations seeking to strengthen SCRES in increasingly dynamic and uncertain environments. The findings show that resilience can be strengthened through the deliberate development and alignment of three human-related capability domains, namely social capital, human capital, and cognition, across pre-disruption, during-disruption, and post-disruption phases. By identifying the specific practices through which these capabilities are enacted, the study provides a practice-based roadmap for organisations seeking to enhance resilience through people-centred strategies.

1) Practical Implications of Social Capital

A first set of practical implications concerns social capital, particularly trust, reciprocity, communication, and cooperation across internal and external relationships. Consistent with practitioner-oriented studies (Fan and Stevenson, 2018; Chowdhury et al., 2024), the findings show that these relational practices enhance resilience by supporting timely information sharing, coordinated action, and access to support during disruptions. Managers should therefore encourage trust-based relationships, reciprocal support, and open communication among managers, employees, teams, and SC partners, while also strengthening cooperation across internal functions and external partners to improve alignment of information and resources (He et al., 2022; Bondeli and Havenvid, 2022). At the same time, firms should avoid excessive relational embeddedness in external ties by maintaining appropriate governance, transparency, and oversight, as overly personalised relationships may weaken objectivity and increase vulnerability under disruption conditions.

2) Practical Implications of Human Capital

A second set of implications concerns human capital, particularly training, education, and experience. The findings show that human capital development supports SCRES by improving preparedness, judgement quality, coordinated execution, and post-disruption learning. Managers should invest in role-relevant training that strengthens risk awareness, communication quality, and coordinated response, while also creating opportunities for experience-sharing across functions and levels. The study further shows that training is most effective when it is aligned with task demands and operational context. For example, sales employees may find experiential learning more valuable than formal training, suggesting that firms should tailor learning approaches to different roles rather than relying on uniform training programmes. In addition, the findings indicate that human capital development can extend beyond the focal firm. Structured downstream distributor training, helped harmonise operational practices, improve process alignment, and support smoother joint responses to shortages and delivery constraints. These insights align with SLR evidence that human capital development enhances decision quality, collaboration, and risk response capability (Ambulkar et al., 2016; Mubarik et al., 2022; Pereira et al., 2023).

3) Practical Implications of Cognition

A third set of implications concerns cognition, including risk awareness, situational assessment, shared codes and language, and shared narratives. The findings suggest that firms should not treat disruption response as only a procedural or structural issue, but also as a matter of interpretation, prioritisation, and collective understanding. In practice, organisations can strengthen cognition by building shared language, common information codes, and shared narratives across teams and organisational levels, which can reduce misinterpretation and support faster situational interpretation during crises (Vanpoucke and Ellis, 2020; Doornich, 2023). The findings also indicate that cognition is affected by emotional conditions during disruptions. Emotional instability can weaken communication, cooperation, and situational assessment, while emotional stability supports clearer thinking and more effective coordination. This suggests that organisations should include emotional regulation and pressure management in resilience-oriented training and team development, especially in high-pressure operational contexts.

4) Organisational Implementation Priorities

Beyond capability-specific actions, the findings also point to important organisational implementation priorities that support the enactment of social capital, human capital, and cognition in practice. Institutionalising communication routines, such as regular operational briefings, standard escalation pathways, and shared digital dashboards, can reduce misinterpretation and ensure timely information flow. Formal review routines after disruption episodes can help capture experience, strengthen shared narratives, and embed lessons into updated training and coordinated response practices. In this sense, organisational routines are important not only for process control, but also for sustaining relational quality, learning, and cognitive alignment across disruption episodes.

5)Industry and Policy Implications

The study also offers guidance for industry-level and policy interventions. Policymakers and industry associations can support resilience by providing accessible training programmes on disruption preparedness, digital tools, and SC coordination, thereby strengthening human capital beyond the focal firm. Promoting cross-organisational training ecosystems, such as supplier-buyer co-training and industry-led learning platforms, can improve shared understanding and practice alignment across SC actors. In parallel, strengthening data transparency and enabling real-time information sharing through digital traceability, logistics visibility, and shared forecasting systems can support both relational coordination and collective interpretation, thereby improving early warning and coordinated response across SC tiers.

Overall, by integrating SLR insights with practice-based evidence from the case studies, this research offers a clearer and more actionable set of recommendations for strengthening SCRES through social capital, human capital, and cognition. The practical contribution of the study lies not only in identifying what organisations should develop, but also in clarifying how these human-related capabilities can be aligned and enacted across actors, relationships, and disruption stages

7.3 Future Research Agenda

Building on the insights generated from both the SLR and the multiple case studies, this thesis identifies several promising avenues for future research that can extend and further validate the

DHRCs framework and deepen scholarly understanding of how human related factors shape SCRES.

1) Balancing Social Capital and Governance in Supply Chain Resilience

While this study shows that social capital strengthens coordination and responsiveness, it also reveals boundary conditions, such as overly personalised supplier relationships that may reduce transparency or introduce governance risks. Future research should examine how firms can balance relational trust with formal controls, how such tensions evolve develop across repeated disruption episodes, and how different industries manage the trade-offs between relational embeddedness and objectivity in building SCRES.

2) Deepening Research on Internal Social Capital and Employee-Level Relationships

Prior SCRES research largely focuses on external relational ties or managerial networks, with limited attention to employee-level trust, reciprocity, communication, and collaboration. Future studies could explore how internal social capital shapes intra-organisational coordination, information flow, sensemaking, and adaptive capacity, and how these dynamics differ across vertical (manager-employee) and horizontal (peer-peer) structures.

3) Advancing Understanding of Human Capital Development Across Boundaries

This study highlights that training and experience contribute differently across organisational functions and contexts. Further research is needed to examine which types of training, experiential learning, and knowledge transfer are most effective for enhancing SCRES. Future studies may also explore cross-organisational learning, such as buyer–supplier or supplier–distributor training, and the contextual factors, such as firm size, digital maturity, and SC complexity, that moderate their effectiveness.

4) Broadening and Extending Cognitive Research in Supply Chain Resilience

Building on the findings of this thesis, cognition remains an underdeveloped area in SCRES research. Beyond risk awareness and shared language, future research should investigate how situational assessment, emotional regulation, shared narratives, and cognitive alignment are developed and enacted, and how they influence organisational responses during disruptions. Process-based and repeated-episode studies would be especially valuable for examining how

these cognitive capabilities are reinforced, institutionalised, or weakened across preparedness, response, and post-disruption learning.

5) Investigating the Interactions Among Social, Human, and Cognition Capabilities

This thesis shows that social capital, human capital, and cognition are mutually reinforcing rather than independent capability domains. Future research could therefore examine how these human-related capabilities interact across different levels, individual, team, organisational, and inter-organisational, and how their complementarities jointly shape the emergence of SCRES. Mixed-method and process-oriented research designs would be especially valuable in generating deeper insight into these dynamic interdependencies.

6) Examining the Role of Emotion in Human-Related Capability Enactment

Future research should examine more explicitly how emotion shapes the enactment of human-related capabilities in SCRES. The findings of this thesis suggest that emotion influences the effectiveness of social capital practices, particularly communication and cooperation during disruptions, and also affects individual cognition by shaping managerial and employee situational assessment under pressure. Further research is needed to clarify whether emotion operates primarily as a boundary condition, an embedded dimension of individual cognition, or a cross-cutting factor that conditions multiple DHRCs practices across disruption stages.

7) Employing Process-Based Approaches to Examine Capability Evolution

Most existing studies provide cross-sectional insights into resilience. Future research is encouraged to use process-based methods to examine how human-related capabilities develop, interact, and transform over time, and how they enable resilience across both acute disruptions and prolonged SC disturbances.

8) Developing Quantitative Measures for the Dynamic Human-Related Capabilities Framework

While this study qualitatively identifies DHRCs and associated practices, future research could develop quantitative instruments, such as survey scales or behavioural indicators, to operationalise the DHRCs framework. Such efforts would support large-scale empirical validation, enable cross-industry comparisons, and strengthen the robustness and generalisability of this human-related capability-based explanation of SCRES.

9) Extending the Multi-Level Architecture of Human-Related Capabilities

This thesis conceptualises human-related capabilities as multi-level phenomena operating within and across organisational boundaries. Future research could build on this by modelling how human-related capabilities are developed and enacted across the individual, team, organisational, and SC levels, how disruption effects travel across these levels, and how cross-level alignment influences the speed and effectiveness of resilience building across disruption stages and repeated disruption episodes.

7.4 Limitations

Despite its contributions, this thesis has several limitations that should be acknowledged. These limitations do not undermine the value of the findings; rather, they provide important context for interpreting the results, clarify the boundaries of the study, and point to productive directions for future research.

First, this thesis is bounded by the scope of the literature base used to develop its conceptual framing. Although the SLR and subsequent theorisation drew primarily on SCM, OSCM, and resilience-related studies, they did not systematically incorporate the broader psychology and organisational behaviour (OB) literatures. As a result, some processes and influences that are well developed in psychology and OB, particularly those relating to emotion, affect regulation, interpersonal behaviour, and workplace communication, were not fully integrated into the initial DHRCs conceptualisation. This boundary became visible in the case evidence, where emotion emerged as an important condition shaping communication, cooperation, and the enactment of individual cognitive attributes during disruptions. Future research could therefore strengthen and extend the DHRCs framework by more explicitly integrating relevant psychology and OB perspectives, particularly to explain how emotional processes shape resilience-related behaviours under stress and uncertainty.

Second, the multiple case study design, while providing rich empirical insights and strong analytical generalisation, introduces limitations related to sample size and empirical generalisability. The study draws on three Chinese firms in beverage and alcoholic beverage supply chains. Although these cases were theoretically selected and are suitable for building and refining theory, the findings may not fully represent firms operating in other countries,

institutional environments, or industry settings. In particular, differences in labour practices, communication norms, governance structures, and inter-organisational relationship patterns may affect how DHRCs are developed and enacted in other contexts.

Third, the study is contextually bounded by the national, cultural, regulatory, industrial, and operational characteristics of the selected cases. The empirical evidence is drawn from Chinese beverage and alcoholic beverage SCs, including segments characterised by time sensitivity, demand variability, short product life cycles, and product perishability. The Chinese context is particularly relevant to the interpretation of the findings, as relationship-based coordination and guanxi-related expressions of trust, reciprocity, and informal support may be especially visible within this setting. These contextual conditions may influence both the salience and configuration of DHRC practices, including the relative importance of rapid communication, relationship-based coordination, and frontline situational judgement. Although the DHRC framework is intended to offer a broader conceptual explanation of how social capital, human capital, and cognition support SCRES across actors and disruption stages, its empirical refinement is grounded in this specific context. The manifestations and relative importance of these capabilities and practices may differ in other settings. For example, human-related capability development in sectors such as high-technology manufacturing, pharmaceuticals, or large-scale global logistics may be shaped differently by operational complexity, process modularity, regulatory regimes, and governance arrangements. Future research should therefore examine the applicability, transferability, and boundary conditions of the DHRC framework across different national, cultural, regulatory, and industrial contexts.

Fourth, the study relies primarily on semi-structured interviews, which introduces the possibility of retrospective bias, selective recall, and subjective interpretation. Although these risks were mitigated through rigorous coding procedures, iterative within-case and cross-case analysis, and triangulation with contextual and documentary evidence where available, interview-based accounts remain shaped by respondents' perspectives, memory, and role positions. As such, the findings should be interpreted as theoretically informed reconstructions of resilience-related practices rather than direct observation of all disruption events and interactions in real time.

Fifth, there are methodological and theoretical limitations associated with the qualitative design. While the thesis identifies DHRCs and explains how they are enacted across disruption stages, it does not quantify the relative effects of different capabilities or practices, nor does it test causal pathways statistically. In addition, although the study conceptualises resilience as a multi-level human capability system spanning individual and team processes across organisational and SC relationships, it does not empirically model cross-level interactions or temporal feedback loops. Future quantitative, mixed-method, and process-based research is therefore needed to test the propositions developed in this thesis, assess the relative influence of different practices, and further refine the dynamic and multi-level relationships and reinforcing patterns of the DHRCs framework.

Finally, this thesis focuses on three human-related capability domains, namely social capital, human capital, and cognition. Although this focus was theoretically grounded and empirically productive, the fieldwork also revealed additional human-related influences that were not fully theorised as standalone components within the framework. Most notably, emotion emerged as an important factor affecting communication, cooperation, and the enactment of individual cognitive attributes during disruptions. This suggests that, although the current framework is robust, it may not yet fully capture the broader emotional and affective dimensions of SCRES. Future research could therefore examine whether emotion should be conceptualised as a boundary condition, an embedded dimension of cognition, or a distinct but interacting human-related capability within resilience research.

In sum, the limitations of this thesis reflect its theoretical scope, empirical setting, and methodological choices. At the same time, they open important avenues for future research to deepen, test, and extend the DHRCs framework across disciplines, contexts, and methods.

7.5 Chapter Summary

This chapter has concluded the thesis by synthesising its contributions, outlining future research directions, and acknowledging key limitations. First, Section 7.2 articulated the overarching, theoretical, and practical contributions of the study. The thesis develops DHRCs theory as a human centred and practice-oriented explanation of SCRES, and translates this theorisation into a DHRCs framework that specifies three capability domains, social capital, human capital, and cognition, and the associated practices through which they are enacted. The

chapter also clarified that these practices play shifting roles across pre disruption, during disruption, and post disruption phases, and that resilience is better understood as a dynamic multi-stage process rather than a static attribute. In addition, the thesis showed that the nine practices operate as an interconnected configuration, with reinforcement across domains, while also displaying trade-offs and contingent effects shaped by governance, role fit, and emotional conditions.

Second, the chapter summarised the practical contributions of the research. The findings provide a practice-based roadmap for strengthening resilience by deliberately developing and aligning social capital, human capital, and cognition across internal and external relationships and across disruption phases. The implications highlight actionable priorities, such as building trust, reciprocity, communication, and cooperation with appropriate oversight, investing in role relevant training and experience sharing within and across organisations, and strengthening shared understanding through shared codes, shared language, and shared narratives. The chapter also emphasised implementation routines, including communication routines and post disruption reviews, and identified opportunities for industry and policy support through wider training ecosystems and information transparency infrastructures.

Third, Section 7.3 proposed a future research agenda that extends the DHRCs framework across disciplines, contexts, and methods, with value in process-based and mixed method designs, stronger measurement development, and deeper examination of cognition and emotion in disruption settings. Finally, Section 7.4 acknowledged limitations related to theoretical scope, empirical context, interview-based evidence, and the non-quantification of relative effects, and positioned these limits as productive boundaries for continued inquiry.

Overall, Chapter 7 closes the thesis by reinforcing its central insight: SCs strengthen resilience through the ongoing development and enactment of social capital, human capital, and cognition, expressed through observable practices that vary across actors, relationships, and disruption phases.

7.6 Closing Remarks

This thesis contributes to a deeper and more nuanced understanding of the human dimensions of SCRES. By revealing how social capital, human capital, and cognition develop, interact,

and are enacted across different disruption stages within and across organisations, the study reframes resilience as a dynamic, multi-level human capability system rather than a static structural attribute. In doing so, this thesis develops a new theoretical framework, the DHRCs framework, to explain how human-related capabilities shape and sustain SCRES across stages of disruption. This framework provides a foundation for future theory building and offers meaningful guidance for organisations navigating increasingly volatile and uncertain environments.

Ultimately, the research highlights a simple but powerful insight: SCs do not become resilient solely through systems or structures; they become resilient through people.

References

Abeysekara, N., Wang, H. and Kuruppuarachchi, D. (2019a) 'Effect of supply-chain resilience on firm performance and competitive advantage: a study of the Sri Lankan apparel industry', *Business Process Management Journal*, 25(7), pp. 1673–1695.

Abeysekara, M.N.P., Wang, H. and Kuruppuarachchi, D. (2019b) 'Antecedent role of risk management culture to drive firm performance and competitive advantage with the mediation effect of agility in resilient supply chains', *International Journal of Information, Business and Management*, 11(1), p. 10.

Acar, M.F., Özer Torgalöz, A., Eryarsoy, E. and Zaim, S. (2022) 'Did COVID-19 change the rules of the game for supply chain resilience? The effects of learning culture and supplier trust', *International Journal of Physical Distribution and Logistics Management*, 52(7), pp. 491–511.

Adner, R. and Helfat, C.E. (2003) 'Corporate effects and dynamic managerial capabilities', *Strategic Management Journal*, 24(10), pp. 1011–1025.

Adler, P.S. and Kwon, S.W. (2002) 'Social capital: prospects for a new concept', *Academy of Management Review*, 27(1), pp. 17–40.

Akkermans, H.A. and Van Wassenhove, L.N. (2018) 'A dynamic model of managerial response to grey swan events in supply networks', *International Journal of Production Research*, 56(1–2), pp. 10–21.

Alghababsheh, M. and Gallear, D. (2020) 'Social capital in buyer-supplier relationships: a review of antecedents, benefits, risks, and boundary conditions', *Industrial Marketing Management*, 91, pp. 338–361.

Ali, A., Mahfouz, A. and Arisha, A. (2017) 'Analysing supply chain resilience: integrating the constructs in a concept mapping framework via a systematic literature review', *Supply Chain Management: An International Journal*, 22(1), pp. 16–39.

Ali, I. and Gölgeci, I. (2019) 'Where is supply chain resilience research heading? A systematic and co-occurrence analysis', *International Journal of Physical Distribution and Logistics Management*, 49(8), pp. 793–815.

Ali, I., Nagalingam, S. and Gurd, B. (2018) ‘A resilience model for cold chain logistics of perishable products’, *The International Journal of Logistics Management*, 29(3), pp. 922–941.

Aman, S. and Seuring, S. (2023) ‘Analysing developing countries approaches of supply chain resilience to COVID-19’, *The International Journal of Logistics Management*, 34(4), pp. 909–934.

Ambulkar, S., Blackhurst, J. and Grawe, S., (2015) ‘Firm's resilience to supply chain disruptions: Scale development and empirical examination’, *Journal of operations management*, *33*, pp.111-122.

Ambulkar, S., Blackhurst, J.V. and Cantor, D.E. (2016) ‘Supply chain risk mitigation competency: an individual-level knowledge-based perspective’, *International Journal of Production Research*, 54(5), pp. 1398–1411.

Argyris, C. (1996) *Organizational Learning II: Theory, Method, and Practice*.

Asamoah, D., Agyei-Owusu, B. and Ashun, E. (2020) ‘Social network relationship, supply chain resilience and customer-oriented performance of small and medium enterprises in a developing economy’, *Benchmarking: An International Journal*, 27(5), pp. 1793–1813.

Aslam, H., Syed, T.A., Blome, C., Ramish, A. and Ayaz, K. (2022) ‘The multifaceted role of social capital for achieving organizational ambidexterity and supply chain resilience’, *IEEE Transactions on Engineering Management*.

Aung, M.M. and Chang, Y.S. (2014) ‘Traceability in a food supply chain: safety and quality perspectives’, *Food Control*, 39, pp. 172–184.

Azadegan, A. and Dooley, K. (2021) ‘A typology of supply network resilience strategies: complex collaborations in a complex world’, *Journal of Supply Chain Management*, 57(1), pp. 17–26.

Barney, J.B. (1991) ‘Firm resources and sustained competitive advantage’, *Journal of Management*, 17(1), pp. 99–120.

Barratt, M. and Oke, A. (2007) ‘Antecedents of supply chain visibility in retail supply chains: a resource-based theory perspective’, *Journal of Operations Management*, 25(6), pp. 1217–1233.

Bateman, T.S. and Strasser, S. (1984) ‘A longitudinal analysis of the antecedents of organizational commitment’, *Academy of Management Journal*, 27(1), pp. 95–112.

Business Continuity Institute. (2023) *BCI Supply Chain Resilience Report 2023*. The Business Continuity Institute. Available at: https://www.thebci.org/resource/bci-supply-chain-resilience-report-2023.html (Accessed: 23 February 2026).

Business Continuity Institute. (2025) *BCI A Year in the World of Resilience Report 2025*. The Business Continuity Institute. Available at: https://www.thebci.org/resource/bci-a-year-in-the-world-of-resilience-report-2025.html (Accessed: 23 February 2026).

Becker, G.S. (1962) ‘Investment in human capital: a theoretical analysis’, *Journal of Political Economy*, 70(5, Part 2), pp. 9–49.

Bendoly, E., Donohue, K. and Schultz, K.L. (2006) ‘Behavior in operations management: assessing recent findings and revisiting old assumptions’, *Journal of Operations Management*, 24(6), pp. 737–752.

Bhattacharjya, J. (2018) ‘The role of egocentric networks in achieving resilience: a case study from the apparel sector’, *International Journal of Physical Distribution and Logistics Management*, 48(7), pp. 682–697.

Biggs, D., Hicks, C.C., Cinner, J.E. and Hall, C.M. (2015) ‘Marine tourism in the face of global change: the resilience of enterprises to crises in Thailand and Australia’, *Ocean and Coastal Management*, 105, pp. 65–74.

Birkie, S.E., Trucco, P. and Fernandez Campos. (2017) ‘Effectiveness of resilience capabilities in mitigating disruptions: leveraging on supply chain structural complexity’, *Supply Chain Management: An International Journal*, 22(6), pp. 506–521.

Blackhurst, J., Dunn, K.S. and Craighead, C.W. (2011) ‘An empirically derived framework of global supply resiliency’, *Journal of Business Logistics*, 32(4), pp. 374–391.

Block, D.E. and Miller, K.V. (2021) *Unit Operations in Winery, Brewery, and Distillery Design*. Boca Raton, FL: CRC Press.

Blome, C., Schoenherr, T. and Rexhausen, D. (2013) ‘Antecedents and enablers of supply chain agility and its effect on performance: a dynamic capabilities perspective’, *International Journal of Production Research*, 51(4), pp. 1295–1318.

Bondeli, J.V. and Havenvid, M.I. (2022) ‘Bouncing back in turbulent business environments: exploring resilience in business networks’, *Industrial Marketing Management*, 107, pp. 383–395.

Brandon-Jones, E., Squire, B., Autry, C.W. and Petersen, K.J. (2014) ‘A contingent resource-based perspective of supply chain resilience and robustness’, *Journal of Supply Chain Management*, 50(3), pp. 55–73.

Brotheridge, C.M. and Lee, R.T., (2008) ‘The emotions of managing: An introduction to the special issue*’*, *Journal of managerial psychology’*, 23(2), pp.108-117.

Bruce, M., Daly, L. and Towers, N. (2004) ‘Lean or agile: a solution for supply chain management in the textiles and clothing industry?’, *International Journal of Operations and Production Management*, 24(2), pp. 151–170.

Bryman, A. and Bell, E. (2011) *Business Research Methods*. 3rd edn. Oxford: Oxford University Press.

Burrell, G. and Morgan, G. (2019) *Sociological Paradigms and Organisational Analysis: Elements of the Sociology of Corporate Life*. London: Routledge.

Gambetti, R.C. and Giovanardi, M. (2013) ‘Re-visiting the supply chain: a communication perspective’, *Corporate Communications: An International Journal*, 18(4), pp. 390–416.

Can Saglam, Y., Yildiz Çankaya, S. and Sezen, B. (2021) ‘Proactive risk mitigation strategies and supply chain risk management performance: an empirical analysis for manufacturing firms in Turkey’, *Journal of Manufacturing Technology Management*, 32(6), pp. 1224–1244.

Cao, M. and Zhang, Q. (2011) ‘Supply chain collaboration: impact on collaborative advantage and firm performance’, *Journal of Operations Management*, 29(3), pp. 163–180.

Carr, A.S., Muthusamy, S. and Lee, P.D. (2008) ‘The relationship between intra-organizational and inter-organizational coordination and its influence on product quality improvement’, *Journal of Applied Business Research*, 24(1).

Chan, C.K., Lee, Y.C.E. and Goyal, S.K. (2010) ‘A delayed payment method in co-ordinating a single-vendor multi-buyer supply chain’, *International Journal of Production Economics*, 127(1), pp. 95–102.

Chang, Y.W., Hsu, P.Y., Shiau, W.L. and Tsai, C.C. (2015) ‘Knowledge sharing intention in the United States and China: a cross-cultural study’, *European Journal of Information Systems*, 24(3), pp. 262–277.

Cheng, T.C.E., Yip, F.K. and Yeung, A.C. (2012) ‘Supply risk management via guanxi in the Chinese business context: the buyer’s perspective’, *International Journal of Production Economics*, 139(1), pp. 3–13.

Chowdhury, M., Prayag, G., Orchiston, C. and Spector, S. (2019) ‘Postdisaster social capital, adaptive resilience and business performance of tourism organizations in Christchurch, New Zealand’, *Journal of Travel Research*, 58(7), pp. 1209–1226.

Chowdhury, M.M.H. and Quaddus, M. (2016) ‘Supply chain readiness, response and recovery for resilience’, *Supply Chain Management: An International Journal*, 21(6), pp. 709–731.

Chowdhury, M.M.H. and Quaddus, M. (2017) ‘Supply chain resilience: conceptualization and scale development using dynamic capability theory’, *International Journal of Production Economics*, 188, pp. 185–204.

Chowdhury, M.M.H., Islam, M.T., Ali, I. and Quaddus, M. (2024) ‘The role of social capital, resilience, and network complexity in attaining supply chain sustainability’, *Business Strategy and the Environment*, 33(3), pp. 2621–2639.

Christopher, M. (2016) *Logistics and Supply Chain Management*. Harlow: Pearson.

Christopher, M. and Lee, H. (2004) ‘Mitigating supply chain risk through improved confidence’, *International Journal of Physical Distribution and Logistics Management*, 34(5), pp. 388–396.

Christopher, M. and Peck, H. (2004) ‘Building the resilient supply chain’, *International Journal of Logistics Management*, 15(2), pp. 1–13.

Chunsheng, L., Wong, C.W., Yang, C.C., Shang, K.C. and Lirn, T.C. (2020) ‘Value of supply chain resilience: roles of culture, flexibility, and integration’, *International Journal of Physical Distribution and Logistics Management*, 50(1), pp. 80–100.

Cohen, M.A., Ho, T.H., Ren, Z.J. and Terwiesch, C. (2003) ‘Measuring imputed cost in the semiconductor equipment supply chain’, *Management Science*, 49(12), pp. 1653–1670.

Cohen, W.M. and Levinthal, D.A. (1990) ‘Absorptive capacity: a new perspective on learning and innovation’, *Administrative Science Quarterly*, 35(1), pp. 128–152.

Collins, C.J. and Smith, K.G. (2006) ‘Knowledge exchange and combination: the role of human resource practices in the performance of high-technology firms’, *Academy of Management Journal*, 49(3), pp. 544–560.

Conduit, J. and Mavondo, F.T. (2001) ‘How critical is internal customer orientation to market orientation?’, *Journal of Business Research*, 51(1), pp. 11–24.

Corley, K.G. and Gioia, D.A. (2004) ‘Identity ambiguity and change in the wake of a corporate spin-off’, *Administrative Science Quarterly*, 49(2), pp. 173–208.

Cristofaro, M. (2020) ‘“I feel and think, therefore I am”: an affect-cognitive theory of management decisions’, *European Management Journal*, 38(2), pp. 344–355.

Croson, R., Schultz, K., Siemsen, E. and Yeo, M.L. (2013) ‘Behavioral operations: the state of the field’, *Journal of Operations Management*, 31(1–2), pp. 1–5.

Dabhilkar, M., Birkie, S.E. and Kaulio, M.(2016) ‘Supply-side resilience as practice bundles: a critical incident study’, *International Journal of Operations and Production Management*, 36(8), pp. 948–970.

Daghar, A., Alinaghian, L. and Turner, N. (2021) ‘The role of collaborative interorganizational relationships in supply chain risks: a systematic review using a social capital perspective’, *Supply Chain Management: An International Journal*, 26(2), pp. 279–296.

Daghar, A., Alinaghian, L. and Turner, N. (2023) ‘The role of cognitive capital in supply chain resilience: an investigation during the COVID-19 pandemic’, *Supply Chain Management: An International Journal*, 28(3), pp. 576–597.

Dane, E. and Pratt, M.G. (2007) ‘Exploring intuition and its role in managerial decision making’, *Academy of Management Review*, 32(1), pp. 33–54.

Davenport, T.T., Harris, J.G., De Long, D.W. and Jacobson, A.L. (2001) ‘Data to knowledge to results: building an analytic capability’, *California Management Review*, 43(2), pp. 117–138.

Day, J.M. (2014) ‘Fostering emergent resilience: the complex adaptive supply network of disaster relief’, *International Journal of Production Research*, 52(7), pp. 1970–1988.

Denyer, D. and Tranfield, D. (2009) ‘Producing a systematic review’.

Dubey, R., Bryde, D.J., Dwivedi, Y.K., Graham, G., Foropon, C. and Papadopoulos, T. (2023) ‘Dynamic digital capabilities and supply chain resilience: the role of government effectiveness’, *International Journal of Production Economics*, 258, p. 108790.

Dubey, R., Gunasekaran, A., Childe, S.J., Papadopoulos, T., Blome, C. and Luo, Z. (2017) ‘Antecedents of resilient supply chains: an empirical study’, *IEEE Transactions on Engineering Management*, 66(1), pp. 8–19.

DuHadway, S., Carnovale, S. and Kannan, V.R. (2018) ‘Organizational communication and individual behavior: implications for supply chain risk management’, *Journal of Supply Chain Management*, 54(4), pp. 3–19.

Durach, C.F. and Machuca, J.A. (2018) ‘A matter of perspective–the role of interpersonal relationships in supply chain risk management’, *International Journal of Operations and Production Management*, 38(10), pp. 1866–1887.

Easterby-Smith, M. and Junshan, G. (2018) ‘Vision, mechanism and logic: understanding the strategic investment decision making process’, in *Management Issues in China: Volume 1*, pp. 106–126. London: Routledge.

Eisenhardt, K.M. (1989) ‘Building theories from case study research’, *Academy of Management Review*, 14(4), pp. 532–550.

Eisenhardt, K.M. and Graebner, M.E. (2007) ‘Theory building from cases: opportunities and challenges’, *Academy of Management Journal*, 50(1), pp. 25–32.

Eisenhardt, K.M. and Martin, J.A. (2017) ‘Dynamic capabilities: what are they?’, in *The SMS Blackwell Handbook of Organizational Capabilities*, pp. 341–363.

Eisenhardt, K.M. and Zbaracki, M.J. (1992) ‘Strategic decision making’, *Strategic Management Journal*, 13(S2), pp. 17–37.

Ergeneli, A., Arı, G.S. and Metin, S. (2007) ‘Psychological empowerment and its relationship to trust in immediate managers’, *Journal of Business Research*, 60(1), pp. 41–49.

Ervina, E. and Agoes, A. (2022) ‘The critical role of social capital in hotel business resilience’, *Jurnal Manajemen and Agribisnis*, 19(2), pp. 288–288.

Esenduran, G., Gray, J.V. and Tan, B. (2022) ‘A dynamic analysis of supply chain risk management and extended payment terms’, *Production and Operations Management*, 31(3), pp. 1394–1417.

Eslami, M.H., Jafari, H., Achtenhagen, L., Carlbäck, J. and Wong, A. (2024) ‘Financial performance and supply chain dynamic capabilities: the moderating role of Industry 4.0 technologies’, *International Journal of Production Research*, 62(22), pp. 8092–8109.

Fan, Y. and Stevenson, M. (2018) ‘Reading on and between the lines: risk identification in collaborative and adversarial buyer–supplier relationships’, *Supply Chain Management: An International Journal*, 23(4), pp. 351–376.

Fan, Y. and Stevenson, M. (2019) ‘Non-linear effects of relational capital on supply-side resilience: the moderating role of boundary spanners’ personal ties’, *International Journal of Operations and Production Management*, 39(9/10), pp. 1053–1075.

Faruquee, M., Paulraj, A. and Irawan, C.A. (2021) ‘Strategic supplier relationships and supply chain resilience: is digital transformation that precludes trust beneficial?’, *International Journal of Operations and Production Management*, 41(7), pp. 1192–1219.

Fawcett, S.E., Wallin, C., Allred, C., Fawcett, A.M. and Magnan, G.M. (2011) ‘Information technology as an enabler of supply chain collaboration: a dynamic-capabilities perspective’, *Journal of Supply Chain Management*, 47(1), pp. 38–59.

Felin, T., Foss, N.J., Heimeriks, K.H. and Madsen, T.L. (2012) ‘Microfoundations of routines and capabilities: individuals, processes, and structure’, *Journal of Management Studies*, 49(8), pp. 1351–1374.

Fiksel, J. and Fiksel, J. (2015) ‘From risk to resilience’, in *From Risk to Resilience*, pp. 19–34. Washington, DC: Island Press/Center for Resource Economics.

Flynn, B.B., Huo, B. and Zhao, X. (2010) ‘The impact of supply chain integration on performance: a contingency and configuration approach’, *Journal of Operations Management*, 28(1), pp. 58–71.

Forbes, S.L., Cohen, D.A. and Clements, M.D. (2010) ‘The dissemination of information amongst supply chain partners: a New Zealand wine industry perspective’, in *Supply Chain Forum: An International Journal*, 11(1), pp. 56–63.

Forgas, J.P., (2002) ‘Feeling and doing: Affective influences on interpersonal behavior’, *Psychological inquiry,* 13(1), pp.1-28.

Frohlich, M.T. and Westbrook, R. (2001) ‘Arcs of integration: an international study of supply chain strategies’, *Journal of Operations Management*, 19(2), pp. 185–200.

Galbraith, J.R. (1977) *Organization Design*. Reading, MA, pp. 243–380.

García-Morales, V.J., Matías-Reche, F. and Verdu-Jover, A.J. (2011) ‘Influence of internal communication on technological proactivity, organizational learning, and organizational innovation in the pharmaceutical sector’, *Journal of Communication*, 61(1), pp. 150–177.

Gerschberger, M., Ellis, S.C. and Gerschberger, M. (2023) ‘Linking employee attributes and organizational resilience: an empirically driven model’, *Journal of Business Logistics*, 44(3), pp. 407–437.

Gervasi, D., Faldetta, G., Pellegrini, M.M. and Maley, J. (2022) ‘Reciprocity in organizational behavior studies: a systematic literature review of contents, types, and directions’, *European Management Journal*, 40(3), pp. 441–457.

Giannoccaro, I. and Iftikhar, A. (2022) ‘Mitigating ripple effect in supply networks: the effect of trust and topology on resilience’, *International Journal of Production Research*, 60(4), pp. 1178–1195.

Gioia, D.A., Corley, K.G. and Hamilton, A.L. (2013) ‘Seeking qualitative rigor in inductive research: notes on the Gioia methodology’, *Organizational Research Methods*, 16(1), pp. 15–31.

Gligor, D., Gligor, N., Holcomb, M. and Bozkurt, S. (2019) ‘Distinguishing between the concepts of supply chain agility and resilience: a multidisciplinary literature review’, *The International Journal of Logistics Management*, 30(2), pp. 467–487.

Gligor, D.M. and Autry, C.W. (2012) ‘The role of personal relationships in facilitating supply chain communications: a qualitative study’, *Journal of Supply Chain Management*, 48(1), pp. 24–43.

Goddard, W. and Melville, S. (2004) *Research Methodology: An Introduction*. 2nd edn. Oxford: Blackwell Publishing.

Gouldner, A.W. (1960) 'The norm of reciprocity: a preliminary statement', *American Sociological Review*, 25(2), pp. 161–178.

Granovetter, M.S. (1973) 'The strength of weak ties', *American Journal of Sociology*, 78(6), pp. 1360–1380.

Grant, R.M. (1991) 'The resource-based theory of competitive advantage: implications for strategy formulation', *California Management Review*, 33(3), pp. 114–135.

Grant, R.M. (1996) 'Toward a knowledge-based theory of the firm', *Strategic Management Journal*, 17(S2), pp. 109–122.

Grötsch, V.M., Blome, C. and Schleper, M.C. (2013) 'Antecedents of proactive supply chain risk management–a contingency theory perspective', *International Journal of Production Research*, 51(10), pp. 2842–2867.

Gu, M., Yang, L. and Huo, B. (2021) 'The impact of information technology usage on supply chain resilience and performance: an ambidextrous view', *International Journal of Production Economics*, 232, p. 107956.

Gu, M., Zhang, Y., Li, D. and Huo, B. (2023) 'The effect of high-involvement human resource management practices on supply chain resilience and operational performance', *Journal of Management Science and Engineering*, 8(2), pp. 176–190.

Guba, E.G. and Lincoln, Y.S. (1994) 'Competing paradigms in qualitative research', in *Handbook of Qualitative Research*, 2, pp. 163–194.

Hambrick, D.C. (2007) 'Upper echelons theory: an update', *Academy of Management Review*, 32(2), pp. 334–343.

Hambrick, D.C. and Mason, P.A. (1984) 'Upper echelons: the organization as a reflection of its top managers', *Academy of Management Review*, 9(2), pp. 193–206.

Han, Y., Chong, W.K. and Li, D. (2020) 'A systematic literature review of the capabilities and performance metrics of supply chain resilience', *International Journal of Production Research*, 58(15), pp. 4541–4566.

He, J., Liang, K. and Wu, P. (2022) ‘Stability governance of e-commerce supply chain: social capital and governance mechanism design perspective’, *Sustainability*, 14(20), p. 13320.

Helfat, C.E. and Peteraf, M.A. (2015) ‘Managerial cognitive capabilities and the microfoundations of dynamic capabilities’, *Strategic Management Journal*, 36(6), pp. 831–850.

Helfat, C.E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D. and Winter, S.G. (2009) *Dynamic Capabilities: Understanding Strategic Change in Organizations*. Hoboken, NJ: John Wiley and Sons.

Helfat, C.E. and Peteraf, M.A. (2003) ‘The dynamic resource-based view: capability lifecycles’, *Strategic Management Journal*, 24(10), pp. 997–1010.

Herbane, B. (2019) ‘Rethinking organizational resilience and strategic renewal in SMEs’, *Entrepreneurship and Regional Development*, 31(5–6), pp. 476–495.

Hoberg, K., Thornton, L. and Wieland, A., (2020). How to deal with the human factor in supply chain management?. *International Journal of Physical Distribution & Logistics Management*, *50*(2), pp.151-158.

Hohenstein, N.O., Feisel, E., Hartmann, E. and Giunipero, L. (2015) ‘Research on the phenomenon of supply chain resilience: a systematic review and paths for further investigation’, *International Journal of Physical Distribution and Logistics Management*, 45(1/2), pp. 90–117.

Holling, C.S. (1973) ‘Resilience and stability of ecological systems’, *Annual Review of Ecology and Systematics*, 4(1), pp. 1–23.

Hollnagel, E., Woods, D. and Levenson, N. (2006) *Resilience Engineering: Concepts and Precepts*. Aldershot: Ashgate.

Horner, M. (1997) ‘Leadership theory: past, present and future’, *Team Performance Management: An International Journal*, 3(4), pp. 270–287.

Hu, L. (2022) ‘The PPE industry in Italy during COVID-19: supply chain disruption and the adoption of digital and social media in B2B firms’, *Journal of Business and Industrial Marketing*, 37(10), pp. 2050–2063.

Huang, A. and Farboudi Jahromi, M. (2021) ‘Resilience building in service firms during and post COVID-19’, *The Service Industries Journal*, 41(1–2), pp. 138–167.

Hudson, L.A. and Ozanne, J.L. (1988) ‘Alternative ways of seeking knowledge in consumer research’, *Journal of Consumer Research*, 14(4), p. 508.

Iftikhar A, Purvis L, Giannoccaro I. (2021) ‘A meta-analytical review of antecedents and outcomes of firm resilience’, *Journal of Business Research*, 135, pp. 408–425.

Iftikhar A, Purvis L, Giannoccaro I, Wang Y. (2023). ‘ The impact of supply chain complexities on supply chain resilience: the mediating effect of big data analytics’, *Production Planning and Control,* 34(16), pp.1562-1582.

Ivanov, D. (2020) ‘Predicting the impacts of epidemic outbreaks on global supply chains: a simulation-based analysis on the coronavirus outbreak (COVID-19/SARS-CoV-2) case’, *Transportation Research Part E: Logistics and Transportation Review*, 136, p. 101922.

Jacobs, B.W. and Subramanian, R. (2012) ‘Sharing responsibility for product recovery across the supply chain’, *Production and Operations Management*, 21(1), pp. 85–100.

Jia, X., Chowdhury, M., Prayag, G. and Chowdhury, M.M.H. (2020) ‘The role of social capital on proactive and reactive resilience of organizations post-disaster’, *International Journal of Disaster Risk Reduction*, 48, p. 101614.

Jick, T.D. (1979) ‘Mixing qualitative and quantitative methods: triangulation in action’, *Administrative Science Quarterly*, 24(4), pp. 602–611.

Johnson, N., Elliott, D. and Drake, P. (2013) ‘Exploring the role of social capital in facilitating supply chain resilience’, *Supply Chain Management: An International Journal*, 18(3), pp. 324–336.

Jüttner, U. and Maklan, S. (2011) ‘Supply chain resilience in the global financial crisis: an empirical study’, *Supply Chain Management: An International Journal*, 16(4), pp. 246–259.

Kalubanga, M. and Gudergan, S. (2022) ‘The impact of dynamic capabilities in disrupted supply chains, the role of turbulence and dependence’, *Industrial Marketing Management*, 103, pp. 154–169.

Kamalahmadi, M. and Parast, M.M. (2016) ‘A review of the literature on the principles of enterprise and supply chain resilience: major findings and directions for future research’, *International Journal of Production Economics*, 171(1), pp. 116–133.

Kim, Y., Chen, Y.S. and Linderman, K. (2015) ‘Supply network disruption and resilience: a network structural perspective’, *Journal of Operations Management*, 33, pp. 43–59.

Kogut, B. and Zander, U. (1992) ‘Knowledge of the firm, combinative capabilities, and the replication of technology’, *Organization Science*, 3(3), pp. 383–397.

Koronis, E. and Ponis, S. (2018) ‘Better than before: the resilient organization in crisis mode’, *Journal of Business Strategy*, 39(1), pp. 32–42.

Kumar, S. and Anbanandam, R. (2020) ‘Impact of risk management culture on supply chain resilience: an empirical study from Indian manufacturing industry’, *Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability*, 234(2), pp. 246–259.

Lambert, D.M. and Enz, M.G. (2017) ‘Issues in supply chain management: progress and potential’, *Industrial Marketing Management*, 62, pp. 1–16.

Langenmayr, T. (2019) ‘Implementation of strategic change by franchisees: a sensemaking perspective’, *Junior Management Science*, 4(2), pp. 173–194.

Lawrence, P.R. and Lorsch, J.W. (1967) ‘Differentiation and integration in complex organizations’, *Administrative Science Quarterly*, pp. 1–47.

Lengnick-Hall, C.A., Beck, T.E. and Lengnick-Hall, M.L. (2011) ‘Developing a capacity for organizational resilience through strategic human resource management’, *Human Resource Management Review*, 21(3), pp. 243–255.

Lerner, J.S. and Tiedens, L.Z. (2006) ‘Portrait of the angry decision maker: how appraisal tendencies shape anger’s influence on cognition’, *Journal of Behavioral Decision Making*, 19(2), pp. 115–137.

Lerner, J.S., Li, Y., Valdesolo, P. and Kassam, K.S. (2015) ‘Emotion and decision making’, *Annual Review of Psychology*, 66(1), pp. 799–823.

Liberati, A., Altman, D.G., Tetzlaff, J., Mulrow, C., Gøtzsche, P.C., Ioannidis, J.P., Clarke, M., Devereaux, P.J., Kleijnen, J. and Moher, D. (2009) ‘The PRISMA statement for reporting

systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration', *Journal of Clinical Epidemiology*, 62(10), pp. e1–e34.

Lincoln, Y. S. and Guba, E. G. (1985) *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publications.

Liu, C.L., Shang, K.C., Lirn, T.C., Lai, K.H. and Lun, Y.V. (2018) 'Supply chain resilience, firm performance, and management policies in the liner shipping industry', *Transportation Research Part A: Policy and Practice*, 110, pp. 202–219.

Lu, X., Chiang, C.Y., Wu, F. and Xu, X. (2025) 'Whose AI matters? Examining the bilateral effects of AI capability orientation on supply chain resilience'*, International Journal of Operations & Production Management,* 45(8), pp. 1549–1577.

Lusiantoro, L., Yates, N., Mena, C. and Varga, L. (2018) 'A refined framework of information sharing in perishable product supply chains', *International Journal of Physical Distribution and Logistics Management*, 48(3), pp. 254–283.

Macdonald, J.R. and Corsi, T.M. (2013) 'Supply chain disruption management: severe events, recovery, and performance', *Journal of Business Logistics*, 34(4), pp. 270–288.

Macdonald, J.R., Zobel, C.W., Melnyk, S.A. and Griffis, S.E. (2018) 'Supply chain risk and resilience: theory building through structured experiments and simulation', *International Journal of Production Research*, 56(12), pp. 4337–4355.

MacInnis, D.J. (2011) 'A framework for conceptual contributions in marketing', *Journal of Marketing*, 75(4), pp. 136–154.

Mandal, S. (2017) 'An empirical competence-capability model of supply chain resilience', *International Journal of Disaster Resilience in the Built Environment*, 8(2), pp. 190–208.

Manhart, P., Summers, J.K. and Blackhurst, J. (2020) 'A meta-analytic review of supply chain risk management: assessing buffering and bridging strategies and firm performance', *Journal of Supply Chain Management*, 56(3), pp. 66–87.

Manyena, S.B. (2006) 'The concept of resilience revisited', *Disasters*, 30(4), pp. 434–450.

Matas, J., Llorens-Montes, F.J. and Perez, N. (2024) 'The influence of collective emotions in the response to supply chain disruptions: a buyer–supplier empirical approach', *Industrial Management and Data Systems*, 124(6), pp. 2180–2204.

Mayer, R.C., Davis, J.H. and Schoorman, F.D. (1995) ‘An integrative model of organizational trust’, *Academy of Management Review*, 20(3), pp. 709–734.

McCauley, D.P. and Kuhnert, K.W. (1992) ‘A theoretical review and empirical investigation of employee trust in management’, *Public Administration Quarterly*, pp. 265–284.

McFadyen, M.A., Semadeni, M. and Cannella Jr, A.A. (2009) ‘Value of strong ties to disconnected others: examining knowledge creation in biomedicine’, *Organization Science*, 20(3), pp. 552–564.

Menéndez Blanco, J.M. and Montes-Botella, J.L. (2017) ‘Exploring nurtured company resilience through human capital and human resource development: findings from Spanish manufacturing companies’, *International Journal of Manpower*, 38(5), pp. 661–674.

Mikalef, P. and Pateli, A. (2017) ‘Information technology-enabled dynamic capabilities and their indirect effect on competitive performance: findings from PLS-SEM and fsQCA’, *Journal of Business Research*, 70, pp. 1–16.

Miles, M.B. and Huberman, A.M. (1994) *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks, CA: Sage Publications.

Mishra, A.K. (1996) ‘Organizational responses to crisis: the centrality of trust’, in Kramer, R.M. and Tyler, T.R. (eds.) *Trust in Organizations: Frontiers of Theory and Research*.

Thousand Oaks, CA: Sage Publications, pp. 261–287.

Mishra, A.K. and Spreitzer, G.M. (1998) ‘Explaining how survivors respond to downsizing: the roles of trust, empowerment, justice, and work redesign’, *Academy of Management Review*, 23(3), pp. 567–588.

Mishra, A.K. (1996) ‘Organizational responses to crisis’, in Kramer, R.M. and Tyler, T.R. (eds.) *Trust in Organizations: Frontiers of Theory and Research*. Thousand Oaks, CA: Sage Publications, p. 261.

Mitręga, M. and Zolkiewski, J. (2012) ‘Negative consequences of deep relationships with suppliers: an exploratory study in Poland’, *Industrial Marketing Management*, 41(5), pp. 886–894.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G. and Prisma Group. (2010) 'Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement', *International Journal of Surgery*, 8(5), pp. 336–341.

Molinaro, M., Romano, P. and Sperone, G. (2023) 'The organizational side of a disruption mitigation process: exploring a case study during the COVID-19 pandemic', *Operations Management Research*, 16(1), pp. 1–17.

Morris, M. and Carter, C.R. (2005) 'Relationship marketing and supplier logistics performance: an extension of the key mediating variables model', *Journal of Supply Chain Management*, 41(4), pp. 32–43.

Mubarik, M.S., Bontis, N., Mubarik, M. and Mahmood, T. (2022) 'Intellectual capital and supply chain resilience', *Journal of Intellectual Capital*, 23(3), pp. 713–738.

Münch, C. and Hartmann, E. (2023) 'Transforming resilience in the context of a pandemic: results from a cross-industry case study exploring supply chain viability', *International Journal of Production Research*, 61(8), pp. 2544–2562.

Mzid, I., Khachlouf, N. and Soparnot, R. (2019) 'How does family capital influence the resilience of family firms?', *Journal of International Entrepreneurship*, 17(2), pp. 249–277.

Nahapiet, J. and Ghoshal, S. (1998) 'Social capital, intellectual capital, and the organizational advantage', *Academy of Management Review*, 23(2), pp. 242–266.

Namdar, J., Li, X., Sawhney, R. and Pradhan, N. (2018) 'Supply chain resilience for single and multiple sourcing in the presence of disruption risks', *International Journal of Production Research*, 56(6), pp. 2339–2360.

Nikookar, E. and Yanadori, Y. (2022a) 'Preparing supply chain for the next disruption beyond COVID-19: managerial antecedents of supply chain resilience', *International Journal of Operations and Production Management*, 42(1), pp. 59–90.

Nikookar, E. and Yanadori, Y. (2022b) 'Forming post-COVID supply chains: does supply chain managers' social network affect resilience?', *International Journal of Physical Distribution and Logistics Management*, 52(7), pp. 538–566.

Ozanne, L.K., Chowdhury, M., Prayag, G. and Mollenkopf, D.A. (2022) 'SMEs navigating COVID-19: the influence of social capital and dynamic capabilities on organizational resilience', *Industrial Marketing Management*, 104, pp. 116–135.

Pereira, V., Temouri, Y. and Patel, C. (2020) ‘Exploring the role and importance of human capital in resilient high performing organisations: evidence from business clusters’, *Applied Psychology*, 69(3), pp. 769–804.

Pérez Mesa, J.C. and Galdeano-Gómez, E. (2015) ‘Collaborative firms managing perishable products in a complex supply network: an empirical analysis of performance’, *Supply Chain Management: An International Journal*, 20(2), pp. 128–138.

Peters, E., Knight, L., Boersma, K. and Uenk, N. (2023) ‘Organizing for supply chain resilience: a high reliability network perspective’, *International Journal of Operations and Production Management*, 43(1), pp. 48–69.

Pettit, T.J., Croxton, K.L. and Fiksel, J. (2013) ‘Ensuring supply chain resilience: development and implementation of an assessment tool’, *Journal of Business Logistics*, 34(1), pp. 46–76.

Pettit, T.J., Croxton, K.L. and Fiksel, J., (2019) ‘The evolution of resilience in supply chain management: a retrospective on ensuring supply chain resilience’, *Journal of business logistics*, *40*(1), pp.56-65.

Pettit, T.J., Fiksel, J. and Croxton, K.L., (2010). ‘Ensuring supply chain resilience: development of a conceptual framework’, *Journal of business logistics*, *31*(1), pp.1-21.

Piriyawatthana, W. (2020) ‘The impact of the social capital on the resilience of a manufacturing supply chains: the mediating role of agility of a supply chain and the moderating role of absorptive capacity of supply chains’, *International Journal of Supply Chain Management*, 9(2), pp. 317–324.

Polyviou, M., Croxton, K.L. and Knemeyer, A.M. (2020) ‘Resilience of medium-sized firms to supply chain disruptions: the role of internal social capital’, *International Journal of Operations and Production Management*, 40(1), pp. 68–91.

Ponis, S.T. and Koronis, E. (2012) ‘Supply chain resilience? Definition of concept and its formative elements’, *Journal of Applied Business Research,* 28(5), pp. 921–935.

Ponomarov, S.Y. and Holcomb, M.C. (2009) ‘Understanding the concept of supply chain resilience’, *The International Journal of Logistics Management*, 20(1), pp. 124–143.

Prasad, S., Su, H.C., Altay, N. and Tata, J. (2015) ‘Building disaster-resilient micro enterprises in the developing world’, *Disasters*, 39(3), pp. 447–466.

Preston, D.S., Chen, D.Q., Swink, M. and Meade, L. (2017) ‘Generating supplier benefits through buyer-enabled knowledge enrichment: a social capital perspective’, *Decision Sciences*, 48(2), pp. 248–287.

Priya Datta, P., Christopher, M. and Allen, P. (2007) ‘Agent-based modelling of complex production/distribution systems to improve resilience’, *International Journal of Logistics Research and Applications*, 10(3), pp. 187–203.

Purvis, L., Spall, S., Naim, M. and Spiegler, V. (2016) ‘Developing a resilient supply chain strategy during “boom” and “bust”’, *Production Planning and Control*, 27(7–8), pp. 579–590.

Raghuram, P., Sandeep, P., Sreedharan, V.R. and Saikouk, T. (2021) ‘Development of a supply chain risk mitigation index for distillery’, *The TQM Journal*, 33(3), pp. 618–639.

Rice, J.B. and Caniato, F. (2003) ‘Building a secure and resilient supply network’, *Supply Chain Management Review*, 7(5), pp. 22–30.

Riley, J.M., Klein, R., Miller, J. and Sridharan, V. (2016) ‘How internal integration, information sharing, and training affect supply chain risk management capabilities’, *International Journal of Physical Distribution and Logistics Management*, 46(10), pp. 953–980.

Robbins, S.P. (2002) *The Truth About Managing People, and Nothing but the Truth*. Upper Saddle River, NJ: FT Press.

Ruel, S. and El Baz, J. (2021) ‘Disaster readiness’ influence on the impact of supply chain resilience and robustness on firms’ financial performance: a COVID-19 empirical investigation’, *International Journal of Production Research*, pp. 1–19.

Sá, M.M.D., Miguel, P.L.D.S., Brito, R.P.D. and Pereira, S.C.F. (2020) ‘Supply chain resilience: the whole is not the sum of the parts’, *International Journal of Operations & Production Management*, 40(1), pp. 92–115.

Saglam, Y.C., Çankaya, S.Y., Golgeci, I., Sezen, B. and Zaim, S. (2022) ‘The role of communication quality, relational commitment, and reciprocity in building supply chain resilience: a social exchange theory perspective’, *Transportation Research Part E: Logistics and Transportation Review*, 167, p. 102936.

Sahin, E., Babaï, M.Z., Dallery, Y. and Vaillant, R. (2007) ‘Ensuring supply chain safety through time tempera

Sanders, W.G. and Boivie, S. (2004) ‘Sorting things out: valuation of new firms in uncertain markets’, *Strategic Management Journal*, 25(2), pp. 167–186.

Santos Jr, H.P., Black, A.M. and Sandelowski, M. (2015) ‘Timing of translation in cross-language qualitative research’, *Qualitative Health Research*, 25(1), pp. 134–144.

Sarathy, R. (2006) ‘Security and the global supply chain’, *Transportation Journal*, 45(4), pp. 28–51.

Satornino, C.B., Pelser, J., Wetzels, M., de Ruyter, K. and Grewal, D. (2023) ‘You’ve lost that learning feeling: drivers and drawbacks of channel partner disengagement with sales training’, *Industrial Marketing Management*, 113, pp. 258–276.

Saunders, M., Lewis, P. and Thornhill, A. (2019) *Research Methods for Business Students*. 8th edn. Harlow: Pearson Education.

Scholten, K. and Schilder, S. (2015) ‘The role of collaboration in supply chain resilience’, *Supply Chain Management: An International Journal*, 20(4), pp. 471–484.

Scholten, K., Scott, S.P. and Fynes, B. (2014) ‘Mitigation processes – antecedents for building supply chain resilience’, *Supply Chain Management: An International Journal*, 19(2), pp. 211–228.

Scholten, K., Stevenson, M. and van Donk, D.P. (2020) ‘Dealing with the unpredictable: supply chain resilience’, *International Journal of Operations and Production Management*, 40(1), pp. 1–10.

Schwandt, T.A. (1994) ‘Constructivist, interpretivist approaches to human inquiry’.

Schwarz, N. and Bless, H. (2020) ‘Happy and mindless, but sad and smart? The impact of affective states on analytic reasoning’, in *Emotion and Social Judgements*, pp. 55–71. London: Garland Science.

Seibert, S.E., Kraimer, M.L. and Liden, R.C. (2001) ‘A social capital theory of career success’, *Academy of Management Journal*, 44(2), pp. 219–237.

Senge, P.M. (1994) *The Fifth Discipline Fieldbook: Strategies and Tools for Building a Learning Organization*. New York, NY: Crown Currency.

Seville, E., Van Opstal, D. and Vargo, J. (2015) ‘A primer in resiliency: seven principles for managing the unexpected’, *Global Business and Organizational Excellence*, 34(3), pp. 6–18.

Sheffi, Y. and Rice, J. (2005) ‘A supply chain view of the resilient enterprise’, *MIT Sloan Management Review*, 47(1), pp. 41–48.

Sheffi, Y. (2005) *The Resilient Enterprise: Overcoming Vulnerability for Competitive Advantage*. Cambridge, MA: MIT Press.

Shela, V., Ramayah, T. and Noor Hazlina, A. (2023) ‘Human capital and organisational resilience in the context of manufacturing: a systematic literature review’, *Journal of Intellectual Capital*, 24(2), pp. 535–559.

Sirmon, D.G. and Hitt, M.A. (2009) ‘Contingencies within dynamic managerial capabilities: interdependent effects of resource investment and deployment on firm performance’, *Strategic Management Journal*, 30(13), pp. 1375–1394.

Smith, E.R. and Semin, G.R. (2004) ‘Socially situated cognition: cognition in its social context’, *Advances in Experimental Social Psychology*, 36, pp. 57–121.

Smith, K.G., Carroll, S.J. and Ashford, S.J. (1995) ‘Intra-and interorganizational cooperation: toward a research agenda’, *Academy of Management Journal*, 38(1), pp. 7–23.

Sopha, B.M., Arvianto, A. and Tjahjono, B. (2022) ‘Survival strategies of traditional retailers during the COVID-19 pandemic: some insights from a developing country’, *Journal of Industrial Engineering and Management*, 15(2), pp. 185–201.

Squires, A. (2009) ‘Methodological challenges in cross-language qualitative research: a research review’, *International Journal of Nursing Studies*, 46(2), pp. 277–287.

Stadtfeld, G.M. and Gruchmann, T. (2024) ‘Dynamic capabilities for supply chain resilience: a meta-review’, *The International Journal of Logistics Management*, 35(2), pp. 623–648.

Stahl, G.K., Larsson, R., Kremershof, I. and Sitkin, S.B. (2011) ‘Trust dynamics in acquisitions: a case survey’, *Human Resource Management*, 50(5), pp. 575–603.

Stake, R. (1995) *Case Study Research*. Cham: Springer.

Stata, R. (1989) ‘Organizational learning: the key to management innovation’, *Sloan Management Review*, 30(3), pp. 63–74.

Strauss, A. and Corbin, J. (1990) *Basics of Qualitative Research*. Newbury Park, CA: Sage, pp. 61–110.

Stringer, M.F. and Hall, M.N. (2007) 'A generic model of the integrated food supply chain to aid the investigation of food safety breakdowns', *Food Control*, 18(7), pp. 755–765.

Teece, D.J. (2007) 'Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance', *Strategic Management Journal*, 28(13), pp. 1319–1350.

Teece, D.J. (2012) 'Dynamic capabilities: routines versus entrepreneurial action', *Journal of Management Studies*, 49(8), pp. 1395–1401.

Teece, D.J., Pisano, G. and Shuen, A. (1997) 'Dynamic capabilities and strategic management', *Strategic Management Journal*, 18(7), pp. 509–533.

Temple, B. and Young, A. (2004) 'Qualitative research and translation dilemmas', *Qualitative Research*, 4(2), pp. 161–178.

Thomé, A.M.T., Scavarda, L.F. and Scavarda, A.J. (2016) 'Conducting systematic literature review in operations management', *Production Planning and Control*, 27(5), pp. 408–420.

Tranfield, D., Denyer, D. and Smart, P. (2003) 'Towards a methodology for developing evidence-informed management knowledge by means of systematic review', *British Journal of Management*, 14(3), pp. 207–222.

Tsai, J.C.A. and Kang, T.C. (2019) 'Reciprocal intention in knowledge seeking: examining social exchange theory in an online professional community', *International Journal of Information Management*, 48, pp. 161–174.

Tukamuhabwa, B., Stevenson, M. and Busby, J. (2017) 'Supply chain resilience in a developing country context: a case study on the interconnectedness of threats, strategies and outcomes', *Supply Chain Management: An International Journal*, 22(6), pp. 486–505.

Uzzi, B. (1996) 'The sources and consequences of embeddedness for the economic performance of organizations: the network effect', *American Sociological Review*, 61(4), pp. 674–698.

Uzzi, B., 1997. Social structure and competition in interfirm networks... *Administrative science quarterly*, *42*(1), pp.37-69.

Van Nes, F., Abma, T., Jonsson, H. and Deeg, D. (2010) 'Language differences in qualitative research: is meaning lost in translation?', *European Journal of Ageing*, 7(4), pp. 313–316.

Van Riel, C.B. and Fombrun, C.J. (2007) *Essentials of Corporate Communication:*

Implementing Practices for Effective Reputation Management. London: Routledge.
Vanhala, M. and Tzafrir, S.S. (2021) 'Organisational trust and performance in different contexts', *Knowledge and Process Management*, 28(4), pp. 331–344.

Vanpoucke, E. and Ellis, S.C. (2020) 'Building supply-side resilience–a behavioural view', *International Journal of Operations and Production Management*, 40(1), pp. 11–33.

Villena, V.H., Revilla, E. and Choi, T.Y., 2011. The dark side of buyer–supplier relationships: A social capital perspective. *Journal of Operations management*, *29*(6), pp.561-576.

Voss, C., Tsikriktsis, N. and Frohlich, M. (2002) 'Operations management case research', *International Journal of Operations and Production Management,* 22(2), pp.195–219.

Werner, M.J.E., Yamada, A.P.L., Domingos, E.G.N., Leite, L.R. and Pereira, C.R. (2021) 'Exploring organizational resilience through key performance indicators', *Journal of Industrial and Production Engineering*, 38(1), pp. 51–65.

Whipple, J.M., Wiedmer, R. and Boyer, K.K. (2015) 'A dyadic investigation of collaborative competence, social capital, and performance in buyer–supplier relationships', *Journal of Supply Chain Management*, 51(2), pp. 3–21.

Wieland, A. and Wallenburg, C.M. (2013) 'The influence of relational competencies on supply chain resilience: a relational view', *International Journal of Physical Distribution and Logistics Management*, 43(4), pp. 300–320.

Wieland, A. and Durach, C.F. (2021), 'Two perspectives on supply chain resilience', *Journal of Business Logistics*, 42(3), pp.315–322.

Wieland, A. (2021), 'Dancing the supply chain: Toward transformative supply chain management', *Journal of Supply Chain Management*, 57(1), pp.58–73.

Wieland, A., Stevenson, M., Melnyk, S.A., Davoudi, S. and Schultz, L. (2023), 'Thinking differently about supply chain resilience: what we can learn from social-ecological systems thinking', *International Journal of Operations & Production Management*, 43(1), pp. 1–21.

World Economic Forum (2021) ‘The resiliency compass: navigating global value chain disruption in an age of uncertainty’, *World Economic Forum*. Available at: https://www3.weforum.org/docs/WEF_Navigating_Global_Value_Chains_Disruptions_2021.pdf (Accessed: 28 September 2024).

Yang, C.C. and Hsu, W.L. (2018) ‘Evaluating the impact of security management practices on resilience capability in maritime firms, a relational perspective’, *Transportation Research Part A: Policy and Practice*, 110, pp. 220–233.

Yang, J., Liu, Y. and Kholaif, M.M.N.H.K. (2024) ‘The impact of relationship management on manufacturer resilience in emergencies’, *Kybernetes*, 53(3), pp. 960–989.

Yin, R.K. (2009) *Case Study Research: Design and Methods*. Vol. 5. Thousand Oaks, CA: Sage.

Yin, R.K. (2018) *Case Study Research and Applications*. Vol. 6. Thousand Oaks, CA: Sage.

Yu, W., Chavez, R., Jacobs, M.A. and Wong, C.Y. (2022) ‘Openness to technological innovation, supply chain resilience, and operational performance: exploring the role of information processing capabilities’, *IEEE Transactions on Engineering Management*, 71, pp. 1258–1270.

Yu, W., Wong, C.Y., Chavez, R., Jacobs, M. and Nittala, L. (2023) ‘How intellectual capital builds supply chain resilience? Exploring mediation and interaction effects from an intellectual capital based view’, *Supply Chain Management: An International Journal*, 28(6), pp. 1060–1074.

Zheng, L., Song, G., Song, S., Huang, N. and Cheng, T.C.E. (2025) ‘How do talent and technology factors affect supply chain robustness and resilience? Evidence from Chinese manufacturers’, *Industrial Management and Data Systems*.

Zhou, L., Peng, M.Y.P., Shao, L., Yen, H.Y., Lin, K.H. and Anser, M.K. (2021) ‘Ambidexterity in social capital, dynamic capability, and SMEs’ performance: quadratic effect of dynamic capability and moderating role of market orientation’, *Frontiers in Psychology*, 11, p. 584969.

Zsidisin, G.A. and Wagner, S.M. (2010) ‘Do perceptions become reality? The moderating role of supply chain resiliency on disruption occurrence’, *Journal of Business Logistics*, 31(2), pp. 1–20.

Zhang, Y., Purvis, L., Huang, Y. and Wang, Y., (2026) ‘An investigation into human related factors for enhanced supply chain resilience: a systematic literature review’, *International Journal of Production Research*, pp.1-32.

Appendix A. Data Collection Tool: Semi-Structured Interview

The data collection tool is a semi-structured interview. we will use the following questions as a guide for our interviews on the topics of social capital, human capital, and cognition within the organisation and their impact on resilience:

Interview Questions-1st phase

Participant role	Interview question（CN/EN）	Theme / Focus
All participants	1. 请您先做一个简短的背景介绍：贵公司主要做什么？您目前的岗位职责是什么？您在这个岗位做了多久？Can you please give a brief background introduction? What is your company all about? What are your responsibilities, and how long have you been in this role?	Company & role background
All participants	2. 贵组织是否会利用个人关系/私人联系来提升供应链韧性，或在困难时期提供过帮助？能否谈谈这种情况？Can you talk about how your organisation uses personal connections to enhance supply chain resilience, or how such connections have helped during tough times?	Social Capital (overview)
All participants	3. 贵组织有哪些做法来建立和强化网络中的社会资本（如信任、互惠、沟通、合作）？能否分享这些做法如何提升韧性的具体案例？What practices does your organisation implement to build and strengthen social capital within your network (e.g., trust, reciprocity, communication, cooperation)? Could you share specific examples where these practices contributed to resilience?	Social Capital practices
All participants	4. 请您分享：您通过教育、培训或工作经验获得了哪些技能/能力，帮助提升供应链韧性或应对困难时期？Can you share what skills or capabilities you have gained from education, training, or experience that help increase supply chain resilience or support you during tough times?	Human Capital (overview)
All participants	5. 能否分享一个具体案例：贵组织的人力资本相关做法（如培训、经验传承、岗位学习等）如何促进韧性提升？Can you share a specific example where human capital practices in your organisation (e.g., training, experience transfer, on-the-job learning) contributed to enhanced resilience?	Human Capital practices
All participants	6. 关于认知方面：您如何看待管理者对供应链中断的认知、员工的认知特点，以及团队/组织层面的共同共识？这些因素是否在困难时期帮助提升韧性？Can you share insights on cognition, such as managers' perceptions of supply chain disruptions, employees' cognitive attributes, and any shared consensus, that helped increase supply chain resilience during tough times?	Cognition (overview)
All participants	7. 贵组织有哪些做法来建立和强化认知相关能力（如风险识别、情境判断、共享语言/叙事、复盘机制等）？能否分享这些做法提升韧性的具体案例？What practices does your organisation implement to build and strengthen cognition within your network (e.g., risk sensing, situational assessment, shared language/narratives, debrief routines)? Could you share specific examples where these cognition practices contributed to enhanced resilience?	Cognition practices

Interview Questions-2nd phase

Respondent group	Main question（CN/EN）	Optional probes	Theme/ Practice/ Focus
Managers	1. 您有没有特别信任的供应商、客户或物流伙伴？面对突发事件，他们是否更愿意优先支持您？Do you have trusted suppliers, customers, or logistics partners who are more willing to support you first during disruptions?	1) 这种信任主要如何形成（长期合作/个人关系/制度机制）？How was this trust built (long-term cooperation, personal ties, or formal mechanisms)?2) 能否举例说明一次危机中这种信任如何发挥作用？Could you share an example where this trust mattered during a crisis?	Social Capital/ Trust/ External
Managers	2. 面对突发事件或不确定决策时，您是否会向朋友、亲人或私人熟人征求建议？他们的意见会影响您的判断吗？When facing disruptions or uncertain decisions, do you seek advice from friends, family, or personal acquaintances? Do their views influence your decisions?	1) 您更信任哪些人？为什么？Whom do you trust most for advice, and why?2) 这些非正式信息是否影响您对风险或应对方案的理解？Has informal advice shaped how you perceive risks or response options?	Social Capital/ Trust/ External
Managers	3. 在分配任务或处理紧急情况时，您是否更愿意委派给您信任的员工？他们在压力下是否更可靠？When assigning tasks or managing emergencies, do you prefer to delegate to employees you trust? Are they more reliable under pressure?	1) 这种信任是否让决策或执行更快？具体体现在哪些环节？Does trust speed up decisions or execution, at which points?2) 您平时如何与下属建立信任？How do you usually build trust with subordinates?	Social Capital/ Trust/ Internal
Employees	4. 面对突发问题或中断时，您是否会优先联系您信任的同事？与他们协作是否更高效？When disruptions or unexpected issues arise, do you contact colleagues you trust first? Is collaboration with them more efficient?	1) 这种信任如何帮助更快分工、减少误解？How does trust help you divide tasks faster or reduce misunderstandings?2) 能否分享一次相关经历？Could you share an example?	Social Capital/ Trust/ Internal
Employees	5. 您是否觉得上级信任您？是否愿意给予您一定自主权去快速处理问题？Do you feel trusted by your supervisor? Are you given autonomy to act quickly and handle issues?	1) 被信任是否增强了责任感或主动性？Does being trusted increase your sense of responsibility or proactivity?2) 在一次突发事件中，这种自主权具体带来了什么结果？In a disruption, what difference did autonomy make?	Social Capital/ Trust/ Internal
Everyone	6. 与供应商或物流伙伴合作中，是否存在“互相支持”的默契？当他们发现潜在风险或关键信息时，会主动第一时间分享吗？In working with suppliers or logistics partners, is there a sense of mutual support? When they identify key information or potential risks, do they proactively share it with you?	1) 这种互相支持是否帮助您更早识别风险、争取时间？Has this reciprocity helped you detect risks earlier and gain time to respond?2) 对方通常通过什么方式/渠道来分享信息？How do they usually share such information (channels, routines)?	Social Capital/ Reciprocity/ External
Everyone	7. 您是否在危机中获得过合作方的“优先支持”或“特别照顾”？您认	1) 您认为对方愿意优先支持的关键原因是什么？What do you think	Social Capital/ Reciprocity/ External

	为这与过去双方的互相支持有关吗？Have you received priority support from suppliers or partners during crises? Do you think it relates to past mutual support?	are the main reasons they prioritize you?2) 这种关系是否影响危机中的协作效率？Has it affected collaboration efficiency during disruptions?	
Everyone	8. 当供应中断或突发问题发生时，那些与您有过“互相帮忙”经历的合作方，是否更愿意与您一起分析原因、共同解决？When disruptions occur, are partners with whom you have a history of mutual help more willing to analyze causes and solve the problem together?	1) 这种互惠是否减少等待、推诿或反复沟通？Does reciprocity reduce delays, avoidance, or repeated back-and-forth?2) 能否分享一次共同解决问题的过程？Could you share an example of joint problem-solving?	Social Capital/ Reciprocity/ External
Everyone	9. 您是否经历过合作方在非合同义务下，主动分享经验、技术或流程等知识？您认为这与双方关系有关吗？Have partners voluntarily shared knowledge (e.g., expertise, techniques, or processes) beyond contractual obligations? Do you think this relates to the relationship between you?	1) 这种知识分享对贵组织能力或应变效率有什么帮助？How did such sharing help your capabilities or adaptability?2) 分享通常发生在什么情境/触发条件下？Under what situations or triggers did it occur?	Social Capital/ Reciprocity/ External
Everyone	10. 有没有同事在您忙不过来或遇到困难时主动帮您？您是否也愿意回报这份帮助？在突发事件中，团队成员是否愿意“顶上去”帮助彼此？Have colleagues helped you when you were overwhelmed or in trouble, and were you willing to return the favor? During emergencies, are team members willing to step in to help beyond their own responsibilities?	1) 这种互助是否减少等待、协调成本或责任边界不清带来的问题？Does mutual help reduce delays, coordination costs, or role ambiguity?2) 能否举例说明一次“顶上去”的情境？Could you share an example of stepping in during an emergency?	Social Capital/ Reciprocity/ Internal
Managers	11. 合作方遇到困难时，您是否愿意提供灵活支持（如放宽交付期限、协同资源等）？When partners are in trouble, are you willing to offer flexibility or support (e.g., relaxing delivery terms or providing resources)?	1) 您通常如何权衡“支持对方”与“自身风险/成本”？How do you balance supporting partners with your own risks/costs?2) 这种做法是否在之后带来更稳定合作或更快响应？Has it later contributed to more stable cooperation or faster response?	Social Capital/ Reciprocity/ External
Everyone	12. 与外部伙伴（供应商、客户、第三方物流等）的沟通是否及时、透明？紧急时刻能否快速获取关键信息？Is communication with external partners (suppliers, customers, third-party logistics, etc.) timely and transparent? In urgent situations, can you obtain critical information quickly?	1) 关键时刻哪些信息最难获得？为什么？What critical information is hardest to obtain, and why?2) 沟通效率会如何影响判断与响应？How does communication efficiency affect decisions and response speed?	Social Capital/ Communication/ External
Everyone	13. 团队在压力或突发任务下，沟通是否顺畅？信息能否在团队内快速传递？When under pressure or facing sudden tasks, is communication within your team	1) 哪些环节最容易“卡住”或产生误解？Where do bottlenecks or misunderstandings most often occur?2) 沟通是否帮助明确分工、统一节奏、减少混乱？Does communication help clarify roles,	Social Capital/ Communication/ Internal

	smooth? Can information be shared quickly?	synchronize action, and reduce confusion?	
Managers	14. 是否建立了与外部伙伴的“预警沟通”机制？他们是否会主动提前通知潜在风险？Do you have early-warning communication mechanisms with external partners? Do they proactively notify you of potential risks?	1) 主要依赖哪些渠道（系统/群组/电话/邮件等）？哪些最有效？Which channels are used (systems, group chats, calls, email), and which are most effective?2) 预警机制如何帮助减轻中断影响？How does early warning help mitigate disruption impacts?	Social Capital/ Communication/ External
Managers	15. 是否建立了清晰的内部汇报或预警机制（例如哪些问题必须上报、如何上报）？Have you established clear internal reporting or early-warning mechanisms (e.g., what must be reported and how)?	1) 在突发事件中，上报链条是否顺畅？哪里可能延误？During disruptions, is escalation smooth? Where can delays occur?2) 该机制如何提升识别与响应能力？How has it improved detection and response?	Social Capital/ Communication/ Internal
Employees	16. 出现问题或中断时，您是否清楚应该联系谁？是否知道如何及时汇报或沟通？When disruptions occur, do you know who to contact and how to report or communicate promptly?	1) 主要依赖固定流程还是非正式通道？各自优缺点是什么？Do you rely more on formal protocols or informal channels, and what are the pros/cons?2) 能否举例说明一次沟通/汇报的实际过程？Could you describe one real reporting/communication episode?	Social Capital/ Communication/ Internal
Employees	17. 您觉得与上级沟通顺畅吗？可以自由表达问题或建议吗？Do you feel communication with your supervisor is smooth? Can you openly raise issues or suggestions?	1) 这种双向沟通会如何影响问题暴露与解决？How does two-way communication affect issue surfacing and problem-solving?2) 是否存在不方便说/不敢说的情况？原因是什么？Are there situations where you hesitate to speak up, and why?	Social Capital/ Communication/ Internal
Everyone	18. 面对突发中断时，您是否能够快速与供应商、物流方或客户进行协调合作？During disruptions, are you able to quickly coordinate with suppliers, logistics providers, or customers?	1) 您认为顺畅协调更依赖流程机制、关系基础还是既往协作经验？Do you think smooth coordination relies more on formal processes, relationships, or past experience?2) 能否举例说明一次快速协调的过程？Could you share an example of rapid coordination?	Social Capital/ Cooperation/ Internal
Everyone	19. 与外部伙伴（供应商、客户、第三方物流等）跨组织合作时，您是否觉得彼此配合顺畅？When working with external partners (e.g., suppliers, customers, third-party logistics), do you feel cooperation is smooth?	1) 哪些机制或信任基础在危机时最关键？Which mechanisms or trust foundations matter most during crises?2) 配合不顺时通常卡在哪个环节？When cooperation breaks down, where is the main bottleneck?	Social Capital/ Cooperation/ External
Everyone	20. 合作方是否愿意灵活配合您的调整请求（如变更交付时间、优先调配资源）？Are partners willing to adjust delivery times or reallocate resources based on your needs during disruptions?	1) 这种灵活性对供应链响应（速度/连续性）带来什么影响？How does such flexibility affect responsiveness (speed/continuity)?2) 对方不愿意配合时，通常原因是什么？If	Social Capital/ Cooperation/ External

		they are unwilling, what are the usual reasons?	
Everyone	21. 组织是否鼓励跨部门协作？您觉得这种合作是否真正“有用/有效”？ Does your organisation encourage cross-department collaboration? Do you find this cooperation meaningful and effective?	1) 在中断或突发事件中，这种协作机制是否发挥作用？ During disruptions, do these collaboration mechanisms work as intended?2) 如果无效，主要问题是什么（信息、权责、资源等）？ If not, what are the main issues (information, accountability, resources, etc.)?	Social Capital/ Cooperation/ Internal
Managers	22. 在跨部门或团队协作中，您通常如何推动合作？ How do you promote cross-functional cooperation?	1) 您如何处理分歧、边界不清或责任争议？ How do you handle disagreements, unclear boundaries, or accountability disputes?2) 这种推动方式是否降低协调成本、提升协同效率？ Has your approach reduced coordination costs and improved collaboration efficiency?	Social Capital/ Cooperation/ Internal
Employees	23. 工作中，哪些同事或部门最容易与您合作？为什么？ Which colleagues or departments are the easiest to cooperate with, and why?	1) 是否因为彼此熟悉、沟通顺畅、或协作习惯一致？ Is it due to familiarity, smooth communication, or shared working habits?2) 遇到不容易合作的情况时，您通常怎么应对？ How do you usually cope when cooperation is difficult?	Social Capital/ Cooperation/ Internal
Everyone	24. 您是否接受过与供应链中断、风险应对、突发事件处理相关的培训？这些培训在实践中有帮助吗？ Have you received training related to supply chain disruptions, risk response, or emergency handling? Was it useful in practice?	1) 哪些内容最“用得上”？在什么场景用到？ Which parts were most useful, and in what situations?2) 能否举一个培训帮助到实际处理问题的例子？ Could you share an example where training helped in practice?	Human Capital/ Training & Education
Everyone	25. 您认为您的学历或教育背景是否提升了您分析问题、做决策、应对突发情况的能力？ Do you think your education background has improved your ability to analyze problems, make decisions, and handle unexpected events?	1) 是否影响您对复杂系统/风险信号的理解与敏感性？ Has it affected your understanding of complex systems or sensitivity to risk signals?2) 有没有具体课程/知识在风险沟通或协调中起作用？ Were there specific courses/knowledge that helped with risk communication or coordination?	Human Capital/ Training & Education
Managers	26. 您是否接受过关于决策、危机管理或战略应对的管理类培训？是否提升了您在中断情境下的判断力？ Have you received training in decision-making, crisis management, or strategic response? Did it enhance your judgment under disruptions?	1) 是否学到过评估风险或制定应急方案的工具/方法？ Did you learn tools/methods for risk assessment or contingency planning?2) 在一次实际中断中，这些方法是否被用上？ Were these methods applied in a real disruption?	Human Capital/ Training & Education
Managers	27. 您是否会为员工安排相关培训？培训后他们的表现是否有变化？ Do you arrange such training	1) 哪些方面变化最明显（错误减少/响应更快/协作更好）？ What changes were most visible (fewer errors, faster response, better	Human Capital/ Training & Education

	for your team? Have you observed changes in performance afterwards?	collaboration)?2) 哪类岗位/能力最需要培训？Which roles/capabilities need training the most?	
Employees	28. 公司是否为您提供过与供应链运营、风险管理或应急处理相关的培训？您觉得有帮助吗？Has the company provided training in supply chain operations, risk management, or emergency handling? Was it helpful?	1) 您在实际工作中是否用到过？能否举例？Have you applied it in real work? Could you share an example?2) 还有哪些培训缺口？What training gaps remain?	Human Capital/ Training & Education
Employees	29. 您觉得学历或学习经历是否帮助您更好理解流程、判断问题、执行任务？Do you think your education or learning experience helps you understand processes, assess issues, and execute tasks better?	1) 遇到突发变化时，您通常如何快速上手？How do you ramp up quickly when something changes suddenly?2) 您认为“学习能力/知识储备”最关键体现在哪？Where does learning/knowledge matter most in your work?	Human Capital/ Training & Education
Everyone	30. 您过去是否经历过供应链中断或突发问题？当时如何应对？Have you experienced supply chain disruptions or sudden problems in the past? How did you respond?	1) 这段经历教会您哪些应对原则/做法？What principles or practices did you learn from it?2) 之后是否形成了更固定的应急习惯或流程？Did it lead to more standardized response routines?	Human Capital/ Experience
Everyone	31. 您是否会把自己的经验传授给团队（如案例复盘、工作指导）？这是否帮助团队成长？Do you share your experience with your team (e.g., case reviews, mentoring)? Does it help others grow?	1) 您会反复强调哪些“经验要点”？What key lessons do you emphasize repeatedly?2) 这种经验传承是否减少错误或提升效率？Has it reduced mistakes or improved efficiency?	Human Capital/ Experience
Managers	32. 您的管理经验中是否有处理供应中断、市场变化等危机的案例？您采取了哪些关键举措？In your managerial experience, have you handled crises such as supply interruptions or market shifts? What were your key actions?	1) 当时决策更多基于经验判断、数据分析还是行业惯例？Were decisions mainly based on experience, data, or industry norms?2) 事后复盘中，您觉得哪些做法最有效？After reflection, what worked best and why?	Human Capital/ Experience
Employees	33.您是否通过工作积累了处理突发问题的经验？能否分享一次最印象深刻的经历？Have you developed experience in handling unexpected issues through work? Could you share a memorable example?	1) 这次经历之后，您在类似情况中是否更有信心/更快行动？Did it increase your confidence or speed in similar situations later?2) 您学到的“关键做法”是什么？What was the key takeaway practice?	Human Capital/ Experience
Employees	34. 老同事、师傅或主管是否在工作中向您传授经验？这种传帮带是否帮助您更快适应？Have experienced colleagues, mentors, or supervisors shared know-how with you? Did it help you adapt more quickly?	1) 是否形成了某些固定的“经验口诀/应对习惯”？Did it form any recurring “rules of thumb” or response habits?2) 您最希望在哪些方面得到更多指导？Where do you want more guidance?	Human Capital/ Experience
Managers	35. 您如何识别和判断供应链中的中断或风险？是否有一套判断标准或框架？How do you identify	1) 您更依赖经验、数据还是直觉？为什么？Do you rely more on experience, data, or intuition, and	Coginition/ Managers’

	and assess disruptions or risks in the supply chain? Do you have a personal framework or standard?	why?2) 能否举例说明一次您如何做出风险判断？Could you share an example of how you assessed a risk?	Cognitive Attributes
Managers	36. 面对变化或不确定性时，您更倾向于规避风险还是抓住机会？When facing change or uncertainty, do you tend to avoid risks or pursue opportunities?	1) 这种倾向如何影响您在中断情境下的决策速度与选择？How does this tendency affect decision speed and choices during disruptions?2) 团队是否会受这种倾向影响？Does it influence the team's actions?	Cognition/ Managers' Cognitive Attributes
Managers	37. 面对复杂问题时，您更偏好分步骤处理，还是整体性思考？When facing complex problems, do you prefer step-by-step analysis or holistic thinking?	1) 在突发事件中，这种方式带来哪些优势/局限？In disruptions, what are the benefits and limitations of this style?2) 能否举一个具体决策场景？Could you describe a specific decision scenario?	Cognition/ Managers' Cognitive Attributes
Managers	38. 在做出中断应对决策时，您的情绪状态是否会影响判断风格（如更谨慎或更果断）？When making disruption-related decisions, does your emotional state affect your decision style (e.g., more cautious vs. more decisive)?	1) 您是否会在重大决策前进行情绪调节？怎么做？Do you consciously regulate emotions before critical decisions? How?2) 能否分享一次情绪对判断产生影响的经历？Could you share an example where emotions affected judgment?	Cognition/ Managers' Cognitive Attributes
Employees	39. 现场出现异常情况时，您能否快速判断问题严重程度或可能后果？When issues arise on site, can you quickly assess severity and potential consequences?	1) 您主要靠经验、培训还是与他人讨论来判断？Do you rely more on experience, training, or consultation?2) 哪些信号最能帮助您做出快速判断？What signals help you assess quickly?	Cognition/ Employees' Cognitive Attributes
Employees	40. 面对困难时，您是否表现出较强责任感与投入度，会坚持到问题解决为止吗？When facing difficulties, do you show strong commitment and stay engaged until the issue is resolved?	1) 这种投入是否受到他人信任或团队氛围影响？Is your commitment influenced by trust from others or team climate?2) 在一次突发事件中，您坚持到底带来了什么结果？In a disruption, what outcome did your persistence lead to?	Cognition/ Employees' Cognitive Attributes
Employees	41. 处理新情况时，您是否会通过他人经验、案例或现场情境来"理解问题本质"？When facing unfamiliar problems, do you try to make sense of them through others' experience, examples, or the situation itself?	1) 您通常如何建立这种理解（信息来源/讨论方式）？How do you build this understanding (sources, discussions)?2) 这种理解如何帮助您找到应对办法？How does it help you identify solutions?	Cognition/ Employees' Cognitive Attributes
Employees	42. 您是否见过同事因情绪影响而判断失误或处理不当？Have you seen a colleague make poor judgments or mishandle a situation due to emotions?	1) 当时发生了什么？对团队应对造成了什么影响？What happened, and how did it affect the team's response?2) 团队后来是否有改进做法（复盘/提醒机制）？Did the team later improve practices (debriefs, reminders)?	Cognition/ Employees' Cognitive Attributes

Everyone	43. 公司内外部日常沟通或操作中，是否有共同认可的术语、流程称呼或表达方式？In daily internal and external operations/communication, do you share common terms, process names, or codes?	1) 在跨部门或应急指挥中，这种共享语言如何影响沟通效率与误解减少？In cross-department or emergency coordination, how does shared language reduce misunderstandings and improve efficiency?2) 如果没有统一术语，会出现什么典型问题？If terms are not standardized, what issues typically occur?	Cognition/ Shared Language and Code/ Internal and External
Everyone	44. 公司内部或与合作伙伴之间，是否会有意使用成功/失败故事来强化风险意识与准备，尤其在危机或重大事件之后？Do you (internally or with partners) intentionally use success/failure stories to strengthen risk awareness and preparedness, especially after crises or major events?	1) 哪类故事更容易被团队/伙伴吸收并形成共识？为什么？What types of stories are more easily absorbed and turned into consensus, and why?2) 这种故事是否帮助在类似事件中更快达成一致判断？Does it help reach shared judgments faster in similar incidents?	Cognition/ Shared Narrative/ Internal and External
Everyone	45. 您是否从过去的故事或前人的经历中学到过应对技巧或风险意识？Have you learned response skills or risk awareness from past stories or others' experiences?	1) 哪一类故事对您影响最大？为什么？What kind of story had the greatest impact on you, and why?2) 这些故事是否改变了您之后的行为或决策？Did these stories change your later behaviors or decisions?	Cognition/ Shared Narrative/ Internal and External

Appendix B. Interview Data Processing Overview

A summary of the sequential procedures for transcribing, cleaning, translating, coding, and verifying the interview data.

Stage	Description of Process	Key Objectives	Output / Deliverable
1. Transcription	All interviews were transcribed verbatim in Chinese immediately after each session. Transcripts were checked against audio recordings for accuracy and completeness.	Ensure the preservation of participants' authentic expressions and contextual meaning.	Verified Chinese transcripts with anonymised participant codes.
2. Cleaning	Transcripts were cleaned by removing fillers, repetitions, and grammatical errors; sentence structures were adjusted for coherence while maintaining meaning.	Enhance readability and analytical clarity without altering meaning.	Cleaned Chinese transcripts ready for translation and coding.
3. Translation	Cleaned transcripts were translated into English by the researcher using a meaning-based approach. Selected excerpts were back-translated to ensure accuracy.	Maintain semantic equivalence and preserve contextual nuances.	English-translated transcripts consistent with the original meaning.
4. Coding (NVivo 14)	The cleaned and translated transcripts were imported into NVivo 14 for qualitative data analysis using a five-level inductive–deductive coding framework (1st–5th order). The coding progressed from first-order themes (Human Factors) to second-order capabilities (Social Capital, Human Capital, Cognition), third-order practices, fourth-order focuses, and fifth-order actors.	Systematically develop a five-level coding hierarchy (themes → capabilities → practices → focuses → actors) to support rigorous within- and cross-case analysis.	Comprehensive five-level coding framework with linked memos, enabling synthesis of descriptive findings and comparative analysis across cases.
5. Memoing and Verification	Analytical memos were written throughout coding to document reflections and conceptual insights; emerging themes were reviewed iteratively.	Ensure traceability, analytical rigour, and conceptual integration across cases.	Memo files and verified coding framework supporting analysis chapters.

Appendix C. Data Cleaning Protocol

This appendix outlines the systematic procedure applied to clean the interview transcripts before translation and coding. The purpose of the data-cleaning stage was to improve textual coherence and analytic usability while preserving participants' authentic meanings and expressions.

Part 1 – Cleaning Objectives

The main objectives of data cleaning were to:

i) Eliminate elements that hinder readability (e.g., fillers, repeated words, speech hesitations, incomplete clauses).
ii) Correct minor grammatical inconsistencies while maintaining the original intent and tone.
iii) Reconstruct broken or interrupted sentences into complete, coherent statements.
iv) Standardise formatting across transcripts (e.g., timestamp alignment, consistent speaker identifiers).
v) Protect anonymity by removing names, company identifiers, or confidential business details.
vi) Ensure that each transcript could be traced accurately to its corresponding audio record.

Part 2 – Illustration of Transcription, Cleaning, and Translation Process

Stage	Example Excerpt	Description / Note
1. Original Transcription (Chinese Verbatim)	"我的供应商里面中的帮助，有次就像另外一家缺货的话，另外有家，就其他说了好的那种很熟悉的那种经常合作到的，即使从他可以调货那种的也是可以噻。关系好噻肯定关系好他才会帮你噻，关系不好他肯定他就不会这个事。"	The audio recording was transcribed verbatim in Chinese, preserving the participant's colloquial speech, dialectal expressions (e.g., '噻', '嘛', '哦'), and repetitions. No grammatical or structural adjustments were made at this stage.
2. Cleaned Transcript (Chinese Refined Version)	"有次另外一家供应商缺货，我们急着要货。那时候一个和我们合作很久、关系很熟的供应商，就主动帮我们从他那边的其他网点调货。"	Redundant words, repetitions, and dialectal fillers were removed. Sentence structure and word order were adjusted for grammatical accuracy and coherence, while the original meaning and tone were fully preserved.
3. English Translation (Meaning-based)	"There was a time when another supplier was out of stock and we were in a hurry to get the goods. At that time, a supplier with whom we have cooperated for a long time and have a very good relationship volunteered to	A meaning-based translation approach was adopted to preserve the semantic intent, tone, and narrative flow of the original Chinese text, avoiding literal translation that could distort meaning.

	help us transfer goods from other outlets on his side. ”	
4. Analytical Coding Tag (NVivo)	Node: External Cooperation with Upstream Partners → Responsiveness	The excerpt was coded as evidence of *external cooperation (upstream partners)*, illustrating how supplier trust and long-term relationships enabled flexible resource allocation and enhanced supply chain responsiveness.

Notes:

i) All Chinese transcripts were first cleaned in the source language to preserve semantic accuracy and cultural context (Temple and Young, 2004; van Nes et al., 2010; Squires, 2009; Santos et al., 2015).
ii) The English translation followed a meaning-equivalence rather than a word-for-word approach to ensure linguistic fidelity and contextual accuracy.
iii) Original audio files, cleaned Chinese texts, and English translations were securely archived for transparency and audit purposes

Part 3 The Researcher’s Role and Reflexive Rationale

All cleaning was performed manually by the researcher to ensure a deep understanding of linguistic nuances and contextual cues. The process was reflexive and iterative: when ambiguity arose, the researcher returned to the audio file or field notes to confirm intent. This human-driven approach preserved the authenticity of participants’ voices while preparing the data for rigorous coding.

Part 4 Ethical and Methodological Compliance

In line with qualitative research guidelines, all transcripts were lightly edited for clarity and conciseness without altering meaning (Miles and Huberman, 1994; Creswell, 2013). Original verbatim transcripts were securely archived to maintain an auditable record of data transformation.

Part 5 Outcome

The cleaned transcripts produced a coherent and trustworthy dataset that captured participants’ authentic voices, thereby forming the empirical foundation for the descriptive findings in Chapter 4 and enabling systematic within-case and cross-case analyses in Chapter 5, which collectively contributed to the theoretical development of this study.

Appendix D. Comprehensive Coding Framework (1st–5th Order) with Notes for Use

Part 1 Coding Framework Structure (1st–5th Order)

1st-order Theme	2nd-order Capabilities	3rd-order Practices	4th-order Focus	5th-order Actor
Human Factors	Social Capital	Trust	Internal / External	Internal: Horizontal / Vertical External: Upstream partners / Downstream partners / Multiple SC partners (multi-tier interaction) / Broader Relationship Network
		Reciprocity	Internal / External	Same as above
		Communication	Internal / External	Same as above
		Cooperation	Internal / External	Same as above
	Human Capital	Training & Education	Internal / External	Internal: Managers / Employees External: Upstream partners / Downstream partners / Multiple SC partners (multi-tier interaction) / Broader Relationship Network
		Experience	Internal / External	Same as above
	Cognition	Individual Cognitive Attributes	Internal / External	Internal: Managers / Employees
		Shared Language and Code	Internal / External	Internal: Horizontal / Vertical External: Upstream partners / Downstream partners / Multiple SC partners (multi-tier interaction) / Broader Relationship Network
		Shared Narrative	Internal / External	Same as above

Part 2 Notes for Use: Definitions and Examples for 5th-order Actor

Category	Subcategory	Definition (including participants)	Examples
Internal	Horizontal ties	Relationships or interaction among employees or departments at the same hierarchical level within the focal firm.	Cross-department teamwork, informal peer support, mentorship among colleagues at the same level
Internal	Vertical ties	Relationships or interaction between different hierarchical levels within the focal firm, involving managers, supervisors, and subordinates.	Manager–employee trust, upward feedback, leadership guidance
Internal	Managers	Individual characteristics of managers.	Leadership experience, strategic decision-making skills
Internal	Employees	Individual characteristics of employees.	Operational skills, frontline problem-solving ability
External	Upstream partners	Relationships or interaction between the focal firm's managers or employees and upstream organisations (e.g., suppliers, logistics providers) that provide raw materials, components, products, or related services.	Key raw material suppliers, packaging suppliers, third-party logistics companies providing inbound transportation or warehousing
External	Downstream partners	Relationships or interaction between the focal firm's managers or employees	Distributors, retailers, corporate clients, third-party

		and downstream organisations (e.g., customers, logistics providers) purchasing products or services and/or supporting outbound distribution.	logistics companies providing last-mile delivery or distribution services
External	Multiple SC partners (multi-tier interaction)	Relationships or interaction involving the focal firm, upstream partners, and downstream partners simultaneously.	Supplier–focal firm–customer joint meetings; cross-tier disruption response planning
External	Broader Relationship Network	Relationships or interaction between the focal firm's managers or employees and external non-SC organisations, personal contacts in the industry, or family members. These connections may include institutions (e.g., industry associations), personal-level industry ties (e.g., friends or acquaintances), and relatives whose positions, resources, or knowledge can indirectly benefit the firm.	Industry associations; friends, acquaintances in the sector; relatives working in related industries

Part 3 – Note on Classification Logic

The classification logic ensures consistent coding and interpretation across internal and external relationships.

Internal Classification Logic:

i) Horizontal / Vertical → Used for *interactive practices based on relationships* (e.g., trust, reciprocity, communication, cooperation, shared language, shared narrative).

ii) Managers / Employees → Used for *individual attribute-based practices by role* (e.g., training & education, experience, individual cognitive attributes).

External Classification Logic:

i) External classification is consistent across all practices: Upstream partners, Downstream partners, Multiple SC partners (multi-tier interaction), Broader Relationship Network.

This five-level coding framework was applied consistently across all cases to ensure analytical depth, comparability, and theoretical coherence in the qualitative analysis presented in Chapters 4 and 5.

Appendix E. Ethical Approval

Monday, December 29, 2025 at 3:00:39 PM Greenwich Mean Time

Subject: Your ethics application has been APPROVED: ID 2173; An Investigation of Human-Related Factors for Enhanced Supply Chain Resilience.
Date: Wednesday, 3 January 2024 at 15:04:58 Greenwich Mean Time
From: CARBS Research Office-Ethics
To: Yueheng Zhang

Dear Yueheng Zhang,

Research project title: An Investigation of Human-Related Factors for Enhanced Supply Chain Resilience.
SREC reference: 2173

The School Research Ethics Committee (SREC) reviewed the above application via its proportionate review process.

Ethical Opinion
The Committee gave a favourable ethical opinion of the above application on the basis described in the application form, protocol and supporting documentation.

Additional approvals
This letter provides an ethical opinion only. You must not start your research project until all any other approvals required for your research project (where relevant) are in place.

Amendments
Any substantial amendments to documents previously reviewed by the Committee must be submitted to the Committee via CARBS-ResearchEthics@cardiff.ac.uk for consideration and cannot be implemented until the Committee has confirmed it is satisfied with the proposed amendments.

You are permitted to implement non-substantial amendments to the documents previously reviewed by the Committee but you must provide a copy of any updated documents to the Committee via CARBS-ResearchEthics@cardiff.ac.uk for its records.

Monitoring requirements
The Committee must be informed of any unexpected ethical issues or unexpected adverse events that arise during the research project.

The programme director would include your research in end of project report. The Committee must be informed when your research project has ended. This notification should be made to CARBS-researchethics@cardiff.ac.uk within three months of research project completion.

Documents reviewed by the Committee
The documents reviewed by the Committee were:
Application ID: 2173
Link to applications list, where you can access the reviewed version.
Data Collection Tool.docx
Debrief Sheet.docx

1 of 2

Invitation Letters.docx
Research Proposal for Ethics Application.docx
SREC-New feedback form - July 2021 version.docx
Version(2)_Participant Information Sheet.docx
Version(3)_CARBS Ethics application form.docx
Version(3)_CONSENT FORM.docx
Yueheng_Completion of Research Integrity Training.pdf

Complaints/Appeals

If you are dissatisfied with the decision made by the Committee, please contact Dr Carmela Bosangit (BosangitC@cardiff.ac.uk) in the first instance to discuss your complaint. If this discussion does not resolve the issue, you are entitled to refer the matter to the Head of School for further consideration. The Head of School may refer the matter to the University Research Integrity and Ethics Committee (URIEC), where this is appropriate. Please be advised that URIEC will not normally interfere with a decision of the Committee and is concerned only with the general principles of natural justice, reasonableness and fairness of the decision.

Please use the Committee reference number on all future correspondence.

The Committee reminds you that it is your responsibility to conduct your research project to the highest ethical standards and to keep all ethical issues arising from your research project under regular review.

You are expected to comply with Cardiff University's policies, procedures and guidance at all times, including, but not limited to, its Policy on the Ethical Conduct of Research involving Human Participants, Human Material or Human Data and our Research Integrity and Governance Code of Practice .

Yours sincerely,

Dr Carmela Bosangit
Chair of School Research Ethics Committee