

How to manage sustainability compliance in multi-tier crop agri-food supply chains through intermediaries?

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Declaration

The researcher hereby confirms that the research is original. The first year of work is based on a systematic review. Years two and three are based on a mix of primary (gathered in Pakistan) and secondary data.

(Khan Khan 01.12.2024).

Dedication

I dedicate this work to the last tender moments I shared with my father as he left this world in my arms. Dad, I know you always dreamed of seeing me become a medical doctor, and I am sorry I could not fulfil that wish. I believe that when we meet again, you will embrace me with pride as I stand before you as a PhD.

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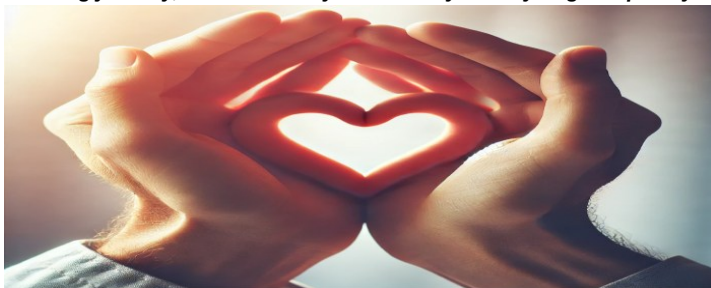
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Table of Contents

Chapter 1.....	1
Introduction	1
1.1 Multi-tier crop agri-food supply chain and sustainability	1
1.2 Research to date and knowledge gap	1
1.3 Research questions	3
1.4 Comprehensive scope of the study	5
1.4.1 Investigating the Social, Environmental, Economic, and Governance Dimensions of Sustainability in MTSCs	5
1.4.2 Considering the perspectives of non-supply chain members and external stakeholders	5
1.4.3 Empirical validation of sustainability compliance strategies	5
1.4.4 Focus on emerging and developing economies	6
1.4.5 Qualitative research on intermediaries in MTSCs	6
1.4.6 Addressing modern slavery in developing countries	6
1.4.7 Methodological pluralism and multidisciplinary research	6
1.5 Audience	7
1.6 The dissertation process	7
1.7 Dissertation structure	8
1.8 Key learning of chapter 1	9
Chapter 2.....	11
Literature Review	11
Systematic Map	11
2.1 Concept of MTSCs in business	11
2.2 Why Is sustainability important in the agri-food supply chains?.....	15
2.3 The role of intermediaries in sustainability compliance in the MTSC	15
2.4 Concluding comments	18
2.5 Systematic Review Map	19
2.5.1 Methodology and aims of the review	19
2.5.2 Search process of the systematic review map	21
2.5.2.1 Step.1 Formation of the research protocol	22
2.5.2.2 Time horizon	22
2.5.2.3 Developing search strings and databases	22
2.5.2.4 PICO framework for the Systematic Map	23
2.5.2.5 Eligibility criteria (Inclusion and Exclusion) of the research.....	24
2.5.2.6 Step. 2 Data collection	25
2.5.2.7 Screening of the articles	25

2.6 Step. 3 Classification and categorisation of the studies	28
2.6.1 Classification scheme	28
2.6.2 Categorisation scheme	31
2.7 Discussion and summary of mapping results	39
2.7.1 Aim 1: To identify the empirical data in a sustainable supply chain context based on philosophical and methodological evaluation	39
2.7.1.1 Concluding comments	42
2.7.2 Aim 2: To understand the nature of MTSCs in the context of a complex adaptive system	42
2.7.2.1 The role of networks and stakeholders in sustainable supply Chain	45
2.7.2.2 Network orientation	46
2.7.3 Aim 3: Theoretical underpinning in sustainable supply chain research	46
2.7.3.1 Social Network Theory	47
2.7.3.2 Stakeholder Theory	48
2.7.3.3 Resource-Based View	49
2.7.3.4 Resource Dependence Theory	50
2.7.3.5 Institutional Theory	51
2.7.3.6 Transaction Cost Economics	53
2.7.3.7 Agency Theory	54
2.7.3.8 Concluding comments	56
2.7.4 Aim 4: Establishing an understanding of the framework of broader sustainability challenges in MTSC structures	56
2.7.4.1 Sustainable supply chain structures	56
2.7.4.2 Economic Dimension	58
2.7.4.3 Environmental Dimension	60
2.7.4.4 Social Dimension	61
2.7.4.5 Governance Dimension	63
2.7.4.6 Concluding comments	64
2.7.5 Aim 5: Management strategies for sustainability compliance in MTSCs	65
2.7.5.1 Discussion and concluding comments	68
2.8 Key learning of Chapter 2	70
Chapter 3	71
Literature Review	71
Evidence Synthesis	71
3.1 Sustainability challenges in multitier crop agri-food supply chains	71
3.2 Structure of the Evidence Synthesis	72
3.3 Theoretical model	72
3.4 Review methodology	73

3.5 Data collection	74
3.6 Review process	75
3.6.1 Use of NVIVO	76
3.6.2 Process of coding (Deductive, inductive, hybrid)	76
3.6.3 Data organisation and findings	78
3.7 Discussion and Findings	79
3.7.1 Descriptive findings of the studies	79
3.7.2 RQ1. What are the sustainability challenges for the lower-tier suppliers of the crop agri-food sector?	84
3.7.2.1 Economic Challenges	84
3.7.2.2 Environmental Challenges	88
3.7.2.3 Social Challenges	92
3.7.3 RQ2. What are the governance challenges for the buying firms in their multi-tier crop agri-food supply chains?	95
3.7.3.1 Governance Challenges	95
3.8 Learning outcome and future research direction.....	104
3.8.1 Setting the scene, future research directions in the crop agri-food sector	104
Chapter 4.....	106
Research Methodology	106
4.1 Research purpose	106
4.2 Research paradigm	106
4.3 Research design.....	108
4.4 Grounded Theory	109
4.4.1 Application of Grounded Theory	111
4.4.2 Limitations	111
4.5 The case study approach.....	112
4.5.1 Case sampling.....	112
4.5.2 Unit of analysis and data collection	113
4.5.2.1 Empirical setting	113
4.5.2.2 The agri-food sector in Pakistan	114
4.6 Primary data collection method	116
4.6.1 Participant observation/field visits	118
4.6.2 Focus group discussions (Formal).....	119
4.6.3 Workshops and seminars.....	120
4.6.4 Semi-structured interviews	121
4.6.5 Formulation of questionnaire/interview protocols	122
4.7 Data interpretation.....	124

4.8 Data synthesis	127
4.9 Methodological limitations	129
4.10 Achieving reliability	130
4.11 Key learning of Chapter 4	131
Chapter 5.....	133
Data Collection	133
5.1 Research process.....	133
5.1.1 Regional team lead for micro-financing schemes	134
5.1.2 District development officer	134
5.1.3 Ethical considerations	135
5.2 Piloting exercise: Objectives and execution	136
5.3 Participant observation and field Visits	137
5.4 Focus group discussions	138
5.5 Workshops and seminars	140
5.6 Semi-structured interviews.....	141
5.6.1 Interviews with social mobilisers (Intermediary-4)	142
5.6.2 Interviews with monitoring and evaluation officers and microfinance officers (Intermediary-3)	142
5.6.3 Interviews with Progressive farmers (intermediary-2)	142
5.6.4 Interviews with APCL NRSP supply chain Officials (Intermediary-1)	143
5.6.5 Interviews with buying firms and exporters	143
5.6.6 Interviews with wholesalers, regional head of NGO, and member of chambers of commerce	144
5.7 Secondary data.....	144
5.8 Key learning of Chapter 5	146
Chapter 6.....	147
Case study findings	147
6.1 Data organisation	147
6.2 Conceptual framework development.....	148
6.3 Research questions and thematic grouping	150
6.4 Primary findings	151
6.4.1 RQ. 1: Sustainability challenges for lower-tier suppliers and governance challenges for the buying firms and intermediaries?	151
6.5 RQ 2: What roles do different levels of intermediaries play for sustainability compliance in the MTSC of the crop agri-food industry?.....	154
6.5.1 Intermediary 4: Social Mobilisers	154
6.6 Research Question 3: What strategies have been used by the buying firms and different levels of intermediaries to address the sustainability challenges?.....	160

6.7 Expanding the roles of various other stakeholders in APCL MTSC	163
6.10 Ensuring reliability	170
6.11 Universality of findings	174
6.12 Alternative explanations	175
6.13 Key learning of Chapter 6	176
Chapter 7.....	178
Discussion of the case study findings.....	178
7.1 From data to theory: The discussion process	178
7.2 Discussion, theoretical contribution and practical implications of RQ 1	179
7.2.1 Challenges for lower-tier suppliers	179
7.2.2 Sustainability challenges: Roots of invisible chains.....	186
7.2.3 Theoretical contributions	192
7.2.4 Theoretical and practical contribution regarding the phenomenon of slavery.....	193
7.2.5 New lines of thought.....	194
7.3 Discussion, theoretical contribution and practical implications of RQ 2	195
7.3.1 Social networking of lower-tiers: collectivistic approach (Social Mobilisers, Tier 4 Intermediaries)	195
7.3.2 Credits for farmers: Need-based approach (NRSP Bank, Tier 3 Intermediaries)	196
7.3.3 Change Agents: Action-oriented approach (Progressive Farmers, Tier 2 Intermediaries)	198
7.3.4 Sustainability strategist: Holistic approach (APCL, Tier 1 Intermediary)	199
7.3.5 Theoretical contributions	201
7.3.6 Practical Implication	204
7.4 Discussion, Theoretical contribution and Practical implications of RQ 3.....	204
7.4.1 Transitional management approach: Fostering direct interaction	204
7.4.2 Indirect management leading to a Polycentric framework: A Shift in paradigm	206
7.4.3 Third-party management: Optimising operations through external collaborations	207
7.4.4 Theoretical contributions	209
7.5 Key learning of Chapter 7	210
Chapter 8.....	212
Conclusion.....	212
8.1 Analytical summary.....	212
8.2 Research implications	215
8.3 Societal implication.....	216
8.4 Limitation of intermediaries.....	217

8.5 Expanding the cross-disciplinary relevance and broader impacts of research....	218
8.6 Limitations of the research	220
8.7 Future research directions	221

List of Figures

Figure 1.1 Outline of the Research Process	8
Figure 2. 1 Highlights Local and MTSC composition.....	12
Figure 2. 2 MTSC structure. Source (Mena et al., 2013).....	14
Figure 2. 3 Explanation of the bonds and roles of intermediaries in MTSC. Structural/ Technological = ST, Economical = E, Social = S.....	16
Figure 2. 4 Overview of the systematic mapping approach used.....	21
Figure 2. 5 PRISMA flowchart for systematic map.....	27
Figure 2. 6 Dimensions of sustainability challenges and major categories of these challenges identified through the systematic map.....	58
Figure 2. 7 Governance structures for MTSCs. Source. Tachizawa and Wong (2014). ..	67
Figure 3. 1 Prisma Flowchart For Review Evidence Synthesis.....	75
Figure 3. 2 The stepwise process used for the evidence synthesis.....	76
Figure 4. 1 Research Strategy	108
Figure 6. 2 Example of analytical coding structure.....	169
Figure 7. 1 The estimated prevalence of modern slavery footprints (excluding North Korea) moving from production-based to consumption-based accounting. Source: Shilling et al. (2021).....	187
Figure 7. 2 Comparison of the existing local supply chain structure and the APCL NRSP MTSC in Punjab, Pakistan (APCL, Agri Processing Company Limited; HRD, human resource development; MFI, Microfinance institute; PF, progressive farmer; SM, social mobiliser).....	Error! Bookmark not defined.

List of Maps

Map. 1 Net modern slavery patterns of importers/exporters—source: Shilling et al. (2021).	187
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List of Tables

A brief overview of the structure of the dissertation.....	9
Table 2. 1 Distinctive features of systematic map methodology.	20
Table 2. 2 Primary search strings.....	23
Table 2. 3 Primary research PICO.	24
Table 2. 4 Inclusion and exclusion criteria of the systematic map.	25
Table 2. 5 Details of search engines and retrieved data.....	25
Table 2. 6 The final dataset of the studies for review mapping.....	26
Table 2. 7 Classified set of studies (1 st phase).....	29
Table 2. 8 Concepts of epistemologies and ontologies used in this research are based on Bryman and Bell (2011).....	30
Table 2. 9 Classified set of studies (2 nd phase).....	31
Table 2. 10 Description of research approaches used in this map.....	32
Table 2. 11 Description of the categories of the studies.	33
Table 2. 12.....	35
Table 2. 13 Sub-categories of inductive reasoning.....	36
Table 2. 14 General knowledge studies.	37
Table 2. 15 Final set of classification and categorisation of the studies.....	38
Table 2. 16 Sub-categories of the classified set of studies, based on other than crop agri-food sector.....	43
Table 2. 17 Details of studies, databases, and search engines were used in reviews.	44
Table 2. 18 Summary of the theories and mechanisms used in the map.	55
Table 3. 1 Features of Review Evidence Synthesis methodology.	73
Table 3. 2 Inclusion and exclusion criteria of the Review Evidence Synthesis	74
Table 3. 3 Advantages of the effective coding structure.....	77
Table 3. 4 Deductive/A-priori coding framework.....	78
Table 3. 5 Descriptive findings of the studies.....	81
Table 3. 6 Economic Challenges.....	87
Table 3. 7 Environmental Challenges.	91
Table 3. 8 Social Challenges.....	94
Table 3. 9 Governance Challenges.....	100
Table 6. 1. Sustainability challenges.....	152
Table 6.2 Roles of different Intermediaries.....	155
Table 6.3 Summary of the themes and categories highlighting the management strategies of the buying firms.	161
Table 6.4 Findings of the interview with the supply chain lead of APCL NRSP.....	164
Table 6.5 Findings of interview with financial analyst NRSP	164
Table 6.6 Highlights a comprehensive synthesis of the key findings from the interviews with the wholesalers.	165
Table 7. 1 Unveiling Insights: Slavery phenomenon across farming communities.....	190

Abbreviations used

Abbreviation	Full Form
MTSC	Multi-tier supply chains
WCED	World Commission on Environment and Development
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
PICO	Population, Intervention, Comparator, and Outcome
PECO	Population, Exposure, Comparator, and Outcome
PO	Population and Outcome
ESG	Environmental, Social and Governance
NGO	Non-Governmental Organisation
CSR	Corporate Social Responsibility
SD	Sustainable Development
APCL	Agri Processing Company Limited
NRSP	National Rural Support Program
MER	Monitoring, Evaluation, and Research
ISO	International Organization for Standardisation
SGS	Société Générale de Surveillance

Glossary

Sustainability	Sustainability is a social goal that enables people to coexist on Earth over a long period.
Sustainability compliance	Sustainability compliance in this research refers to integrating economic, environmental, social, and governance principles (Triple Bottom Line and ESG model) into organisational compliance frameworks in businesses and their supply chains, ensuring long-term adherence to regulatory standards while minimising negative impacts on the planet and society.
Social mobilisers	Young graduates from local smallholder farming communities who act as cultural and religious intermediaries in the research.
Progressive farmers	Large-scale landlords who believed in equal opportunities for sustainable development.
Waqf	Waqf is a recurring, ongoing charity, a voluntary charitable endowment from one's personal belongings or wealth, in the form of cash or property, in Islam.
Sharia	Islamic canonical law is based on the teachings of the Muslim holy book, the Quran and the traditions of the Muslim Prophet.
Thala	Keeping some grains unethically and illegally.
Chungi	Illegal deduction for the Assistant working in the central wholesaler market.
Kammi	The lowest people in Indian subcontinent culture, members of different artisan and service-providing castes, such as barbers, carpenters, cobblers, weavers, potters, and labourers, are collectively referred to as kami.
Maashki	Servers of water and Tea from lower castes
Fatwa	Religious rulings issued by Islamic scholars based on their interpretation of Islamic law (Sharia) and teachings from the Quran and Hadith (Islamic religious beliefs).
Saraiki	One of the local languages of Punjab, Pakistan.
Punjabi	The primary language of Punjab (India/Pakistan).
Bhattay	Illegal brick kilns.
Kacha	Raw, made of mud and clay.
Khala	Raw watercourse.
Watta Satta	Exchange marriages.
Muftis	Islamic scholars.
Aad Samood	Two nations, mentioned in the Muslim holy book, The Quran.

Abstract

This study investigates sustainability challenges in Pakistan's rice multi-tier supply chain (MTSC), focusing on the socio-cultural and religious factors that sustain modern slavery and hinder sustainability efforts. A two-stage systematic literature review, incorporating mapping and evidence synthesis, established the theoretical foundation and guided the empirical investigation. The qualitative analysis reveals how cultural values, social hierarchies, and religious beliefs perpetuate exploitative labour practices in the MTSCs of Pakistan's rice industry. The study highlights how Agri Processing Company Limited (APCL), operating as a first-tier intermediary, effectively launched and managed different levels of intermediaries through 'multi-actor' and 'multi-level' management approaches to extend sustainability upstream in the rice supply chain, particularly in the lower tiers previously considered 'commodities with no value'. Social networking and progressive farmers played inclusive roles as change agents in bringing all stakeholders of a traditional and fragmented supply chain into a coordinated platform. The bottom-up strategic management approach of APCL gained the trust of local stakeholders and buying firms, resulting in a sustainable business strategy. Increased collaboration at different levels of farming communities led to a transformed methodology for sustainable development through intermediaries. The transformed business structure and mediated governance of 'multi actors' supply chains revamped socio-ecological outcomes for the lower-tiers and improved local living conditions through economic fairness and equal opportunities. This transformation has contributed significantly to advances in Pakistan's rice industry towards sustainable development. By demonstrating how intermediaries bridge institutional voids and mitigate socio-cultural resistance, this study broadens the understanding of sustainability in MTSCs. Future research should investigate the applicability of intermediary-driven management models across various industries and socioeconomic contexts. Investigating intermediary roles in global supply chains beyond agriculture could further reveal how socio-cultural and economic factors influence supply chain resilience and ethical labour practices.

Chapter 1

Introduction

1.1 Multi-tier crop agri-food supply chain and sustainability

Crop agri-food supply chains in a global context have witnessed a dramatic increase in multi-tier suppliers' involvement in the process of product formation (Boström et al., 2015; Grimm et al., 2014; Mena et al., 2013; Wilhelm et al., 2016). These suppliers are considered a major driving force for buying firms to achieve competitive advantages and contribute to an organisation's overall success (Chacón Vargas et al., 2018; Feola, 2015; Rashidi et al., 2020; Rueda et al., 2017). However, when these suppliers, particularly at lower tiers, are not managed well by the buying firms, they cause multidimensional, real-world sustainability challenges (Remondino & Zanin, 2022). These challenges not only affect the ethical standing of the companies but also disrupt supply continuity, reduce product quality, and expose firms to regulatory and reputational risks (Chae et al., 2024). Thus, sustainability in this sector has emerged as a significant business objective to address the concerns of different stakeholders, not only at the corporate level (Derqui, 2020) but also in maintaining compliance throughout business operations (Wilhelm et al., 2024).

In recent years, various scholars have attempted to outline a brief definition of sustainability, drawing on the concept introduced in the Brundtland Commission report of the United Nations, which aims for sustainable development with the agenda of 'Our Common Future' (WCED, 1987). Nevertheless, it is now well-established that the concept of sustainability is holistic and encompasses a variety of interpretations, albeit with different foci (Lozano, 2015). This view is supported by Scoones et al. (2020), who subsequently argue that sustainability and its transformation are based on a business's systemic and structural approaches. The systemic approach provides a broader interpretation of sustainability in a business, encompassing environmental, social, and economic aspects of sustainability. In contrast, the structural approach sets a governing mechanism to manifest a systemic approach (Scoones et al., 2020). Nonetheless, the integration of structural and systemic approaches to sustainability in crop agri-food MTSC literature is insufficiently documented to date, and the important question of how to manage sustainability compliance in MTSCs of the crop agri-food sector remains persistent.

1.2 Research to date and knowledge gap

Several studies have emphasised that a business's first step towards sustainable growth is understanding sustainability challenges in its geographically fragmented MTSC structures (Boström et al., 2015; Schramm et al., 2020). The structure of MTSCs consists of a

hierarchical system of interconnected tiers (Gong et al., 2023; Jia et al., 2019). The first tier forms the direct link between the buying firm and its suppliers, while the second tier consists of the link between these suppliers and their sub-suppliers or lower-tier suppliers, extending through successive tiers in a cascading manner (Mena et al., 2013; Grimm et al., 2014). However, most contemporary research on supply chain networks has focused only on buyer and first-tier supplier relationships (dyadic) for sustainability compliance in MTSCs. In reality, the greater the number of supply chain tiers, the higher the probability of facing sustainability challenges, which needs comprehensive investigations beyond dyadic relationships (Sarpong, 2014). Studies by León Bravo et al. (2021), Canto et al. (2021), and Grimm et al. (2016) have highlighted multiple sustainability challenges related to social equity, environmental health, and economic wealth emerging from beyond tier-one suppliers in agri-food businesses. These challenges are not merely a result of cultural and institutional differences but are deeply rooted in systemic power imbalances, weak regulatory enforcement, and entrenched socio-economic disparities within lower-tier suppliers (Gold et al., 2022). For instance, fragmented governance structures and informal labour practices often exacerbate worker exploitation, while differing environmental and economic standards across regions lead to inconsistent sustainability compliance. Cultural norms also reinforce hierarchical supply chain relationships, limiting the bargaining power of lower-tier suppliers and perpetuating unfair trading conditions (LeBaron et al., 2021). Understanding these underlying mechanisms is essential to addressing sustainability challenges in a way that goes beyond surface-level institutional and cultural explanations. In such situations, geographically fragmented supply chains require an effective governance structure to establish operational collaborative mechanisms across multiple tiers, contributing to supply chain network-level objectives and organisational-level competitive advantages (Boström et al., 2015; Grimm et al., 2016; Meinschmidt et al., 2018; Sancha et al., 2019). MTSCs, when operating from different geographies, often involve 'governance at a distance', which can result in a disconnect between buying firms and their lower-tier suppliers, leading to various sustainability challenges for both (Boström et al., 2015; Bush et al., 2015). The research of Mena et al. (2013) has revealed that shorter supply chains might help businesses expand more sustainably. For example, sourcing products directly from local farmers decreases the complexity of the supply chain and makes communication with suppliers and the traceability of the product much more accessible. Given the magnitude of economic globalisation to achieve organisational-level competitive advantages, the return to local and shorter supply chains is not likely to be a panacea, mainly in most MTSCs (Boström et al., 2015). Governance mechanisms in MTSCs have to face indirect and distant interactions among various supply chain actors and manage sustainability challenges in their MTSCs (Boström et al., 2015). To address such challenges, arrangements could be made

through advanced information flows on production, a comprehensive understanding of sustainability challenges, new ways of mediating communication among different tiers and generic governance 'standards' (Boström et al., 2015; Chae et al., 2024). However, sustainability risks related to such abstracts and mediated communication are significant. The academic debate has highlighted the importance of the effective governance structure of buying firms for sustainable development, mainly when the lower-tier suppliers are from developing countries. These structural implications for buying firms must develop in proximity and sensitivity to production norms and practical circumstances. The governance of lower-tier suppliers needs to occur systemically and relate to social equity, environmental health, and economic wealth in crop agri-food businesses, without which any sustainability improvement is unlikely to materialise (Cole & Aitken, 2020).

Several studies have explored sustainability challenges faced by buying firms and lower-tier suppliers in MTSCs. However, a systematic and comprehensive examination of the systemic and structural factors influencing sustainability across MTCS of the crop agri-food sector has to emerge. For instance, Grohmann et al. (2023) shed light on the critical role of governance in achieving sustainability compliance. However, their research focuses predominantly on the German agri-food sector, emphasising various trust mechanisms in governance without fully addressing the challenges of lower-tier suppliers in crop supply chains. The study calls for a broader framework to identify hidden sustainability barriers, yet its focus does not extend to the specific dynamics within multitier crop agri-food supply chains. Similarly, Alsayegh et al. (2020) investigated governance's influence on the economic, environmental, and social performance of Asian firms across various sectors. However, they did not delve into the barriers faced by lower-tier suppliers or explore the performance challenges that buying firms face in ensuring sustainability compliance within the multi-tier crop agri-food sector.

Considering the above debate, this research has been conducted in various phases and established research gaps for investigation.

1.3 Research questions

In the first phase, this research employs a descriptive review methodology that combines a systematic map and a review of evidence synthesis to structure the theoretical foundation of the primary investigation.

The systematic map comprehensively overviewed the existing research in multi-tier agri-food industries and established the research framework (**Chapter 2**).

Then, it extended the systematic view to evidence synthesis to understand the nature of various sustainability challenges in crop agri-food MTSCs for suppliers and buyers (**Chapter 3**).

The systematic review phase revealed several practical research gaps through empirical analysis. For instance, which research areas and countries should be focused on to explore sensitive yet neglected operational sustainability challenges in MTSCs that hinder sustainability compliance? Did any studies comprehensively highlight social, economic, environmental, and governance sustainability challenges for suppliers and buyers in a single study of MTSCs? Did any research focus on lower-tier suppliers and their institutional and cultural sustainability challenges in crop agri-food MTSC? How can various local actors act as intermediaries beyond first-tier to alleviate operational sustainability challenges in MTSCs? Will further primary research be feasible, and will researchers have access to the locale?

The review findings were further corroborated by the systematic study of Senyo and Osabutey (2023), which outlined critical areas for future research, which include (1) integrating the social, environmental, and economic dimensions of sustainability in MTSCs; (2) considering non-supply chain members and external stakeholders for sustainable development; (3) conducting rigorous empirical validation of sustainability assessment methods; and (4) focusing on perspectives from emerging and developing economies. Likewise, Kähkönen et al. (2023) advocated for further research into managing sustainability-related risks, particularly within supply chains where raw material suppliers and lower-tier actors, often located in developing countries, play pivotal roles. The study also emphasises the importance of including these suppliers in data collection.

Similarly, Gruchmann (2022) emphasises the necessity for qualitative, empirical research, primarily through case studies, to better understand the roles and relationships of intermediaries in fostering sustainable supply chains. Drawing from these studies, Marttinen and Kähkönen (2022) also recommend focusing on lower-tier suppliers in MTSCs, acknowledging their often-overlooked contributions to supply chain resilience and efficiency. They propose extending sustainability compliance research to include multiple supply chain tiers for a more holistic understanding.

Considering these research gaps, this study is uniquely positioned to contribute a qualitative investigation into the crop agri-food sector in Pakistan, with a particular focus on lower-tier suppliers. It aims to integrate multiple research streams, offering a distinct perspective on sustainability compliance challenges. This approach promises to enrich theoretical and practical knowledge in the domain of MTSCs, particularly in developing economies like Pakistan and proposes the following research questions for further research,

RQ1: What sustainability challenges do lower-tier suppliers face, and what governance issues do intermediaries and buyers encounter when managing sustainability compliance in MTSCs?

***RQ2:** What roles do different levels of intermediaries play for sustainability compliance in the MTSC of the crop agri-food industry?*

***RQ. 3:** What strategies have been used by the buying organisations and different levels of intermediaries in addressing the challenges?*

1.4 Comprehensive scope of the study

The study takes a multidimensional approach, focusing on sustainability challenges, governance, and ethical practices through empirical research in Pakistan's Basmati rice supply chains. This research strategically addresses significant gaps in the crop agri-food sector's MTSCs, and it is important to highlight what this research has addressed in the following text.

1.4.1 Investigating the Social, Environmental, Economic, and Governance Dimensions of Sustainability in MTSCs

This study delves into the interconnectedness of sustainability challenges across the social, environmental, and economic dimensions integrated within the governance structure of MTSCs. Leveraging the triple bottom line framework alongside the ESG (Environmental, Social, and Governance) model, this research uniquely addresses these supply chains' systemic challenges. It responds to recent calls for comprehensive studies by Köhler et al. (2021) and Carter et al. (2022), emphasising the critical need to address all sustainability dimensions simultaneously to ensure long-term viability.

1.4.2 Considering the perspectives of non-supply chain members and external stakeholders

Non-supply chain actors, including government regulators, NGOs, and consumers, significantly shape sustainability initiatives in MTSCs. This study investigates how these external forces influence sustainability practices in Pakistan. Building on the work of Busse et al. (2021) and Senyo and Osabutey (2023), the research incorporates perspectives from external stakeholders to provide a holistic view of sustainability compliance in MTSCs. The study also examines how gender and social inclusion, often overlooked in MTSC research, can be integrated into sustainability initiatives, particularly for marginalised groups in emerging economies.

1.4.3 Empirical validation of sustainability compliance strategies

Sustainability management strategies often need more rigorous empirical validation, especially in complex MTSCs operating in resource-constrained environments. This research responds to Sarkis and Zhu's (2020) call for more empirical studies by examining the entire product life cycle of Pakistan's Basmati rice MTSCs. The study assesses the sustainability compliance of lower-tier suppliers, validating the practical application of sustainability strategies in these contexts. Drawing on Carter et al. (2022), this research evaluates the

long-term viability of these strategies, offering insights into how sustainability practices can be sustained and scaled across different supply chain tiers.

1.4.4 Focus on emerging and developing economies

Emerging economies, especially those with lower-tier suppliers, face unique cultural, regulatory, and economic barriers in adopting sustainability practices but have received less attention from scholars. This study provides a detailed analysis of these challenges in Pakistan's crop agri-food sector, particularly in the context of inclusive sustainability strategies. Kähkönen et al. (2023) stress the importance of focusing on these suppliers to build resilient and sustainable supply chains. By emphasising inclusivity, this research examines how sustainability practices can be tailored to reflect the socioeconomic realities of lower-tier suppliers and marginalised groups, thus contributing to a more equitable global supply chain.

1.4.5 Qualitative research on intermediaries in MTSCs

Intermediaries play a critical role in MTSCs, especially connecting developed-country buyers with lower-tier suppliers in developing nations. Gruchmann (2022) calls for qualitative research to explore the intermediaries' influence beyond mere transactional roles. This study uses an in-depth case study to examine how intermediaries in Pakistan's agrifood sector facilitate sustainability efforts. It investigates how local actors serve as intermediaries to alleviate sustainability challenges, particularly those related to operational and ethical issues. This research further contributes to understanding how intermediaries can promote inclusive strategies that benefit all stakeholders in the supply chain, fostering sustainable socioeconomic growth.

1.4.6 Addressing modern slavery in developing countries

Modern slavery continues to be a persistent issue within global supply chains, particularly in developing economies. This study investigates the root causes of modern slavery in Pakistan's agrifood sector, considering the cultural, economic, and religious factors that perpetuate labour exploitation. In line with Gold et al. (2022) and Han et al. (2022), this research aims to understand lower-tier suppliers' systematic socio-cultural marginalisation in perpetuating these practices in high-power distant societies. It also builds on the collaborative approach proposed by Meehan and Pinnington (2021), integrating governments, NGOs, and businesses in the fight against modern slavery. By applying social networking theory, the study explores how fostering emotional support and respect for lower-tier suppliers can lead to more ethical practices, creating a sustainable pathway to combatting exploitation in high-risk industries.

1.4.7 Methodological pluralism and multidisciplinary research

To comprehensively understand the complexities of sustainability challenges and modern slavery in MTSCs, this research adopts a methodological pluralism approach, as suggested

by Szablewska and Kubacki (2023). By integrating various data collection methods, including participant observations, focus groups, interviews, workshops, and seminars, this study comprehensively analyses the unique dynamics of sustainability challenges and how they promote the phenomenon of slavery in MTSCs. This multidisciplinary approach enables the exploration of the social, environmental, and economic factors that influence sustainability in MTSCs. The research also investigates how different disciplines, such as social and behavioural sciences, can be integrated to offer new insights into ethical business practices and modern slavery.

1.5 Audience

This dissertation is relevant to the following audiences:

- **Researchers in sustainable development and supply chain management**

Scholars focused on sustainability, particularly within MTSCs, will benefit from the empirical validation of sustainability compliance strategies.

- **Stakeholders in sustainability programs**

Local governments, supply chain officials, NGOs, and international donors involved in sustainability initiatives can use the insights to improve governance and address challenges lower-tier suppliers face in developing economies.

- **Business leaders and corporate governance experts**

Corporate governance and supply chain management practitioners will gain practical recommendations on integrating sustainability and mitigating risks, such as socio-cultural impact across global supply chains.

- **International scholars and organisations investigating modern slavery**

This research provides valuable insights into the causes of modern slavery and collaborative approaches to combat it at the local level, appealing to those focused on labour rights and ethical supply chains.

- **Researchers in related fields**

Scholars in international development, business ethics, and global governance will find this study relevant for understanding sustainability's broader impact on organisational and societal outcomes.

1.6 The dissertation process

Figure 1 outlines the complete process for this dissertation, providing a visual representation of the key stages involved. It highlights the sequential steps of the research. This figure draws a roadmap of the research, guiding the reader through each phase of the research process and offering a clear overview of how the study was conducted.

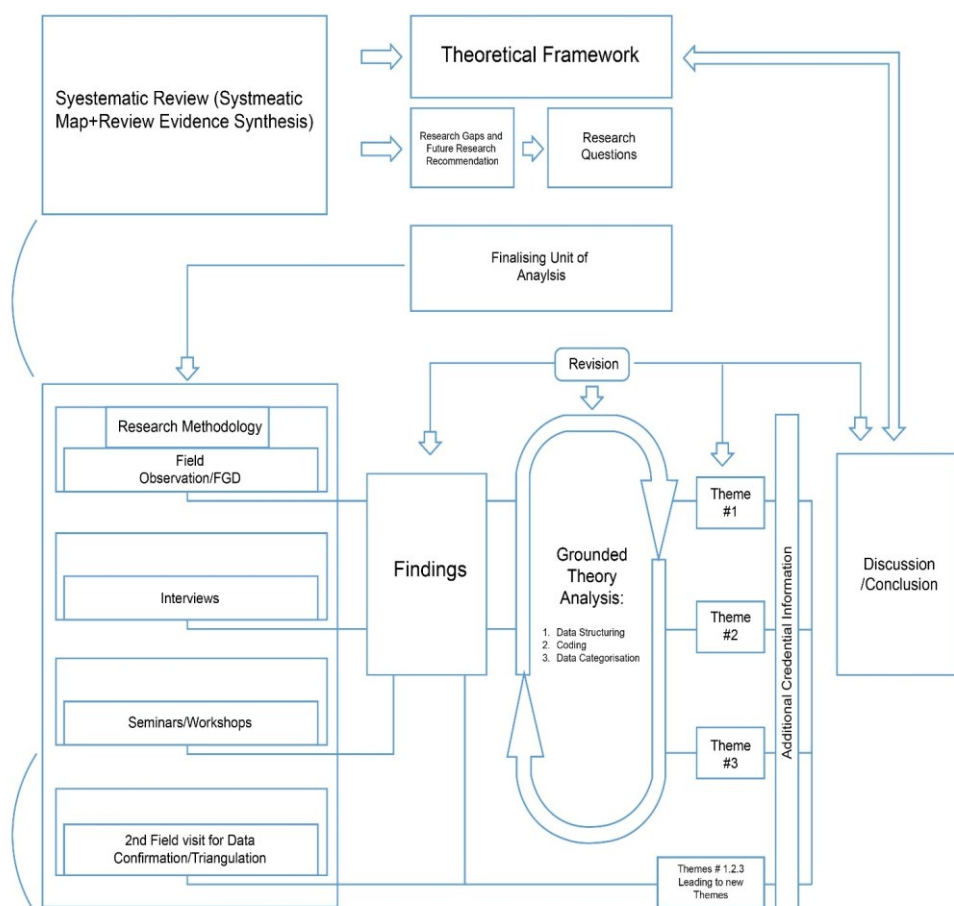


Figure 1.1 Outline of the Research Process.

1.7 Dissertation structure

Table 1.1 provides a concise overview of this dissertation's structure. It outlines the key chapters and sections, summarising each part's primary focus and content. This table serves as a guide to help readers navigate the dissertation, offering a clear understanding of how the research is organised and presented.

Table 1. 1 A brief overview of the structure of the dissertation.

Chapters	Questions Addressed
2. Systematic Map	<ul style="list-style-type: none"> • To identify the empirical data in a sustainable supply chain context based on philosophical and methodological evaluation. • To understand the nature of MTSCs in a complex adaptive system. • Theoretical underpinning in sustainable supply chain research • Establishing an understanding of the framework of broader sustainability challenges in multi-tier supply chain structures • The management strategies used by the buying firms for the compliance of sustainability challenges in the multi-tier supply chain
3. Evidence synthesis	<ul style="list-style-type: none"> • What are the sustainability challenges for the lower-tier suppliers of the crop agri-food sector? • What are the governance challenges for the buying firms in their multi-tier crop agri-food supply chains?
4. Methodology	<ul style="list-style-type: none"> • What research paradigm would be used to address the research question? • What research design would be adopted, and what is the justification? • Empirical setting for the primary research • How would the research design be operationalised regarding data collection, analysis, and synthesis? • What are the methodological strengths and limitations?
5. Data collection	<ul style="list-style-type: none"> • Research process • Piloting exercise • What data collection methodologies were taken, • How were the methodologies executed, and what protocols were used? • How secondary data was collected
6. Analysis and findings	<ul style="list-style-type: none"> • How is data represented, sorted and organised to address the research questions? • Findings of each research question and their impact • How did analysis lead to different perspectives towards the slavery phenomenon? • Summary of Modern slavery challenges in different contexts based on current literature. • Expanding the roles of various other stakeholders in APCL MTSC • How are the validity requirements of the chosen research methodology met?
7. Discussion	<ul style="list-style-type: none"> • Based on the newly analysed data, theoretical discussions are established. • Unveiling the slavery phenomenon • Theoretical contribution of the research • Practical contribution of the research. • New lines of thoughts of the research.
8. Conclusion	<ul style="list-style-type: none"> • Analytical summary, Key points? • Limitation of the research. • Societal implication. • Expanding the Cross-Disciplinary Relevance and Broader Impacts of Research • Comprehensive Note • Future research directions

1.8 Key learning of chapter 1

The following key learning outcomes summarise the chapter's main contributions:

- Understanding Multitier Agri-Food Supply Chains: Insights into the structure and impact on sustainability compliance.
- Review of Existing Research: Identifying knowledge gaps.

- Research Questions: Presentation of the key questions driving the primary study.
- Scope of the Study: Overview of the study's focus and boundaries.
- Audience: Identification of relevant groups for the research findings.
- Dissertation Structure: Explanation of the organisation of the dissertation.

The next chapter systematically categorises the existing supply chain literature, followed by a focused evaluation of multi-tier agri-food supply chains. It provides an evidence-based mapping of sustainability within this sector, establishing a targeted selection of primary studies for review evidence synthesis in multi-tier crop agri-food supply chains.

Chapter 2

Literature Review

Systematic Map

The second chapter establishes the foundational understanding of sustainability compliance within MTSCs, focusing on the agricultural sector. This chapter systematically maps the existing literature to explore the intricate dynamics of MTSCs and the significant role intermediaries play in ensuring sustainability compliance. This review is rooted in methodological frameworks that allow critically evaluating empirical data from a sustainability perspective. This chapter engages with the complex adaptive systems (CAS) theory to understand how the various layers of MTSCs interact in MTSCs. The systematic map highlights critical sustainability issues and helps identify the theoretical underpinnings crucial for studying sustainability in MTSCs. The chapter also outlines the management strategies that buying firms employ to address sustainability challenges, providing a framework for broader sustainability concerns. It critically examines how these strategies are framed in the literature and what role various intermediaries play in the sustainability compliance of the MTSCs.

2.1 Concept of MTSCs in business

Multitier business supply chains have received considerable scholarly attention due to the increasing pressure from different segments of society on businesses, consumers, government, and non-government organisations to demonstrate greater compliance with sustainability in their product supply chains. More indispensably, considerable literature has grown on multitier agri-food business supply chains because they are directly linked to human health and are frequently perceived as a source of non-compliant, sustainable business operations (Gunderson et al., 2014). Thus, sustainability in the agri-food supply chain has emerged as a significant business objective to address different stakeholders' concerns at the corporate level (Derqui, 2020) and maintain compliance throughout the business operation (Wilhelm et al., 2024). Agri-food supply chains are interconnected through multiple autonomous actors in a local business environment and integrated into multi-tier relationships in the global context (Wongprawmas et al., 2015). MTSC generally involves a variety of actors within local and global business settings, as indicated in **Figure 2.1**.

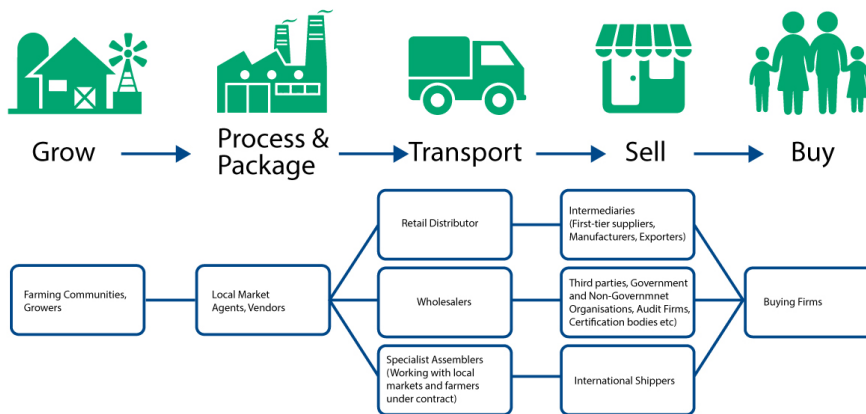


Figure 2. 1 Highlights *Local and MTSC composition*.

In local agri-food supply chains, independent growers produce and sell their crops directly to local food collectors (Wongprawmas et al., 2015; Monteiro & Barata, 2021). Local collectors may also collect crops directly from fields and bring them to central wholesale marketplaces, where retailers buy products for resale to end customers at markets. A global multi-tier agri-food supply chain operates in a more complex environment with several stakeholders, including specialised assemblers (who frequently have contracts with farmers), processors and exporters (Wongprawmas et al., 2015). In this setting, the quality and safety of food requirements become difficult to follow due to a lack of coordination among different actors, and sustainability compliance across the entire supply chain becomes questionable (Rotter et al., 2014). This fragmented and extended supply chain, involving multiple tiers, complicates product traceability, which is essential for ensuring sustainability. According to Roy (2021), product traceability is a fundamental measure of sustainability compliance in an MTSC. However, this issue warrants deeper investigation to identify the gaps in coordination and traceability mechanisms (Rajak et al. (2022). Without a clear understanding of these gaps, efforts to ensure sustainability across the supply chain remain fragmented, undermining the potential for effective compliance and overall supply chain integrity (Cole & Aitken, 2020; Gruchmann, 2022; Noviaristanti et al., 2022).

Overall, evidence suggests that it was much easier for a buying firm to address sustainability challenges during the mid-20th century when a single organisation might own an entire supply chain, rather than involving multiple tiers. Sustainability challenges at that time were more focused on operational efficiency and resource management. The complexity of today's sustainability challenges, such as social equity, labour rights, and global environmental standards, were less pronounced. The shift to MTSCs over the past few decades has

introduced greater complexity, with sustainability concerns now encompassing diverse socio-cultural, institutional, and economic factors. For example, Ford Motor Company owned the entire supply chain during the first half of the last century, and sustainability challenges were more concerned with operations and the quality of the products (Gelderman (1989), as cited in Mena et al. (2013).

During the last century, an essential concept of supply chain structure known as a dyadic supply chain emerged (Miemczyk et al., 2012). This usually consists of two business entities (a buyer and a supplier) and the link known as the relationship that connects them (the relationship of buyer and supplier) (Wilding et al., 2012). Previous studies have explored the dyadic buyer-supplier relationship and introduced the importance of structural embeddedness in business for buying firms through monitoring and training their lower-tier suppliers (Swierczek, 2019).

Having analysed the concept of embeddedness in detail in a dyad, the fundamental characteristics are trust, cooperation and commitment, and strengthening a buyer-supplier relationship (de Stefano & Montes-Sancho, 2018; Wilhelm, 2011). Dyads are later discovered to be insufficient interaction chain structures due to the inclusion of several additional stakeholders inherent in a global business environment, which would have resulted in more complex supply chain networks and weakly embedded (Mena et al., 2013). The buyer-supplier dyad in a complex supply chain network is further embedded in a third node, another supplier's supplier, or even the buyer's customer, formally known as a triadic relationship (Mena et al., 2013).

This fundamental block of a triadic relationship is a three-tier buyer-supplier network known as a system of a triad in a supply chain (buyer-supplier–supplier relationships) (Mena et al., 2013). This network is uniquely connected through direct or indirect relationships of multi-tier stakeholders. This triad system extends the characteristics of a dyad, as discussed before, such as cooperation, trust, and commitment in business (Vlachos & Dyra, 2020). Much uncertainty about the relationship between different tiers in this triad system still exists. However, generally, it is agreed that a triadic relationship combines interdependence, long-term collaboration, relationship change over time, and consideration of network characteristics in a business supply chain (Touboullic et al., 2014). This network of triads works in three structural forms: closed, open, and transitional, as highlighted in **Figure 2.2**.

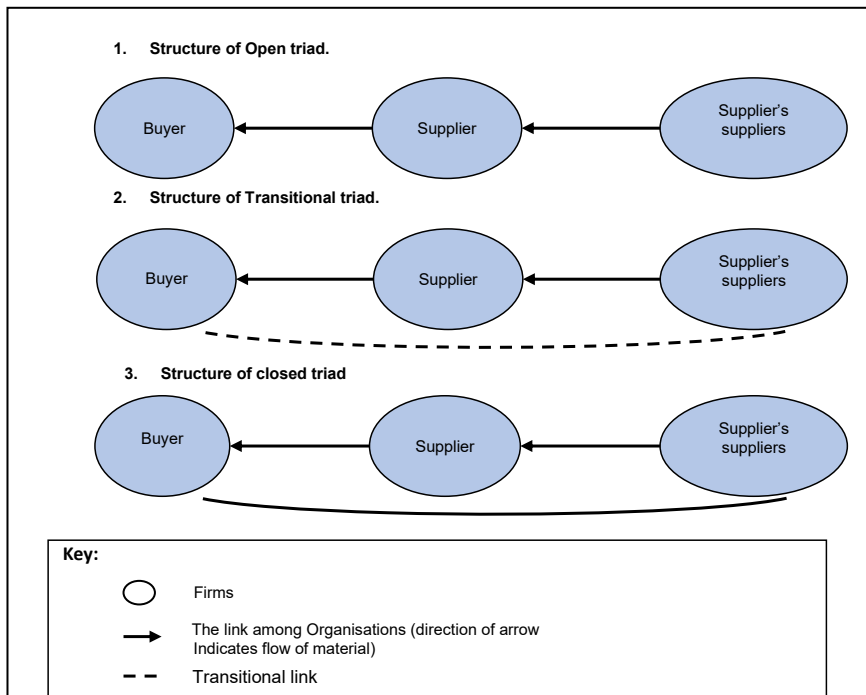


Figure 2. 2 MTSC structure. Source (Mena et al., 2013).

The structure of a 'Closed Triad' is formed when the buyer and the supplier of the supplier launch a direct link to each other that has been formally managed by the buying firm (Mena et al., 2013). The 'Open triad' supply chain structure is considered a traditional one. In this structure, information and product flows between the buyer and supplier's suppliers are linear (Mena et al., 2013). In this relationship, the connection between the buyer and supplier's supplier is established through a supplier, and there is no direct connection between the buyer and the supplier's supplier (Mena et al., 2013). In this structure, the supplier is mediating between the buyer and the supplier's supplier. Finally, the third structure is the 'Transitional triad', where the buying company outstretches to the supplier's supplier within its business framework, and starts building a direct link and moves toward a 'Closed MSC' structure (Mena et al., 2013). Moreover, as the number of stakeholders in the supply chain increases, this triadic system's nature turns into a more complex multi-tier relationship, also known as tetradic and so on (Paulraj et al., 2017). In the current study, these proposed supply chain structures by Mena et al. (2013) will complement the theoretical base to understand the nature of MTSC structures in a global context (study sample frame) and how these different supply chain structures address sustainability challenges by using their different tiers of suppliers.

2.2 Why is sustainability important in the agri-food supply chains?

Sustainability experts believe that compliance towards sustainability is not only just a driving force towards social and environmental change but also sustainability initiatives that can contribute to an organisation's overall success (Feola, 2015; Shrivastava et al., 2020). Several systematic reviews and research have been undertaken to probe the significance of sustainability initiatives in organisational success and achieve maximum competitive advantages in this globalised arena (Chacón Vargas et al., 2018; Mani et al., 2016; Martins & Pato, 2019). For instance, Rajak et al. (2022) suggests it may seem counterintuitive in business practices to ignore sustainability initiatives and spend resources on already-existing sustainable practices that increase company profitability, particularly in situations like the recent COVID-19 pandemic.

A growing body of literature highlights that companies proactive in sustainability initiatives often experience better long-term profitability (Mani et al., 2016; Orenstein & Shach-Pinsley, 2017). However, the relationship between sustainability and profit remains complex (Edmans, 2021). For instance, according to a global survey of 509 companies operating through MTSCs, sustainability initiatives may not always lead to immediate financial benefits, and the connection between the two is not straightforward (Edmans, 2021; Edmans et al., 2024). While sustainability does not necessarily mean sacrificing profits (Hulshof & Mulder, 2020), its impact may vary depending on the industry, organisational context, and specific sustainability initiatives. Sustainability has increasingly become a crucial element of an organisation's strategy, contributing to long-term resilience and success (Edmans, 2021; Edmans et al., 2024; Hulshof & Mulder, 2020).

Several studies have emphasised that the first step towards sustainability compliance with the sustainability challenges for a buying firm is the selection of sustainable suppliers in its MTSC (Schramm et al., 2020). A comprehensive systematic meta-review by Rashidi et al. (2020) concluded that sustainable suppliers help a buying company achieve its targets. These suppliers also make them better competitors in the international market to gain competitive advantages (Chacón Vargas et al., 2018). To gain competitive advantages in businesses with MTSC settings, the role of intermediaries is receiving considerable importance (Cole & Aitken, 2020; Gruchmann, 2022; Noviaristanti et al., 2022).

2.3 The role of intermediaries in sustainability compliance in the MTSC

The selection of sustainable suppliers is critical in gaining competitive advantages in MTSCs because it enables businesses to mitigate risks, enhance brand reputation, and comply with evolving environmental and social standards. By aligning with suppliers who prioritise sustainability, companies can improve operational efficiency, reduce long-term costs, and strengthen relationships with environmentally and socially conscious consumers, ultimately

contributing to a stronger competitive position in the market (Ganann et al., 2010; Paul & Barari, 2022). In this regard, intermediaries are significant in managing MTSC relationships in a business. The buyer-supplier relationship becomes more critical when lower-tier suppliers have limited knowledge of sustainability measures due to geographical dispersion and the need for facilitation (Cole et al., 2020; Kivimaa et al., 2019). In MTSCs, intermediaries play a key role by providing sustainability platforms that align business objectives across the product cycle for both buyers and suppliers (Cole et al., 2020). More broadly, intermediaries can act within a tri-lateral framework to address sustainability challenges in supply chains (Kowalkowski & Kindström, 2014; Korkmaz et al., 2025), as highlighted in **Figure 2.3**.

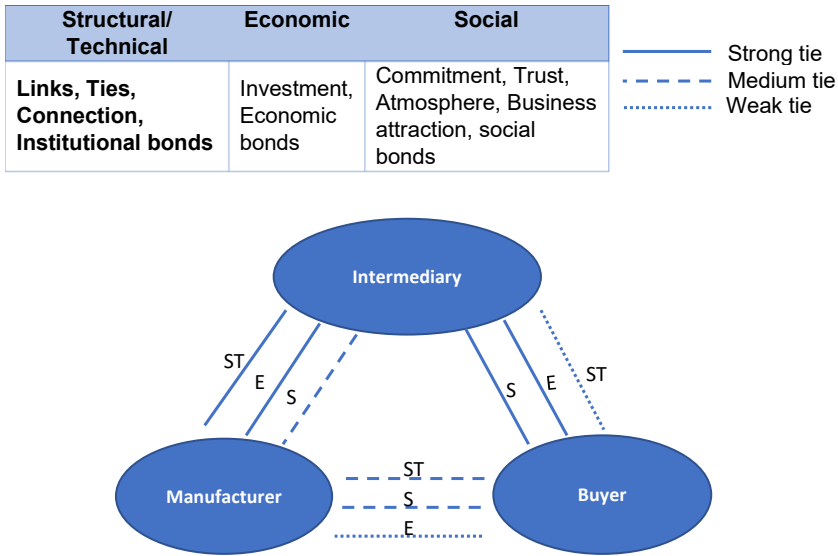


Figure 2. 3 Explanation of the bonds and roles of intermediaries in MTSC. Structural/ Technological = ST, Economical = E, Social = S.

These institutional bonds are mainly based on structural, economic, and social (relational) ties (Kowalkowski & Kindstrom, 2014). The structures of a supply chain primarily decide the nature of the relationship of an intermediary (Kowalkowski & Kindström, 2014; Schmidt et al., 2019). For instance, if an intermediary in business partnership relations is through investment, then these relationship ties are considered strong institutional bonds (Kowalkowski et al., 2014; Schmidt et al., 2019). If these ties are based on technical support, then these ties are considered medium institutional bonds (Kowalkowski et al., 2014). However, if the relationship between buying firms and intermediaries is just based on addressing sustainability challenges, particularly highlighting social sustainability challenges,

then this relationship is considered weak (Kowalkowski et al., 2014). This weakness could be because intermediaries usually do not follow the fundamentals of CSR, particularly in developing countries, and social sustainability challenges are ignored (Kowalkowski et al., 2014).

Prior studies have attempted to explain the different roles of intermediaries performed by wholesalers, processors, and exporters in supply chains (Gómez-Luciano et al., 2018; Lund-Thomsen et al., 2021). However, the study of Mirkovski et al. (2015) highlighted the unique role of intermediaries, which involves social networking between different tiers of suppliers. The study concluded that the dynamic roles of intermediaries are critical in social networking, particularly in countries where societies are more collectivistic and suppliers in business supply chains are integrated (Mirkovski et al., 2015). Social networking factors such as mutual benefits and exchange of services in the business supply chains significantly reduce the information asymmetry and knowledge gaps between buyers and suppliers for sustainable business supply chains (Mirkovski et al., 2015). The existing body of research on intermediaries suggests that these intermediaries could be from any tier of the business supply chain, for instance, tier-one, tier-2, tier-3 and so on (Silva et al., 2020).

Despite the importance of intermediaries in the business supply chains for sustainability compliance, there remains a paucity of evidence on exploring tri-lateral business relationships between lower-tier suppliers, intermediaries, and buying firms. Although there is evidence in the African mineral context where lower-tier suppliers play a crucial role in regulating sustainability compliance in a supply chain by performing the role of nexus suppliers (Sancha et al., 2019), the literature is scant on how a lower-tier supplier can be used as an intermediary in the mainstream supply chain setting in the agri-food sector. Intermediaries potentially work interchangeably both for buying and supplying firms. Intermediaries are important in mitigating sustainability risks for buying firms by overseeing various supply chain activities, including monitoring compliance and providing sustainability training to lower-tier suppliers (Mirkovski et al., 2015). However, the adherence of intermediaries to sustainability standards is not universal, and multiple factors influence the conditions under which they operate (Lobo et al., 2025). Some intermediaries, particularly those with more substantial and established relationships with either buyers or suppliers, are more likely to implement rigorous sustainability practices (Song, 2025). In contrast, others may only adopt such standards when compelled by market pressures, regulatory requirements, or specific contractual obligations (Wilhelm et al., 2024). The capacity of intermediaries to effectively reduce sustainability risks also depends on their ability to influence the behaviour of suppliers and the degree of commitment to sustainability throughout the supply chain. Furthermore, compliance may fluctuate depending on changing market conditions, evolving regulatory landscapes, and the varying degrees of commitment

to sustainability within different tiers (Marano et al., 2024).

The role of intermediaries has garnered significant attention in the globalised business environment, particularly when lower-tier suppliers are based in developing countries (Silva et al., 2020). As globalisation advances, supply chains increasingly span industrialised and less industrialised economies, creating structural and regulatory asymmetries (Silva et al., 2020). Waqas et al. (2018) provide a comprehensive empirical analysis of economic, cultural, legislative, and regulatory divergences between buyer and supplier countries, which present sustainability challenges in managing MTSCs. However, these challenges are not solely due to a lack of awareness. Suppliers may refuse to comply with sustainability requirements for strategic, financial, or institutional reasons rather than being merely unable to do so (Soundararajan et al., 2018). This highlights the necessity of considering Whitley's (2003) 'national business systems' approach, which explains how institutional frameworks and business structures shape compliance behaviour in different national contexts.

Furthermore, the issue is not just that suppliers cannot comply but also that they may choose not to respond to compliance demands, either as a strategic decision or due to misaligned incentives. Some suppliers may intentionally evade engagement with sustainability requirements, creating governance challenges for buying firms (Bartley & Egels-Zandén, 2016). Political instability, fragmented governance structures, labour-intensive production models, and limited technological adoption exacerbate these challenges (Köksal et al., 2021).

These dynamics make intermediaries critical in bridging regulatory and operational gaps within MTSCs. Their functions extend beyond facilitation to include enforcement, capability-building, and mediating trust between buyers and suppliers (Hannibal et al., 2019; Kowalkowski & Kindström, 2014; Lund-Thomsen et al., 2021; Mirkovski et al., 2015; Silva et al., 2020). By addressing both compliance challenges and instances of strategic non-compliance, intermediaries contribute to a more sustainable and effectively governed supply chain system.

2.4 Concluding comments

The concept of MTSCs and their management of sustainability challenges has garnered significant attention in academic and industry discussions. However, there remains a lack of clarity in defining MTSC structures and the effective management of sustainability strategies within these chains (Sindakis et al., 2023). While sustainability compliance is often discussed in the context of MTSCs, it is important to emphasise that it refers to the actions of individual firms, such as buying firms and their direct or indirect suppliers responsible for meeting sustainability standards and regulations (Lobo et al., 2025).

The existing literature identifies the challenge of managing lower-tier suppliers, particularly regarding their visibility and the lack of formal contractual relationships with buying firms. This lack of transparency often leads to difficulties in ensuring that lower-tier suppliers adhere to sustainability standards. While the literature has pointed out these challenges, there is limited exploration of the specific actions that buying firms can take to overcome them, mainly through the role of intermediaries (Gaitán-Cremaschi et al., 2024; Grabs & Carodenuto, 2021). Moreover, the framing of sustainability challenges within MTSCs warrants a deeper examination of the perspectives of various stakeholders, such as buying firms, lower-tier suppliers, and intermediaries. Understanding how these stakeholders interpret and address sustainability challenges is crucial, as their perceptions influence the strategies employed. In particular, intermediaries play a significant role in shaping these perspectives and bridging the gap between lower-tier suppliers and buying firms. Future research should focus on how intermediaries contribute to framing sustainability issues and how this impacts the management of sustainability practices in MTSCs.

Given the complexity of the literature on sustainable supply chains, a major limitation of traditional reviews is their inability to accommodate the breadth and diversity of such complex topics, often leading to fragmented insights and a lack of holistic evaluation (Ganann et al., 2010; Paul & Barari, 2022). The following section critically evaluates MTSC literature through a systematic mapping review methodology, facilitating a comprehensive analysis. This section systematically categorises existing research on supply chains, aligning it with the specific objectives of the mapping study discussed below. Primarily, it categorises the studies of various supply chains and then lays a foundation for the subsequent phase—review evidence synthesis focusing on the MTSCs of the crop agri-food sector.

2.5 Systematic Review Map

2.5.1 Methodology and aims of the review

This research follows a two-stage method. A two-stage descriptive review or map eliminates coverage bias of data in research that is not easily possible in conventional reviews (Haddaway et al., 2016). The primary literature review method for this research is a systematic map. It covers the breadth of the topic under investigation in a systematic way. It streamlines the unstructured data in a structured way for further investigation through evidence synthesis or systematic reviews (Dicks et al., 2014). A systematic review mapping methodology was adopted due to its distinctive features, highlighted in **Table 2.1**.

Table 2. 1 Distinctive features of systematic map methodology.

SR.	Descriptions
1.	Systematic mapping is particularly valuable and provides reliable data when the research field is too broad and tries to investigate a topic's multifaceted dimensions (James et al., 2016).
2.	Systematic maps are not specific in answering a question, as systematic reviews are. However, they point out the general conclusions of a topic by collating, categorising, describing, and cataloguing available evidence in the present literature (e.g., primary, secondary, quantitative, or qualitative) (Haddaway et al., 2020).
3.	The categorisation in a systematic map is used to better understand concepts and identify knowledge gaps by generating knowledge clusters or subsets (Haddaway et al., 2020; Randall & James, 2012). These subsets are further used, mainly where existing knowledge is insufficient to produce the required results and novel primary research is required for theory building or more focused results (Haddaway et al., 2016).
4.	Systematic maps remain focused and adopt a rigorous, transparent process to capture relevant evidence of the study, as do systematic reviews, thus avoiding the prospective drawbacks of conventional literature reviews (e.g., reviewer and publication bias, unfocused literature) (Bragge et al. 2011 & Randall & James, 2012).
5.	Systematic maps assimilate more studies and produce homogenised data to achieve targeted objectives. Future researchers may choose a subset of studies driven by systematic mapping reviews for synthesis to save time and achieve more rigorous results (Randall & James, 2012). <i>This is what has been done in this study.</i>

Systematic maps are sometimes called 'descriptive reviews', mainly when a study follows the two-stage literature review methodology (James et al., 2016; Moghri et al., 2016; Shemilt et al., 2014). This mapping method will systematically distinguish the nature of multidimensional sustainable supply chain literature by classifying and categorising large datasets into focused clusters of sub-sets. This map aims to cover the subsequent areas of sustainable supply chains for a broader understanding of the research, as outlined below:

1. Identifies empirical data in a sustainable supply chain context based on philosophical and methodological evaluation,
2. Provides a comprehensive understanding of the multi-tier supply chain in the context of the complex adaptive system,
3. Presents the theoretical underpinning of sustainable supply chain research,

4. Establishes a clear understanding of the framework of broader sustainability challenges in multi-tier supply chain structures,
5. Highlights the management strategies used by the buying firms for the compliance of sustainability challenges in the multi-tier supply chain,
6. Provides a focused direction for the second stage model of the research.

2.5.2 Search process of the systematic review map

The process of this systematic mapping review adopted three significant search steps proposed by James et al. (2016) and Haddaway et al. (2020). Each step focused on an outcome. These core steps led this map toward the second stage of the proposed study. The comprehensive process of this study is outlined in **Figure 2.4**.

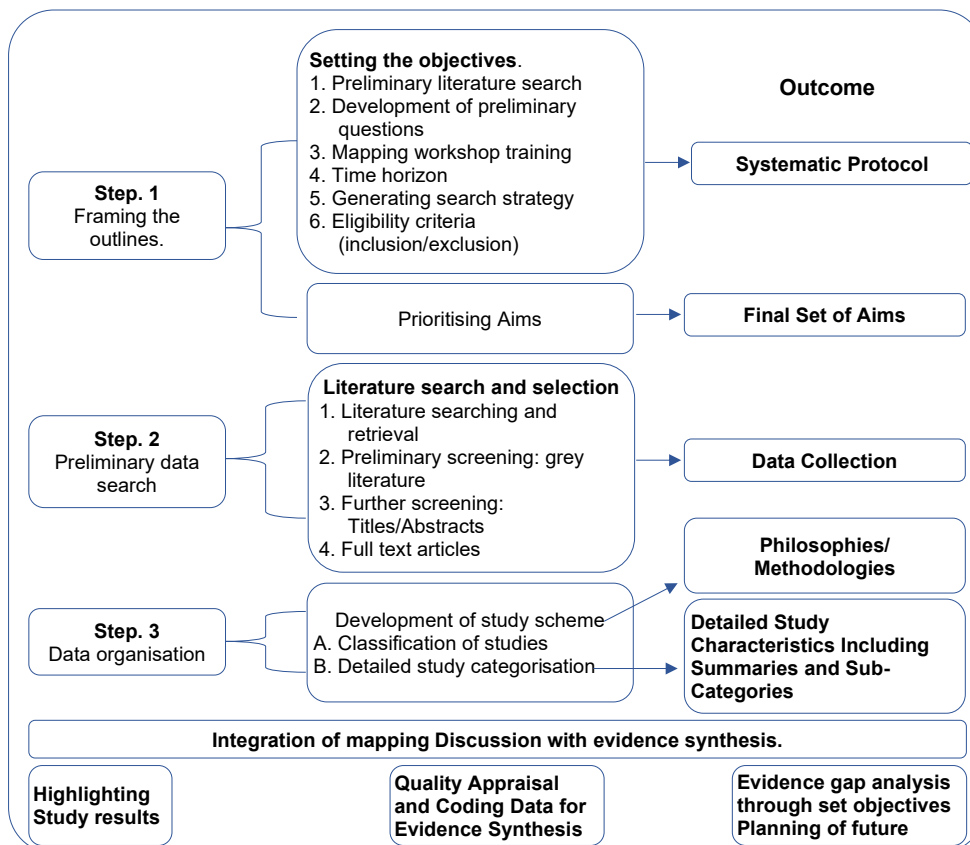


Figure 2. 4 Overview of the systematic mapping approach used.

2.5.2.1 Step.1 Formation of the research protocol

To achieve credible results, primarily, this map generated a comprehensive protocol by following Cochrane's systematic review guidelines described by Henderson et al. (2010). Henderson et al. (2010) determined that using a clear systematic review protocol in a systematic research process keeps the researcher on track and enhances methodological transparency throughout the search process. Following a thorough preliminary literature search, this map established a primary set of aims by considering the subsequent criteria comprehensively.

2.5.2.2 Time horizon

Deciding the correct period for acquiring suitable published data predominately sets the stage for a systematic study (Bashir et al., 2018; Takwoingi et al., 2013). Determining an appropriate timeframe for acquiring published data is crucial for ensuring the rigour and reliability of a systematic study (Bashir et al., 2018; Takwoingi et al., 2013). This approach builds on the concept of 'completeness of systematic reviews' by Bashir et al. (2018), which posits that the relevance and sufficiency of a body of literature are temporally bound as research landscapes evolve and new empirical evidence emerges. By recognising the temporal limitations of completeness, this approach ensures that the data collected remains methodologically sound while capturing the most salient contributions within a structured review process (Takwoingi et al., 2020). Initially, a comprehensive random search was performed using Google Scholar to achieve the concept of completeness. Although this search successfully demonstrated the concept of a sustainable supply chain, it had certain limitations in exploring the right time for the core concepts of this research, such as MTSCs in the agri-food sector and the use of intermediaries for a sustainable product. After substantial investigation, the concepts of MTSC and intermediaries have received significant attention from researchers since 2008 and are frequently used in sustainable supply chain research (Grames et al., 2019). Thus, 2008 was chosen as the starting time for data collection in this research.

2.5.2.3 Developing search strings and databases

A detailed set of primary search strings was generated using the strategy proposed by Grames et al. (2019) and guidelines from Aromataris and Riitano (2014). In a well-designed and robust study, they assert that developing a search strategy is an iterative process that involves continually assessing the research's aims and then final refinement through identifying possible relevant studies. This map generated a primary search strategy in two steps: first, by focusing on keywords from already-known papers, and then a set of different keywords was applied to different databases. Newly emerged relevant terms were also included to build different components of the search strategy. The search string was tested and adapted iteratively during the initial process.

Primarily, this map used a search engine, Google Scholar, to test and develop substantial search strings. Then, through cross-validation of these search strings in one of the targeted databases, the Web of Science, a primary set of search strings was designed and finalised. This study also considered a comprehensive Boolean structure to attain the maximum accuracy of search results. This map also carefully used synonyms for some significant terms, such as intermediaries or brokers, and emerging or developing countries. The primary search strategy is presented in **Table 2.2**.

Table 2. 2 Primary search strings.

Primary search strings
Component 1: Sustainab* OR standards OR environment* OR AND (standard* OR "code of practice" OR "code of conduct" OR supply chain OR lower-tier AND...
Component 2: (Food OR grocery OR coffee OR fruit OR vegetable OR edible* OR) AND ...
Component 3: (Buy* company* OR global OR cross-borders management OR smallholder OR traceability OR Agri* OR third-party certificate AND...
Component 4: (Multitier OR long supply chain OR complex supply chain OR intermedia* Or agent* OR supply* OR supplier* OR import* OR export OR Trace* AND ...

The map then chose the databases for data collection. Selecting a suitable database and searching for the best possible accurate data is very significant, and researchers should measure what databases are fully available to them before starting any systematic review (Bramer et al., 2013).

This map underwent several systematic studies by cross-referencing to determine the most valuable and appropriate databases used in this research discipline. Finally, it considered the relevant search databases that could be available and accessed through Harper Adams University's digital library. This map performed electronic searches in six databases: EBSCOhost, Emerald, ScienceDirect, Web of Science, Wiley Online, and Google Scholar. No external sources, including books, were used to acquire further data.

2.5.2.4 PICO framework for the Systematic Map

Successfully retrieving relevant evidence in a systematic study begins with a well-structured question (Saaq & Ashraf, 2017). Thus, the ability to target aims and objective formulation is fundamentally based on PICO formation to locate and systematically evaluate relevant resources (Saaq & Ashraf, 2017).

The PICO framework is recommended for systematic reviews and further designed into appropriate and relevant search strings to find relevant literature to answer research objectives (Kang et al., 2019; Saaq & Ashraf, 2017). The elements of the PICO include 'P' for population, 'I' for intervention, 'C' for comparison, and 'O' for outcomes. A PO (population and outcome) framework is generally established for a mapping study. The PO framework is

a critical driver in collecting relevant and eligible data in a systematic map (Vriezen et al., 2019). Focusing on the nature of this mapping study, a comprehensive PO criterion was designed, followed, and presented in **Table 2.3**. Relevant interventions and Comparators were also considered.

Table 2. 3 Primary research PICO.

Research PICO
Population (s) Buying companies (Food companies sourcing through cross borders MTSC).
Intervention (s) Could be relevant, e.g., Management through intermediaries, the Role of NGOs, and the Role of internal and external supply chain stakeholders in sustainability compliance.
Comparator (s) could be any relevant entity, e.g., nature of businesses, role of different intermediaries a buying company or a third-party intermediary.
Outcome(s) Degree of sustainability compliance by lower-tier suppliers based in the sourcing countries.

2.5.2.5 Eligibility criteria (Inclusion and Exclusion) of the research

The eligibility criteria in a systematic study are considered significant to ensure that only relevant studies are analysed in systematic research (Booth et al., 2016). Eligibility criteria need careful planning, such as designing comprehensive inclusion and exclusion criteria for the studies to retrieve the relevant data (Booth et al., 2016; Needleman, 2002).

The general guidance provided by Booth (2016) and Needleman (2002) was followed to avoid losing relevant data and ensure that the map is not too narrow. This map remained inclusive of data studies unless there were convincing and clear methodological/sectoral reasons for excluding them. A complete description of exclusion and inclusion criteria is given in **Table 2.4**.

Table 2. 4 Inclusion and exclusion criteria of the systematic map.

Exclusion criteria	Inclusion criteria
<ul style="list-style-type: none"> • Grey literature (abstracts, biographical notes, business reports, conference papers, conference posters, directories, libguides, newsletters, reports, government documents, speeches, white papers, urban plans, unpublished work). • Books or book chapters • Thesis • Studies other than The English language 	<ul style="list-style-type: none"> • Studies from the year 2008 onward • Studies focused on the agri-food sector • Studies focused on sustainable multi-tier business supply chain structures • Studies from the same authors but from different perspectives (different food supply chains etc). • Studies highlighting sustainability challenges and the role of intermediaries • Studies discussing managing strategies of the buying firms to address sustainability challenges • Studies available in Harper Adams research databases.

2.5.2.6 Step. 2 Data collection

This map used Mendeley as the reference management software (Mendeley V.2.84.0). Six databases were used for data collection, providing a primary sample of 2068 studies exported to Mendeley (**Table. 2.5**). A total of 163 duplicates were then removed, leaving a remaining dataset of 1905 studies (**Figure 2.5**).

Table 2. 5 Details of search engines and retrieved data

Database	Number of Search Hits to retrieve data	Number of articles	Retrieval dates
EBSCOhost	171	213	01-03/March/2022
Emerald	212	348	05-06/March/2022
Google Scholar	107	372	08-09/March/2022
ScienceDirect	233	347	10/11/March/2022
Web of Science	189	376	13-14/March/2022
Wiley online	111	412	16-17/March/2022
Total: 6	Total: 1023	Total: 2068	1-17th March

2.5.2.7 Screening of the articles

After retrieval, articles were screened for relevance based on multiple phases. In the preliminary phase, grey literature was excluded to avoid the greater probability of unpublished data and reports. Grey literature can include abstracts, biographical notes,

business reports, conference papers, conference posters, directories, libguides, newsletters, reports, government documents, speeches, white papers, urban plans, unpublished work, no access to complete study (Adams et al., 2017; Petticrew & Roberts, 2006). Following this criterion, 1157 studies were excluded, and the dataset was condensed to 748 studies.

During the second phase, this map followed the guidelines of Polanin et al. (2019) as a screening tool. Title-based screening was employed as an initial filtering mechanism to enhance efficiency while maintaining methodological rigour. Titles serve as a preliminary indicator of relevance, allowing for excluding studies that fall outside the research scope. However, to mitigate the risk of excluding relevant studies prematurely, this process was complemented by an abstract review, which assessed whether a proposed methodological framework was applied. This dual-layered approach ensured that the selection process remained systematic and minimised the likelihood of omitting pertinent research following the PICO framework. This study established a three-way format for screening, such as (a) yes, (b) no, and (c) unsure. This format allowed a transparent and structured screening process. To minimise the risk of losing relevant data, studies that were unclear and not concise were included in the unsure section for further detailed screening before a final decision was made. The map had 54 articles in this list, of which 31 were excluded. At the end of the second phase of the map, 175 studies were eliminated, and the relevant research remained focused on 573 studies, as stated in **Table 2.6**.

Table 2. 6 The final dataset of the studies for review mapping.

Database	Remaining number of Articles after screening
EBSCOhost	91
Emerald	118
Google Scholar	129
Science Direct	78
Web of Science	92
Wiley online	65
Totals. 6	573

To ensure validity and reliability, testing for interrater reliability was undertaken with kappa scores recorded. According to Cohen (1960), as cited in Cole & Aitken (2019), '*The Kappa statistics represent the proportion of joint judgments and agreement of reviewers in a study process*'. Usually, a Kappa score between 0.61 and 0.80 represents substantial agreement', p.5. This study performed two sets of kappa reliability checks by $n=4$ researchers. The first

set of reliability scores during titles and abstract screening was recorded at 0.73. The second score of kappa interrater reliability was recorded at 0.76 during the classification and categorisation phase. As guided by Moher et al. (2009), a PRISMA-type flow chart was formulated to keep a record of each step of the study and is presented in **Figure 2.5**.

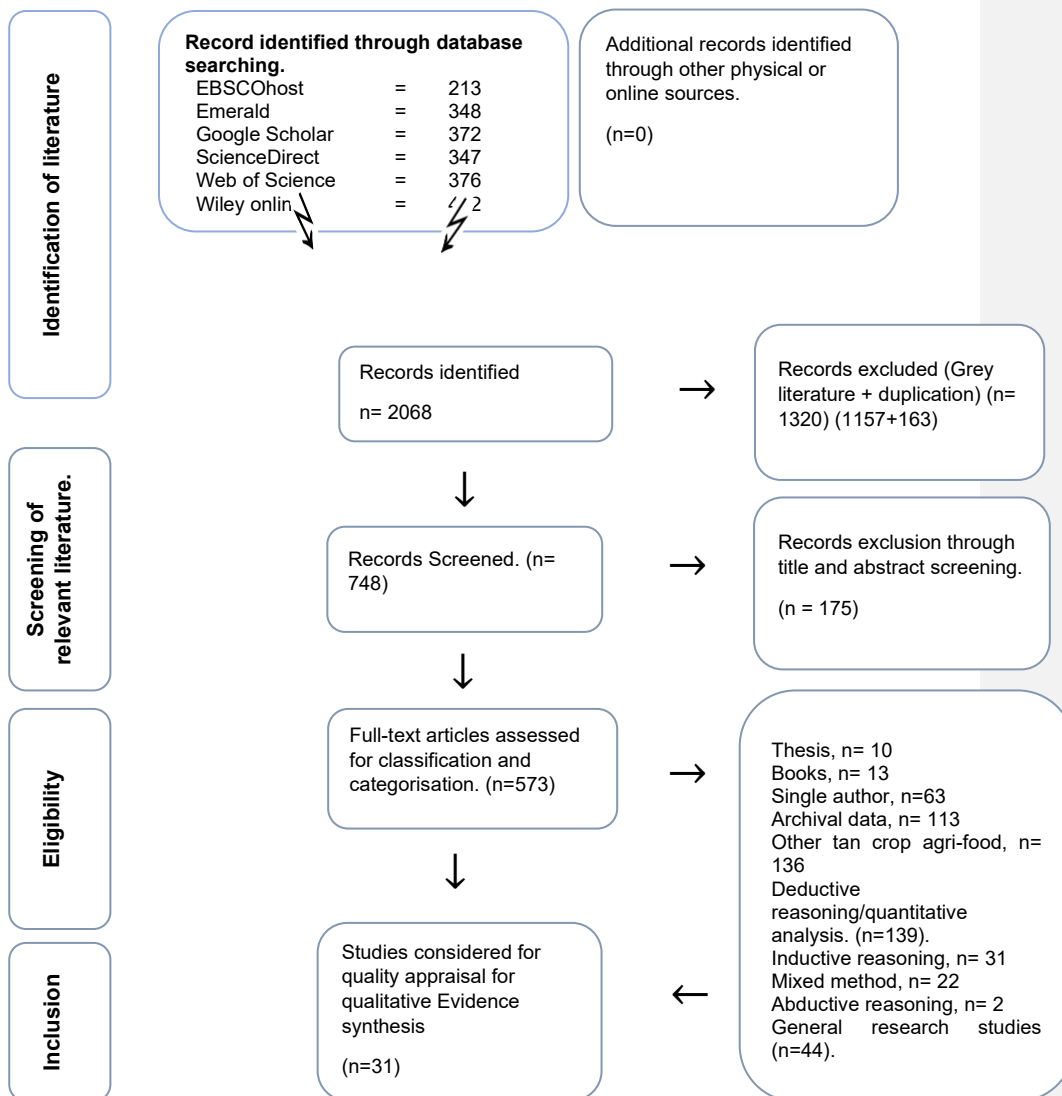


Figure 2. 5 PRISMA flowchart for systematic map.

2.6 Step. 3 Classification and categorisation of the studies

The 3rd step of the map was data organisation. The entire dataset was primarily classified and further categorised. Since the concepts of classification and categorisation vary among researchers, it is essential to clarify how these terms have been used in this map. Herold (2004) identified two characteristics of these concepts that might be subsumed: classification involves a predefined formalised system of organising data in research, while categorisation groups similar research data based on this classification. Herold's (2004) work on classification and categorisation is further complemented by Paré et al. (2015) with a clear distinction between these two concepts and further explained them with the new models of typologies and taxonomies. A typology is considered a driven concept through a deductive or pre-assumed (*a-priori*) method, while a taxonomy is usually an empirically driven concept inductively (Eggert & Alberts, 2020; Paré et al., 2015). This map integrated both concepts into this study. Typology was used to establish a predefined classification scheme, while taxonomy was used to categorise the dataset as research progressed. Pre-established inclusion and exclusion criteria for the map guided this entire process.

2.6.1 Classification scheme

A spreadsheet was used to collate relevant information about each article's fundamental terminologies, study designs, philosophies, approaches, methodologies, and scope (Microsoft Excel, 2016). This collective analysis of data extraction was iterative and helped to organise and collate study samples for further classification and categorisation schemes. Each study's eligibility was considered only once for classification or categorisation schemes. The primary objective of these stages was to separate studies that were outside the inclusion criteria of the map. A two-stage classification scheme for the dataset was performed to build an initial roadmap for clustering the data in this systematic map:

1. To develop a detailed, comprehensive roadmap for this systematic mapping, a multi-label text classification framework by Jindal et al. (2015) and Zhang et al. (2022) was used to organise extensive data in a review. The Multi-Label Text Classification framework relies on label surface names and descriptions during inference in organising big data (Jindal et al., 2015; Zhang et al., 2022). It aims to associate a document with its relevant labels (Zhang et al., 2022). A user-based classification was performed manually by adding labels to every study (de Groot, 2021). Primarily, this annotation was based on the author's name, title, type of study, year of publication, abstracts, and key points of each study. This framework helped to achieve a more focused dataset for analysis. Through this framework and following the eligibility criteria, this map excluded books, theses, single-author studies, and archival data. Books and theses were excluded due to their broader scope (Edinger & Cohen, 2013). Single-author studies are excluded to reduce potential bias and ensure diverse perspectives

in the review process (Nama et al., 2021). Archival data is excluded due to its non-standard and incomplete nature, hindering practical synthesis (Edinger & Cohen, 2013). However, the results of these studies, apart from the thesis and books, were used to discuss the aims of gaining a comprehensive and multidimensional perspective of the subject matter. The total number of these studies was 199; the remaining studies were 374 for second-stage classification, as shown in **Table 2.7**.

Table 2. 7 Classified set of studies (1st phase).

Topic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Grand Total
Total	8	16	12	14	23	19	24	30	32	57	58	66	81	102	31	573
Thesis	-	-	-	-	1	-	-	-	1	2	2	1	2	1	-	- 10
Books	-	1	-	-	1	-	1	-	1	4	2	2	-	-	1	-13
Single Author	5	4	3	2	2	2	5	2	7	9	4	1	6	9	2	-63
Analysis Based on Secondary data	1	-	2	3	4	3	3	3	4	14	16	18	15	22	5	-113
Grand Total	6	5	5	5	8	5	9	5	13	29	24	22	23	32	8	-199
Remaining dataset	2	11	7	9	15	14	15	25	19	28	34	44	58	70	23	+374

2. After the initial development of the organising of identified papers in this map, the second classification scheme was developed based on the research assumptions of Bryman and Bell (2011) and Saunders et al. (2015). Understanding a topic's philosophical paradigm establishes the research's reasoning and methodological roadmap (Bryman & Bell, 2011; Saunders et al., 2015; Saunders et al., 2019). The process of classifying research must be systematically and philosophically straightforward to enhance methodological transparency in further research (Ananiadou et al., 2009; Saunders et al., 2015; Thangaraj & Sivakami, 2018). In this classification phase, the methodological segment of every study was reviewed to understand its philosophical perspectives. Each study was classified with distinct keywords. However, most of the studies did not mention or follow any particular frame of philosophy used in their studies. Therefore, the research team did not label the studies with particular philosophies. However, a general conception of the research philosophies was discussed to understand the nature of the studies. The following epistemologies and ontologies, such as interpretivism, constructivism, phenomenology, positivism, post-positivism, and realism, were highlighted (**See Table 2.8**). Understanding the philosophical nature of the data helped distinguish and separate the study sample into

different methodological categories because, in social science research, methodologies are derived from philosophical assumptions (Bryman & Bell, 2011). Most significantly, these philosophical paradigms would also justify the proposed research method for this doctoral project.

Table 2. 8 Concepts of epistemologies and ontologies used in this research are based on Bryman and Bell (2011).

Research philosophies	Descriptions
Philosophical paradigms	A philosophical paradigm is, a cluster of beliefs that dictates to researchers what should be studied in a research discipline, how research should be done, and how results should be interpreted' Kuhn (1979) cited in Bryman and Bell (2011) p.24
Epistemology (Constructivism, Phenomenology)	Epistemology is the theory of knowledge and deals with how knowledge should be gathered and framed and from which sources (scope and methods). Epistemological considerations are considered the 'study of knowledge and are concerned with acceptable knowledge' Cited in Bryman and Bell (2011).
Constructivism	Constructivism epistemology maintains that knowledge is constructed and not discovered. (Bryman & Bell, 2011; Saunders et al., 2019).
Phenomenology.	1. Interpretivist phenomenology is considered holistic and is often based on the researcher's perspectives on how a phenomenon under investigation is described (Bogdan & Taylor, 1975). 2. Descriptive phenomenology tends to emphasise the original (Bogdan & Taylor 1975), for instance, meanings from the perspective of the participants involved in the social phenomenon (Bogdan & Taylor 1975), cited in Bryman and Bell (2011).
Ontology (Realist, relativist, positivist)	What exists in the world about which humans can acquire knowledge (Potter & Hepburn, 2005; Strauss (1973) cited in Bryman & Bell (2011) is termed a natural social entity or existence of a subject matter. Ontology helps researchers to recognise how certain they can be about the nature and existence of their subject matter, as cited in Bryman and Bell (2011).
Realist	The real world exists independently of human experience (Whittington, 1989) and is mainly used in natural science (Knowledge is objective). Cited in Bryman and Bell (2011).
Relativist	Reality is constructed (conceptual and perception scheme, Davidson, 1984) within the human mind rather than exist. Reality is 'relative' to how individuals perceive and experience it in different settings. (Knowledge is subjective) Cited in Bryman & Bell (2011) and Paleček & Risjord (2013).
Positivist	Positivism, also known as empiricism ontology, relies on empirical scientific evidence, such as controlled experiments and statistics. (Knowledge is objective) Cited in Bryman and Bell (2011), p.15

After getting a complete picture of epistemologies and ontologies, this map sought to make these concepts more understandable by transforming them into the subjective-objective dimensions developed by Burrell and Morgan's (1979) model, which is mentioned in Bryman and Bell (2011), p. 619. Every study was labelled as objective and subjective. The inductive nature of studies was labelled as subjective, whereas the deductive nature of studies was labelled as objective for the methodological categorisation of the studies. In this phase, 136 studies were separated by following the eligibility criteria explicitly focused on other than the crop agri-food sector. The remaining dataset of studies in this research was 238 that qualified for further categorisation scheme, as presented in **Table 2.9** below.

Table 2. 9 Classified set of studies (2nd phase).

Topic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Grand Total
Total	2	11	7	9	15	14	15	25	19	28	34	44	58	70	23	374
Other than Crop-Agri Food	1	3	5	5	5	5	4	9	9	12	10	21	16	24	7	-136
Remaining	1	8	2	4	10	9	11	16	10	16	24	23	42	46	16	238

2.6.2 Categorisation scheme

This review phase followed the conceptual framework of Eggert and Alberts's (2020) 'Taxonomy of concept matrix in research'. A concept matrix is a logical approach for covering large data in research, and it has a highly descriptive character that defines several concepts through an inductive manner (research approach, design, area of research, nature of data, and findings) in which all articles are grouped in (Eggert & Alberts, 2020; Smith, 2002). This concept matrix helped to focus this review's eligibility criteria by locating the research approaches and research areas through intensive reading of the dataset. This map underwent a rigorous reading process, considering the above philosophical debate and emerging concepts of 'objective' vs 'subjective'.

The dataset predominantly contained inductive and deductive research approaches; however, a few studies used the less-known abductive reasoning approach. The research approach is also called the reasoning of the research (Heit & Rotello, 2010).

The concept of deductive reasoning is well-established in social science, where it is used to predict and control research phenomena through quantitative modelling within a broader theoretical framework (Railton, 1978). Deductive reasoning and quantitative modelling often work together in research paradigms (Park et al., 2020; Smith, 2002). On the contrary, inductive reasoning is used to describe a phenomenon for a greater understanding in a more

focused research setting, predominantly adopting qualitative research methods (Willmott (1983). There is consensus across the various disciplines through published literature (Bansal et al., 2018; Liu, 2016) that a research phenomenon is considered more comprehensive through inductive reasoning following the qualitative research methodology. The research approaches used in this review map are described in **Table 2.10**.

Table 2. 10 Description of research approaches used in this map.

Research Approach	A defined procedure of research, stepping from broad philosophical and theoretical assumptions to the methods of data collection and further analysis to formulate predictions or to draw interpretations (Saunders et al., 2015).
Inductive Approach	It aims to generate meanings from the data to identify patterns and relationships to build a theory, predominantly following the qualitative research paradigm, e.g., ethnography, action research, and grounded theory. (Bansal et al., 2018; L. Liu, 2016; MOHAJAN, 2018).
Deductive Approach	It is a top-down research process of understanding whether an assumption is valid or not based on logic and experimentation. It mainly tests a hypothesis in a more quantitative setting through archival data, survey research, and experimental studies (Jackson, 2013; Jones, 2004; Park et al., 2020).
Abductive Approach	It is a logical process of making observations and generating a new hypothesis that would be more adequate to explain these observations (Hypothetical and observational studies) (Gold et al., 2011).

The establishment of these categories based on research approaches represented an apparent picture of the dataset of this map. 31 studies followed the qualitative research method, 139 studies were conducted using the quantitative method, and 22 adopted a mixed-method approach. Additionally, two studies used abductive reasoning without an established methodology. This map also found 44 studies that did not fit the study-determined criteria. However, to establish a final list based on classification and categorisation, this map generated a separate category for these studies named general studies. For this category, the concept of Aven & Kristensen (2019) and Lavonen & Meisalo (1998) 'crystallised intelligence' as cited in Collombat (2006) was followed. General studies aim to increase an individual's, student's, or society's understanding of different subjects through verbal comprehension and numerical skills based on factors learned in formal schools or a social setting (Collombat, 2006). In general, these studies supported the conceptual premise of a subject matter and provided a broader orientation of which specific factors/conditions are essential for understanding. A brief list of 238 studies based on different categories is provided in **Table 2.11**.

Table 2. 11 Description of the categories of the studies.

Topic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Grand Total
Deductive reasoning	-	6	1	3	5	2	7	6	8	12	12	17	29	21	10	139
Inductive reasoning	-	-	-	1	2	2	2	3	1	2	3	3	5	7	-	31
Mixed Method	-	1	-	-	1	2	2	2	-	1	3	1	2	5	2	22
Abductive reasoning	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2
General Research Studies	-	1	1	-	2	3	-	5	1	-	6	2	6	13	4	44
Grand Total	1	8	2	4	10	9	11	16	10	16	24	23	42	46	16	238

During the final phase, to develop sub-categories within the concepts of the main categories, this map followed the study of Lewis et al. (2004), which found that categorisation requires a thorough knowledge of the context in which the data is generated. To aid this, category codes are assigned to each study from different sets (Lewis et al., 2004). This map also designed codes to meet the inclusion criterion to collate multiple studies and associated topics.

Primarily, this map generated four codes: topic code (assigned to capture the significant subjects), industry or sector code (assigned based on the types of businesses discussed in the story), methodological code (assigned based on the methodological framework of the studies), and a general studies code (assigned to those studies, that were not focused, and covering a broader dimension of different topics and this category was designed later after an iterative process). This strategy provided a framework to generate subcategories such as case studies, action research, and statistical analysis. There were other studies as well that employed various techniques and were not sector specific.

This map followed the selection criteria based on the sub-categories of Hmelo-Silver (2003) and Seuring (2011). While different methods could be used within a single study, these concepts were chosen because they align with the specific focus of the map, which categorises studies based on their predominant methodological approach. However, these concepts are not mutually exclusive in the single category of the studies (as this map followed). For instance, one study could be based on secondary data. It may simultaneously contain first-hand interviews/direct observation or a questionnaire survey for validation purposes and perform experiments. However, this map placed such studies only in one category that was more explicit for the authentication purpose of the map's category scheme. A very comprehensive list of sub-categories was generated in an explanatory way. Studies based on the deductive reasoning category were further categorised into thirteen sub-

categories, shown in **Table 2.12**. Four subcategories were generated in the inductive reasoning category, as shown in **Table 2.13**.

Multiple new concepts emerged during the explanatory analysis based on the codes, and this map had to re-classify and re-categorise some of the studies through a laborious process. This iterative process had to be followed until the concepts remained stable. For instance, due to the emergence of many other studies, these were kept in a separate category of 'general studies' for further analysis in the discussion segment. These studies include life cycle assessment, COVID-19 impact, consumer behaviours and modern slavery. Some studies based on Islamic principles (waqf and sharia) and family businesses were also placed in the same category. These studies were assigned to a single category based on their predominant methodological approach or the primary focus of the research. When a study employs multiple methods, it is categorised according to the method that most aligns with its core objectives or research questions (Munn et al., 2018; Xiao & Watson, 2019). This approach ensures consistency and allows for a robust synthesis of findings within each category, even if the study includes secondary data, interviews, surveys, or experiments as supplementary methods (Munn et al., 2018). Primarily, 10 studies were kept separate and later merged into the general studies category (**Table 2.14**). A brief description of the entire dataset is given in **Table 2.15**.

Table 2. 12 Sub-categories of deductive reasoning.

Main Category	Sub-category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Grand Total
Exclusion criteria, (Deductive reasoning/ Quantitative method)	Conjoint analysis		1			1											2
	Dematel and MICMAC Method							1			3	1	3	3	1	1	13
	Descriptive statistical studies					1			1								2
	Econometric analysis		1								2		1	2	1		7
	Experimental studies							2		1	1	2		2	2	1	11
	Mann-Whitney U test studies											1	1	1	1		4
	Mathematical modelling					1							1	2	1		5
	Multiple modelling and analysis		2					2	2	2	1	1	1	5	4	2	22
	Regression Analysis			1	1	1	2		2	2	1	3	2	12	4	4	35
	Statistical factor analysis		1		2			1	1	2	2	1	4		1	1	16
	Statistical quantitative data analysis		1					1		1	2	2	3	2	4		16
	Studies on equilibrium analysis/ framework					1						1					2
	Studies on structural equation modelling												1		2	1	4
Total	13		6	1	3	5	2	7	6	8	12	12	17	29	21	10	139

Table 2. 13 Sub-categories of inductive reasoning.

Topic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Grand Total
Ethnographies/ participant observations	-	-	-	-	1	-	-	-	1	1	-	-	1	1	-	5
Action Research	-	-	-	-	1	-	1	-	-	1	-	-	1	2	-	6
Interpretive Paradigm	-	1	-	-	-	-	1	2	1	1	1	1	2	1	1	12
Phenomenological Paradigm	-	1	-	1	1	-	-	1	-	-	2	1	-	1	-	8
Total 4	-	2	-	1	3	-	2	3	2	3	3	2	4	5	1	31

The clarity of these detailed classification and categorisations results defined the nature of methodologies used in supply chain research and also set a clear direction to draw a final sample for evidence review synthesis (the next step of this study). All the studies were explained through a summary and clear description in an excel file. This file was reviewed, verified, and discussed briefly among the review team to build a logical consensus before moving toward the discussion segment.

Table 2. 14 General knowledge studies.

Category	Sub-category	Year															Grand Total
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
General Research Studies	Covid-19 impact	-	-	-	-	-	-	-	-	-	-	-	2	4	1	7	
	Behavioural studies	-	-	-	-	1	-	-	-	1	-	1	-	1	-	5	
	Comparative research	-	-	-	-	-	-	-	1	-	-	2	-	1	2	1	7
	Food Safety	-	-	1	-	-	1	-	2	-	-	-	-	-	1	1	6
	greenhouse gases (GHG)	-	-	-	-	-	-	-	1	-	-	2	1	1	-	-	5
	Life course research	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
	Modern slavery in the supply chain	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	3
	Article discussion on opco/propco model of financialization and the role of private equity	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
	Based on family business and family role in sustainable supply chain	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
	Comparative research	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
	Development standards study on sustainability through the role of Fair Trade	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
	Several topic areas and suggest emerging research focuses that should be considered in coming years for the sustainability	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
	Study based on two non-govt organisations	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	The study focused on agency theory prepositions	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
	The study focused on human excreta-derived fertiliser	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
	SWOT Analysis	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	Waqf, (Sharia)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
	Total		0	1	1	0	2	3	0	5	1	0	6	2	6	13	4

Table 2. 15 Final set of classification and categorisation of the studies.

Topic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Grand Total	Percentage of Studies
Thesis	-	-	-	-	1	-	-	-	1	2	2	1	2	1	-	10	1.75%
Books	-	1	-	-	1	-	1	-	1	4	2	2	-	-	1	13	2.27%
Other than Agri - (Crop food)	1	3	5	5	5	5	4	9	9	12	10	21	16	24	7	136	23.73%
Exclusion criteria (Single Author).	5	4	3	2	2	2	5	2	7	9	4	1	6	9	2	63	10.99%
Reviews).	-	-	1	1	3	3	2	1	3	10	10	13	12	18	3	80	13.96%
Analysis Based on Secondary data	1	-	1	2	1	-	1	2	1	4	6	5	3	4	2	33	5.76%
Deductive reasoning/ Quantitative method	-	6	1	3	5	2	7	6	8	12	12	17	29	21	10	139	24.26%
Inductive reasoning/ qualitative methods	-	2	-	1	3	-	2	3	2	3	3	2	4	5	1	31	5.41%
Abductive reasoning	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	0.35%
Mixed Method	-	1	-	-	1	2	2	2	-	1	3	1	2	5	2	22	3.84%
General Research Studies	-	1	1	-	2	3	-	5	1	-	6	2	6	13	4	44	7.68%
Grand Total	8	18	12	14	24	17	24	30	33	58	58	65	80	100	32	573	100%

2.7 Discussion and summary of mapping results

Based on the classification and categorisation schemes of the dataset for this research, the following discussion succinctly highlights the findings for each aim through the systematic mapping approach.

2.7.1 Aim 1: To identify the empirical data in a sustainable supply chain context based on philosophical and methodological evaluation

Two major research approaches emanating from the above philosophical debate in the map sample are deductive and inductive approaches/reasoning. The Positivist or objective paradigm followed deductive reasoning. Deductive reasoning was mainly employed to predict a phenomenon based on a hypothesis or mathematical modelling, predominantly following a quantitative research method. The subjective paradigm followed an inductive approach to gain a deeper understanding of a phenomenon and mainly employed a qualitative methodology.

However, beyond these two approaches, the map has also found a couple of studies following a lesser-known approach used in research, abductive reasoning. Abductive reasoning is generally perceived as reasoning from effect to cause and is sometimes taken as deductive (Spens & Kovács, 2006). The Abductive approach generally investigates a study's theoretical framework or findings and suggests a new or alternative hypothesis for further investigation (Spens & Kovács, 2006).

In the map sample, deductive reasoning was used as a theory testing process (from general to specific) through two quantitative techniques, empirical and analytical. Analytical methods were further categorised as mathematical and statistical models. There were 5 studies through mathematical modelling. While using the statistical models, 35 studies were found through regression analysis, followed by 22 multiple modelling studies. Thirdly, studies analysed through statistical factor analysis and quantitative analysis were 16 each. 13 studies were carried out through causal modelling (Dematel and Micmac). 7 studies used econometric analysis. Structural equation modelling and Mann Whitney U test were used 4 times each. Conjoint analysis and equilibrium analysis were employed by 2 studies each. At the same time, there were 11 experimental studies in total.

On the contrary, 31 studies followed inductive reasoning through qualitative studies to investigate the sustainability phenomenon under investigation (specific to general). 12 studies were mainly carried out through interpretive case studies followed by 8 phenomenological studies. Action research was used in 6 studies, and ethnographies were used in 5. In such methodologies, researchers try to observe the holistic phenomenon by participating in the actual research domain and analyse by using their experiences, intuitions

or actions, whether through participant observations (Emic approach, insider view) or by observing the participants (Etic approach; outsider view) (Xia, 2011).

The findings of such research techniques left some critical queries for the critics. For example, what mechanism does a positivist modeller use to holistically understand and investigate the unintended external consequences, particularly in agri-food supply chains (such as the recent floods and devastating earthquake in 2005, as witnessed in Pakistan)? Furthermore, how could it be possible to implement sustainable supply chain management practices without action-oriented or practical research?

Sectors like dairy food, livestock, and particularly the crop sector involve people working in a more collectivistic and dynamic interaction. This map found that participative action research would best fit to discover how interactions exist and the meaning, benefits, and shortcomings of these encounters in sustainable supply chains. However, the results of this map discovered that most of the research followed quantitative modelling and tried to find desired objectives through the distribution of surveys.

22 articles reflected mixed-method research paradigms that adopted no clear philosophical paradigms. A small number of these techniques in research could be due to budget and time constraints and also some practical difficulties due to the nature of the unestablished philosophical paradigm to date in developing such methods (Falvo et al., 2021).

In the general research category, the map found that most studies (7) concentrated on sustainable supply chains during the pandemic, reflecting a strong belief that natural disruptions could severely impact the supply chain. This highlighted the need for companies to develop contingency plans for situations like COVID-19. Many of these studies used a quantitative modelling approach. However, one particularly insightful study by Falvo et al. (2021) examined contingency plans based on the just-in-time inventory method, which aims to receive only the required products from suppliers. To achieve resource-efficient supply chains and better competitive advantages, 5 studies focused on greenhouse gas emissions. 7 studies were based on comparative models and focused on logistics operations, particularly in the apparel, dairy, and marine sectors. Comparative studies argued that there is an urgent need in supply chain operations to reduce energy consumption and GHG emissions. Most of these studies used simulation modelling methodologies, with Rajagopal's et al (2015) paper serving as an excellent example in the dataset. 6 studies focused on food safety through the Life cycle assessment technique, and 1 study was based on a life course assessment of the products, highlighting the optimising operation technique for sustainability compliance. This life cycle assessment was mainly prevalent in natural science settings through experimental studies.

The map's analysis further discovered that changes are needed in behaviour patterns for sustainability compliance. Five studies that primarily focused on the methodology of

psychology and psychometric analysis highlighted different behaviours in a sustainable supply chain across the world, from developing countries (Bangladesh shoe industry and Tanzanian tomato sector) to developed countries (Italy to the USA, considering product costs) (Alphonse & Alfnes, 2012; Brockhaus et al., 2016; Albani et al., 2018; Foti & Timpanaro, 2021; Kumar et al., 2020).

The most significant yet underexplored literature in the dataset was the challenges of modern slavery, mainly focusing on sociocultural issues in the MTSCs. There were 3 studies mentioning cultural issues in the apparel and mining sectors but did not investigate them in detail. Modern slavery is a pervasive issue affecting both developing and developed countries and is a root cause of social sustainability challenges in the contemporary world. However, primary data on modern slavery remains scarce, primarily due to the sensitivities surrounding the issue, as well as cultural and social practices that hinder open dialogue and data collection, particularly in developing countries (LeBaron et al., 2021). Focusing on modern slavery challenges highlights a critical gap in the literature, offering new insights into an underreported aspect of sustainability and the ethical complexities within global supply chains. This topic needs urgent attention from research scholars in business supply chains. This map also found some exciting studies with unique methodologies. For instance, a study by Burch & Lawrence (2013) based on Opco/Propco model of financialisation and the role of private equity in the agri-food supply chain retail sector. Another study by Azganin et al. (2021) focused on Islamic principles (sharia and waqf) in a UAE context aimed at how the waqf crowdfunding models are intended to provide alternative sources of funds for the waqf institutions and farmers. A study by Moya et al (2019) Identified the impact and barriers to using human excreta-derived fertiliser (HEDF) by farmers participating in the horticultural export market in the African Context. One study used the conventional SWOT matrix to highlight the many components of fruit, vegetables, wine, cereal, and oil olive's sustainability compliance efforts in their supply chains through the features and structures of strategic management (Fiore et al., 2018).

Most of the research in the map dataset was conducted through empirical observations and case studies, particularly 136 studies (evaluated briefly in addressing the second aim of the study in the following section 1.2.5) to understand the theoretical underpinning of the sustainable supply chains of different sectors) that was focused on other than the crop agri-food sector. In contrast, 80 studies were based on archival data, following a systematic literature review approach. Several survey-based studies following deductive reasoning have also been carried out, particularly in the dairy and livestock sectors. The analysis also revealed an absence of detailed investigation through inductive reasoning in these sectors. This may be due to the multidisciplinary nature of qualitative research (Vallet-Bellmunt et al, 2011), which made it challenging to acquire the generalisability of a particular research

domain by controlling all variables (Tarifa-Fernandez & de Burgos-Jiménez, 2017), particularly in social and cultural constructs.

Most authors were frequently observed to be oriented toward deductive paradigmatic preferences in their research process through quantitative modelling, particularly in apparel, automotive, industries, and mineral sectors. This was possibly due to the less intensity required in formulating such methods, particularly in developing countries, as witnessed in Tunisia, where cultural barriers created challenges while conducting research through inductive reasoning (Slimene & Lakhal, 2020).

In the agri-food supply chain, inductive paradigms were an emerging trend, primarily applied through case studies, personal experience, interviews, direct observation, and interactions with targeted groups. These methods are particularly suited to a 'natural setting,' which refers to conducting research in the original field environment outside of laboratories or controlled settings (Zarei et al., 2019). This approach allows researchers to observe and engage with phenomena as they naturally unfold, providing a more authentic understanding of the supply chain dynamics. Such a setting is especially valuable for theory building and interpretation, as it captures the complexities of real-world operations, mainly when suppliers are geographically distant and cannot be easily studied in artificial environments (Andersen & Kragh, 2010).

2.7.1.1 Concluding comments

The comprehensive debate between objective and subjective paradigms brought very comprehensive research findings through their own established techniques. Due to different scientific orientations, both approaches are comprehensive and correct. By analysing and comparing different research philosophies and world views, inductive reasoning is valid and relevant, particularly in generating a theory that covers a subject matter from different angles from a social science perspective. Studies based on objective ontology through experiential and practical ways of knowing in natural science are more effective as they give a generalised orientation. However, research through triangulation could provide more valid results and academic rigour to theory development if organised systematically.

2.7.2 Aim 2: To understand the nature of MTSCs in the context of a complex adaptive system

The primary purpose of this aim was to attain the multilateral aspects of sustainability compliance in MTSCs (Theories used, challenges, and management strategies in MTSCs, discussed later in this chapter). This map chooses the complex adaptive system model of Choi et al (2001) and Dooley (1997) to understand the nature of MTSCs, which helped to assess the different aspects holistically.

The study of complex adaptive systems by Dooley (1997) has remained substantial and instrumental for more than two decades in understanding the multi-tier structural

phenomenon of a business. Dooley (1997) proved a distinctive literary genre by establishing a complex adaptive system concept. This distinction is further exemplified in the study of Choi et al. (2001) that business companies dwelled into manifolds of cognition and action, which could be represented by the generic theoretical assumptions and driving mechanisms of a complex adaptive system. This map remained focused on the assumptions and mechanism of Choi et al. (2001) and Dooley (1997) in a supply chain context, which would refer to a network of firms collectively engaged in supplying and buying a given part of their supply chain through the exchange of products and services. The nature of the firm's participation in a network dictates the behaviour (Dooley, 1997) and exhibits the level of control in a supply chain structure within the firms (Choi et al., 2001). These assumptions facilitated an understanding of the variety of MTSCs. For instance, every study was distinct in its multi-tiers. In some studies, one tier was based on one entity; in others, one tier had more than one entity or stakeholder working concurrently.

To understand the study's second aim, this map analysed 136 studies based on sectors other than the crop agri-food sector. This analysis facilitated an understanding of how MTSCs work in various other sectors. A detailed analysis of these 136 studies further categorised them into 12 sub-categories, as highlighted in **Table 2.16**.

Table 2. 16 Sub-categories of the classified set of studies, based on other than crop agri-food sector.

Category	Sub-category	Year																Grand Total
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
Other than the crop Agri-food Sector	Academic Sector	-	-	-	-	-	-	-	1	-	-	-	1	1	2	1	6	
	Apparel sector	-	-	-	-	-	-	-	-	1	1	1	1	1	4	-	9	
	Automotive sector	-	-	-	-	1	-	-	-	1	2	-	1	1	-	1	7	
	Defence/military sector	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	2	
	Energy and hydro sector. (Bioenergy, Biomass, Biofuel, Aqua etc.)	-	-	-	1	1	1	1	2	-	-	-	-	3	1	-	10	
	Honey producing sector	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	2	
	Industry or manufacturing sector	-	-	-	1	1	-	-	1	-	-	2	2	1	-	-	8	
	Livestock, meat and Dairy sector	1	1	5	3	1	2	3	3	4	4	3	8	2	6	3	49	
	Miscellaneous. (Studies based on different units of analysis or unit of analysis is not clear)	-	-	-	-	1	-	-	-	2	2	2	4	1	-	1	13	
	Plastic/rubber sector	-	-	-	-	-	-	-	-	-	2	1	-	-	1	1	5	

Seafood and marine sector	-	-	-	-	-	1	-	2	1	-	-	1	1	-	-	8
Technological sector	-	1	-	-	-	-	-	-	-	-	-	3	3	7	-	14
Tourism sector	-	-	-	-	-	1	-	-	-	1	-	-	1	-	-	3
Total	1	3	5	5	5	5	4	9	9	12	10	21	16	22	7	136

Further, this map also analysed archival data mainly through systematic reviews. There were 80 reviews, and 11551 reported studies were analysed from 1960 onward. In these reviews, 39 research engines and databases were used 256 times. The analysis of archival data helped to draw a background of different challenges and management strategies used in a sustainable supply chain, as highlighted in Table 2.17.

Table 2. 17 Details of studies, databases, and search engines were used in reviews.

Description	Numbers	
Total Article Reported in reviewed articles	11551	
Total Article Reviewed	Year	Number of Articles.
	2010	1
	2011	1
	2012	3
	2013	3
	2014	2
	2015	1
	2016	3
	2017	10
	2018	10
	2019	13
	2020	12
	2021	18
	2022	3
	Grand Total	80
Reported Search engines and databases in reviews.	MDPI, Wiley, Science Direct, Sage, Springer, Scopus, IEEE Xplore, Thomson Reuter's Web of Science, ProQuest (ABI/INFORM), Emerald, Google Scholar, Google, Emerald, ProQuest, NHB, Indian Horticulture Database, Elsevier, Taylor, Francis, ABI/Inform, Nexus Uni, JSTOR, Inder Science, Web of Science, EBSCO, Academic Search, Social Sciences and Humanities (CPCI-SSH), Agricola, Hein Online, Clarivate Analytics, Science Citation Index Expanded (SCI-Expanded), Arts and Humanities Citation, Conference Proceedings Citation Index—Science (CPCI-S), Web of knowledge, PLoS, Dialnet Plus, ASSET4/Eikon, Emerging Sources Citation Index (ESCI), Not mentioned/ No Data	
	Total	39
The number of times these search engines and databases have been used in reviewed articles	246	

The following section briefly overviews the complex adaptive system in business supply chains, drawing on analyses from key studies (Choi et al., 2001). These analyses highlight the dynamic nature of supply chains, emphasising how stakeholders in a network of MTSC systems interact and evolve. The section explores the roles of various stakeholders, including suppliers, manufacturers, and distributors, within different orientations of the complex adaptive system and how these roles contribute to the resilience and flexibility of the supply chain (Seuring & Müller, 2008). This understanding is crucial for addressing the complexities and uncertainties modern supply chains face in a rapidly changing global environment.

2.7.2.1 The role of networks and stakeholders in sustainable supply Chain

The network structure consists of different actors with linkages or ties to one another in a social or business setting (Choi et al., 2001). . The network structure consists of different actors with linkages or ties to one another in a social or business setting (Choi et al., 2001). These dynamic structures are primarily shaped by buying firms, which are described as focal firms, particularly in MTSC networks (Kim et al., 2022). Focal firms play a central role in influencing the overall configuration and interactions of the MTSC network (Farahani et al., 2014; Marttinen & Kähkönen, 2022). This system of network structures determines embeddedness within different stakeholders (Swierczek, 2019). Two types of embeddedness within an MTS are relational and structural (Swierczek, 2019). The term 'structural embeddedness' embodies many concepts that refer to the formal and impersonal aspects of the structure of a network, which deals with how the network is configured through formal contracts developed through measures of centrality (Swierczek, 2019). Relational embeddedness is a more informal and commonly used notion in sociology. It looks at the interpersonal aspects and how socially formed relations affect information and resource-sharing (Martins et al., 2017; Swierczek, 2019).

These types of embeddedness have significant and multiple implications for understanding how each type works for the effectiveness of structural networks. In supply chain structure, this embeddedness works in two ways: ensuring compliance with sustainability norms and facilitating the flow of information throughout the product flow from upstream to downstream suppliers and from the focal organisations to other internal and external stakeholders (Swierczek, 2019). The goal here is not merely compliance with sustainability norms but also fostering long term sustainability by enhancing resource efficiency, reducing environmental impact, and improving social equity within the network. Focal firms typically determine the nature of embeddedness in a network and the strength of ties between network members, guiding the network's orientation toward sustainable practices, whether formal or informal (Choi & Kim, 2008).

2.7.2.2 Network orientation

Every organisation has multiple relationships with stakeholders within its network. These networks consist of an interrelated set of stakeholders, categorised as internal or external, based on their position within or outside the organisation. Internal stakeholders are those directly involved in the organisation's operations, such as employees, managers, and departments, while external stakeholders include suppliers, customers, regulators, and other entities outside the organisation. Internal and external stakeholders exert direct or indirect influence on the flows of information, resources, and decision-making processes within the network, whether through formal or informal interactions (Martins et al., 2017). Some stakeholders may even have multiple 'stakes'; for instance, a company can be both a buyer and a seller in a network, as is the case with DHL or FedEx (Lazzarini et al., 2001). These stakeholders include suppliers, consumers, audit firms, government, and NGOs. All these relationships are interconnected and change and evolve with time (Choi & Kim, 2008). Focusing on network relationships helps to orient a business's stakeholders as an organisation attempts to implement strategic, overarching initiatives related to sustainability (Dooley, 1997).

Choi and Kim (2008) assert that systemic activities should be recognised in a given supply chain to manage a multi-tier network of organisations. Swierzeck (2019) further recommends that these activities be managed through a strategic implication of management involved in the material and service flows. A large body of existing literature supports these ideas that an established strategic management mechanism of information supplied across an extensive, distributed network, particularly in different regions, is the primary pillar of structural and relational embeddedness for sustainability compliance (Choi & Kim, 2008; Lazzarini et al., 2001; Martins et al., 2017; Swierzeck, 2019).

This discussion now leads to the highlight of the theoretical frameworks in this mapping review. The following aim only focused on the major theories used in this map. It does not cover the models used, as the dataset of quantitative modelling has already been stated above in **Table 2.12**.

2.7.3 Aim 3: Theoretical underpinning in sustainable supply chain research

Over the last decade, the theorisation effort in sustainable supply chain management research has increased significantly. Several classical theories from the social science perspective have been applied in sustainable supply chain management studies. This theoretical underpinning helps to draw the philosophical understanding of a subject matter that leads to determining a proper methodological roadmap for further investigation of this subject matter (Grubic & Fan, 2010). These theories enable scholars to understand, explain or define the structure of the subject under discussion (Grubic & Fan, 2010) and what could

be the best possible way to explore further dimensions of a subject matter, e.g., supply chain (Foster, 2008).

This section presented how different organisational theories have addressed the issue of sustainability in supply chain studies. However, the analysis highlighted that the majority of papers were a-theoretical. Social network theory, Agency theory, Stakeholder theory, resource-based view (RBV), resource dependence theory (RDT), institutional theory, transaction cost economics, and agency theory were the most used theories in the literature. This map briefly discusses the primary features of these theories, and the mechanisms used by different scholars to establish theoretical assumptions of the studies. Most importantly, understanding the nature of theories also helped to establish a framework for the roles of intermediaries in sustainability compliance in a complex adaptive system of MTSCs. These theories helped to place a concrete foundation for the next step in this doctoral journey.

2.7.3.1 Social Network Theory

The importance and originality of this theory in the supply chain network indicate how multiple stakeholders form a structure while maintaining their separate entities (Monaghan et al., 2017). These structures may be formed in a global supply chain because of a geographic location or common interests (Lance et al., 2017). Two important themes emerged from the studies of Kim et al. (2011) and Kim (2014) discussed so far; primarily, this structural network highlights that the embedded actors facilitate the knowledge and service flow in a network. Secondly, identifying highly embedded actors through this network can create a way to find linkages between these actors from informal to formal relational embeddedness by playing the role of intermediaries or brokers (Kim, 2014; Schoenherr et al., 2015). Social network analysis, primarily in a MTSC context, focuses on different types of relationships and how these relationships provide a platform for sustainable action through relational and structural embeddedness (Choi & Kim, 2008; Swierczek, 2019).

Different types of mechanisms have been used to analyse sustainable supply chain structures. 17 studies discussed the importance of social network theory in the sustainable supply chain context in this map. Structural embeddedness was used to investigate how decisions and outcomes are affected by the structure of the overall inter- or intra-organisational network of relations within which the actor resides (Choi & Kim, 2008). This map found that the formal organisational position in a network and the nature of responsibilities shape its structural position in the network (Asamoah et al., 2020). Buying firms in many studies, had a proper formal position. The buying firm's formal structural embeddedness, particularly in the livestock sector, shaped the nature of a network and created the channels for sharing norms, values and coordination among different actors in their supply chain.

To successfully implement sustainability compliance initiatives in a supply chain, a firm may have to make changes to some of the relationships in the network, perhaps structural to relational or otherwise (Canto et al, 2021). As examined in the dataset, a theoretical demonstration of this structural embeddedness was first carried out by Study Mena et al. (2013) in the British food industry. This study highlighted that using brokers or intermediaries in a regional context to comply with sustainability through structural embeddedness could bring a positive outcome where the role of intermediaries remained significant. Relational embeddedness can be used to explore information exchange and the quality of that information with connections, as discussed in the data (Swierzeck, 2019). These activities are the interpersonal relationships that develop between different network actors, generally formed by how they interrelate in their formal network positions, which may then move beyond their formal network positions to informal network positions (Swierzeck, 2019). In a sustainable supply chain network, Mazzola et al. (2015) highlighted that a system of transferring information to achieve a common goal depends upon relational ties, including the trust and strength of ties within the network, not just the formal structural ties. However, different goals of the individual actors within the network vary depending on the project and the activity, which may raise sustainability challenges (Day et al., 2013). To successfully transfer information and achieve their goals, organisations must understand the strength of relational embeddedness and how information flows across multiple tiers through direct and indirect connections (Day et al., 2013). Achieving organisational goals typically involves implementing strategies, actions, or schemes designed to improve communication, efficiency, or coordination within the supply chain. These goals are generally set by top management or focal firms within the network. Achieving these goals may require intermediaries, such as supply chain coordinators or facilitators, to ensure that information flows smoothly and that a clear and consistent message is conveyed across the multiple tiers of the supply chain, involving both internal and external stakeholders (Mazzola et al., 2015).

2.7.3.2 Stakeholder Theory

This map found 19 studies that suggested stakeholder theory (ST) is often used as a descriptive framework to understand the processes and contingencies involved in implementing sustainable supply chain practices (Hörisch et al., 2014). For instance, the study by Marshall et al. (2010) emphasises that external stakeholders' concerns, such as those of consumers, governments, and non-governmental organisations, serve as 'starting points' for sustainability compliance throughout the supply chain. In this context, ST describes how the relationships and interactions between these stakeholders unfold, detailing how their interests and concerns drive actions within the supply chain. While ST provides insight into these dynamics, implementing sustainability practices is often carried out through third-party intermediaries (Jones et al., 2018). This map identified three key

aspects of stakeholders in a sustainable supply chain. The descriptive aspect of ST explored how companies consider stakeholders' interests, considering that sustainability compliance could occur within a network of several downstream and upstream supply chain actors (Busse et al., 2021).

The instrumental and integrative aspects of ST investigate the advantages gained by a firm that accounts for stakeholders' interests (demands and expectations) (Mani & Gunasekaran, 2018). The study of Meixell and Luoma (2015) explored two instrumental mediating factors, mainly related to the economic dimension of sustainability. One mediating factor that positively influences focal firms is the reduction of sustainability risk costs, which refer to the financial impacts associated with environmental, social, and governance risks, such as regulatory fines, reputational damage, or disruptions in the supply chain due to unsustainable practices. On the other hand, the factor that exerts a negative influence is increased purchasing costs.

The normative characteristic considers the ethical reasons why companies consider stakeholders' interests (Soundararajan & Brown, 2016). Beyond the dominant descriptive and instrumental logic of ST, a significant research gap was found in the analysis concerning the role of ST and pressures on sustainability compliance in the MTSC, not through any external stakeholder pressure but through the development of the normative features in a network through self-reliance (Soundararajan & Brown, 2016; Tangestani et al., 2020; Uribe et al., 2018).

2.7.3.3 Resource-Based View

The resource-based view (RBV) is when a set of particular resources are utilised and embedded in organisational practices to gain competitive advantages in their businesses (Barratt & Oke, 2007). These resources may be tangible or intangible (Dubey et al., 2019). This theory suggests that firms may achieve a competitive advantage by possessing and controlling rare resources and capabilities (McWilliams & Siegel, 2011). These resources may be classified into assets, capabilities, organisational knowledge and information (Eryarsoy et al., 2022). Controlling any of these resources by a firm enables it to create and implement strategies to improve efficiency and effectiveness (Formentini & Taticchi, 2016). In supply chain management for sustainability compliance, resource-based mechanisms suggested that competitive advantage could be obtained through sustainability-related resources and competencies in the supply chain, as observed in 21 studies (Khan et al., 2022). Through systematic studies, Khan et al. (2022) and Mardani et al. (2020) believe that identifying and further developing critical resources promote the achievement of environmental, social, and economic performance in a complex adaptive network. However, this map found that the majority of supply chains concentrate on short-term economic gains through their obtained resources rather than focusing on the long-term environmental and

social dimensions to comply with sustainability (Brandon-Jones et al., 2014; Rousseau, 2017; Somsuk et al., 2012; Squire et al., 2009).

Rousseau (2017) established the view that the implementation of sustainable supply chain practices is possible only if buying companies and their suppliers possess (before business) or develop (during business) the necessary relevant internal resources, tangible or intangible. Trust is a fundamental, significant inter-organisational resource (intangible), representing and resulting from close collaboration between buyer and supplier in a supply chain (Dubey et al., 2017, 2019). A study by Wu and Chiu (2015) also maintained that cooperation between the focal firm and its suppliers is another significant intangible resource. Through cooperation, access to scarce resources in the supply chain could be possible, positively impacting companies' sustainability compliance efforts across social, environmental, and economic dimensions. Through the lens of RBV, the acquisition and management of scarce resources stand as crucial elements to achieve sustainability compliance and consequently obtain competitive advantages such as trust, knowledge, and training (Mardani et al., 2020). A strong relationship between cooperation and trust in sustainable practices has been reported in the study of Sancha et al. (2019) on the mining community in the African context. One of the other best examples of the integrated benefits of such tangible and intangible resources for achieving sustainability compliance is found in the study of Sancha et al. (2016) in Spanish manufacturing firms.

2.7.3.4 Resource Dependence Theory

Supply chain networks include multiple interdependent organisations in a globalised context, which makes resource dependence theory (RDT) a relevant theoretical perspective for studying sustainability compliance in supply chain management. This theory provided valuable insights into how focal companies spread sustainability practices throughout the supply chain. 14 studies highlighted the significant use of resources to achieve sustainability compliance. One of the significant mechanisms of this theory is the contractual relationship of multiple firms in a business network to gain competitive advantages by establishing a formal business relationship (Donato et al., 2015). This relationship is sometimes considered a power-dependence relationship, as in the study by Davis and Cobb (2010). Drawing on a different range of sources, the primary objective of this relationship in a business network is to develop a mechanism of power development (Davis & Cobb, 2010). This power development can be done on both ends, with both buyers and suppliers. In terms of buying firms, this map evaluated that buying firms used to have power development aspect of resource dependence within a business network since they could offer long-term contracts. Also, these firms are a path for the market; for instance, positional power was found to be more significant in reaching the markets (Chand & Tarei, 2021; Liu et al., 2022). Suppliers develop this power relationship by offering rare, irreplaceable product qualities (Liu et al.,

2022), as in the mining and technological sectors. In this case, buying companies become more resource-dependent on suppliers.

Many scholars hold the view that the level of interdependence between buyers and suppliers, as well as the effectiveness of their efforts, may directly affect the sustainability compliance towards the business supply chain, sometimes due to a lack of suppliers' commitment and sometimes less coordinated efforts from the buying firms as witnessed in geographically fragmented supply chains (Genovese et al., 2022; Gong et al., 2018; Govindan et al., 2021). The findings of Gligor et al. (2018) have strengthened the map analysis and explored in the Vietnam context that a dominant player, either buyer or supplier, can use its power to drive sustainability in the supply chain by sharing responsibility with the other stakeholders. However, more recent attention has focused on the power position of the focal firm, where these firms can quickly diffuse sustainability practices when they are in a position of power (Kalaitzi et al., 2018). Conversely, when suppliers are in a position of power, they are found resistant to pressures to integrate sustainability strategies from the focal company, thus hindering the sustainability compliance process, as cited in the study of Kalaitzi et al. (2018). More recently, there has been increased emphasis on the level and nature of dependence on the supplier and their relative power in the network, mainly seen in the context of developing countries (Yin & Ran, 2021). However, this map's findings suggest that intermediaries could effectively address the real-life sustainability complexities of supply chain networks to gain a holistic and realistic perspective of buyers and suppliers (Gruchmann, 2022; Saeed et al., 2018). Numerous studies, such as the study of Spieske et al. (2022), have attempted to explain the successful role of intermediaries in the resource dependency view, particularly during a situation like the COVID-19 pandemic.

2.7.3.5 Institutional Theory

The concept of isomorphism within institutional theory is central to understanding how organisations in a network adopt similar structures, practices, and behaviours due to various pressures (DiMaggio & Powell, 1983; Greenwood & Meyer, 2008). This map identifies three key mechanisms of isomorphism that influence the practices of organisations within a supply chain: coercive, normative, and mimetic isomorphism (Meyer & Rowan, 1977).

Coercive Isomorphism occurs when organisations are pressured by external forces, such as regulations, laws, or influential stakeholders, to adopt specific practices or behaviours. This pressure can be formal (e.g., legal regulations) and informal (e.g., expectations from dominant stakeholders in the network). In supply chains, coercive isomorphism is particularly important for ensuring sustainability compliance (Calzolari et al., 2025). For example, governmental regulations or industry standards might compel focal firms to ensure that their suppliers follow sustainable practices. This creates a ripple effect throughout the supply chain, as suppliers must comply to maintain their relationship with the focal firm. As a result,

coercive isomorphism is a critical factor in driving sustainability practices within supply chains (Carbone & Moatti, 2011; Shubham et al., 2018).

The influence of professional standards, norms, and values within a specific industry or organisation drives Normative Isomorphism. This isomorphism occurs when organisations adopt practices because they are seen as 'the right thing to do' within a particular professional or social context (Nawaz & Guribie, 2022). In a supply chain, normative isomorphism often manifests as adopting sustainability practices due to ethical, moral, or societal expectations rather than legal or financial incentives (Okeke, 2025). For example, companies might adopt sustainability practices because they are seen as the ethical standard in their industry or because they want to align with the broader values of the professional community. This isomorphism is driven not by external regulations but by internal values and professional norms (Flynn & Walker, 2021; Niesten et al., 2017).

Mimetic Isomorphism involves organisations imitating the practices of others in the network, particularly in situations of uncertainty or when an organisation is unsure of how to act (Calzolari et al., 2025). However, it is important to note that mimetic isomorphism does not necessarily lead to adopting the best practices. Instead, firms may adopt practices simply because they are widely accepted or because other successful organisations use them (Ouro-Salim & Guarnieri, 2023). In sustainability, mimetic isomorphism may drive firms to adopt sustainability practices because other firms in their industry or region are doing so, not necessarily because these practices are the most effective or efficient (Singh, 2024). This is particularly common in global supply chains, where firms may mimic local practices to align with global sustainability standards or gain competitive advantage, even if those practices are not the best (Font et al., 2019; Liao et al., 2020). This map analysed these mechanisms within the institutional contexts (regulations, norms, culture) to understand the sustainability phenomenon, with 7 studies found discussing institutional theory. Studies of normative isomorphism were scarce, particularly in a global context. Multiple unsustainable practices were evident in the supply chains of major brands, but attributing corporate irresponsibility solely to a lack of normative isomorphism is insufficient. While weak normative pressures may contribute to unsustainable practices, corporate irresponsibility is also shaped by factors such as misaligned incentives, weak governance structures, and cost-driven decision-making (Calzolari et al., 2025). The absence of strong institutional norms may reduce the emphasis on sustainability within corporate headquarters, but broader structural and economic factors also influence corporate behaviour (Ebrahimi & Koh, 2021).

Similarly, mimetic isomorphism was not consistently observed among lower-tier suppliers, as evidenced in the cases of Nike and Mattel. The ability of suppliers to replicate sustainability practices depends on visibility into leading firms' actions and access to the necessary financial and operational resources (Flynn & Walker, 2021). Lower-tier suppliers often face

economic and structural constraints that hinder their ability to adopt sustainability standards, even when such practices are well established at higher levels of the supply chain (Nielsen et al., 2017). Thus, the uneven diffusion of sustainability practices across supply chain tiers reflects disparities in institutional pressures, resource availability, and regulatory oversight. This map proposes a couple of questions to explore in an isomorphic context. How could sustainability experts combine and adapt different isomorphic approaches (coercive, normative, and mimetic) to comply with sustainability practices in a global context of the crop agri-food sector for sustainable products? and how could different intermediaries perform this role?

2.7.3.6 Transaction Cost Economics

Transaction cost economics (TCE) in a business are the costs of all activities beyond the cost of a product, such as costs related to finding a business partner, negotiating, and monitoring contractual agreements (Jraisat et al., 2021; Kembro et al., 2014; Kembro & NäsLund, 2014; Koberg & Longoni, 2019). Additionally, Williamson (2008) further redefines the dimensions to also include uncertainty (risks), asset specificity, and transaction frequency.

In the context of a complex supply chain network, investments are needed for sustainability compliance throughout the supply chain (Lee & Choi, 2021), such as physical costs (monitoring tools), recruitment costs (new hiring), organisational costs (hierarchical deployment) and intangible costs (code of conduct, process, and standards) (Huo et al., 2018; Lee & Choi, 2021; Meinlschmidt et al., 2018). Companies should evaluate the costs associated with potential and uncertain risks before implementing sustainability practices across the supply chain. This assessment includes integrating risk management processes and cost-saving strategies to ensure compliance (Lee & Choi, 2021). While regulatory pressures may drive sustainability adoption through coercive mechanisms, companies also engage in voluntary sustainability initiatives due to normative influences, such as industry expectations and stakeholder pressures (Lee & Choi, 2021; Paolucci et al., 2021). Therefore, sustainability decisions are shaped by both regulatory mandates and the broader institutional environment in which firms operate. This map has widely explored the transaction cost evaluation related to adopting global standards or certifications such as ISO 14001 (Campos & Mello, 2017). These certification standards reduce transaction costs related to setting sustainability criteria, finding and qualifying suppliers, and verifying compliance (Campos & Mello, 2017). From the TCE perspective, Lee & Choi (2021) have demonstrated that collaboration between buying firms and suppliers helps to minimise short-term costs due to less monitoring (attenuating uncertainty) (Sheffi et al., 2019). This was also associated with rendering the broker services through the TCE mechanism; buyers and suppliers develop

common goals of processing sustainable products, particularly in an environmental context (Sheffi et al., 2019; Yang & Lien, 2018).

In the data, there were almost 11 reviews which highlighted different opportunities and recommended the application of transactional cost economics mechanism for the evaluation of actual costs of decisions on different types of transactions within the parameters of sustainability compliance, particularly in the crop and dairy sector (Bakucs et al., 2013). TCE theory may be employed to investigate the investments that either promote or hinder the sustainability compliance process, particularly in the regional context of the mineral sector (Jraisat et al., 2021). For instance, cooperation or organisational costs are possible barriers to spreading sustainability (Jraisat et al., 2021). However, there is an inconsistency with this argument, and several studies demonstrate that compliance towards sustainability follows the path that minimises costs (Jraisat et al., 2021; Lee & Choi, 2021). The analysis of this map suggests that applying TCE is a potential solution to reduce asset specificity through standards and norms by establishing the role of intermediaries, which were considered powerful enablers to spread sustainability practices along the supply chain through transaction frequency.

2.7.3.7 Agency Theory

In agency theory, Eisenhardt (1989) briefly explained the concept of Meckling and Jensen (1976), which states that one party, known as the 'principal' delegates, works with another party, known as the 'agent', in a complex multi-adaptive system. The principal-agent relationship in a sustainable supply chain framework is mainly based on the normative account of agency theory (Vlachos & Dyra, 2020). This relational embeddedness is designed for sustainability compliance in a supply chain (Vlachos & Dyra, 2020). This relationship primarily relies on contract-based incentives between the principal and agent to align their interests (Morais et al., 2022; Vlachos & Dyra, 2020).

This map set out to gain further understanding of such relations, particularly when these are applied in a broader geographical framework to achieve sustainability compliance in a multi-tier supply chain setting, where factors relating to knowledge, commitment, and trust often outweigh contractual relationships. This map found 19 research papers that have tried to establish agency relationships between broker, agent or intermediary. However, to date, the problem of intermediaries has received scant attention. A summary of the used theories and their mechanisms in this map is highlighted in **Table 2.18**.

Table 2. 18 Summary of the theories and mechanisms used in the map.

Theory	Mechanism Used
Social Network Theory (Durkheim, 1964)	Structural embeddedness (Mainly prevalent in individualistic societies like the USA and Scandinavian countries). Relational embeddedness (which mainly exists in collectivistic societies, such as India, Pakistan, and Middle Eastern countries).
Stakeholder Theory (Freeman, 1984)	Descriptive aspect (Stakeholder interest in a network). Instrumental aspect (Demands and expectations of stakeholders). Normative aspect (Based on ethical characteristics between stakeholders in a network).
Resource-Based view (Barney, 1991)	The embeddedness of resources in a business network. Tangible (Physical resources) and intangible (organisational knowledge).
Resource Dependence Theory (Pfeffer & Salancik, 1978)	Stakeholders' mutual interdependencies of services and resources in a network.
Institutional Theory (Meyer & Rowan, 1977)	Isomorphism (Process of homogenisation of different institutes in a business network). A. Coercive isomorphism is due to formal and informal pressure in a business network (relational embeddedness). B. Normative isomorphism, Legitimate and autonomous cooperation in a business network. C. Mimetic Isomorphism, Mutual benefits through transfer of knowledge.
Transaction Cost Economics (Coase, 1937, cited in Jacobsen, 2015; Williamson, 2005)	Measure and calculate the value of all aspects of the good or service involved in the transaction. Enforcement highlights the need for an unbiased third party or intermediary to ensure a fair deal in business. Market size, which affects the partiality or impartiality of transactions.
Agency Theory (Meckling & Jensen, 1976)	Principal (buyer) and agent relationship in a business mechanism. Based on normative mechanism (Eliminating moral hazards, reducing the risk of opportunism between actors in a network) Contract-based incentives between principal and agent.

2.7.3.8 Concluding comments

In the field of social science, theories are formulated to explain and understand a subject matter that is going to be investigated. Theories primarily extend existing knowledge in a domain within the limits of critical bounding philosophical assumptions. These assumptions primarily frame a research structure by providing broader dimensions of a phenomenon towards targeted variables. Due to the substantive nature of theories, selecting appropriate theories helps a researcher and a reader evaluate a phenomenon critically. It helps to understand its real meaning and nature of existence. In social science, theories are as critical as a research formula or experimental setting in natural science. However, they are often ignored in systematic mapping. Unfortunately, most of the studies reviewed lacked a strong theoretical foundation, limiting their ability to provide a focused and systematic understanding of the phenomenon within a specific framework. The absence of theoretical underpinning weakens the analytical depth of these studies, making their findings more susceptible to challenges regarding reliability and generalisability (Atkins et al., 2017). Without a guiding theoretical lens, studies may struggle to establish consistent methodological rigour, potentially leading to fragmented or context-specific insights that are difficult to compare across different settings (Rotfeld, 2014). The fundamentals of the above-stated theories will primarily be used to compare and contrast the data, and an analytical summary will be presented in the discussion and conclusion of chapters **7 and 8**.

2.7.4 Aim 4: Establishing an understanding of the framework of broader sustainability challenges in MTSC structures

2.7.4.1 Sustainable supply chain structures

In the literature on supply chains, the importance of sustainable structure has been intensely debated by a vast existing body of knowledge. Supply chain structures are considered sustainable when they incorporate economic, environmental, and social dimensions and equally address sustainability challenges towards their supply chain structures (Sarkis & Dhavale, 2015). These dimensions are commonly termed the triple-bottom-line approach in the supply chain (Gimenez et al., 2012; Hanan Alhaddi, 2015; Sarkis & Dhavale, 2015). Providing a conceptual model of the triple bottom line by British management consultant John Elkington (1994), as cited in Park (2018), offered a novel understanding of different dimensions of sustainability. This triple bottom line concept is further linked with the three P's: profit (economic), people (social), and planet (environmental). A primary comprehensive illustration of this link was reinforced by Kleindorfer et al. (2005).

Unfortunately, most of the literature found in this mapping review, however, primarily dealt with one or two dimensions of sustainability. For instance, according to the findings of a review by Seuring (2013) in investigating dimensions of sustainable supply chain

management, the social dimension of the sustainable supply chain is almost entirely missing in the existing body of literature. Seuring (2013) further argued that to develop sustainable supply chains, there should be a balance between economic, environmental, and social dimensions. However, the triple bottom line concept has recently been further challenged by Boström et al. (2015), demonstrating that a missing link to attaining sustainability compliance is the governance dimension, particularly in a globalised business environment. To understand this demonstration of sustainability, this map considered the concept of ESG (environmental, social, and governance), an initiative by the international finance corporation and the Swiss government through the United Nations platform to promote sustainability practices. The term ESG received more attention after a landmark study entitled 'Who Cares Wins' in 2005 by Lily Cole, as cited in Pollman (2022). Linnenluecke (2022) recently defined ESG strategy, established this concept more comprehensively, and defined a business model emphasising sustainability practices through its governance structure. This map evaluated 80 reviews present in the dataset and through primary research analysis establishes four dimensions of sustainability by integrating the ESG model and triple bottom line approach.

This map adopted Gellynck & Molnár's (2009) and Heide's (1994) chain governance models and international governance structures. This governance phenomenon is considered a multidimensional phenomenon from a global network perspective that involves initiating, developing, and maintaining relationship balance between stakeholders to implement a triple bottom line (Gellynck & Molnár, 2009; Heide, 1994). This governance structure in the supply chain primarily establishes the relationships and coordination among different supply chain tiers (Formentini & Taticchi, 2016). The findings of a recent study by Gruchmann (2022) also supported the conceptual premise of intermediaries establishing a coordinated relationship and their role in effective governance to comply with sustainability challenges in multi-tier supply chain structures. For instance, Gruchmann (2022) also believes that intermediaries can play a significant role as governance agents in achieving a balance of interest and regulating all relations within extended boundaries of the supply chain.

This map primarily discussed the challenges in globalised supply chain structures by considering four dimensions of sustainability. These dimensions of challenges are interlinked and have been discussed interchangeably. The dimensions of sustainability challenges and their significant findings are highlighted in **Figure 2.6¹**. The interlinked model of sustainability dimensions will be used in the next chapter to synthesise multidimensional sustainability challenges and establish the theoretical foundation for Objective One of the primary

¹ The figure is based on a systematic mapping approach. Data was coded and categorised using thematic analysis of peer-reviewed literature. Statistical frequency analysis was employed to identify recurring categories across the four dimensions.

research, focusing on the sustainability challenges for lower tiers and buying firms, discussed in Chapters 4, 5, 6, and 7.

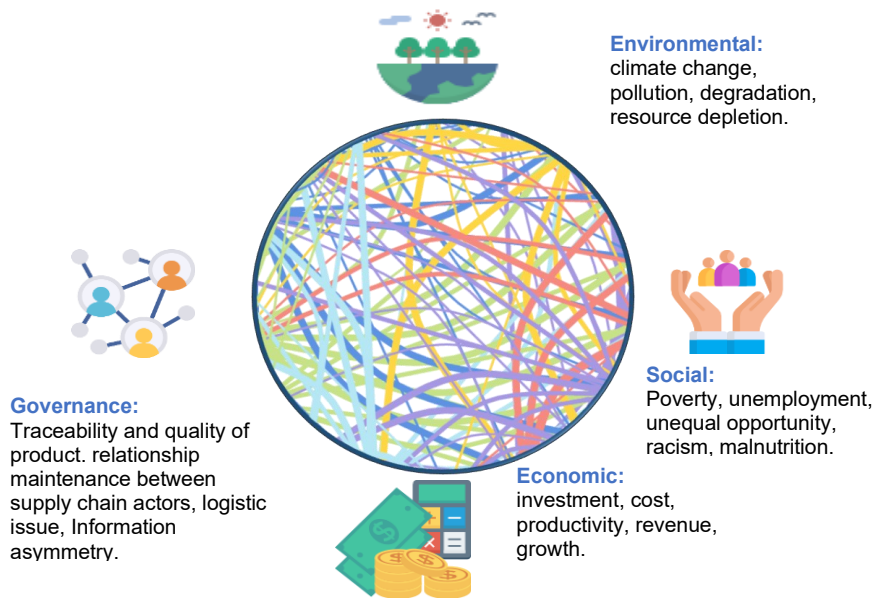


Figure 2. 6 Dimensions of sustainability challenges and major categories of these challenges identified through the systematic map.

2.7.4.2 Economic Dimension

The meaning of economic sustainability has proved to be notoriously hard to define. However, Norton and Toman (1997) established an early definition of this concept, and according to this, business practices in a supply chain are designed to create long-term economic growth in a network. However, as explained by Goerner et al. (2009) and further supported by Ng and Rezaee (2015), economic growth should be achieved without negatively impacting the other dimensions of sustainability.

Unfortunately, in most scenarios in this map, economic sustainability is presented only in monetary terms (Falade & Folorunso, 2015). Whereas a real sense of economic sustainability, as guided by Barton & Fløysand (2010), encourages the responsible use of all available resources to minimise environmental issues considered a major threat to harm the balance of local ecology. A study by Anand & Sen (2017), with the collaboration of the University of Oxford and Cambridge, has been considered very valid, as economic sustainability is not straightforward. It is highly challenging for organisations to identify

various strategies for their economic sustainability that make it possible to use available resources to their benefit (Balasubramanian, 2018; Haessler, 2020; Lozano et al., 2015). This map found that most buying firms were not focused on long-term economic sustainability through large-scale actions considered significant for economic sustainability. A few primary studies have clearly illustrated that developing new strategies and finding new resources are significant for a business supply chain to sustain for extended periods (Maes & Jacobs, 2017). These large-scale collective actions, for instance, assessing the entire supply chain operations and monitoring things like energy waste, are extremely important for a business's economic sustainability (Maes & Jacob, 2017). Being an economically sustainable business through sustainable collective actions throughout the supply chain can help organisations gain customer loyalty, which can help these companies gain economic benefits (Eastham, 2017; Haessler, 2020). For instance, this map found examples of Nike, Apple, and Matel, which have suffered millions of losses due to their non-collective actions resulting in unsustainable behaviour of their sub-suppliers (Gualandris et al., 2014).

This map found multiple missing factors that caused economic sustainability challenges to be more prevalent in supply chain businesses. For instance, in modern globalised supply chain businesses, the Cole et al. (2020) study highlighted the importance of technology in achieving economic sustainability for companies. The use of blockchain technology, as in the findings of Rogerson and Parry (2020), would help companies monitor their operations and engage with customers. The use of technology (e.g. robots) would be beneficial, particularly in the dairy sector, not only in gaining economic sustainability but also in improving the ecology of the local area and animal welfare as well (Cardoso et al., 2016; Kozina & Semkiv, 2020; Rogerson & Parry, 2020).

Mefford (2011) further stretches the dimension of economic sustainability by mentioning recycling stores of different businesses, particularly in the apparel sector. Filho et al. (2019) further assert that recycling contributes to eliminating waste by reusing materials and finished garments, and companies can achieve economic sustainability through this. Evidence from the data also suggests that switching to renewable energy resources is among the most essential factors in companies prioritising economic sustainability in the future (Akadiri et al., 2019). For instance, transitioning the energy sources of small and medium-sized textile industries to renewable options, such as solar panels or wind turbines, presents a viable and sustainable alternative to traditional fossil fuels. This shift can enhance energy efficiency, reduce carbon footprints, and contribute to long-term cost savings, particularly in regions with favourable renewable energy conditions (Emblemsvåg, 2022).

Moreover, devising less wasteful systems was found the most severe and widespread disturbance to achieving economic sustainability in developing countries, particularly where buying companies outsource their operations (Lindsey, 2011).

2.7.4.3 Environmental Dimension

Earth is the only known planet in the universe that sustains life. Human activities play a central role in shaping ecological systems, driving both biological and environmental diversity through agricultural expansion, urbanisation, industrialisation, and technological advancements (Sommariva, 2015). However, these activities also contribute significantly to environmental challenges, including land degradation, declining air and water quality, depletion of non-renewable resources, loss of biodiversity, and the emission of greenhouse gases (Arora et al., 2018; Elleuch et al., 2018; Fantke & Illner, 2019; Schilling & Chiang, 2011). These factors are known as environmental sustainability, a broad topic. This map encountered many issues regarding environmental sustainability and highlighted the most discussed issues that were mainly projected.

- **Pollution, climate change, and global warming**

Pollution in any form is a global threat affecting every nook and corner of the earth (Elleuch et al., 2018). Due to industrial growth, various types of pollutants have appeared during the last few decades, adversely affecting the ecosystem (Fleming et al., 2021). These adverse effects were more debilitating in the developing world as there is no established mechanism for mitigating environmental challenges due to rampant industrialisation (Alpizar et al., 2020). This industrial growth is the leading cause of urbanisation (Manisalidis et al., 2020). A comprehensive review by Karwacka et al. (2020) concluded that urbanisation constantly reduces the amount of natural habitat and also deteriorates the ecosystem. This map found a couple of studies focused on the paint sector, where researchers suspected the excessive use of harmful chemicals in the paint sector to be responsible for ozone depletion (Alpizar et al., 2020; Nair K et al., 2021).

Rentschler and Bazilian (2017), in their review and study of (Asongu et al., 2020), shed light on the new challenges in the consumption of fossil fuels, which are very high in demand and are one of the primary reasons for air pollution, particularly in agribusinesses. Four studies in the dataset have highlighted the processing procedures of the rubber industry, and these processes are causing a disaster in environmental sustainability (Alpizar et al., 2020; Evode et al., 2021; Gerassimidou et al., 2022). Kafel et al. (2021) provide an in-depth analysis of the rubber industry and found that harmful chemicals are increasing drastically in rubber and plastic processing despite the horrible consequences. Similarly, Evode et al. (2021) and Gerassimidou et al. (2022) highlighted similar issues. They claimed that due to modern-day needs, there is a need to find alternative ways for the non-degradable entities rather than making this earth a dumping yard.

The current data, particularly seven studies, highlighted detrimental effects on the planet's ecosystem due to oil spills (Kuznetsov et al., 2015; Worthington et al., 2018). Oil spills, rapid urbanisation due to industrialisation, and related human business activities were found to be the most affecting elements causing environmental sustainability across the earth, including the rivers, oceans, and lands (Worthington et al., 2018). The most significant impact of the aforementioned environmental sustainability issues is climate change; for instance, the consumption of fossil fuels is considered the primary source of GHGs and CO₂ emissions resulting in global warming (Ciscar et al., 2011).

- **Land degradation and agricultural constraints**

This map suggested that due to the increase in temperature, global warming has been found very challenging, particularly in vegetation density (Barbier & Hochard, 2018). Major crops such as wheat have experienced significant yield reductions worldwide, for instance, in south and central Asia and Pacific countries (Barbier & Hochard, 2018). Due to increasing global temperature, episodes of irregular precipitation patterns have increased significantly, resulting in severe soil erosions (Alonso, 2011). According to one study, the Republika Srpska and Bosnia have faced soil erosion and biodiversity loss for the last couple of decades (Solomun et al., 2018). Further, the study of Berbel & Esteban (2019) has highlighted similar findings, noting that Australia and Spain have experienced multiple droughts in recent years, which have exacerbated soil erosion and biodiversity loss. Drought conditions are also a significant reason for soil salinisation and land degradation, for instance, in developing countries, such as Bangladesh, which experience severe environmental sustainability issues due to the growth in the apparel sector (Hossain et al., 2020). One of the other causes of land salinisation was improper agricultural practices in the tobacco sector. Inappropriate irrigation methods are the major cause of land salinisation (Valipour, 2015). For instance, one of the growing practices witnessed is the excessive use of low-quality water due to dumping waste in rivers and canals (Valipour, 2015). Poor drainage systems were also the leading reason for the accumulation of salts and many other hazardous chemicals in soils (Valipour, 2015).

More precisely, the analysis of this map suggests that due to industrial growth, the demands for resources to meet human needs have significantly increased. Humans need more land for agricultural purposes to produce food and build different infrastructures in multiple supply chains to manage their businesses. This expansion, however, should not be at the expense of their interests because the primary source of all interest is a sustainable environment (Arora et al., 2018; Solomun et al., 2018; Pacheco et al., 2018).

2.7.4.4 Social Dimension

The analysis of this map on the social dimension of sustainability was based on the definition of Klassen and Vereecke (2012). The product design process by the buying firm from their

upstream suppliers to the downstream supplier, which affects human safety, welfare, community development, and protection, is known as the social dimension of sustainability in a business (Klassen & Vereecke, 2012).

This map finds and discusses social issues in the supply chain primarily based on empirical studies investigating social issues such as health and safety of labour, child labour, gender discrimination, and human rights, which are prevalent in the supply chain. This map found evidence from several previous reviews; for instance, Nakamba et al. (2017) established that these issues overlap. However, the context could be different. Mani et al. (2016) found in their study, which was conducted in India, that labour conditions are linked to health and safety, while child labour and gender discrimination are human rights issues in their wider interpretations of the South Asian context.

Studies that have been undertaken so far provide conflicting evidence concerning the nature and the manifestation of different social issues. The findings of most of the studies resulted in those social issues being more prevalent in lower-tier suppliers, particularly when they are based in developing countries (Mani et al., 2016). Most of the literature in the past ten years has been found nascent in directly addressing how social sustainability is addressed in the context of lower-tier suppliers in developing countries through first-hand data (Mani et al., 2016). Compliance with social sustainability has debunked the so-called socially sustainable supply chain myth during the pandemic in the textile industry of South Asian countries (Majumdar et al., 2020).

As stated above, the social sustainability dimension is considered different in a different context. Through the findings of this map, it could be argued, in general, that there are no legal requirements for a partnership with lower-tier suppliers located in developing countries (as found in the mineral supply chain and blockchain technology reviews) in which the risk of social misconduct is higher, and CSR measures are not well established (Haque & Azmat, 2015). However, buying companies should voluntarily go beyond legal requirements in developing countries because buying firms are increasingly held more responsible by several stakeholder groups (NGOs and civil societies) for their supply chain misconduct, which could threaten their economic outcomes (Carlson & Bitsch, 2018).

According to the analysis of this mapping review, supplier locations typically highlight the established and non-established measures of social aspects of sustainability in a supply chain. For instance, unsafe working conditions, use of dangerous and poisonous material, and child labour were found in developing countries, while providing fair wages, sensing work-life balance policies, and following CSR were associated with the context of so-called developed countries. Unfortunately, in this map, primary literature that empirically highlighted social challenges was scarce and requires urgent attention through first-hand investigation, particularly in the context of developing countries.

2.7.4.5 Governance Dimension

To highlight the sustainability dimension of governance, this map incorporates Hilletofth's (2011) concept of 'product management flow' and Boström et al.'s (2015) discussion of 'outsourced production' to illustrate how production shifts in MTSCs impact sustainability. Hilletofth (2011) highlights how products that were once manufactured locally 'here' are now produced in geographically distant locations 'elsewhere', raising concerns about supply chain transparency, ethical sourcing, and regulatory oversight. However, sustainable supply chain management extends beyond external production shifts and also relies on corporate governance mechanisms, including internal oversight, executive decision-making, and ethical accountability (Boström et al., 2015). Applying a corporate governance perspective ensures that outsourcing aligns with sustainability commitments, addressing risks such as labour exploitation, environmental degradation, and weak institutional frameworks in supplier regions (Wilhelm et al., 2021). Strengthening corporate governance within MTSCs can enhance accountability, ensuring sustainability goals are embedded in strategic decision-making and operational practices. The dilemma is that multinational brands primarily focus on product design and marketing while operating from head offices in developed economies. In contrast, manufacturing activities are outsourced to low-income countries due to the availability of raw materials and cheap labour (Bendul et al., 2017). This dynamic raises critical governance and social sustainability concerns, particularly regarding weak institutional frameworks, labour rights violations, and environmental degradation in supplier regions (Liu et al., 2022). The disparity in regulatory enforcement between developed and emerging economies often results in inadequate oversight of outsourced production, allowing exploitative labour conditions and unsustainable practices to persist (Li et al., 2023). Therefore, this map examines the multi-institutional nature of supply chain governance, considering how governance structures, corporate responsibility, and institutional capacities influence sustainability outcomes across global supply chains. To understand this phenomenon, this map used the spatial metaphor of Bostrom et al. (2015) and John et al. (2019) as a 'gap' to highlight the interconnected governance sustainability challenges. Primarily due to a competitive industry and globalised business phenomenon, companies' supply chains are based on multi-agent architecture for their manufacturing through outsourcing products or materials (Kumari et al., 2015). Most products are sourced from developing countries, mainly in sectors like minerals and apparel. This geographical distance between the buyer and supplier generates unseen and unknown serious unsustainable impacts on production.

Governance arrangements face indirect and distant interactions among various supply chain actors in a long supply chain, which primarily needs establishing generic 'standards' for sustainability compliance (Sabara et al., 2019). Khaddam et al. (2020) further distinguish

these standards and elaborate that these standards could be implemented through advanced information flow structures of production and product characteristics. However, Cole et al. (2020) raised a query: How could this information flow be systematised in an MTSC setting when lower-tier suppliers have no technological support? This question further urges future researchers to find new ways of mediated communication where the role of intermediaries is critical, particularly in the global supply chain context (Cole et al., 2020; Khaddam et al., 2020). However, due to geographical distances, there remains a persistent standard gap in sustainability between global versus local fit between the actors (Cole et al., 2020).

This map found that geographical distances between stakeholders in a supply chain bring information asymmetry. Outsourcing products provide better chances to achieve global competitive advantages. However, buying firms were found missing a reliable and comprehensive information mechanism about the sustainable impacts of products and production processes within the different stakeholders of the supply chain (Liu et al., 2018). One of the other main reasons for this information asymmetry was the communication gaps. There were considerable challenges involved when trying to find communication tools; for instance, a study by Tölkes (2020) highlighted that due to communication gaps, behavioural issues emerge that decline the level of trust between the parties in a supply chain structure. Communication gaps were also found a significant issue in governance sustainability by Melissen & Koens (2016) in the tourism sector. Communication gaps could also expose the supply chain actors to unseen psychological issues due to different cultural codes, damaging and destroying the whole supply chain structure (Melissen & Koens, 2016).

Buying firms have established standards to mitigate information asymmetry and cultural and communication gaps, but who will implement these standards for sustainability compliance, and what would be its role? Can head offices implement driven codes of conduct at a corporate level to ensure sustainability compliance in the lower-tier fields? It is acceptable that intermediaries find ways to buy companies; however, fundamental questions remain unanswered on the sustainability surface. These questions concern power gaps between buyers and suppliers and the interpretation of sustainability standards, particularly in developing countries.

2.7.4.6 Concluding comments

Compliant behaviour shapes how humans interact with the environment and natural resources and how to manage sustainability challenges by saving the natural environment and benefitting society. These challenges are often obscured by contestation, ignored, varied, and sometimes taken as benefits rather than challenges (forest cutting and using timber). This map observed the extensive nature of sustainability challenges in multi-tier business supply chains. The root cause of all challenges was to be an intertwined, unnatural

business relationship. There are massive social divisions between the buying firms (mainly based in developed countries) and supplying firms (mainly based in developing countries).

2.7.5 Aim 5: Management strategies for sustainability compliance in MTSCs

Due to the intertwined challenges to sustainability compliance, there are various management strategies discussed in this study dataset that buying firms adopt to manage their supply chain tiers. Supply chain scholars are consistent and agree that buying firms should manage the sustainability compliance of their suppliers. However, there is still a debate on how this should be done. Many studies underscore that sustainability compliance can be achieved by applying CSR principles (Kang et al., 2025; Santiago et al., 2025; Sun, 2024). However, sustainability compliance in developing countries, where most lower-tier suppliers are based, requires further scrutiny due to the often weak enforcement of legal frameworks (LeBaron et al., 2021). In these regions, inadequate regulatory oversight and enforcement mechanisms may hinder the effective implementation of sustainability practices, leading to challenges in ensuring compliance with environmental and social standards across supply chains (Crotty & Bouch, 2018). Identifying specific management strategies within MTSCs in this map has proven difficult. Although some studies mentioned international management models in their literature, they did not apply them in practice. Consequently, these studies are excluded from the analysis, as supply chain experts often differentiate MTSCs from international management frameworks. Hence, ethnocentric, polycentric, geocentric, and regiocentric models were not considered in examining sustainability compliance in MTSCs.

To uncover effective management strategies primary studies and systematic reviews were comprehensively analysed. The study of Mena et al. (2013) provided one of the first comprehensive frameworks for managing strategies in MTSCs by extending the findings of Vermeulen and Seuring (2009), as illustrated in **Figure 2.2**. Similarly, in a globalised multi-tier stakeholder business setting, Tachizawa and Wong (2014) grouped management strategies of buying firms into four approaches: 'direct', 'indirect', 'work with third parties', and 'do not bother' strategies. Due to the expansion of businesses and the nature of multi-tier business relationships, these management approaches are widely discussed and used. Buying firms build a direct relationship with their sub-suppliers through a direct approach. These sub-suppliers are identified through 1st tier suppliers or transitional strategies (Mena et al., 2013). In this direct management strategy, buying firms directly monitor their sub-suppliers' compliance efforts and measures for sustainable practices (Mena et al., 2013; Tachizawa & Wong, 2015). Buying firms directly collaborate with their lower-tier suppliers to establish a four-dimensional (Economic, Social, environmental, and Governance) sustainability-compliant business structure (Tachizawa & Wong, 2014). Direct links allow focal companies to have a high impact on sub-suppliers through bilateral actions, such as

providing immediate training and implementing contingency plans in the worst-case scenario (Tachizawa & Wong, 2014). However, this requires ample resources and high managerial effort from buying companies (Tachizawa & Wong, 2015).

In the indirect management strategy, buying firms do not have a direct relationship with their sub-suppliers, unlike in the direct management strategy (Mena et al., 2013). Instead, buying firms leverage their control over sub-suppliers through their first-tier suppliers. First-tier suppliers establish this control by monitoring and collaborating with sub-suppliers to improve sustainability compliance standards across the supply chain (Tachizawa & Wong, 2014). However, this model, which relies on cascading sustainability practices through multiple supply chain tiers, may not always be as effective in practice. While it theoretically works to disseminate sustainability compliance, its success depends on the strength of relationships and oversight mechanisms (Tang et al., 2024). For example, it might work more prevalently in aspects of environmental sustainability, where compliance standards are more transparent and easier to monitor than more complex social sustainability issues, such as labour rights or working conditions, which can be harder to enforce across tiers. This delegation of sustainability compliance standards is mainly covered through the provision of training and sustainability policy of buying firms to 1st tier suppliers that enable them to monitor sub-suppliers (Vermeulen & Seuring, 2009). This strategy is considered more impactful globally; however, sometimes, this strategy fails because of the buying firm's dependency on the tier-one supplier, and the supplier lacks the capabilities to enforce sustainability management practices (Vermeulen & Seuring, 2009).

In third-party management strategies, the buying firm collaborates with or delegates responsibilities to different organisations, as cited in the study by Grimm et al. (2014). These organisations could be government or non-government organisations. Government organisations are mainly multiple monitoring sectors under different govt ministries to define and implement sustainability standards (Tachizawa & Wong, 2014). Non-govt organisations could be NGOs, audit firms, or service providers such as certification groups to monitor or certify sub-suppliers and offer them capacity development services. By collaborating with or engaging their sustainability tasks with these third parties, buying firms work for their interests through collective actions. Buying companies through this strategy establishes different groups of government or non-government organisations sharing similar objectives to concentrate on their sustainability compliance practices. This compliance is achieved through an efficient monitoring mechanism of sub-suppliers and their development (Tachizawa & Wong, 2014).

Finally, in the 'do not bother' management strategy, the buying companies focus exclusively on their 1st tier suppliers. A buying firm does not intend to monitor its sub-suppliers, so firms

do not collect any information or trace their products to such extreme ends. However, 1st tier suppliers are connected with these lower-tier suppliers only to buy the products and nothing else. Buying companies tend to follow this strategy when supply chain actors are based in a more distant geographical setting and face no pressure from stakeholders. Consumer attention is also very little focused on the origin of the product. Figure 2.7 illustrates the governance structures adopted by buying firms in their multi-tier supply chains (MTSCs), as proposed by Tachizawa and Wong (2014). The figure is developed based on their findings to provide a clear visual representation.

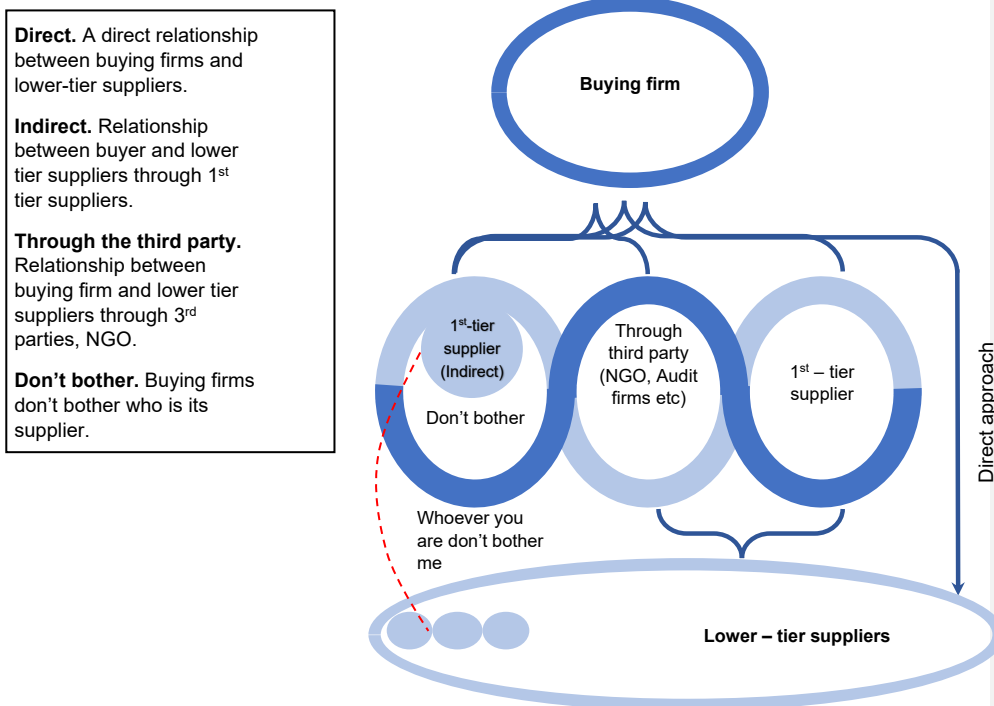


Figure 2. 7 Governance structures for MTSCs. Source. Tachizawa and Wong (2014).

Different authors have extensively investigated the management strategies discussed, particularly in the context of sustainability compliance within the MTSC setting. However, further research is needed to identify practical approaches to make sustainability compliance more accessible and feasible for buying companies. There has recently been renewed interest in finding new management structures to comply with sustainability; for instance, Sauer and Seuring (2019) added a new concept in the sustainable supply chain mechanism debate, the 'cascaded' management mechanism. This mechanism combines two or more

MTSCs into a cascade of supply chain structures. These structures are generally based upon multiple buyers to the supplier (1st tier) and sub-supplier relationships (tier 2 or 3 and so on) (Saur & Seuring, 2019). In this setting, each supply chain structure drives its compliance towards sustainability issues by using its resources individually and supporting other structures through a mechanised information system. This compliance is not only about adhering to external regulations but also about ensuring that sustainability practices are effectively integrated at each tier of the supply chain. By sharing resources and leveraging technology, supply chain structures work together to ensure that sustainability standards are met across multiple levels, addressing both legal and voluntary sustainability commitments (Sarkar & Das, 2014). This system allows each entity within the chain to align its operations with broader sustainability goals while also assisting others in meeting the same standards (Tang et al., 2024). This means a cascaded structure best addresses sustainability challenges collectively for managing the suppliers and sub-suppliers. In contrast, the model of Tachizawa and Wong (2014) has already been unable to produce the desired results. Briefly stated, the model of Tachizawa and Wong (2014) overarchingly works with the cascaded approach for the buying firm of each supply chain to attain mutual supply chain targets (Sauer & Seuring, 2019).

The strategies mentioned will complement the RQ 3 research findings analysis, covered in Chapters 4, 5, 6, and 7, in line with **Figure 2.2** by Mena et al. (2013).

2.7.5.1 Discussion and concluding comments

Even though these management models are frequently presented in multi-tier supply chain literature for sustainability compliance, there is no detailed structure for these models. Due to this infancy in literature, the existing body of knowledge on supplier management is challenging to transfer to the context of relationships with sub-suppliers through these models. These models become more restrained when the buying firm has no contractual relationships in the traditional food sector (Gellynck & Molnar, 2009), particularly lower-tier suppliers contributing to sustainability compliance in their supply chains. This map also shows that sometimes, lower-tier suppliers are unaware of the significance of their participation in sustainability compliance in MTSCs, as cited in the study of McMurray et al. (2014) in the Malaysian context. Likewise, as found in the study of Bigliardi et al. (2012), some companies do not have any organisational structure responsible for managing sub-suppliers, particularly for environmental innovation, management of social practices, strategic management, and sustainable development. Villena and Gioia (2018) term this phenomenon in the sustainable supply chain as '*On the riskiness of lower-tier suppliers*'.

According to this study, mapping multi-tier supply chain structures, monitoring, and training lower-tier suppliers are frequently mentioned parameters in management approaches for sub-suppliers, whether indirectly or through third parties' management approach. A recent

seminal study by Meqdadi et al. (2020) has provided valuable insights into understanding the comprehensive structures of monitoring and training sub-suppliers by focusing on three multinationals. 'Metal', based in Europe; 'Pharma', a leading pharmaceutical company based in Europe and headquartered in the US; and 'Coating', a global company headquartered in Europe that operates in markets across Asia, Europe, and the US. However, the literature lacks a clear idea about how high dynamics can be accounted for in MTSCs, where multiple sourcing and frequent exchanges of sub-suppliers occur. In this map, multiple patterns have been identified for the need for sustainability compliance, that influence buying firms to extend their sustainability compliance practices to lower-tier suppliers. These patterns emerged through supply chain complexity, which means the number of suppliers and sub-suppliers in the supply chain; secondly, what is the geographical length of different MTSCs? The further pattern identified was how buying companies had access to their lower-tier suppliers and sub-suppliers. The last pattern was whether the buying firm could employ resources to reach their lower-tier suppliers and make them compliant with sustainability practices. These patterns decide which management strategy should be used; however, as discussed above, there is no established management structure. Most of the dataset analysed that buying firms delegate control and motivate 1st tier suppliers to gain sustainability compliance through an indirect management approach. However, in different cases of lower-tier suppliers, particularly in broad geographical settings, buying companies have been inclined to apply the 'do not bother approach'.

Directions to the next stage of the review

- Although a large body of literature exists and is debated in the agri-food sector, this systematic map found some primary research gaps in the crop agri-food sector. Primarily, MTSC structures of the crop agri-food sector were found to be a less focused area by the researchers, which was why it was not easy to understand the sustainability phenomenon in this sector. The existing body of literature is scant to underline the unique but ignored sustainability challenges in MTSCs of the crop agri-food sector, such as socio-cultural challenges. Subsequently, this map hardly found a grounded theory in the crop agri-food sector for sustainability compliance to mitigate these challenges, focusing on the lower-tier suppliers when geographically distant and based in developing countries.
- The literature discussed the general management strategies for MTSCs. There were some applications of these strategies, but these strategies were less focused on cross-border MTSCs. Furthermore, considering various variables according to the research context, it has not comprehensively discussed how these strategies are implemented in the MTSCs of the crop agri-food industries.
- The entire discussion of this map not only eliminated the coverage bias of data but also remained focused on avoiding sample saturation, which is impossible in conventional

reviews (Hennink & Kaiser, 2022). This map systematically extracted a sample of 31 qualitative primary studies. It proceeded toward the second stage of this doctoral project, identifying the holistic nature of sustainability challenges in the MTSC of the crop agri-food sector through evidence synthesis in the next chapter.

2.8 Key learning of Chapter 2

The above-structured discussion has given this topic new relevance. With several specific arguments concerning sustainability compliance in multi-tier agri-food supply chains, the discourse on the issue needs to progress. A better understanding of sustainability compliance in the agri-food supply chain needs to be developed, particularly in lower-tier suppliers of developing countries. This systematic mapping approach achieved the following:

- It identifies sustainability compliance in MTSCs and examines the critical role of intermediaries in enforcing sustainability practices. However, the actual sustainability of the supply chains studied may vary depending on the sector, commitment levels, and the effectiveness of governance mechanisms. While intermediaries facilitate sustainability practices, their impact on overall supply chain sustainability is context-dependent.
- It systematically separated the large data into focused sub-sets for future analysis, which can be used for further analysis.
- The discussion of the map established different philosophical and methodological parameters for future research in sustainable MTSCs.
- It sets a comprehensive theoretical roadmap by discussing different mechanisms of the theories applied in complex adaptive systems in the MTSC context.
- It highlighted a broader view of different sustainability dimensions and the nature of existing challenges in the MTSCs.
- The map briefly overviewed buying firms' current management structures and approaches for sustainability compliance in MTSCs to mitigate these sustainability challenges.

For this purpose, this map has accomplished its sixth aim and draws a targeted sample for future examination. Building on this systematic map the next chapter examines the crop agri-food supply chain in greater depth, offering an evidence-based synthesis of sustainability and governance challenges specific to the sector.

Chapter 3

Literature Review

Evidence Synthesis

Chapter 3 extends the literature review by focusing on the multitier crop agri-food supply chain, where sustainability challenges are more severe than those in other sectors. The severity of these challenges arises from the sector's unique characteristics, including resource-intensive production processes, environmental degradation, and varying levels of regulatory oversight across regions. Through a structured evidence review synthesis, this chapter provides a comprehensive analysis of the sustainability issues faced by lower-tier suppliers, as well as the governance challenges encountered by buying firms. The findings underscore that sustainability challenges in the crop agri-food supply chain are more prevalent and more complex than other sectors, mainly due to the intersection of environmental, social, and economic pressures. In light of these issues, the chapter also proposes future research directions, stressing the need for further empirical investigations into the specific sustainability dynamics within crop agri-food supply chains.

3.1 Sustainability challenges in multitier crop agri-food supply chains

Several studies have emphasised that a business's first step towards sustainable growth is understanding sustainability challenges in its geographically fragmented MTSC structures (Boström et al., 2015; Schramm et al., 2020). Studies by León Bravo et al. (2021), Canto et al. (2021) and Grimm et al. (2016) have highlighted multiple sustainability challenges related to social equity, environmental health, and economic wealth emerging from beyond tier-one suppliers in agri-food businesses. However, a literature synthesis that provides a comprehensive picture of influencing systemic and structural orientations (discussed in Chapter 1) and their research streams in multi-tier crop agri-food supply chains has not yet emerged. A recent study by Grohmann et al. (2023) calls for developing a broader framework for identifying hidden sustainability challenges. Similarly, Alsayegh et al. (2020) emphasise a review of the barriers for lower-tier suppliers and the performance challenges of buying firms for sustainability in the multitier crop agri-food sector.

To address these fundamental gaps in the literature and corroborate with the findings of literature review mapping, the following research questions have guided this systematic study:

RQ1. What are the sustainability challenges for the lower-tier suppliers of the crop agri-food sector?

RQ2. What are the governance challenges for the buying firms in their multi-tier crop agri-food supply chains?

Synthesising the sustainability challenges faced by lower-tier suppliers and buying firms, along with the methodologies documented in various studies, will provide a comprehensive theoretical framework for the next phase of this research. This synthesis will reveal the sustainability challenges within MTSCs specific to the crop agri-food sector. Additionally, it will inform the selection of an appropriate unit of analysis, sample frame, size, methodologies, and research approaches that have been effective in MTSCs of the crop agri-food industry. This groundwork will allow primary research to build on existing knowledge, contributing novel insights to the current research framework.

3.2 Structure of the Evidence Synthesis

This synthesis first describes the theoretical research model chosen in this review to address the study's objectives. Then, a brief methodological process is underlined, which leads to the discussion of the findings based on descriptive analysis and thematic synthesis. Lastly, through its discussion, it recommends future research directions.

3.3 Theoretical model

After outlining the review objectives, this investigation systematically developed theoretical models based on systemic and structural sustainability approaches to guide the review process. A summary of this model is provided here, as discussed in **Chapter 2**. These models also played a crucial role in refining the inclusive eligibility criteria for the review. A triple-bottom-line sustainability approach was used to address RQ1 of the review. The triple-bottom-line approach remained invaluable in analysing the systemic nature of sustainability challenges, holistically considering the social, economic, and environmental aspects (Scoones et al., 2020; Gimenez et al., 2012). Few studies have taken a 'systemic approach' to exploring and managing multifaceted sustainability challenges that cover all aspects of the triple-bottom-line approach (Seuring, 2013; Desiderio et al., 2022). To answer RQ2, the review establishes a link between the environment, social and governance (ESG) model and the triple-bottom-line approach by adopting Gellynck and Molnár's (2009) chain governance model. The chain governance mechanism investigating the ESG model is viewed from a multi-tier network perspective. Further, it reveals how 'structural orientations' of the buying firms influence systemic integration, interdependencies and relationships of different stakeholders, leading to a better understanding of sustainability challenges and possible solutions (Boström et al., 2015; Degli et al., 2020; Gellynck & Molnár, 2009; Gruchmann, 2022; Tachizawa & Wong, 2014; Vlachos & Dyra, 2020).

3.4 Review methodology

The systematic mapping review method in the previous chapter identified various research gaps through a comprehensive empirical analysis. The existing body of literature predominantly lacks the qualitative data needed to understand the sustainability phenomenon in the MTSC of crop agri-food. Secondly, no empirical evidence could explain the concrete nature of sustainability challenges in the multi-tiered crop agri-food sector. Lastly, no concrete grounded theory was found in the crop agri-food sector for sustainability compliance to address these challenges, especially when the lower-tier suppliers are based in developing countries.

To fill these research gaps, this study followed the evidence-synthesis methodology suggested by Glenton et al. (2021), Higgins et al. (2019) and Thomas & Harden (2008). Systematic review evidence synthesis enables a researcher to 'go beyond' the findings of individual studies and helps to produce more significant results through empirical thematic synthesis (Glenton et al., 2021). Evidence synthesis not only sets a theoretical foundation for research but also could draw grounded theory if needed (Thomas & Harden, 2008). Various other research advantages could also be achieved through evidence synthesis methodology, as highlighted in **Table 3.1**.

Table 3. 1 Features of Review Evidence Synthesis methodology.

Advantages
<ul style="list-style-type: none">• Integrates large data sets (Thomas & Harden, 2008).• Qualitative evidence synthesis is essential for the primary understanding of further investigation (Thomas & Harden, 2008).• Develops cumulative knowledge by systematically synthesising qualitative data findings in a conceptually richer description (Higgins et al., 2019).• On the contrary, conventional reviews of qualitative data only seek to combine findings in a summary format (Hannes & Lockwood, 2011).• Establishes a deeper insight into the often sensitive individual or group problems where traditional reviews remain unproductive. However, a meta-analysis could give a general prediction rather than a brief interpretation (Thomas & Harden, 2008).• Places qualitative insight within a larger discourse and develops a conceptual framework to increase the understanding of a phenomenon and interpret how things connect and interact. (Hannes & Lockwood, 2011)• Gives reviewers an audit trail for text description or the interpretation of the data (Thomas & Harden, 2008).

3.5 Data collection

Comprehensive eligibility criteria were followed to collect data for this two-staged systematic review during the first stage. The first stage was based on a systematic map, which empirically analysed the results of 573 studies and collated the entire dataset into subsets. Subsequently, the second stage model followed the review evidence synthesis method. According to Thomas and Harden (2008), review evidence synthesis mainly concentrates on the qualitative nature of data. Due to the unique nature of this method, the subject matter, and the objective of the research, this stage followed a focus on inclusion and exclusion criteria, which are highlighted in **Table 3.2**. A dataset of 31 qualitative studies collated through the systematic map for further evaluation was taken for this evidence synthesis review (See **Table 2.13**).

Table 3. 2 Inclusion and exclusion criteria of the Review Evidence Synthesis.

Exclusion criteria	Inclusion criteria
<ul style="list-style-type: none"> • Grey literature. • Books or book chapters • Thesis • Studies other than crop agri-food sector • Studies that specify supply chain but do not explain existing challenges to sustainability compliance or management strategies from buying firms • Studies from a single author • Studies based on triangulation or multi-research methods • Systematic reviews such as meta-analysis and meta-ethnographies • Studies based on secondary data/analysis • Studies purely based on deductive reasoning and positivistic paradigm • Studies that will be more generic to the supply chain, such as studies on Covid 19, modern slavery in the supply chain, behavioural studies, food safety standards and GHG • Studies from the same author with similar objectives • Studies from the same author/objectives but from different databases • Studies following inductive reasoning through ethnographies, action research life cycle analysis, etc • Studies with abductive reasoning • Studies with duplicate data. 	<ul style="list-style-type: none"> • Studies with restriction to post the year, 2008 • Qualitative studies that report primary data and highlight sustainability challenges and their managing strategies in the crop agri-food sector • Studies with multiple units of analysis, including crop as well as other food sectors, but highlighting research objectives significantly, would also be considered after the review team consensus • Studies focusing on business supply chains and following multitier or triadic supply chain structure • Studies from the same authors but from different perspectives (different food supply chains) • Studies with the epistemological assumption(s) of phenomenological and interpretive paradigm

Finally, 18 studies were selected for in-depth review and coding based on the interpretive and phenomenological paradigms of the crop agri-food sector. Synthesising the data through phenomenological and interpretive paradigms increases the understanding of a phenomenon and interprets how things connect and interact in a natural setting (Hannes & Lockwood, 2011). One study was also included, which was based on 3 supply chains, two of which were focused on crop agri-food. A brief Prisma flowchart for this evidence synthesis is presented below in **Figure 3.1**.

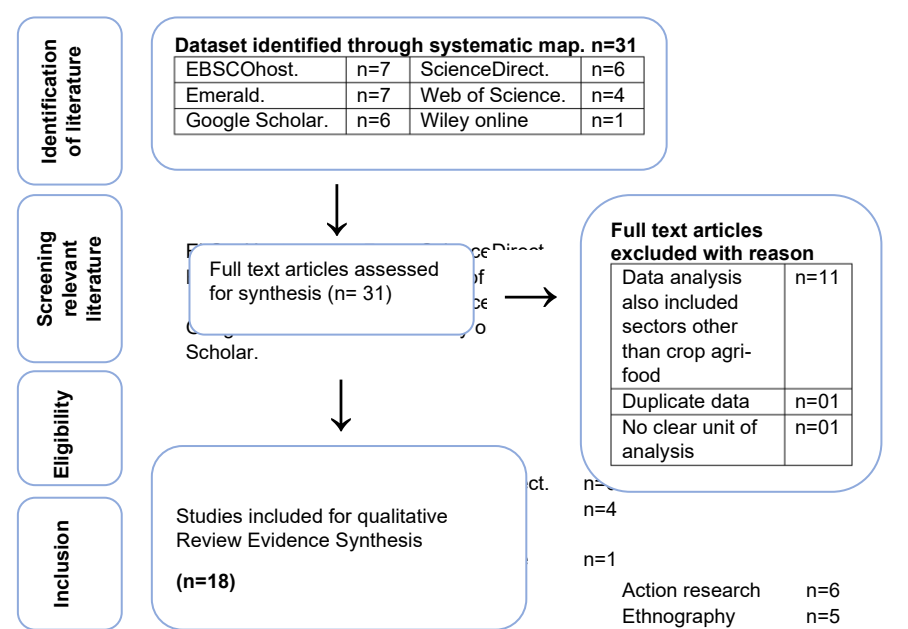


Figure 3. 1 Prisma Flowchart For Review Evidence Synthesis

3.6 Review process

The evidence synthesis followed 5 steps from start to completion (**Figure 3.2**). These steps included an in-depth review of the text, generating initial codes, developing categories, turning categories into themes, cross-checking themes, and finally, interpretation through writing. A similar data organisation process was adopted to analyse primary data, which was gathered in the next phase of this research and discussed in **Chapters 6 and 7**.

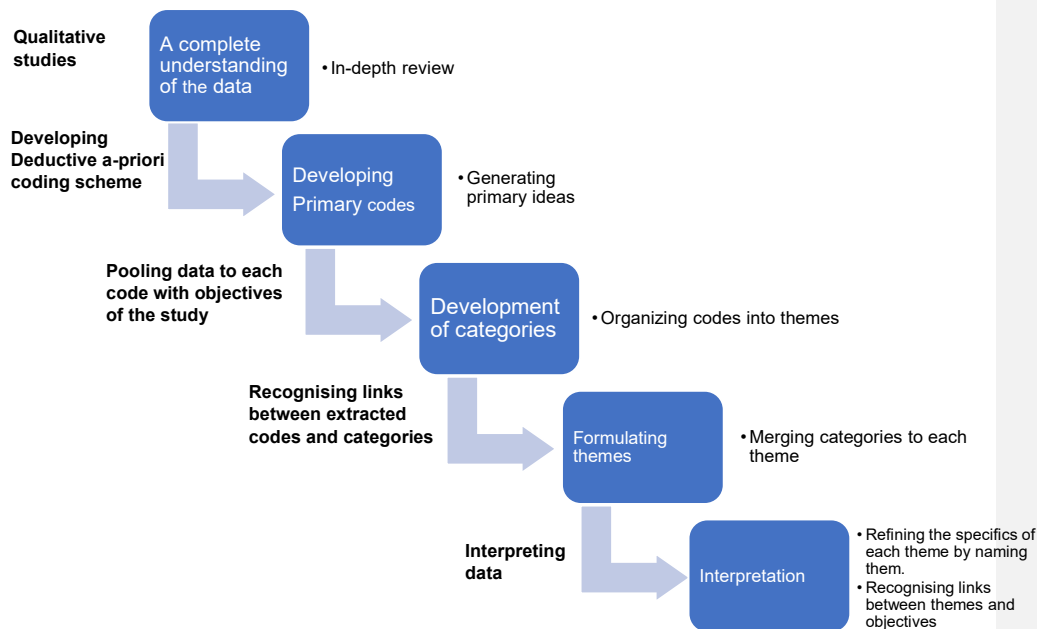


Figure 3. 2 The stepwise process used for the evidence synthesis.

3.6.1 Use of NVIVO

The 18 identified studies were imported into NVivo (Nvivo R 1.7, 2022), and a comprehensive coding structure was devised. NVivo helps to organise unstructured information by providing tools for classifying, sorting, and arranging data through codes (Maher et al., 2018). In total, 1545 unique codes were generated, and 3811 references were used from the 18 studies by using NVivo. After completing the coding structure, a codebook was generated for a kappa interrater reliability check. Two reviewers cross-checked the final set of codes, sub-categories, categories, and themes, which were established before the next step.

3.6.2 Process of coding (Deductive, inductive, hybrid)

After a preliminary examination of the dataset, a comprehensive qualitative coding structure was generated. Qualitative coding systematically recognises, and extracts required data to find patterns, categories, and themes (Adaira & Pastorib, 2011; Bryman & Bell, 2011). Code essentially is a qualitative reflection of the underlying flavour of the investigated phenomena (Skjott-Linneberg & Korsgaard, 2019). There is no right or wrong way to code a data set;

however, a focused coding strategy can offer aimed and accurate results (Elliott, 2018; Wicks, 2017), as described in **Table 3.3**.

Table 3. 3 Advantages of the effective coding structure.

Advantages of effective coding structure	
Increase validity	It provides a logical structure of the unstructured data for careful examination in a systematic way to increase the validity of the analysis (Linneberg & Korsgaard, 2019)
Reflexive in nature	A rigorous coding structure gives researchers reflexivity and enables them to find insights genuinely representative of data (Wicks, 2017).
Accurately represent objectives	It identifies accurate and relevant data for a detailed analysis to understand a holistic picture of the subject matter under investigation (Elliott, 2018)
Enable transparency	It enables researchers to review theoretical paradigms, research approaches, and methodologies holistically used in the study and direct the roadmap for further investigation (Elliott, 2018; Wicks, 2017)
Factual presentation of the data	An effective coding format aids in interpreting key facts about a phenomenon (Linneberg & Korsgaard, 2019).

This study adopted a hybrid coding strategy. A deductive coding strategy was implemented following an a priori guide to extract descriptive data presented in **Table 3.4**. Following this, a recursive inductive strategy was followed as the emergence of different conceptual codes for in-depth interpretation.

Table 3. 4 Deductive/A-priori coding framework.

Deductive/A-priori coding framework	
1	Primary information (authors, title, year(s) of data collection),
2	Study's focus and theoretical/philosophical basis,
3	Study approach, sampling procedures, and description of qualitative methods used (e.g., interviews, observation, analysis),
4	Description of the study setting, where this study has been conducted (country and sector), and Description of respondents (type of respondents, rank/title).
5	Type of supply chain structures,
6	Nature of challenges faced by the buying firms,
7	Management strategies by the buying firms,
8	Limitations of the study,
9	Recommendations of the study,
10	Nature of data collection tool (Questionnaire/interview guide).

3.6.3 Data organisation and findings

The entire coding structure was organised into three phases, and each phase had multiple steps:

- (1) Developing primary coding structure,
- (2) Establishing categories and
- (3) Creating interpretive themes.

This synthesis reviewed empirical data from qualitative studies, and then codes were generated by following the prior guide. The codes were organised hierarchically, and the extracted data were pooled into a relevant set of a-priori codes.

In the second phase, coded text was constantly verified for interpretive consistency to determine whether new codes were required to be generated or if some codes should be merged or erased. During this process, codes were carefully reviewed to establish a valid scheme of descriptive sub-categories.

The third stage was the purpose of thematic synthesis. Thematic synthesis is described as unifying and interpreting emerging themes necessary for accurately describing a phenomenon (Thomas & Harden, 2008). During this stage, all the sub-categories were compared to multiple concepts and theories to develop a solid relevance before generating analytical categories. The primary researcher carried out the relational analysis of codes and carefully examined the latent codes before forming a unified structure of thematic synthesis for interpretation. This iterative procedure continued until the data assessment ceased to yield the final scheme of interpretive themes.

3.7 Discussion and Findings

3.7.1 Descriptive findings of the studies

The distribution of published studies across different years revealed exciting patterns. The maximum number of studies was observed in 2021 (n=5), indicating a growing interest in sustainable development. Regarding publication sources, most of the cited papers were published in EBSCOhost and Emerald journals (n=7). The investigation found an intriguing aspect: most papers were atheoretical, implying that many studies lacked a solid theoretical basis. However, among the theories employed, social network theory emerged as the most utilised (n=3), indicating its suitability for understanding the complexities of multi-tier business settings. Most research followed the case study approach and targeted Italy and Brazil's fruit and coffee sectors (n=3).

Semi-structured interviews and focus group discussions emerged as the preferred approaches in data collection methods. These methods allowed researchers to engage directly with farmers, supply chain officials, and sustainability experts, offering valuable insights into the hidden sustainability challenges and uncovering overlooked aspects. The study by Lanka et al. (2017) in India's coffee sector recorded the highest number of respondents, 256, underscoring the extensive efforts to capture diverse perspectives and experiences related to sustainability challenges. Thematic content analysis was the primary analytical technique employed in the reviewed studies (n=6), and snowball and purposive sampling were the preferred sampling techniques (n=4). The range of supply chain tiers varied across the studies; for example, Mena et al. (2013) explored at least three tiers within the supply chain, while Grabs and Carodenuto (2021) analysed a maximum of seven tiers. This variation reflects the diverse structural arrangements and complexities within the crop agri-food sector's supply chains.

Given the 'complex adaptive system' establishing the roles of multiple tiers of suppliers in different supply chains, the dynamics of their relationship with buying firms, and exploring the sustainability challenges in complex multi-tier supply chain structures were the absolute contributions of this research (Kevin & Dooley, 1997; Choi et al., 2001; Mena et al., 2013). By implementing the 'Triple bottom-line approach' concept, *RQ1* explored three interlinked dimensions of major sustainability challenges for lower-tier suppliers: economic, environmental, and social. By integrating the ESG model with the TBL approach and employing chain governance, *RQ2* highlighted the multidimensional nature of sustainability challenges faced by buying firms in terms of governance. The comprehensive review analysis also highlighted that one of the primary reasons for these challenges was the missing integration link between buyers and lower-tier suppliers, mainly due to their cross-border and different geographical locations. This was primarily due to two reasons. Firstly,

the buying firms had no effective governance structure in their MTSC to comply with the sustainability challenges in a cross-border context. Secondly, buying firms tended to have contractual business relationships with only the first-tier suppliers, in which lower-tier suppliers were often not bothered and frequently caused multidimensional sustainability challenges. These challenges significantly shaped the sustainability landscape of lower-tier suppliers and buying firms in the crop agri-food sector. The subsequent section analyses and discusses these challenges. The descriptive findings of these studies have been highlighted in **Table 3.5**.

The thematic synthesis intended to explore different sustainability challenges in the multi-tier supply chain. The entire process ended by finding four major themes of sustainability challenges. These were social, economic, environmental, and governance dimensions of sustainability challenges. Each theme was based on different categories. The economic and environmental themes had 3 categories each, while social had 4 and the maximum was 7 from governance. The following section presents the synthesis of multiple challenges that were synthesised in each theme in a tabular format discussing each question.

Table 3. 5 Descriptive findings of the studies.

Sr	Author (s) (Year)	Theoretical Framework/ Approaches	Crop wise Sector	Country/ Region	Research Approach	Sampling Techniques	Sample Size	Data Collection Methods	Data Analysis Technique	Supply Chain Tiers	Sustainability Challenges Identified
1	Blasi et al. (2015)	Stakeholder theory	Durum Wheat	Italy	Qualitative case study	Not clear	4 Groups	Focus group	Grounded theory, 'phenomenologic al perspective' and 'thematic analysis	Farmer, elevator, wholesaler, processor, and buyer.	Economic/ Governance
2	León Bravo et al. (2021)	Contingency theory, stakeholder theory	Fruits and vegetables, Balsamic Vinegar	Italy	Inductive case- based approach	Not clear	21	Interviews	Cross-stage, Cross-chain, within the case, cross-case	Grower, processor, wholesaler, retailer.	Economic/ Environmental / Social/ Governance
3	Canto et al. (2021)	Social network theory, social capital theory	Grape juice and wine	Brazil	Qualitative case study	Random	27	Interviews	Within the case, cross-case, Content analysis	Grower, sugar supplier, third party, Distributor, Buyer	Economic/ Environmental /Social
4	Challies and Murray (2011)	System theory	Chilean raspberries	Chile	Qualitative case study	Not clear	20	In-depth interviews	GVC analysis	Growers, intermediaries, processors, exporters, agronomists, public officials, buyers	Economic/ Environmental / Social/ Governance
5	Gboko et al. (2021)	Social network theory	Cocoa	Ivory Coast	Qualitative case study	Snowball	101	Interviews	Thematic analysis	Manufacturers, exporters, cooperatives, certification organisations	Economic/ Environmental Social/ Governance
6	Grabs and Carodenuto (2021)	A-theoretical	Coffee, cocoa, and palm oil	Multinational	Qualitative case study	Not clear	18	Semi- structured interviews	Systematic analysis	Producer, Primary cooperative, National exporter, National	Social/ Governance

Commented [MR1]: The 'a-theoretical' nature of some of the papers investigated may need to be reassessed. This paper, for example, does not name a specific theory but does contribute to theoretical discussions. Outside the management literature, academic work signals differently. The introduction for this paper, states that "to contribute to a broader theoretical and methodological discussion on the need to incorporate local rural development and poverty reduction into GVC research (Pimbert et al. 2001; Kanji and Barrientos 2002; Kanji et al. 2005; Bolwig et al. 2008; Challies 2008; Fold and Gough 2008)." This 'broader theoretical... discussion' features (in this specific case) world systems theory, sociological theory/theories, commodity chains and their systems and, more completely and importantly, global value chains, which is a theoretical literature in its own right. See the work of Stefano Ponte and/or Peter Lund Thomsen among myriad others on this.

										importer, Broker, international manufacturer, buyer		
7	Grimm et al. (2014)	A-theoretical	Chocolate/sugar and fruit juice	Switzerland	Qualitative exploratory case approach	Not clear	2	Focus group	Template analysis	Indirect supplier, direct supplier, the buyer	Social/ Governance	
8	Jraisat et al. (2013)	Marketing theory, social network theory	Cucumber	Jordan	Qualitative comparative case study	Purposive/ Snowball	40	Qualitative interviews	Cross case	Grower, wholesaler, National retailer, exporter, buyer	Economic/ Environmental/ Social/ Governance	
9	Lanka et al. (2017)	Labour theory	Coffee	India	Participatory case study approach	Not clear	256	Participant observation/ Focus group/ unstructured interviews	Empirical	Farmer, cooperative, buyer	Economic/ Environmental /Social	
10	Manning and Reinecke (2016)	A-theoretical	Coffee	Multinational	Embedded Qualitative Case Study Research	Not clear	64	Participant observation/ in-depth interviews/ workshop/ conference	Theoretical/ within case	Farmers, intermediaries, international buyers	Economic/ Environmental /Social/ Governance	
11	Mena et al. (2013)	Modelling and simulation/ Balance theory/ relational view/ TCE/ CAS/ RBV	Beer, Bread, and Pork	United Kingdom	Inductive case study theory building	Theoretical	28	Qualitative interviews	Within the case, cross-case	Grower, processor, buyer	Economic /Governance	
12	McLoughlin and MeeHan (2021)	Stakeholder theory	Cocoa Chocolate	Multinational	Qualitative Case Study Research	Snowball	35	Semi-structured Interviews	Thematic	Farmers, traders, processors, buyers' exporters	Economic/ Environmental /Social/ Governance	
13	Mirkovski et al. (2015)	A-theoretical	Macedonian wineries	Macedonia	Interpretative approach/ exploratory case approach	Convenience/ purposive	4/5	Focus group/ interview	Thematic, within the case, cross-case	Not Established	Social/ Governance	

14	Pancino et al. (2019)	A-theoretical	Barilla	Italy	Qualitative case study	Not clear	4	Qualitative interviews	Empirical/ Situational	Grower, wholesaler, processor, retailer	Economic/ Environmental /Governance
15	Sjauw-Koen-Fa et al. (2018)	A-theoretical	Black soybean/ tomato	Indonesia/ India	Link methodology	Not clear	Not clear	Semi-structured	Cross case	Grower, Procurer, cooperative, commercial, smallholders, buyer	Economic/ Environmental /Governance
16	Sousa et al. (2018)	Resource-based view, social network theory	Sunflower	Brazil	Qualitative case study	Not clear	27	Qualitative interviews	Case analysis	Farmer, seed provider, processor, buyer	Economic/ Environmental /Governance
17	Sozinho et al. (2018)	A-theoretical	Sugarcane	Brazil	Exploratory descriptive approach/ multi-case approach	Purposive	8	Semi-structured	Content analysis	Producers, investors, traders, third parties, retailers	Economic/ Environmental /Social
18	Wongprawas et al. (2015)	A-theoretical	Fruits and vegetables	Thailand	Qualitative exploratory case approach	Convenience/ Snowball/ purposive	48	Semi-structured	Content analysis	Producer, collector, District wholesaler, central wholesaler, Buyer	Economic /Governance

3.7.2 RQ1. What are the sustainability challenges for the lower-tier suppliers of the crop agri-food sector?

3.7.2.1 Economic Challenges

A total of 14 studies identified many economic sustainability challenges, subsequently synthesised into three major categories. Those were economic exploitation of farmers, limited economic incentives for farmers and high-cost agricultural practices highlighted in **Table 3.6**. The measure of economic sustainability in the supply chain is presented only in monetary terms (Falade & Folorunso, 2015), whereas a real sense of economic sustainability, as guided by Barton & Fløysand, (2010) encourages the responsible use of all available resources to minimise environmental issues considered a major threat to harm the balance of local ecology.

After a comprehensive investigation, 171 challenges were primarily codified. Then, different codes were merged into 20 subcategories, which were further synthesised into 3 main categories.

The studies of Sousa et al. (2018) and Sozinho et al. (2018) specifically examined the economic challenges faced by Brazilian sunflower and sugarcane growers. Their research highlighted unique challenges specific to the farmers and growers, shedding light on their distinct circumstances within the MTSC. The lack of job plans and proper schooling opportunities for the farmers' children and their lack of land ownership rights significantly compromised their economic condition and heightened their vulnerability (Eastham et al., 2017; Sozinho et al., 2018). The farmers were only considered 'commodities with no value'. This highlighted the 'social capital deficits' (Johnson et al., 2018) farmers face, contributing to their compromised economic condition (Johnson et al., 2018). Integrating community development projects, such as providing basic business infrastructure to farming communities and supporting vocational training programs for young farmers, could foster socio-economic capital and ensure long-term economic sustainability for lower-tier suppliers and their communities (Johnson et al., 2018). The buying firms should encourage partnerships with local agricultural cooperatives by involving multiple intermediaries beyond tier-one suppliers and community-based organisations (Mirkovski et al., 2015). This strategy would enhance the bargaining power of smallholders, enabling them to negotiate fair prices and more favourable terms. Such collaborative approaches contribute to the economic sustainability of smallholders by promoting a more supportive and equitable supply chain environment (Alsayegh et al., 2020; Raihan & Tuspekova, 2022). A comparative analysis of Sjauw-Koen-Fa et al. (2018) also reported numerous other economic challenges in India and Indonesia's black soybean and tomato industries. Those were mainly related to high spraying costs and delayed payments for their products, which always kept farmers under the debt pressure of local wholesalers. The decreased remuneration for growers further compounded

the difficulties faced by the farmers (Canto et al. 2021). This emphasised the importance of 'trust' (Grohmann et al. 2023; Hoffmann et al. 2010) and 'organisational cooperation' (Huang et al. 2016) regarding 'social capital' within MTSC (Canto et al. 2021; Gulati et al., 2011; Johnson et al., 2018).

Challenges such as the lack of renewable energy and limited use of biodegradable materials used for fruit, vegetables and balsamic vinegar production by Italian farmers also underscored the significance of adopting a comprehensive approach to economic sustainability beyond the narrow focus on monetary considerations (León Bravo et al., 2021; Kristensen & Mosgaard, 2020). To reduce reliance on high-cost fossil fuels, decrease greenhouse gas emissions, and promote energy self-sufficiency, it is beneficial to encourage and support farmers to invest in renewable energy technologies such as solar panels or wind turbines (Broad et al., 2022; Melomey et al., 2022; Tanneberger et al., 2022). By considering the broader social implications due to economic exploitation, as cited in Sozinho et al. (2018) and Sousa et al. (2018), stakeholders of MTSC should take proactive measures to address the exploitation of farmers and provide basic health facilities, schooling, and job opportunities for their children. Economic exploitation could pose detrimental social sustainability threats, particularly in developing countries (Venkatesha et al., 2019). According to the stakeholder approach, to mitigate such challenges, 'normative aspects' (Sherer et al., 2016) in a supply chain (based on ethical characteristics) could play a significant role in fulfilling 'Instrumental aspects' (demands and expectations) (Ricart & Rico-Amorós, 2022).

The review findings further emphasised that lower-tier suppliers have been adversely affected by the lack of financial resources, limited incentives, and reduced product remuneration (Blasi et al., 2015; Challies & Murray, 2011; Manning & Reinecke, 2016; Mena et al., 2013; Sousa et al., 2018; Sozinho et al., 2018; Wongprawas et al., 2015). According to the resource-based perspective, farmers should have access to 'affordable long-term credit', subsidies, and crop insurance programs for necessary 'resources' to promote economic sustainability (Eryarsoy et al., 2022; Forkuor & Korah, 2021). This support could enable farmers to invest in modern farming technologies, equipment, and infrastructure and expand their operations (Forkuor & Korah, 2021). In addition to financial support, improving their market access is significantly important (Raihan & Tuspekova, 2022). This can be achieved by developing adequate infrastructure, transportation, and grain storage facilities (Kendall et al., 2022). Balance theory asserts that these enhancements could enable farmers to reach broader markets, secure fair prices for their products, and create a more 'balanced' economic environment (Elahi et al., 2022; Ferreira et al., 2016; Forkuor & Korah, 2021; Kendall et al., 2022; Phillips & Costello, 1998). To save lower-tier suppliers from further economic loss and exploitation of their quality products, as mentioned in the studies of Lanka et al. (2017) and

Sousa et al. (2018), a fair pricing mechanism should also be established to reflect the quality of their products accurately (Forkuor & Korah, 2021; Kendall et al., 2022).

At the farmer level, empowerment initiatives are critical in enhancing sustainability practices, particularly in emerging economies where farmers may lack awareness of concepts like sustainability management (Shaw et al., 2024). One key aspect of this empowerment is adopting sustainable farming techniques that reduce environmental impact. As the supply chain progresses up the tiers, sustainability managers within larger firms can support these practices by promoting the integration of circular economy principles (Jodlbauer et al., 2024). These principles focus on reducing waste and encouraging the recycling and reuse of materials throughout the supply chain, thereby ensuring that sustainability efforts are not only locally implemented but also extended across all levels of the chain (Sgroi, 2022). This approach ensures a more systematic and integrated strategy, from farm-level interventions to broader corporate sustainability practices (Zhou et al., 2025). This may include collaborating with suppliers to implement closed-loop systems, where products are designed with recyclability in mind (Selvan et al., 2023; Sgroi, 2022). Managers could also consider diversifying farmer income sources by exploring alternative crops or products with higher economic value, particularly in the developing world (Peiris & Dayarathne, 2023). Encouraging the adoption of precision agriculture technologies can optimise resource use, reduce costs, and enhance overall economic efficiency (Wang et al., 2024). However, it is important to consider the environmental and social trade-offs associated with these technologies. While precision agriculture can reduce resource waste and improve yields, its environmental costs, such as the energy consumption required to manufacture high-tech equipment and the associated carbon footprint, should not be overlooked (Ceccarelli et al., 2022). The reliance on advanced technologies may exacerbate social inequalities, especially in emerging economies where smallholder farmers may lack the resources, education, and access to these technologies, potentially widening the gap between large agribusinesses and local farmers (Pakseresht et al., 2023).

The adoption of precision agriculture technologies by farmers in emerging economies involves significant challenges, especially given the disparity between their immediate survival needs and the sophisticated technological solutions proposed (Lowenberg-DeBoer et al., 2021). Farmers in these regions often face fundamental socio-economic difficulties, such as limited access to education and healthcare, which are critical barriers to effectively implementing advanced agricultural technologies (Afzal & Bell, 2023). As the literature indicates, technological adoption cannot be expected to succeed without first addressing these foundational issues, including developing educational infrastructure, strengthening governance systems, and improving healthcare services (Pakseresht et al., 2023). Without

addressing these systemic barriers, high-tech solutions may exacerbate existing inequalities and hinder the long-term sustainability of agricultural practices.

Furthermore, while technological solutions like blockchain can enhance transparency in the supply chain, enabling consumers to trace the origin of products and ensuring adherence to sustainability standards, the literature cautions against an over-reliance on technology (Pakseresht et al., 2023; Rogerson & Parry, 2020). Technological solutions, although valuable, cannot address systemic issues such as weak governance, poor regulatory enforcement, and institutional capacity in many emerging economies. The risk is that these technologies may be implemented without tackling these underlying problems, leading to a superficial approach to sustainability that fails to create meaningful change (Rogerson & Parry, 2020).

Table 3. 6 Economic Challenges.

Categories of Economic sustainability challenges	The nature of sustainability challenges
Limited economic incentives for farmers	<ul style="list-style-type: none"> • No jobs plan for the farmers' kids (Sozinho et al., 2018). • No land ownership rights for farmers (Sozinho et al., 2018). • Less agronomic benefits, Unavailability of financial resources (Sousa et al. 2018).
Economic exploitation of the farmers	<ul style="list-style-type: none"> • Farmers are just commodities without value (Lanka et al., 2017). • Decreased Grower remuneration (Canto et al., 2020). • Lack of incentives and support for the farmers (Blasi et al., 2015; Manning & Reinecke, 2016). • Less financial resources and low income (Challies & Murray, 2011; Manning and Reinecke, 2016; Mena et al., 2013; Sousa et al., 2018; Sozinho et al., 2018; Wongprawas et al., 2015). • Delayed payments for suppliers (Pancino et al., 2019; Sjauw-Koen-Fa et al., 2018). • low prices of quality products (Lanka et al., 2017; Sousa et al., 2018). • No investment to improve post-harvesting facilities (Jraisat et al., 2013). • Exploitation through Prefixed farmgate price (Sjauw-Koen-Fa et al. 2018). • Less price agreement before quality measures (Mena et al., 2013). • No payment for additional labour (Lanka et al., 2017).
Cost-intensive challenges for farmers	<ul style="list-style-type: none"> • High energy costs (Sousa et al., 2018). • Minimum wage of packaging for labour (Canto et al., 2020). • High setup costs of fields for farmers (León Bravo et al., 2021; Sousa et al., 2018). • High spraying cost (Sjauw-Koen-Fa et al. 2018). • High transportation costs (Canto et al., 2020; Sousa et al., 2018). • Increased land rent (Sjauw-Koen-Fa et al. 2018). • Tax aversion and financial risks due to verbal contracts (Sjauw-Koen-Fa et al.,

2018).

- Price volatility of energy and fertilizers (Sjauw-Koen-Fa et al. 2018; Lanka et al. 2017; Manning and Reinecke 2016).
- Less Production due to high energy costs (McLoughlin & Meehan, 2021; Sozinho et al., 2018).
- Depreciation and currency appreciation due to bad macroeconomic conditions (Sousa et al., 2018).
- Criminal and immoral transactions (Manning & Reinecke, 2016).
- Temporary employment (Manning & Reinecke 2016).
- No use of renewable energy and biodegradable material (León Bravo et al., 2021).

3.7.2.2 Environmental Challenges

The collective findings of 12 studies in this review highlighted the wide-ranging challenges associated with environmental sustainability that were pervasive and widespread, affecting various regions across the globe (**Table 3.7**). These were linked to climate change, soil erosion, deforestation, product waste and severe hydrological issues. In the 1st phase, 211 challenges were coded. Based on these codes, 6 subcategories were generated. Following multiple rounds of merging codes and subcategories, 3 main categories were settled with 20 codes of environmental challenges. Studies by McLoughlin and Meehan (2021) in the cocoa sector and Sozinho et al. (2018) in the Brazilian sugarcane sector highlighted the maximum environmental sustainability challenges.

Primarily, the detrimental effects of deforestation emerged as a significant environmental concern, given its role in natural habitat destruction, loss of biodiversity, and contributions to greenhouse gas emissions. These challenges were prevalent mainly in Brazil, India, Indonesia and Ivory Coast industries of coffee, soybean, tomato and sugarcane (Gboko et al., 2021; Manning & Reinecke, 2016; Sjauw-Koen-Fa et al., 2018; Sozinho et al., 2018). Product and water waste challenges were also identified as key areas requiring mitigation strategies to ensure environmental sustainability, particularly in the sunflower, raspberry and fruit/vegetable sectors of Brazil, Chile, Italy, and Thailand. The lack of understanding of lower-tier suppliers about sustainable agricultural practices to protect the environment was identified as the underlying cause of land degradation and drought conditions in India, Brazil and the business operations of multinationals (Canto et al., 2021; Gboko et al., 2021; Lanka et al., 2017; Manning & Reinecke, 2016; Sozinho et al., 2018). Recognising the challenge of deforestation, buying firms can engage in community-based conservation initiatives. This may involve collaborating with local communities in regions like Brazil, India, Indonesia, and Ivory Coast to implement sustainable forestry practices. By supporting afforestation projects, promoting responsible logging practices, and providing alternative livelihood options, buying

firms can contribute to preserving natural habitats, enhancing biodiversity, and mitigating the adverse effects of deforestation. However, the environmental benefits of these actions are not without trade-offs (Esfahbodi et al., 2023). For instance, while afforestation efforts can increase carbon sequestration and restore ecosystems, they may also compete with agricultural land use or require significant water resources (Ménard et al., 2023). Promoting responsible logging can help reduce deforestation but may still involve environmental costs, such as habitat disruption or resource depletion, if not carefully managed (Verma et al., 2023). In some cases, the most significant environmental contribution may come not from the firms' continued operations but from ceasing trade altogether, which could reduce overall consumption and environmental degradation (Nand et al., 2023). These trade-offs highlight the complexity of corporate environmental responsibility and the need for a more comprehensive, balanced approach to sustainability.

Considering the vulnerability of smallholders in developing countries to climate change, buying firms can take a proactive role in promoting climate-resilient agricultural practices (Goswami et al., 2023). Investing in research and development to identify and disseminate crop varieties more resistant to climate extremes would also bring positive results. Providing smallholders access to these resilient seeds and training on climate-smart farming techniques can enhance their capacity to adapt to changing environmental conditions and promote long-term sustainability (Hellin et al., 2023).

Specific studies conducted within distinct crop agri-food sectors further contributed valuable insights into environmental sustainability challenges. For instance, the studies of Manning and Reinecke (2016) and McLoughlin and Meehan (2021) focused on the Cocoa and coffee sectors of multinational firms, identifying significant soil erosion challenges, predominantly missing waste management mechanisms, and avoiding harmful fertilisers. Another significant environmental sustainability challenge was the emissions of greenhouse gases from using old agricultural machinery and the pollution of clean water in canals caused by the disposal of food waste by growers in Brazil, India, Indonesia, and Thailand's industries of coffee, tomato and vegetable. Similarly, León Bravo et al. (2021) and Sozinho et al. (2018) conducted their studies in Italy and Brazil, investigating the vegetable and sugarcane sector, respectively. Their findings highlighted distinct hydrological challenges, including using polluted water and extensive deforestation, significantly affecting environmental sustainability. The research conducted by Mirkovski et al. (2015) and Lanka et al. (2017) emphasised the importance of effectively adopting sustainable agricultural practices and implementing interventions to address environmental issues, particularly in cross-border settings. Failure to do so could have far-reaching consequences, impacting our immediate surroundings and the entire ecosystem. In response to the significant challenge of food waste in the Brazilian and Indian context, buying firms can initiate localised efforts to promote

eco-friendly packaging solutions. Partnering with suppliers and local communities, they can explore sustainable alternatives such as 'green packaging' using biodegradable materials or reusable packaging systems (Kim & Ruedy, 2023). This addresses environmental concerns and enhances the brand image as environmentally conscious, appealing to consumers who prioritise sustainable practices. Amazon is often cited as a leading example of green packaging, implementing initiatives to reduce waste and enhance sustainability while maintaining significant competitive advantages (Sarkar, 2023). However, despite these efforts, the company's business model is inherently built on high sales volumes and the continuous promotion of consumerism (Spilda et al., 2024). This raises concerns about whether packaging sustainability alone can offset the broader environmental impact of increased production, transportation, and resource consumption (Meduri, 2023). While green packaging mitigates some ecological damage, its effectiveness must be evaluated within the larger context of Amazon's operational scale and consumption-driven model.

This analysis emphasised an urgent need for 'collective efforts' and 'coordinated actions' to tackle environmental sustainability challenges associated with climate change and greenhouse gas emissions (Ardoin et al., 2023; DiVito & Ingen-Housz, 2019). The findings underlined that 'collective efforts' (Ardoin et al., 2023) and 'coordinated actions' (DiVito & Ingen-Housz, 2019) involving 'stakeholders in a business network' (Vasconcelos et al., 2022) are needed to address environmental sustainability challenges and promote awareness programs tailored for farmers, particularly in developing countries (Nigussie et al., 2021; Wongprawas et al., 2015). These programs could promote sustainability and ensure farmers' compliance with environment-friendly agricultural practices in the crop agri-food industries (Johnson et al., 2018). Achieving compliance often comes at significant costs, including the financial burden on farmers to adopt new practices, the need for infrastructure investment, and potential trade-offs between short-term productivity and long-term sustainability (Touch et al., 2024). Additionally, stringent compliance requirements may disproportionately affect small-scale farmers who lack the resources to transition smoothly, raising concerns about economic viability and social equity in sustainability initiatives. However, such initiatives would also enhance 'social capital' by fostering 'cooperation' (Fuller et al., 2022) and 'knowledge sharing' (Blome et al., 2014). Several studies have extensively discussed intensive land use and monoculture farming practices, highlighting their damaging effects on soil erosion and fertility. Encouraging farmers to embrace sustainable farming practices, especially organic farming and crop rotation, can have multiple benefits (Baaken, 2022; Broad et al., 2022). These practices minimise environmental impact, reduce the need for chemical inputs, and foster soil health, which can be seen as a 'knowledge-based view' to minimise environmental impact and enhance 'soil health' (Blome et al., 2014). Buying firms can significantly advocate organic farming, crop rotation, and agroecological approaches to

minimise environmental impact, reduce reliance on harmful fertilisers, and enhance soil health. This approach aligns with a 'knowledge-based view' to minimise environmental impact and promotes a holistic understanding of sustainable agricultural practices among smallholders, Fostering long-term environmental sustainability. Immediate attention is required to address various other aspects of environmental sustainability discussed in this review, including traditional irrigation systems leading to water wastage and the utilisation of polluted water in response to water scarcity. Promoting the adoption of efficient irrigation techniques, such as 'drip irrigation' and the building of 'water reservoirs' can help farmers conserve water resources (Baaken, 2022; Cerdà et al., 2022; Tanneberger et al., 2022).

Table 3. 7 Environmental Challenges.

Categories of Environmental sustainability challenges	The nature of sustainability challenges
Climate change, Greenhouse gas emissions	<ul style="list-style-type: none"> • Threats to climate change due to bad farming practices (León Bravo et al., 2021; Canto et al., 2020; Jraisat et al., 2013; Lanka et al., 2017; McLoughlin & Meehan, 2021). • CO₂ emissions (León Bravo et al. 2021; McLoughlin and MeeHan. 2021; Sozinho et al., 2018; Sjauw-Koen-Fa et al., 2018). • Wrong energy use (McLoughlin & Meehan, 2021; Sozinho et al., 2018). • No understanding of Environmental preservation and degradation (Canto et al., 2020; Lanka et al., 2017). • Unexpected extreme weather events, heatwaves, and floods due to heavy rain (Sjauw-Koen-Fa et al., 2018)
Soil erosion and deforestation	<ul style="list-style-type: none"> • Land use intensity caused soil erosion and damaged soil fertility (Lanka et al., 2017; Manning & Reinecke, 2016; McLoughlin & Meehan, 2021; Pancino et al., 2019). • Drought lands due to deforestation (Sozinho et al., 2018). • No practices for soil quality improvement related to crop rotation (Sousa et al., 2018). • Wrong use of soil resources caused soil pollution (Lanka et al., 2017; McLoughlin & Meehan, 2021; Sozinho et al., 2018).

Hydro issues and product waste	<ul style="list-style-type: none"> • Depletion of water resources due to excessive use and no storage system (León Bravo et al., 2021; Challies & Murray 2011; Jraisat et al., 2013; Manning & Reinecke 2016; Sozinho et al., 2018). • Use of polluted water and no filtering system for wastewater (León Bravo et al., 2021; Manning and Reinecke 2016). • Traditional irrigation systems and water loss (Challies and Murray 2011). • No waste management system and food waste dumping in canals (McLoughlin and MeeHan 2021; Sozinho et al., 2018).
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3.7.2.3 Social Challenges

Within social sustainability dimensions, severe issues related to the farmers' human rights, livelihood, health, and safety emerged as significant challenges in 13 studies, as highlighted in **Table 3.8**. Various studies significantly enhanced the understanding of the social sustainability challenges for farmers in different sectors. For instance, McLoughlin and Meehan (2021) identified multiple challenges related to modern slavery and the poor conditions of labourers, who had no basic facilities available in the cocoa industry of a multinational firm. The presence of child labour and the employment of aged individuals for labour work in the coffee sector of a multinational also raised alarming concerns, especially considering multinationals' so-called claims of sustainability (Brandli et al., 2022; Gboko et al., 2021; Manning & Reinecke, 2016; Montiel et al., 2021). Challies and Murray (2011) focused on the Chilean raspberry sector and reported challenges to gender inequality, especially the exploitation of female farmers and unfair wages. In many developing regions that mainly rely on agricultural products, gender inequality is a prevalent social sustainability challenge. For instance, in the South Asian and East African regions, where female workers mainly perform crop sowing, gender inequality and sexual harassment have been reported (Oosterom et al., 2023). Sustainability managers can play an essential role in promoting gender equality by actively engaging in initiatives that empower women in agriculture. Supporting programs that provide training and resources tailored to female farmers, enhancing their skills and enabling them to take on leadership roles should be encouraged. By fostering inclusivity and gender-sensitive policies, managers contribute to the social well-being of the farming communities, ensuring women have equal access to opportunities and resources (Sultan, 2023).

In a study of the Brazilian sugarcane industry, Sozinho et al. (2018) highlighted some distinct challenges related to food security and fewer social benefits for farmers. The studies of León Bravo et al. (2021), Canto et al. (2021), and Sousa et al. (2018) shed light on specific social sustainability concerns in Italian and Brazilian industries of sunflower, fruits and vegetables,

emphasising the importance of fair labour practices, community development, and the well-being of workers. Addressing these challenges requires comprehensive actions and systemic changes to ensure the well-being and rights of all 'stakeholders' involved in a multi-tier supply chain. To address such issues, 'farmers' associations' and 'cooperatives' by 'relational' and 'structural embeddedness' of social networking should be encouraged, which can empower them by providing a 'collective voice' (Baaken, 2022; Broad et al., 2022; Cerdà et al., 2022; DiVito & Ingen-Housz, 2019; Tanneberger et al., 2022) and 'promoting cooperation' (Fuller et al., 2022). These organisations can facilitate their access to 'resources' (Eryarsoy et al., 2022), 'market opportunities' (Elder, 2019), and 'shared knowledge' (Blome et al., 2014) while also advocating for farmers' rights and interests (Brandli et al., 2022; Elder, 2019; Montiel et al., 2021). A 'policy mechanism' should be implemented to promote the 'fair distribution' of resources, emphasising a 'resource-based view' especially among smallholder farmers and marginalised groups (Elder, 2019; Fayet et al., 2022; Montiel et al., 2021). The studies of Challies and Murray (2011), Gboko et al. (2021), Manning and Reinecke (2016) and McLoughlin and Meehan (2021) highlighted the need to address 'social inequalities', 'promote inclusivity' to ensure the well-being of farming communities. León Bravo et al. (2021), Challies and Murray (2011), and Sozinhos et al. (2018) underscored the significance of ensuring the health and safety of workers and farmers in the fields. Stakeholders in MTSC need to prioritise occupational safety measures and provide training on adequately handling agricultural inputs to mitigate health risks (León Bravo et al., 2021; Sousa et al., 2018). Opportunistic behaviour of buying firms and misunderstanding within the supply chain actors contributed to a 'trust' and 'commitment' deficit between growers and buyers, particularly in Jordan, Switzerland, and Thailand (Grimm et al., 2014; Grohmann et al., 2023; Jraisat et al., 2013; Wongprawas et al., 2015). The hidden and exploited intentions of buyers; brokers, the lack of respect for values and culture, and the absence of 'social responsibility' added to the complex social sustainability issues in the coffee, cocoa, and palm oil sectors of a big multinational and sugarcane supply chains of Brazil (Grabs & Carodenuto, 2021; Sozinhos et al., 2018). Understanding the values of cultural nuances and local contexts is extremely important for social sustainability in agriculture. For instance, big multinationals with production sites in different geographies should tailor their support programs to align with the cultural values, traditions, and socio-economic structures of the communities they engage with. Promoting cultural diversity by integrating local knowledge could ensure that interventions by the firms resonate with smallholder farmers' specific needs and aspirations. By embracing a culturally sensitive approach, buying firms can build stronger relationships with local communities, enhancing their supply chains' social fabric and sustainability. Promoting local markets, not only in the crop agri-food sector but also in other food supply chains, could enhance lower-tier suppliers' income and reduce their 'dependence' on un-fair

practices of brokers (Fayet et al., 2022; Fuller et al., 2022). Farmer's associations or third parties such as non-government organisations can mediate access to intangible resources such as organisational knowledge and market access (Davis & Cobb, 2010) from buying firms by leveraging the value of tangible resources of farmers such as grain and products (Rousseau, 2017). A transparent and fair bargaining mechanism can be established by considering both 'resource dependence' and 'resource-based' perspectives. Farmers should be recognised as active contributors to sustainable development, and their perspectives should be valued (Brandli et al., 2022; Fayet et al., 2022). When implemented in combination and tailored to local contexts, these considerations can help address social sustainability challenges and promote the well-being of farmers, their families, and their communities through collective participation (Fuller et al., 2022; Montiel et al., 2021). These participatory approaches can gain lower-tier communities' confidence, empower them to voice their concerns and aspirations and make suggestions for improvement (Brennan et al., 2023). Such approaches foster a sense of ownership and inclusivity and allow for co-creating sustainable solutions. They also acknowledge smallholders' unique challenges and ensure that social sustainability initiatives are relevant, impactful, and embraced by the community.

Table 3. 8 Social Challenges.

Categories of Social Sustainability Challenges	The nature of sustainability challenges
Human rights challenges	<ul style="list-style-type: none"> • Child labour (Gboko et al., 2021; Manning & Reinecke, 2016) • Aged labour (Manning & Reinecke 2016) • Modern slavery issues (McLoughlin & Meehan, 2021). • Poor condition and quality of workers (Canto et al., 2020; Lanka et al., 2017; McLoughlin & Meehan, 2021). • Unfair Employee rights (León Bravo et al., 2021; Sozinho et al., 2018).
Health and safety challenges	<ul style="list-style-type: none"> • Missing basic facilities for workers (Challies & Murray, 2011). • Bad health and safety practices (León Bravo et al., 2021; McLoughlin & Meehan, 2021). • Severe health conditions of labour (Manning & Reinecke, 2016; McLoughlin and Meehan, 2021; Sozinho et al., 2018). • Alienation from family (Sozinho et al., 2018).
Fair labour practices	<ul style="list-style-type: none"> • Inappropriate labour standards (McLoughlin & Meehan 2021). • Unfair wages (Challies and Murray; 2011; McLoughlin and Meehan 2021). • Gender inequality and women empowerment (Challies & Murray, 2011; Gboko et al., 2021; Manning and Reinecke 2016; McLoughlin and Meehan 2021).

Livelihood and social interactive challenges between stakeholders	<ul style="list-style-type: none"> • Restricted freedom of labour association (Jraisat et al., 2013; Manning & Reinecke, 2016). • Food security risks for farmers (Sozinho et al., 2018). • Poor quality of life, well-being, and livelihood of workers (Canto et al., 2020; McLoughlin & Meehan, 2021). • Trust and commitment deficit between growers and buyers (Grimm et al., 2014; Jraisat et al., 2013; Wongprawas et al., 2015). • Misunderstanding related to dependencies of stakeholders (Mirkovski et al., 2015) • Opportunistic behaviour of buying firms (Jraisat et al., 2013). • Tensions between the buyer, supplier, and sub-supplier (McLoughlin & Meehan, 2021). • Socio-political effects on supply chain actors (McLoughlin & Meehan, 2021). • Undisclosed and exploited intentions of buyers (Mirkovski et al., 2015). • No respect for Values and culture (Grabs & Carodenuto, 2021). • No social responsibility and benefits for suppliers (Sozinho et al., 2018).
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3.7.3 RQ2. What are the governance challenges for the buying firms in their multi-tier crop agri-food supply chains?

3.7.3.1 Governance Challenges

To highlight the sustainability dimension of governance, this review evidence synthesis followed the concept of Hilletoft (2011), 'product management flow', and Bostrom et al (2015), 'outsourced production. Simply put, products for everyday needs used to be made 'here', while now they are made 'elsewhere' (Hilletoft, 2011). This means that sustainability challenges mainly stem from outsourced production, which features the concept of 'made elsewhere' in a multi-tier supply chain (Bostrom et al., 2015). Due to outsourced production in geographically dispersed locations, buying firms often struggle to develop and maintain relationships across different supply chain tiers (Bostrom et al., 2015). This challenge is exacerbated by competitive incentives among intermediaries and suppliers to retain opacity, limiting transparency and oversight (Canto et al., 2020). As a result, buying firms may face difficulties enforcing sustainability standards and ethical sourcing practices, particularly in lower tiers where visibility is most constrained. This disintegration between buyer and supplier is considered the root cause of the sustainability challenges, including social, economic, and environmental dimensions in the Broader context (Bostrom et al., (2015). This review included 15 studies that uncovered multifaceted governance sustainability challenges. These challenges require the immediate attention of buying firms for a

sustainable product. Buying firms regularly encountered traceability and monitoring of the product, logistical issues, cultural barriers, knowledge gaps, and technological hurdles, particularly within their lower supply chain tiers. Primarily, 321 references were codified and the number of codes was 271. Mainly 51 subcategories were generated. Those were then turned into 7 categories. A final set of 71 codes were assigned to these 7 categories. A comprehensive description of governance challenges is presented in **Table 3.9**.

Buying firms encountered serious governance sustainability challenges with the security and stability of their commodity supply. These issues emerged due to difficulties in monitoring and controlling barriers to observing local market trends of the product, limited assessment mechanisms of global market fluctuation and unreliable market data from their suppliers (Grabs & Carodenuto, 2021; Mena et al., 2013; McLoughlin & Meehan, 2021; Mirkovski et al., 2015; Wongprawas et al., 2015). A robust monitoring system could effectively evaluate the marketing trends and inequalities of economic sustainability to address the security and stability concerns related to the supply of agri-food commodities (Mirkovski et al., 2015; Wongprawas et al., 2015). The studies of Mena et al. (2013), Challies and Murray (2011), and Grabs and Carodenuto (2011) focusing on beer, bread, coffee and raspberry sectors underlined the importance of establishing robust monitoring mechanisms for the traceability of agricultural practices using technology, which could enable transparency and accountability among different tiers throughout the supply chain. An effective blockchain technology in supply chain management can enhance traceability and transparency. This is particularly crucial in regions with a prevalence of smallholders, as blockchain ensures an immutable and secure record of transactions. This technology can mitigate challenges related to information asymmetry and contribute to improved governance in the supply chain (Pakseresht et al., 2023).

Efficient transparency also could ensure the quality, quantity, and safety of the product, as witnessed in wheat, beer and fruit/vegetable sectors in Italy, England and Thailand (León Bravo et al., 2021; Sjaauw-Koen-Fa et al., 2018; Manning & Reinecke, 2016; Mena et al., 2013; Wongprawas et al., 2015). With robust mechanisms for traceability and monitoring, buying firms can reduce uncertainties and transactional risks, thereby enhancing transparency and trust throughout the supply chain (Grohmann et al., 2023; Williamson, 2008). These efforts aim to optimise economic efficiency and mitigate opportunistic behaviours, which are central concerns of transaction cost economics (Campos & Mello, 2017). Another possible way out could also be integrating the agency concept with TCE, where buying firms could establish direct contact with lower-tier suppliers, albeit indirectly through another supplier. By leveraging their influence over first-tier suppliers by using them as intermediaries, buying firms can prompt them to 'monitor' (Koh et al., 2012) or 'collaborate' (Mueller et al., 2009) with their lower-tier counterparts (Tachizawa & Wong, 2014) in a cost-

effective way. Cross-tier collaboration is significant given the challenges associated with monitoring the entire supply chain (Koh et al., 2012; Mueller et al., 2009). Buying firms may also pressure their intermediaries to enforce environmental or social certification requirements for their lower-tier suppliers. This approach aligns with the concept of an 'open triadic structure' proposed by Mena et al. (2013). Another managing concept of a multi-tier supply chain through third-party certification is supported by Tachizawa and Wong (2014). Developing localised and context-specific certification systems tailored to the unique challenges of smallholders can be instrumental. Conventional certification processes might be resource-intensive and less adaptable to diverse farming practices, mainly in the developing world. Engaging the local government representatives in creating certification frameworks that consider smallholder agriculture's socio-economic and environmental context ensures that sustainability standards are met without imposing unrealistic burdens. This approach can foster a sense of ownership and compliance among smallholders. Communication gaps brought information asymmetry between buying firms and their lower-tier suppliers, which caused buying firms to have limited knowledge about suppliers' culture and learning complications. This was mainly emerging due to geographically dispersed lower-tier suppliers (León Bravo et al., 2021; Challies & Murray, 2011; Gboko et al., 2021; Grimm et al., 2014; Jraisat et al., 2013; Manning & Reinecke, 2016; Mena et al., 2013; Mirkovski et al., 2015; Sousa et al., 2018; Wongprawas et al., 2015). Leveraging mobile technology or introducing electronic resources (e-chats) for direct communication, particularly between buying firms and smallholders at lower tiers, can bridge information gaps (Li et al., 2023). This view aligns with 'direct management' (Tachizawa & Wong, 2014) and 'closed management' (Mena et al., 2013), both in the distinct geographies of inter-country or intra-country MTSCs. E-chat sources could be platforms for sharing real-time market information, weather forecasts, and best agricultural practices. This direct communication channel empowers smallholders with timely insights, allowing them to make informed decisions. It also facilitates a collaborative approach to problem-solving and builds a stronger relationship between supply chain actors.

The varying cultural specificities of different sourcing markets, including language barriers, lack of awareness of consumer demands and learning complications of suppliers, caused significant operational challenges for the buying firms, particularly in Thailand's fruit and vegetable sectors (Wongprawas et al., 2015). These specificities and operational challenges in different sourcing markets can also be analysed through the lens of CAS. Within this framework, supply chain governance mechanisms evolve dynamically, adjusting operational strategies and resource allocations in response to sustainability challenges. The resource-based view further emphasises the 'strategic value' of 'resources' and 'capabilities' within organisations in which by sharing knowledge and promoting collaboration (Grimm et al.,

2014) with suppliers, buying firms can enhance supplier capabilities, improve information exchange, and drive sustainable farming practices in cross-border supply chains (Gabler et al., 2022). Buying firms could embrace complexity by fostering flexibility, resilience, and adaptability within their supply chains, enabling them to effectively navigate cultural barriers and respond to market demands in their lower tiers (Nair & Reed-Tsochas, 2019). Moreover, effective communication among different supply chain tiers is an established concept in mitigating cultural and geographical barriers, particularly in fostering social and environmental sustainability (Challies & Murray, 2011; Mena et al., 2013). Effective communication among different tiers of the supply chain aligns with the principles of social network and institutional analysis, as it highlights the significance of 'collaboration', 'trust', and 'bridging knowledge gaps' to moderate information asymmetry (Asamoah et al., 2020; Grohmann et al., 2023; Lafargue et al., 2022; Monaghan et al., 2017). This strategy was effectively used in the study of Mena et al. (2013) in the bread and beer sectors of the UK. To mitigate operational challenges, Steinberg (2023) proposed a multi-level governance approach in the multi-tier supply chain context, combining 'network analysis' (Monaghan et al., 2017) and an 'in-direct governance' (Boström et al., 2015; Tachizawa & Wong, 2014) structure. This approach is primarily driven by a polycentric theoretical framework in international business (Ostrom, 2010). The multi-level governance approach involves small, medium, and large supply chain units with autonomy to establish and enforce rules within their scope (Ostrom, 2010). Decision-making power is distributed across different levels, influencing local cultural specificities and outcomes (Nair et al., 2009). It also examines intersections and interactions between various supply chain levels. This approach could enhance buying firms' understanding of drivers of variation in social and environmental consequences within their MTSCs (Alsayegh et al., 2020; Wilhelm et al., 2016). Inadequate roads and poor telecommunication conditions in Chile, India, Indonesia, and Ivory Coast sectors of soybean, tomato, coffee, and raspberry emerged as frequently encountered logistics challenges (Challies & Murray, 2011; Gboko et al., 2021; Sjauw-Koen-Fa et al., 2018). Limited space in crop-carrying trucks and long distances between the main road and the fields also caused severe delays in the delivery of products (León Bravo et al., 2021; Grabs & Carodenuto, 2021; Jraisat et al., 2013). Buying firms should at least ensure the availability of transport services for commuting farmers and spacious product delivery trucks to avoid supply delays (Mena et al., 2013; Pancino et al., 2019; Wongprawas et al., 2015). From a TCE perspective, inadequate infrastructure facilities in a business supply chain increase the transaction costs associated with transportation and coordination (Williamson, 2008).

By designing appropriate contracts and monitoring mechanisms through principal-agent relationships from an Agency perspective, buying firms can enhance 'coordination' in a

supply chain to mitigate these challenges (Wilhelm et al., 2016). The absence of suppliers' accountability and records of food standards to ensure their reliability and adherence to standards for the buyers also led to operational challenges in the coffee and palm oil sectors of multinationals as well as fruit sectors of Thailand (Grabs & Carodenuto, 2021; Wongprawas et al., 2015). From a social networking perspective, by establishing strong 'collaborative' partnerships and fostering 'information sharing', buying firms can ensure compliance with standards and improve supply chain 'transparency' (Monaghan et al., 2017). The absence of formal and legal contracts resulted in ambiguity and potential 'conflicts', highlighting perspectives of 'conflict theory' (Jraisat et al., 2013; Mirkovski et al., 2015). Failure to publish annual sustainability reports due to suppliers' lack of data provision also reduced buyer data transparency (León Bravo et al., 2021). Community development through social mobilisers can be employed to create decentralised annual sustainability reports. Suppliers can contribute data to designated representatives, ensuring transparency and reliability. These initiatives could mitigate the governance sustainability challenges buying firms face due to a lack of data provision, allowing for a comprehensive and trustworthy source of information for sustainability reporting. However, suppliers should also provide full support to these mobilisers to improve their development and performance (Sjauw-Koen-Fa et al., 2018), and issues with contractors and policy changes disrupt operations and create uncertainty (Jraisat et al., 2013).

The heterogeneity of farm sizes created challenges for buyers in managing and coordinating supply chain activities effectively in Switzerland's fruit juice industry (Grimm et al., 2014). Buyers faced challenges due to their suppliers' poor professional and personal reputations, affecting trust and relationship development in the Brazilian sunflower sector (Grohmann et al., 2023; Sousa et al., 2018). Buying companies need reputable intermediaries to address the challenges emerging from trust issues (Grohmann et al., 2023). Buying firms and intermediaries in 'Principal-Agent' relationships could design contracts and monitor mechanisms that align the interests of the buyers and suppliers, promoting accountability and ensuring reliable performance (Wilhelm et al., 2016). In the Chilean raspberry sector, the lack of transparency regarding supplier identities forced buying firms to adopt a reactive and unstructured business approach. This absence of systematic oversight and coordination resulted in inefficiencies, inconsistencies in supply chain practices, and difficulties in ensuring compliance with sustainability standards (Challies & Murray, 2011). This business approach by the buying firm can be seen as a response to the high 'uncertainty' and 'information asymmetry' associated with dealing with unfamiliar suppliers (Meinlschmidt et al., 2018). In such situations, buying firms face increased transaction costs regarding search and information gathering, negotiating contracts, and monitoring supplier performance (Campos & Mello, 2017; Rossi et al., 2023; Weituschat et al., 2023). These transaction costs can

hinder the efficiency and effectiveness of the supply chain. The absence of secure storage facilities for chemicals, fertilisers, and equipment posed safety and regulatory concerns (Challies & Murray, 2011). Inequitable distribution of resources between upstream and downstream suppliers and lack of understanding about the 'shared needs' created imbalances and dissatisfaction in lower-tier suppliers in the cocoa and chocolate sectors of a Multinational and was constantly reported to buying firms (Blasi et al., 2015; Grabs & Carodenuto, 2021; McLoughlin & Meehan, 2021; Mirkovski et al., 2015). Challenges due to the packaging and storage of products also forced the buying firms to limit their product delivery planning in Italy's balsamic vinegar and wheat sector (Blasi et al., 2015; León Bravo et al., 2021).

This research reveals that various market dynamics predominantly influenced these sustainability challenges. Considering the overall aspects of the above discussion, a comprehensive governance mechanism is significantly imperative to balance social equity, environmental health, and the economic wealth of MTSCs (Boström et al., 2015; Chapin et al., 2022; Vasconcelos et al., 2022). However, this undertaking requires sincere relational and organisational embeddedness, collaborative efforts and a holistic approach from all stakeholders to establish a sustainable supply chain structure that should align with the dynamics of the industry and market (Asamoah et al., 2020; Baaken, 2022; Broad et al., 2022; Cerdà et al., 2022; DiVito & Ingen-Housz, 2019; Ricart et al., 2022; Tanneberger et al., 2022; Vasconcelos et al., 2022). Promoting formal, social, and legal contracts in business could also draw clear expectations and obligations between farmers and buyers (Behl et al., 2022; Sheehy, 2022). Before initiating any business operations, in-depth market research and analysis to understand the characteristics of different sourcing markets could be a practical initial step towards a sustainable business operation (Gabler et al., 2022). As industries evolve and multiple tiers are involved, embracing the above-discussed cutting-edge analytical approaches becomes imperative for creating resilient and sustainable supply chain ecosystems for buying firms.

Table 3. 9 Governance Challenges.

Categories of Governance sustainability challenges	The nature of sustainability challenges
Market and monitoring challenges	<ul style="list-style-type: none"> • Monitoring and controlling barriers to observing local market trends (Mirkovski et al., 2015; Wongprawas et al., 2015). • Less assessment of global market fluctuations (Grabs & Carodenuto, 2021). • Product marketing challenges (Mena et al., 2013). • Un-reliability of market data (Mena et al., 2013). • Security and stability issues of commodity supply (McLoughlin &

	<p>Meehan, 2021).</p> <ul style="list-style-type: none"> • Less assessment of Market inequity and trends (McLoughlin & Meehan, 2021; Mirkovski et al., 2015).
Geographical and cultural challenges	<ul style="list-style-type: none"> • Geographically dispersed suppliers and processors (Challies & Murray 2011; Grimm et al. 2014; Sousa et al., 2018). • Communication issues (Mena et al., 2013). • Cultural differences (Language) (Grabs & Carodenuto 2021; Grimm et al., 2014). • Different characteristics of sourcing markets (e.g., cultural specificities) (Grimm et al., 2014).
Knowledge gaps challenges	<ul style="list-style-type: none"> • Learning complications of suppliers (León Bravo et al., 2021; Manning & Reinecke, 2016). • Low knowledge of production (Gboko et al., 2021; Sousa et al., 2018). • Information asymmetry between buyer and supplier (León Bravo et al., 2021; Challies & Murray, 2011; Grimm et al., 2014; Jraisat et al., 2013; Mirkovski et al., 2015; Wongprawas et al., 2015). • Farmers' knowledge constraint about product hygiene (León Bravo et al., 2021; Manning & Reinecke, 2016). • Limited knowledge of product processing (Sousa et al., 2018). • Less awareness of consumer demands and learning complications of suppliers (Wongprawas et al., 2015). • Limited network composition between buyer and supplier (Mirkovski et al., 2015).
Technological challenges	<ul style="list-style-type: none"> • No mechanism and technology for testing the quality of products (Mena et al., 2013). • No technical production guidelines for growers (Challies & Murray, 2011). • No source of innovation of new techs (Mena et al., 2013). • Low technological level regarding seed adaptability and agrochemicals compared to well-established crops (Sousa et al., 2018). • No DE-pulping, drying and dehulling mechanism of the final product (Grabs & Carodenuto, 2021).
Logistics challenges	<ul style="list-style-type: none"> • Poor roads and telecommunication services (Challies & Murray, 2011). • No logistics information (Jraisat et al., 2013). • Supply chain security problems in product logistics (Manning & Reinecke, 2016).

	<ul style="list-style-type: none"> • Light bridges (unable to bear loaded vehicles) (Challies & Murray, 2011). • No transport services for employees (Challies & Murray, 2011). • Use of fewer space trucks for logistics (León Bravo et al., 2021). • Late product delivery (Challies & Murray 2011; Jraisat et al. 2013; Pancino et al. 2019; Wongprawas et al. 2015). • Long distance transporting issues (León Bravo et al. 2021; Challies & Murray 2011; Grabs & Carodenuto 2021; Jraisat et al. 2013; Mena et al. 2013).
Product traceability (Quality, quantity, and safety) challenges	<ul style="list-style-type: none"> • No Monitoring room to trace energy usage in product formation (León Bravo et al., 2021; Manning & Reinecke, 2016). • Lack of warehousing for product safety (Mena et al., 2013). • Compromised quality of crop seeds and poor delivery standards (Blasi et al., 2015; León Bravo et al., 2021; Gboko et al., 2021; Grabs & Carodenuto, 2021; Grimm et al., 2014; Jraisat et al., 2013; Koen-Fa et al., 2018; Manning & Reinecke, 2016; Mena et al., 2013; Pancino et al., 2019; Sousa et al., 2018; Pancino et al., 2019; Wongprawas et al., 2015). • No mechanism to measure the safety and hygiene of production (Challies & Murray, 2011). • No check on the quantity of the product and supplied materials (Challies & Murray, 2011). • No measures to eradicate weeding (Challies & Murray, 2011). • No Pruning of the trees for quality purposes (Challies & Murray, 2011).
Operational challenges	<ul style="list-style-type: none"> • No accountability of suppliers (Wongprawas et al., 2015). • The choices of bad season replanting crops from growers (Challies & Murray, 2011). • No cooperation between buyers and suppliers (Jraisat et al., 2013). • Difficulties in record keeping about food standards due to uneducated labour (Wongprawas et al., 2015). • No enforcement of production standards (Grabs & Carodenuto, 2021). • Insufficient investment to improve supply chain infrastructure (Sousa et al., 2018). • Absence of conflict management practices (Mirkovski et al., 2015).

- Lack of integration and trust between different tiers (Sousa et al., 2018; Wongprawas et al., 2015).
- lack of credibility in the product verification system (Wongprawas et al., 2015).
- The absence of formal and legal contracts (Jraisat et al., 2013).
- No composition of supply chain tiers (Sousa et al., 2018).
- Non-competitive business practices (León Bravo et al., 2021).
- Conflict of interest due to the dependent relationship (Grabs & Carodenuto, 2021).
- limited market structure on both the supply and demand side (Sousa et al., 2018).
- Not Publishing sustainability reports annually for customers due to no data provision from the suppliers (León Bravo et al., 2021).
- Not upgrading support for the supplier (Koen-Fa et al., 2018).
- Problems with contractors and policy changes (Jraisat et al., 2013).
- Heterogeneity of farm sizes (Grimm et al., 2014).
- lack of mutual understanding between supply chain members (Blasi et al., 2015).
- Bad professional and personal reputation of suppliers (Sousa et al., 2018).
- A spontaneous business approach that is rather focused and organised (Challies & Murray, 2011).
- Inequitable value distribution between upstream and downstream suppliers (McLoughlin & Meehan, 2021).
- No initial assessment of consumer preferences (Mirkovski et al., 2015).
- Packaging sizes (León Bravo et al., 2021).
- Constraint of weather stations in the fields (Blasi et al., 2015).
- No secure chemical, fertiliser, and equipment storage (Challies & Murray, 2011).
- Inefficient labour (Manning & Reinecke, 2016).

3.8 Learning outcome and future research direction

This chapter concludes by identifying critical insights into the sustainability challenges faced in the crop agri-food sector and the factors contributing to these issues. The key findings and proposed research directions are as follows:

- Investigating the crop agri-food sector, the systematic review established that lower-tier suppliers and buying firms faced numerous sustainability challenges across economic, environmental, social, and governance sustainability dimensions.
- The analysis of these challenges underscored the absence of a robust integration link between buyers and their lower-tier raw material suppliers. This missing link, attributed to the cross-border nature and diverse geographical locations of the supply chain tiers, was rooted further in two primary factors. First, buying firms were found to lack an effective governance structure within their MTSCs, rendering them inadequately prepared to address sustainability challenges in cross-border contexts. This inadequacy perpetuated challenges and hindered the establishment of cohesive sustainability practices.
- Secondly, the prevalent practices of contractual relationships, primarily only with first-tier suppliers, contributed to the multidimensional sustainability challenges. Suppliers beyond tier-one in this contractual relationship were consequently overlooked, resulting in a cascade of ignored sustainability challenges throughout the supply chain.
- The review's descriptive analysis also sets unique theoretical directions for scholars. Integrating social network theory's relational and structural embeddedness aspects in future research could provide distinctive perspectives. For example, in collectivistic societies, relational embeddedness often leads to structural embeddedness in businesses.

3.8.1 Setting the scene, future research directions in the crop agri-food sector

The comprehensive exercise of systematic review revealed several practical research gaps through empirical analysis (Khan et al., 2024). For instance, what research areas and countries need to be focused on exploring sensitive but neglected operational sustainability challenges in MTSCs that cause hindrances to sustainability compliance? Did any studies comprehensively highlight social, economic, environmental, and governance sustainability challenges for suppliers and buyers in a single study of MTSCs? Did any research focus on lower-tier suppliers and their institutional and cultural sustainability challenges in crop agri-food MTSC? How can various local actors act as intermediaries beyond first-tiers to alleviate operational sustainability challenges in MTSCs? Will further primary research be feasible, and will researchers have access to the locale?

The systematic review by Senyo and Osabutey (2023) outlined critical areas for future research, which include (1) integrating the social, environmental, and economic dimensions of sustainability in MTSCs; (2) considering non-supply chain members and external

stakeholders for sustainable development; (3) conducting rigorous empirical validation of sustainability assessment methods; and (4) focusing on perspectives from emerging and developing economies. Likewise, Kähkönen et al. (2023) advocated for further research into managing sustainability-related risks, particularly within supply chains where raw material suppliers and lower-tier actors, often located in developing countries, play pivotal roles. The study also stresses the need for data collection to include these suppliers.

Gruchmann (2022) emphasises the necessity for qualitative, empirical research, mainly through case studies, to better understand intermediaries' roles and relationships in fostering sustainable supply chains. Drawing from these studies, Martinen and Kähkönen (2022) also recommend focusing on lower-tier suppliers in MTSCs, acknowledging their often-overlooked contributions to supply chain resilience and efficiency. They propose extending sustainability compliance research to include multiple supply chain tiers for a more holistic understanding.

Considering these research gaps, this study is uniquely positioned to contribute a qualitative investigation into the crop agri-food sector in Pakistan, with a particular focus on lower-tier suppliers. It aims to integrate multiple research streams, offering a distinct perspective on sustainability compliance challenges. This approach promises to enrich theoretical and practical knowledge in MTSCs, particularly when supply chain operations are between developed and developing countries.

The analysis of this synthesis proposes the following research questions for further research through primary analysis.

- **RQ1.** *What sustainability challenges do lower-tier suppliers face, and what governance issues do intermediaries and buyers encounter when managing sustainability compliance in MTSCs?*
- **RQ2.** *What roles do different levels of intermediaries play for sustainability compliance in the MTSC of the crop agri-food sector?*
- **RQ3.** *What strategies have been used by the buying firms and different levels of intermediaries to address the sustainability challenges?*

The next chapter will focus on the research methodology employed to investigate the above-given research questions. This methodology chapter lays the foundation for the empirical research that follows.

Chapter 4

Research Methodology

Chapter 4 presents the research methodology employed to explore sustainability challenges and compliance strategies by the intermediaries and the buying firms within MTSCs. Firstly, this chapter introduces the research purpose, design, and grounded theory approach as primary methodological approaches. This chapter further elaborates on the unit of analysis and the data collection methods, including participant observation, focus group discussions, workshops, and semi-structured interviews. The methodology section details how data was collected and interpreted, addressing the challenges of reliability and methodological limitations. This chapter thoroughly outlines the research process, providing a roadmap for understanding the following empirical investigation.

4.1 Research purpose

This exploratory study investigates intermediaries' organisational performance drivers, distinguishing itself from explanatory studies that analyse causal relationships and descriptive studies that outline emerging phenomena (Bunge, 2004). The researcher opted for the exploratory research method because it is valuable for identifying key variables and creating relationships, leading to the foundation of theory construction (Christensen & Sundahl, 2001).

Unlike descriptive research, which aims to create an accurate image or profile of research (Lester, 2005), this study intends to explore the various variables in the sustainability compliance phenomenon in the MTSC of the rice industry in Pakistan. This research explores how these variables emerge within a research phenomenon. In the current study, the primary variables being investigated are sustainability challenges, how various variables emerge and shape dimensions of sustainability challenges, how these influence intermediaries' performance, and the impacts of intermediaries on each other's roles in delivering sustainability compliance in MTSC. As discussed in **Chapter 2**, existing literature has identified the critical role of intermediaries; however, the primary gap in the scholarly debate is that there needs to be more effort to understand their performance and how first-tier intermediaries shape the performance of other intermediaries in MTSCs.

4.2 Research paradigm

From a philosophical standpoint, research paradigms are shaped by distinct ontological, epistemological, and methodological assumptions, each offering a unique lens through which phenomena can be studied (Bryman & Bell, 2007). As discussed in **Chapter 2**, these paradigms significantly influence the direction and nature of the research process. This study

adopts the pragmatic paradigm, particularly well-suited to examining the complexities of managing sustainability compliance within MTSCs in the crop agri-food sector. Pragmatism is a dominant research paradigm that emphasises solving real-world problems through practical, contextually relevant inquiry (Bryman & Bell, 2007; Sodhi & Tang, 2012). This approach prioritises actionable, context-sensitive outcomes and is specifically designed to address stakeholders' immediate challenges in the supply chain (Brooks et al., 2017; Knoll & Jastram, 2019).

Pragmatism is inherently suited for studying sustainability compliance in MTSCs because it can bridge multiple perspectives and methodologies (Fayezi et al., 2012; Obayi et al., 2025). In MTSCs, intermediaries such as brokers, suppliers, and non-governmental organisations are crucial in navigating these complexities. Their role varies significantly across geographical and institutional settings, requiring a research framework accommodating subjective experiences and objective realities (Bryant, 2017; Luo, 2024; Strübing, 2019). Pragmatism allows researchers to explore how intermediaries facilitate compliance, negotiate power dynamics, and respond to sustainability challenges in dynamic and context-specific ways (Morgan, 2020). Unlike constructivism, which posits that knowledge is co-constructed through social interaction, pragmatism ensures a balance between theoretical inquiry and practical application, thus offering a flexible yet structured framework for this research (Bag et al., 2025; Yin, 2015).

While paradigms such as critical theory offer valuable perspectives on social change, power structures, and the role of intermediaries (Levers, 2013; Mukherjee & Roy, 2024), they are more appropriate for longitudinal and comparative studies. This exploratory research focuses on understanding sustainability practices within MTSCs in a specific, problem-solving context, making critical theory a less suitable primary paradigm. Similarly, interpretivism and phenomenology emphasise understanding subjective experiences, which align with certain aspects of this research—particularly in exploring stakeholders' lived experiences (Aguinaldo, 2004; Kemp, 2012). However, these paradigms are integrated within the overarching pragmatic framework in this research, acting as complementary tools rather than constituting the primary epistemological foundation.

Positivist and post-positivist approaches seek to establish deterministic causal effect relationships (Saunders et al., 2019), which is not the core focus of this research.

Sustainability compliance within MTSCs is influenced by fluid and context-dependent factors that do not lend themselves to rigid laws or generalisable theories. Instead, the research benefits from pragmatism's emphasis on actionable, contextually grounded knowledge. This approach enables the study to explore and generate new insights into the roles of

intermediaries and their responses to diverse sustainability challenges rather than merely establishing causal relationships (Bryant, 2017; Yin, 2015).

By adopting a pragmatic approach, this study addresses the immediate research problem and establishes a coherent and rigorous framework for exploring the role of intermediaries in sustainability governance. The findings are designed to be theoretically grounded while remaining relevant and actionable for practitioners and policymakers in this field.

Furthermore, opting for a pragmatic approach facilitates the development of a grounded theory that provides a robust roadmap for future research (Bryant, 2017; Morgan, 2020; Strübing, 2019). Given that sustainability compliance within agrifood MTSCs is deeply embedded in historical, social, and religious contexts, a pragmatic approach allows for identifying solutions that incorporate the roles of various social and cultural intermediaries. Unlike purely theoretical investigations, this research seeks to inform sustainable supply chain governance by addressing practical challenges through empirically derived solutions and establishing nuanced theories.

4.3 Research design

Research design is defined as the ‘overall strategy’ by which the researcher incorporates the different components of the study coherently and logically, thereby effectively addressing the research problem. **Figure 4.1** highlights the overall research strategy.

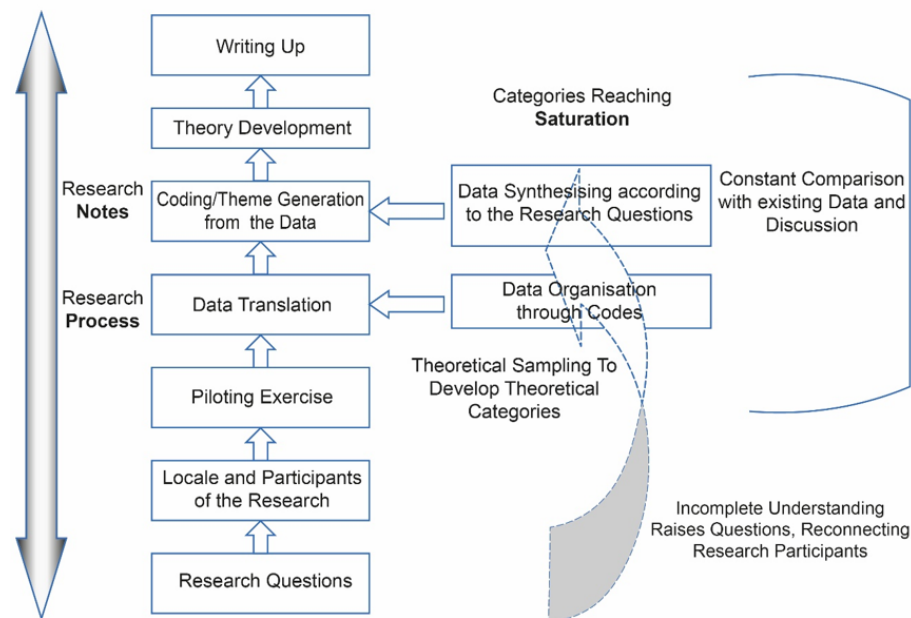


Figure 4. 1 Research Strategy.

A research strategy is the foundation for collecting, measuring, and analysing data (Creswell et al., 2017). Various research strategies could be considered for research. This research is based on a grounded theory approach, which does not employ preconceived theoretical frameworks during data collection (Yin, 2015). Instead, frameworks those are identified through a literature review are primarily applied when interpreting findings (Yin, 2015). The fundamental advantage of this design is its ability to generate novel substantive theories about a concept for which existing formal theories are limited (Creswell et al., 2017; Yin, 2015). As discussed in **Chapter 2**, the roles of intermediaries are well established, and most of the global supply chain operations are conducted through first-tier intermediaries. However, how the first-tier intermediary affects other stakeholders, particularly intermediaries beyond tier one, still needs to be explored. Addressing this gap requires developing relevant theoretical insights. Therefore, the grounded theory approach has been employed in this research.

As discussed earlier, an alternative to grounded theory is the traditional hypothesis-driven approach, which begins by establishing a theoretical framework to guide data collection (Bryman & Bell, 2007). This method validates or challenges existing theories (Yin, 2015). However, it is unsuitable for the current research due to the lack of comprehensive theoretical frameworks (**Chapter 2**). This study aims to develop new substantive theories to elucidate the drivers of intermediary performance and their relationship with buying firms in MTSCs. It also examines sustainability challenges through the grounded theory lens.

4.4 Grounded Theory

Grounded theory is a methodological framework that systematically integrates data collection and analysis to develop conceptual understandings of specific phenomena through an inductive process (Charmaz, 2008). It is particularly useful where existing theories are insufficient, inappropriate, or limited (Charmaz, 2008). Unlike formal theories, which are often deductively derived, grounded theory emerges directly from data, providing context-specific insights that remain inherently interpretive (Pidgeon & Henwood, 2004). While grounded theory can inform the refinement of formal theories, its strength lies in its capacity to construct meaning from lived experiences rather than establish universal explanatory models (Charmaz, 2008; Morgan, 2022).

This inductive approach centres on discovering theories from empirical data and is commonly applied in qualitative research. However, it is not restricted to qualitative methods and can also be integrated into quantitative or mixed-methods research, particularly in the social and behavioural sciences (Glaser & Strauss, 2017). Grounded theory research typically begins with a research question, drawing data from diverse sources such as observations, interviews, documents, or other relevant materials (Bryman & Bell, 2007). Data

coding follows systematic guidelines, as detailed in standard qualitative research practices (Corbin & Strauss, 2014).

Key Features Distinguishing Grounded Theory:

- Establishing iterative data collection and analysis processes (Corbin & Strauss, 2014).
- Continuous comparative analysis of data throughout the research (Yin, 2015).
- Developing analytical categories directly from data rather than predefined frameworks (Corbin & Strauss, 2014).
- Employing theoretical sampling aimed at theory development rather than representativeness (Robinson, 2014).

The Role of pragmatism in grounded theory development

A pragmatic approach enhances grounded theory by prioritising real-world applicability, flexibility, and responsiveness to empirical data (Bryant & Charmaz, 2010; Bryant, 2017). Pragmatism does not adhere to rigid ontological or epistemological positions; rather, it adopts a problem-centred and action-oriented perspective (Morgan, 2020). These complements grounded theory, which emphasises emergence, iteration, and the co-construction of meaning between researcher and participants (Charmaz, 2006; Strübing, 2019).

Keyways in which pragmatism strengthens grounded theory include:

- Flexibility in methodological choices: Pragmatism allows researchers to integrate multiple data sources and analytical techniques, ensuring that the emerging theory is shaped by practical utility rather than rigid methodological constraints (Bricks & Mills, 2015).
- Theoretical sensitivity and adaptability: By prioritising the usefulness of concepts, pragmatism ensures that categories and themes reflect empirical realities rather than abstract theoretical commitments (Joas, 1993; Talisse & Aikin, 2008).
- Iterative and problem-solving orientation: Pragmatism aligns with grounded theory's emphasis on constant comparison and data-driven refinements, making the research process dynamic rather than linear (Corbin & Strauss, 2014).
- Philosophical foundation: Since grounded theory can incorporate mixed methods, pragmatism provides a philosophical foundation for integrating qualitative insights with pragmatic validation, enhancing the robustness of emerging theories (Oktay, 2012; Schreiber & Stern, 2001).

Thus, the pragmatic approach in this research ensures that grounded theory remains responsive, practical, and contextually relevant, fostering theories that are not just abstractly meaningful but empirically grounded and applicable.

4.4.1 Application of Grounded Theory

This study recognises the critical role of researcher reflexivity in the grounded theory process. Reflexivity ensures that data analysis remains iterative, allowing emerging patterns and concepts to guide further inquiry rather than imposing preconceived notions (Yin, 2015). The points outlined below reflect the evolving analytical lens employed by the researcher to interpret existing data and determine the need for further exploration (Bennardo & De Munck, 2014):

- What variables are forcing sustainability challenges in MTSCs?
- What works when intermediaries seek to manage sustainability compliance in their MTSCs?
- What does not work when intermediaries seek to manage sustainability compliance?
- How do international buying firms and exporters believe the intermediary may improve sustainability compliance?

These points illustrate how the researcher interpreted qualitative data blocks collected during the study. Themes were identified by clustering ideas about what is effective, ineffective, or otherwise significant. In qualitative research, explicitly articulating the researcher's thought process is emphasised in the literature as a critical factor for ensuring the reliability of the research process (Ritchie et al., 2003).

This study diverges from the prescriptive approach of Glaser and Strauss, which advocates for developing and testing hypotheses regarding the researcher's mental frameworks (Glaser & Strauss, 2017). Such a rigid approach is seen as contrary to the foundational principles of grounded theory (Birks & Mills, 2015). Instead, this research aligns with the framework that Birks and Mills (2015) proposed, emphasising the researcher's creative freedom in employing mental frameworks during grounded theory analysis. This flexibility is integral to the concept of theoretical coding (Charmaz, 2008). The mental framework described above is an example of theoretical coding applied during the analytical phase of this study.

4.4.2 Limitations

Grounded theory is often viewed as a purely inductive approach, meaning that theories emerge entirely from the data without any pre-existing ideas or frameworks. However, this idea can be problematic because the researcher still plays a key role in interpreting the data and deciding what to focus on. As Boyatzis (1998) argues, even if categories seem to be 'discovered' from the data, they will inevitably be shaped by what the researcher is looking for.

To address this limitation, this study balanced the grounded theory's flexible, inductive nature by acknowledging the mental framework of the research team (4 members) and key informants rather than solely relying on the researcher's mental framework. This approach helps make the research process more transparent and ensures that findings are adequately

contextualised (Boyatzis, 1998). If researchers rely solely on their mental framework, contextual findings can be misinterpreted (Bennardo & De Munck, 2014). Instead of selectively choosing pieces of data that fit specific ideas, every line of the data was carefully discussed and coded, reflecting the full depth of the data (Hennink et al., 2020).

4.5 The case study approach

This research adopted a case study approach. Moving beyond the conventional approach of the case study method by exploring the 'how' and 'why' fundamentals of the research approach, this case research also attempts to investigate the research phenomenon in the unique boundaries of the research. For instance, 'the researcher cannot manipulate people's behaviours within the studied research setting,' and the boundaries between the research phenomenon and its context are indistinct yet significant for various societal groups (Yin, 2015).

In the present study, these criteria are met. First, the research questions focus on 'why' and 'how', which align with the traditional requirements of case study methodology. Second, the respondents operate independently, beyond the researcher's direct influence. Finally, the relationship between the context of one intermediary and another's role in sustainability compliance remains ambiguous, a topic of considerable relevance in the literature on MTSCs. Therefore, this study fulfils the three core conditions for employing a case study approach.

4.5.1 Case sampling

The case sampling approach in this study followed the principles of theoretical sampling associated with grounded theory research (Robinson, 2014). This method prioritises selecting cases that meet essential research criteria, such as alignment with the conceptual framework, providing rich and detailed insights, analytical generalisability, credible explanations, ethical considerations, and practical feasibility (Robinson, 2014). Yin (2015) also highlights the importance of similarities and/or differences between cases. This research considered the following criteria for the selection of the unit of analysis for the research:

- Accessibility of the locale of the research.
- Data richness.
- Stakeholders understanding and sensitivity of businesses towards sustainability in their MTSCs (Billah et al., 2023),
- Stakeholders' requirements for sustainability compliance in supply chain management practices for sustainable development (Grimm et al., 2016) and
- managing MTSCs that include lower-tier suppliers highly relevant to the businesses and recognising them as a primary asset (Oyedijo et al., 2024).

The most essential thing in these criteria is accessibility. Accessibility refers to the researcher's approach to the study's locale and ability to directly engage with the target respondents (Ashby et al., 2000). Accessibility is crucial because organisations might be unwilling to share data with researchers without existing relationships. The second key criterion, data richness, is vital, as organisations or industries may differ significantly in the depth and quality of their experiences and expertise.

4.5.2 Unit of analysis and data collection

This study focused exclusively on suppliers in Pakistan engaged in exporting high-quality agricultural products to developed countries, particularly in North America and Europe. This selection aimed to establish a direct link between MTSCs operating across developed and developing economies. For this purpose, firms from key export sectors, including rice, oranges, mangoes, dates, and pulses, were contacted based on their international trade engagements.

Firms were contacted through formal industry networks, trade associations, and direct corporate outreach to recruit participants. Due to the sensitive nature of the research, data confidentiality and potential business implications, most companies declined to participate. Ultimately, two firms agreed to participate in the study; however, APCL provided full access, motivated by its strategic interest in academic collaboration, professional development, and sustainable farming initiatives.

APCL is Pakistan's first accredited warehouse and has also been declared 'best basmati rice processor and warehouse operator' by the 'Executive Committee of the Chamber of Commerce and Industry' of Pakistan. These distinctions also positioned APCL as convincing for research, emphasising its significant role in the sustainable development of Pakistan through agriculture, a contribution that other companies in Pakistan may not easily match. APCL is a leading processor in sustainable rice farming in Pakistan that acts as a major supplier and first-tier intermediary in the international rice business. The company has a well-established supply chain network with international buying firms throughout the globe, mainly in Asia, including the Middle East, Europe, and North America. APCL was established by the National Rural Support Program (NRSP), the largest program in Pakistan's development sector, on October 31, 2016, sensing the importance of a sustainable supply chain in modern business by integrating small farmers within vertical value chains. It originated from NRSP's 'Back-to-Back' value chain model, providing smallholding farmers with inputs like Farm Credit, Certified Seed, Fertiliser, and Advisory Services to increase farm yields. NRSP runs different social and environmental sustainability projects, mainly with the cooperation of the World Bank, World Health Organization, Asian Development Bank and other international organisations.

4.5.2.1 Empirical setting

The rice industry is vital to Pakistan's economy, contributing significantly to agricultural production, exports, and employment opportunities (Zuberi et al., 2024). However, like many industries, it faces challenges related to sustainability, including environmental impact, social responsibility, and economic viability (Tasneem & Khan, 2024). Ongoing war, terror, and socio-political unrest have significantly damaged the economy of Pakistan (Hassan et al., 2021). Major buying firms have shifted due to such situations and operating their businesses through intermediaries (Ghani et al., 2023; Qasim, 2023). As critical actors within the supply chain, Intermediaries are the potential source of facilitating and promoting sustainability practices in Pakistan's rice industry.

APCL NRSP conducts 'sustainable lower-tier management' programs to a greater extent than its industry peers. In this study, APCL provided diverse examples of lower-tier supplier management outcomes (success and failure) from the industry over the years. This helped identify challenges and success factors in managing lower-tier suppliers, allowing for a stable case study and robust analysis of their complex supply chain in this research. The theoretical sampling technique was used to foster the external validity of the research findings (Yin, 2005). Following a theoretical sampling logic (Qureshi, 2018), four aspects of APCL highlighted the substantial potential for investigating the phenomenon discussed in the research objectives. Primarily, given its vast experience in the industry, APCL NRSP is considered a pioneer due to its various initiatives in managing socio-economic sustainability in the rural sectors of Pakistan. Second, when implementing its sustainability practices, APCL NRSP has initiated a 'radical transformation' of its rice supply chain, engaging lower tiers in collectively creating socio-ecological knowledge. Thirdly, the company's operations intensely penetrate local communities, indicating a significant role in community ties and suggesting a form of social-ecological and economic embeddedness. Lastly, the company has a well-established supply chain network with international connections in Asia, Europe, and North America.

4.5.2.2 The agri-food sector in Pakistan

Pakistan's agriculture sector accounts for approximately 23% of its GDP and employs 37.4% of its labour force. Nearly 70% of the country's exports are directly or indirectly linked to agriculture. An agricultural land area of 30.5 million hectares represents about 47% of the national territory, surpassing the global average of 38% (FAO, 2023). According to the Ministry of Finance (2023), Pakistan is the world's 10th largest rice producer, producing diverse varieties. Its exports comprise more than 8% of the world's rice trade. The country is especially recognised for its premium Basmati rice, which is in high demand internationally and is primarily grown in the Punjab region. In 2023, Pakistan exported \$2.95B in rice. Pakistan's agricultural policies include improving infrastructure, enhancing research and development, and providing farmers better credit access (Tasneem & Khan, 2024).

However, the policy mechanism varies for smallholders and big landlords (Zuberi et al., 2024). Most big landowners are actively involved in politics, national policy making, and legislation, hindering access to or resisting implementing reforms for basic livelihood necessities, mainly education, in their constituent areas (Anser et al., 2023). This deliberate hindrance has kept farming communities unaware of their rights for decades, leading to continuous dependence on landowners and impeding sustainable agricultural development (Zuberi et al., 2024).

Due to these circumstances, Pakistan's agricultural sector faces many challenges. These include dependence on traditional farming practices, high power distance between large and smallholding farmers, monopoly of the brokers that act as cartels, and socio-political situations. Limited access to vital agricultural inputs and the precarious financial situation of lower-tier farmers are other challenges which significantly impede the sector's efficiency and productivity towards sustainable development (Ministry of Finance, Economic Survey of Pakistan 2022-23). The weak as well as more informal supply chain and governance structures significantly disadvantage Basmati rice farmers and often lead to their exploitation (Abubakar et al., 2023; Hassan et al., 2021). Small-scale farmers rely on local brokers and wholesalers for input financing because they are the only available options for them, who then purchase export-quality produce at local rates. Farmers are compelled to sell at these rates to repay loans and high interest rates for seeds, pesticides and fertilisers (Ghani et al., 2023). Given that most Pakistani rice farmers operate on small-scale farms (less than 10 hectares), they serve as the sole source of income for their families. Enhancing farmers' profitability and creating an equitable business framework would significantly influence the overall economy, social well-being, and sustainable development. This research aims to outline a strategic roadmap for sustainable development in Pakistan. The religious and cultural sensitivities and power distances inherent in Pakistani society have significantly hindered comprehensive primary research on marginalised segments, such as farmers and lower-tier communities. These barriers have prevented the identification of potential operational challenges for sustainable development in Pakistan, leading to a substantial gap in the existing literature on the subject.

The single case methodology allowed the research team to conduct a thorough analysis, revealing nuanced relationships and patterns in Pakistan's crop agri-food sector that could have been overlooked in broader-scale studies or comparative analyses (Mills et al., 2009). The single case method also offered a detailed understanding of Pakistan's sensitive socio-economic and cultural landscape of agricultural practices. Also, it provided an opportunity to investigate the religious complexities of these issues within their unique context.

4.6 Primary data collection method

The choice of data collection methodologies was the most critical segment of this research. Primary research that deals with fields requiring the examination of socio-economic, cultural, and agricultural practices in collectivistic societies is not only essential but also challenging. This research was more challenging due to the religious and social sensitivities and the tribal structure of the Pakistani diaspora. The chosen methodologies were carefully employed to gain accurate and relevant data without influence. The following section provides a comprehensive overview of various primary data-collection methodologies for the study and the objectives of these methodologies in this research. Primary data was collected in 2 consecutive years, 2023-2024. The methodologies and their objectives are highlighted in **Table 4.**

Table 4. 1 Summary of the research methodology.

Data Collection Methods	Number of Interviews/Details of Respondents	Objectives and Findings
Participant Observation/ Field Visits	Exploring Agricultural Practices: Ethnographic immersion with farming communities	To observe the socio-cultural family structure of the producers. This method, rooted in ethnographic research (Geertz, 1973; Spradley, 1980), facilitated an in-depth understanding of how agricultural practices are implemented and how local landlords perceive sustainability compliance and challenges (Schatzki, 2002; Bourdieu, 2020).
Focus Group Discussions (Formal)	4 discussions with lower-tier farmers (5-7 farmers, 3-4 hours long) 3 discussions with progressive farmers (3-4 progressive farmers, 2-3 hours long) Total: 07	To explore farmers' perspectives on socio-economic, cultural, and religious challenges in farming and livelihoods. Focus groups, following the methodological frameworks of Krueger & Casey (2014) and Morgan (1997), revealed how progressive farmers influence lower-tier farmers in transitioning to sustainable supply chains and modifying traditional farming practices (Pretty, 2008).
Workshops and Seminars	Total: 05	To examine training programs on sustainability compliance. These workshops, in line with participatory research approaches (Chambers, 1994), enabled an assessment of monitoring, transparency, and training practices in sustainability. Additionally, they provided access to representatives from buying firms, facilitating engagement with corporate sustainability strategies (Lee et al., 2012).
Semi-structured Interviews	District Development Officer (1), Social Mobilisers (3) (Tier-4 Intermediaries) Monitoring and Evaluation Officers (2), Microfinance Officers (2) (Tier-3 Intermediaries) Progressive Farmers (4) (Tier-2 Intermediaries) General Manager, Chief Executive, and Company Engineer (Twice each), Supply Chain Officials (Export Manager, Supply Chain Lead, Supply Chain Financial Analyst) (1 Each) (Tier-1 Intermediaries) Total: 19	To analyse sustainability challenges faced by local farmers, lower-tier intermediaries, and stakeholders. Semi-structured interviews, guided by Bryman and Bell (2007), revealed multi-tiered perspectives on sustainability challenges and the management strategies employed by APCL to address them. Additionally, the roles of intermediaries, including social mobilisers, progressive farmers, and microfinance institutions, were explored (Swinnen, 2015).
Semi-structured Interviews	Buying firms and exporters (5) Total: 05	To evaluate management strategies employed by buying firms to mitigate sustainability challenges and their

		effectiveness. This method, supported by the global value chain (GVC) framework (Gereffi et al., 2005), offered insights into firms' approaches to supplier engagement in sustainability, alignment with intermediaries, and mechanisms ensuring product traceability (Lee et al., 2012).
Semi-structured Interviews	Wholesalers (3), Regional Head of NGO, Member of Chambers of Commerce (1 each) Total: 04	To understand cultural metrology, credit practices, and the evolution of input standards (e.g., seeds, fertilisers). Engagement with third-party stakeholders provided an extended perspective on supply chain transparency (Barrientos et al., 2011) and their perceptions of sustainable farming initiatives by APCL and NRSP in Punjab, Pakistan (Raynolds, 2004).

4.6.1 Participant observation/field visits

In qualitative research, participant observation and field visits involve the researcher immersing themselves in the respondent's daily lives to understand their behaviours, practices, and social interactions from an insider's perspective (Atkinson & Hammersley, 1998). This research utilised the participant observation technique over three weeks of ethnographic immersion with farming communities in 2023 and 6 weeks in 2024. The researcher lived among the farmers, participating in their daily routines, observing their agricultural practices, and engaging in informal conversations to gather data on how the socio-cultural family structures within these communities influenced these practices. This methodology was critical for several reasons in the research context. Firstly, it allowed for data collection in a natural setting, providing insights into the real-world application of agricultural practices and the socio-cultural dynamics that underlie them (Yin, 2015). Unlike structured methods such as surveys, participant observation enabled the researcher to witness firsthand the intricacies of how these practices were performed and shaped by local norms, values, and hierarchies (Allen, 2010). For instance, observing the interaction between landlords and tenant farmers provided a deeper understanding of the power dynamics and economic dependencies affecting sustainability compliance decision-making processes.

The researcher observed and understood the role of family structures in decision-making processes, the influence of traditional practices on modern farming techniques, and the landlords' perceptions of sustainability. These observations revealed that many sustainability challenges were not merely technical or economic but deeply rooted in the community's cultural and social frameworks. For example, resistance to adopting sustainable practices

often stemmed from a fear of disrupting established social norms or a lack of trust in new methods promoted by external agents.

Participant observation also facilitated identifying key challenges landlords and farmers face in complying with sustainability standards. The immersive nature of this methodology enabled the researcher to capture the nuances of these challenges, which might have been overlooked in more structured research methods. However, the effectiveness of participant observation is highly dependent on the researcher's ability to blend into the community and build trust with the participants (Puri, 2010). To overcome these challenges, the researcher also shared his life stories, how British society deals with him, their kinship and education system and how their agricultural practices are alike. The researcher's prolonged engagement with the community allowed for the development of friendly relationships and facilitated more open and honest communication. This was critical in ensuring the validity and reliability of the data collected, as participants were more likely to share their true thoughts and experiences in a trusted environment.

4.6.2 Focus group discussions (Formal)

Focus group discussions (FGDs) are a widely used qualitative research method that facilitates in-depth exploration of participants' perspectives on specific issues under the guidance of a moderator (Bryman & Bell, 2007; Morgan, 1996; Sussman et al., 1991). In this study, FGDs were conducted with two distinct groups: lower-tier farmers and progressive farmers. Lower-tier farmers were smallholders with less than ten acres of land. In contrast, progressive farmers were large-scale landowners who had adopted advanced farming techniques and demonstrated a stronger inclination toward sustainable practices.

The discussions aimed to examine both groups' perspectives on socio-economic, cultural, and religious challenges in farming and livelihoods and the role of peer influence in adopting sustainable practices. Given the hierarchical social structures and economic disparities in rural agricultural communities, power dynamics could have influenced data collection, potentially limiting the ability of lower-tier farmers to express dissenting views. To address this, the study incorporated culturally respected key informants to facilitate discussions.

These key informants helped ensure an environment where participants, particularly smallholder farmers, felt comfortable sharing their insights without intimidation (Chambers, 1997; Pretty, 1995).

Furthermore, FGDs were conducted separately for each group to prevent dominant voices from overshadowing discussions. The moderator employed neutral facilitation techniques, participatory discussion, and open-ended questioning to encourage diverse perspectives (Krueger & Casey, 2015). These methodological considerations enhanced data reliability and mitigated different perspectives stemming from social hierarchies, allowing for a more balanced representation of perspectives across different farming groups.

The FGDs were carefully structured to ensure a diverse range of views and experiences were captured. Four discussions were conducted with lower-tier farmers, each involving 5-7 participants and lasting between 3 to 4 hours. These discussions were designed to delve into the challenges these farmers face in their day-to-day operations, particularly their socioeconomic status, cultural practices, and religious beliefs. The choice of participants was strategic, ensuring a representation of different age groups and levels of farming experience. This diversity was crucial in capturing the varied experiences and challenges faced by lower-tier farmers.

In parallel, three discussions were conducted with progressive farmers, each involving 3-4 participants lasting 2-3 hours. The discussions with this group aimed to understand their motivations for adopting sustainable practices, the challenges they encountered, and their role in influencing their peers. The contrast between the discussions with lower-tier farmers and progressive farmers provided significant insights into the socio-economic and cultural barriers within the farming community and the potential for progressive farmers to act as change agents.

The group dynamics inherent in focus group discussions were particularly beneficial in this research. It allowed participants to build on each other's comments, leading to a more comprehensive exploration of the issues. For instance, one farmer's mention of a particular challenge often prompted others to share similar experiences, leading to a richer and more detailed understanding of the common challenges faced by the group. Similarly, if some respondents' views differed, the researcher could probe and dig deeper into the subject matter. The interactive nature of FGDs fostered an environment where participants felt more comfortable sharing their thoughts, knowing they were among peers who shared similar experiences. The researcher also kept in mind that the locale of the study was highly collectivistic and that FGD would provide essential findings.

Despite their strengths, focus group discussions also posed some challenges. Managing group dynamics was critical to ensuring that all participants had the opportunity to contribute and that dominant voices did not overshadow the views of others. The key informants played a very dynamic role as moderators, requiring a balance between guiding the discussion and allowing for free-flowing conversation.

4.6.3 Workshops and seminars

Participatory research methods, such as workshops and seminars, facilitate participants' learning, discussion, and collaboration (Ayers, 1989; Storvang et al., 2018). In this study, the researcher participated in a series of workshops and seminars conducted by the target company, involving various stakeholders, including farmers, researcher, and representatives from buying firms. The primary objective of these sessions was to investigate the programs and initiatives aimed at helping farmers understand and comply with sustainability standards.

Additionally, these sessions provided a platform for discussing issues related to monitoring, transparency, and training for the sustainability compliance in MTSCs of APCL NRSP sustainable development practices. Workshops and seminars provided a structured environment for discussing the challenges and opportunities associated with sustainability compliance and identifying practical solutions that farmers and other stakeholders could implement in the supply chain. These sessions also underscored the importance of continuous learning and adaptation in pursuing sustainable agricultural practices. The workshops were structured to include presentations, group discussions, and interactive sessions where participants could share their experiences and challenges. Each workshop focused on different aspects of sustainability compliance, ranging from the technical requirements for sustainability compliance in farming practices to the social and economic implications of adopting such practices. Conversely, the seminars were more formal and included expert speakers who provided insights into the latest developments in sustainable agriculture and supply chain management.

One of the critical strengths of workshops and seminars is their ability to bring together diverse groups of stakeholders in a collaborative setting (Storvang et al., 2018). In these sessions, participants were able to discuss the challenges they faced in understanding and implementing sustainability practices, and these discussions highlighted the need for more tailored training programs that address the specific needs of different types of farmers. For instance, lower-tier farmers often require more basic training focusing on the fundamental principles of sustainability. In contrast, progressive farmers might benefit from more advanced training that delves into the technical aspects of sustainable farming techniques. Another critical aspect of these workshops was the opportunity for the researcher to collaborate directly with buying firm representatives. This collaboration provided insights into how these firms monitor and evaluate sustainability compliance within their MTSCs. It also highlighted the importance of transparency and accountability in the supply chain, as buying firms increasingly demand proof of sustainability from their suppliers.

4.6.4 Semi-structured interviews

Semi-structured interviews combine the flexibility of open-ended questions with the focus of a structured interview guide (McGrath et al., 2019; Mueller, 2019; Oltmann, 2016; Potter & Hepburn, 2005). This research conducted semi-structured interviews with various stakeholders, including district development officers, social mobilisers, monitoring and evaluation officers, microfinance officers, supply chain officials of APCL NRSP, progressive farmers and representatives from buying firms and NGOs. The objective was to explore the sustainability challenges faced by different tiers of stakeholders and to understand the management strategies employed to address these challenges.

The semi-structured nature of these interviews allowed the researcher to explore specific topics in depth while also being responsive to the conversation's direction and variables that emerged from FGDs. This flexibility was crucial in uncovering detailed insights into each group of stakeholders' unique challenges. For instance, interviews with district development officers and social mobilisers revealed the difficulties in promoting sustainability practices among farmers, including cultural resistance, lack of resources, and inadequate training. These interviews provided a ground-level perspective on the barriers to sustainability, highlighting the need for more localised and culturally sensitive approaches to training and support.

Interviews with supply chain officials and representatives from buying firms provided insights into the strategies firms employ to monitor and enforce sustainability standards, including using technology for product traceability, implementing supplier audits, and developing incentive programs for compliant suppliers. The interviews also highlighted the challenges these firms face, such as the complexity of managing MTSCs, the variability in sustainability practices among suppliers, and the need for greater collaboration and transparency between different supply chain tiers. This method also provided an opportunity to explore the effectiveness of existing management strategies in promoting sustainability. For example, interviews with microfinance officers revealed the critical role of financial support in enabling farmers to adopt sustainable practices.

The interviews also uncovered significant challenges in achieving this alignment across the supply chain. For example, while buying firms often set high standards for sustainability, the ability of grassroots farmers to meet these standards was frequently hampered by limited access to resources, lack of knowledge, and cultural resistance. This disconnect between the expectations of buyers and the suppliers was a recurring theme in the interviews for the buying firms, highlighting the need for more integrated and supportive approaches to sustainability. This theme shaped the research in a focused way through which the researcher could establish the coherence among the roles of various intermediaries in MTSCs.

4.6.5 Formulation of questionnaire/interview protocols

The development of research protocols was grounded in the study's comprehensive systematic review of existing questionnaires and interview guides across the literature. By thoroughly analysing these resources to understand how they addressed topics related to MTSCs, using them as foundational examples for the research. The researcher formulated initial protocols from these examples, explicitly designed to align with his research objectives, focusing on sustainability in Pakistan's rice industry.

- **Pilot testing, Key informant feedback, and adaptation**

The initial protocols were first tested during a pilot study. This phase proved essential in assessing its effectiveness within the local context. During this pilot phase, key informants, including local experts, intermediaries, and APCL officials, provided critical insights. Their feedback helped the researcher identify areas where the questions needed refinement to ensure clarity and cultural relevance. For example, they emphasised the importance of phrasing questions more indirectly when addressing sensitive topics, such as religion and cultural practices.

The feedback from key informants and the pilot study report highlighted the need for more nuanced questions regarding farmers' perceptions of sustainability and supply chain transparency. These insights allowed the researcher to modify his protocols to better capture stakeholders' lived experiences without compromising the inquiry's depth.

- **Contextual adaptation and probing techniques**

Given the socio-cultural complexity of the research locale, direct questioning was often ineffective or inappropriate. For example, when engaging with religious leaders, we found that asking directly about the role of Islam in business practices was too sensitive. Based on feedback from the key informants, the researcher shifted to a probing technique. For instance, instead of posing direct questions, he asked them to compare the role of different religions in business. This indirect approach encouraged more open, reflective responses, helping us navigate delicate topics without causing discomfort.

The use of probing techniques proved invaluable across multiple stakeholder interactions. By allowing respondents to elaborate naturally, the researcher uncovered deeper insights into the interplay of religion, culture, and economic practices within the multi-tier agri-food supply chain.

- **Theoretical foundations for protocol development**

The development and continual refinement of the research interview protocol is grounded in established qualitative research theories:

1. Systematic reviews and evidence-based design: Drawing from a systematic review of existing literature, the researcher adhered to an evidence-based approach to form relevant, contextually relevant questions (Tranfield et al., 2003). This review ensured that the initial questions were grounded in the existing body of knowledge.
2. Pilot testing and iterative refinement: Research process of testing and refining the protocol follows grounded theory (Glaser & Strauss, 1967), which supports iterative adjustments based on emerging data patterns and stakeholder feedback.
3. Key informant feedback: Integrating feedback from key informants and stakeholders such as APCL aligns with participatory research methodologies, which emphasise the inclusion of local actors in shaping research tools (Bergold & Thomas, 2012).

4. Cultural sensitivity and probing techniques: The use of probing techniques, influenced by the sensitive nature of religious and socio-cultural dynamics, follow guidelines for contextual sensitivity (Hennink et al., 2020) and indirect questioning (Rubin & Rubin, 2012).

4.7 Data interpretation

Qualitative research in the social sciences can be analysed or interpreted using various methods, which can be characterised along different dimensions. One key distinction lies in the relationship between data and theory—inductive versus deductive (Christensen & Sundahl, 2001; Flick, 2013). Inductive methods build theory directly from primary data, whereas deductive methods rely on existing theory to interpret empirical findings (Charmaz, 2008).

For this study, the analysis of primary data followed an inductive approach. This choice reflects the study's aim to investigate a construct with minimal prior theoretical conceptualisation. As no established theoretical categories existed to contextualise the empirical data, a deductive approach was deemed unsuitable (Lester, 2005). Instead, the inductive method aligns with the study's objective of contributing to theoretical development regarding the different roles of intermediaries (Flick, 2013).

The study employed thematic analysis, focusing mainly on the constant comparison method and interpretive processes. This facilitated the identification of patterns and key themes from the data corpus. To ensure reliability, measures such as repeated coding for consistency, triangulation, member-checking, and saturation were applied (Thornberg, 2017). These measures and their role in maintaining consistency are detailed in the next chapter.

There are different methods for building grounded theory. This research adopted the following four essential steps outlined by Charmaz (2008):

1. Coding raw data with memos: The data coding process involved line-by-line analysis of interview transcripts, field notes, and other relevant sources. During this phase, open coding was used to generate initial codes, while memo writing allowed for reflective notes on emerging patterns, interpretations, and ideas (Charmaz, 2008). These memos were an important tool for refining the codes and fostering deeper insights throughout the coding process.
2. Grouping codes through constant comparisons: After generating initial codes, these were systematically compared to identify similarities and differences. Constant comparison facilitated the identification of more abstract categories that reflected broader concepts and patterns within the data, enabling the researcher to synthesise findings iteratively. This process was fundamental for shaping the preliminary categories into more coherent, focused themes.

3. Identifying themes common within data groups: As the codes were refined and grouped into higher-order categories, these were further examined for recurring themes across the dataset. Pattern recognition was used to identify significant themes related to the research questions, ensuring that these themes reflected both the empirical data and the theoretical framework guiding the study (Charmaz, 2008).

4. Collecting additional data to fill gaps or address new insights: Based on the themes identified, the research sought to address emerging gaps through further data collection. This process was driven by the goal of saturation, ensuring that themes were fully developed and supported by ample data and that any new insights were captured through theoretical sampling (Charmaz, 2008). This iterative process ensured a comprehensive understanding of the study's focus while allowing the flexibility for new themes to emerge.

These foundational elements of grounded theory were integrated into the study's analytical framework. **Chapters 5 and 6**, which cover data collection and findings, elaborate on the practical application of these steps. Data analysis was conducted separately for each research objective. However, as indicated in step four, further rounds of data collection involved expanding interview questions, focus group discussions, and observational field notes to capture emerging ideas. This iterative approach helped address challenges not previously identified in the evidence synthesis or the study's research objectives. For instance, the triple bottom line and ESG models were integrated concurrently to investigate the first research objective for how experts interpret various sustainability challenges. The researcher expanded on these challenges to see how they facilitate the slavery phenomenon, which has received less attention from scholars due to its invisible and ignored nature.

At this point, the data interpretation phase constantly highlights a distinct research phenomenon, which was inducing slavery issues in the Pakistani context. The researcher conducted multiple sessions to understand the new research puzzles in the data interpretation. To properly understand the new variable at this point of the research phase, the researcher initially conducted a secondary data analysis to comprehend the nature of modern slavery within contemporary supply chains, and the results are in Chapter 6, highlighted in **Table 6.7**. However, there were sensitivities and ambiguities in verifying these variables, so the researcher decided to revisit the research locale.

- **Second round of field Visit**

To investigate these new variables that were not covered in the researcher's objectives, the second round of field visits in 2024 focused on how these challenges facilitate the slavery phenomenon.

By comprehending the nature of the challenges of modern slavery, the researcher conducted a second round of field visits. The primary objective of this visit was to deepen the

understanding of the socio-cultural and religious factors that sustain the phenomenon of slavery. During these visits, the researcher discussed the themes that had emerged from the initial fieldwork with various farming communities and groups.

This analytical stage involved performing a narrative analysis from February to April 2024.

Themes were extensively discussed with the heads of farming communities and other participants in the research, ensuring that the findings were accurately captured and conveyed. By focusing on narrative analysis, the researcher was able to explore not only the context surrounding the identified themes but also how individuals construct their stories.

This approach allowed for a nuanced examination of the cultural and religious influences and the Broader societal and historical contexts that shape these narratives.

Additionally, narrative analysis enabled us to explore temporal dynamics, such as shifts in farmers' perspectives across three generations. The integration of narrative and thematic analysis significantly contributed to the study's theoretical development. It provided deeper insights into the mechanisms, processes, and dynamics underlying the thematic patterns observed in the data (Crobin & Strauss, 2014).

During this field visit, the researcher conducted various group discussions and informal interviews with the same communities' respondents to keep the uniformity of the themes the researcher interacted with during 2023². Additionally, the researcher engaged with religious scholars to gain insights into Islamic teachings on workers' rights, particularly about exploitation. This decision was driven by the understanding that religious and cultural frameworks significantly shape societal attitudes towards labour practices, including those related to exploitation and what could be considered forms of modern slavery. The religious scholars were selected based on their prominence and recognised influence within the local community, ensuring their perspectives represent widely accepted interpretations of Islamic teachings. With the support of key informants, these scholars were chosen from reputable mosques and Islamic institutions with established records of scholarly authority in the region. Their inclusion in the research was critical, as it provided an understanding of the cultural and religious underpinnings of the issue. However, care was taken to select scholars whose interpretations aligned with mainstream Islamic thought to ensure their insights would reflect the broader community's understanding and not individual or fringe interpretations.

The decision to include religious leaders' perspectives came after the first round of field observations, where initial findings suggested that cultural and religious factors played a significant role in shaping attitudes towards labour exploitation. This sequencing was intentional: the researcher first sought to gather data from farmers and supply chain representatives, which illuminated the need for a more culturally informed perspective. The

² Due to ethical measures, the details of additional respondents are not mentioned.

insights from the religious scholars were then used to deepen the analysis and provide context to these practices within the framework of societal beliefs and values.

The incorporation of religious perspectives significantly influenced the research approach by broadening the lens through which the phenomenon of exploitation and slavery was understood. This helped to enrich the research by providing a nuanced understanding of the phenomenon from a holistic societal perspective, addressing not just the economic or legal aspects but also the deep rooted cultural and religious dimensions.

“Our targeted company fully supported us for this research phase and managed all the confirmatory and additional data collection processes with a written ethical binding. As ethical considerations bind us, the researcher is not writing more details about this research phase”.

APCL also invited our university to their business exhibition in Birmingham, United Kingdom, to discuss the research findings in person but not in writing.

4.8 Data synthesis

The data synthesis process in qualitative research involves integrating and interpreting various data sources to develop a coherent and comprehensive understanding of the research phenomenon (Willis, 2007). This process is iterative and interpretive, aimed at identifying patterns, themes, and meanings within the data. Overall, the data synthesis process in qualitative research is dynamic and reflexive, requiring the researcher to continuously engage with the data and emerging interpretations throughout the research process (Willis, 2007).

Following is the process which the researcher followed in this research for the data synthesis:

1. **Data translation:** The data was gathered in different languages, including Urdu, Saraiki, Punjabi, and English, and then translated into English. Reflexivity was maintained throughout the translation process to enhance the veracity of the findings and actively engage with key informants to confirm the authenticity of translations. This approach ensured that the nuances of cultural and regional contexts were preserved, providing reliable data for analysis.
2. **Data familiarisation:** The researcher immersed himself in the data by reading and re-reading field notes and other collected materials. This helped us gain a Broad understanding of the context and content.
3. **Coding:** Codes can emerge inductively from the data or be derived deductively from preexisting theories or research questions (Wicks, 2017). However, relying exclusively on deductive coding can risk imposing preconceived notions on the data, potentially limiting the richness of insights from the participants' perspectives (Bryman & Bell, 2007).

Therefore, a balanced approach that allows for inductive emergence and deductive guidance is employed to ensure a comprehensive understanding of the data while maintaining methodological rigour (Yin, 2015).

4. As discussed in **Chapter 3**, the data was broken down into codes representing meaningful information units using NVivo. The same inductive and deductive techniques were used in Chapter 3's evidence review synthesis, and the same technique was applied in this phase.
5. **Categorisation and theming:** Codes were grouped into broader categories. These categories represented significant patterns or ideas that recur across the data set. This categorical pattern was grouped in themes for the constant comparison method.
6. **Constant comparison:** In qualitative research, the synthesis often involves comparing data within and between cases. The researcher grouped distinctive cases of each data collection phase; for instance, findings of participant observation were a case, and similarly, other phases were grouped in different cases. Then, the researcher compared them, known as constant comparison (Yin, 2015). This allowed the researcher to refine categories and themes by examining similarities and differences.
7. **Interrelating themes:** After identifying the themes, the researcher examined the relationships between them. This step involved exploring how the themes are interconnected, considering potential hierarchies, sequences, or patterns that may emerge. The aim was to develop a more nuanced understanding of the data by identifying how themes influence one another rather than treating them as isolated entities. By doing so, the researcher ensured that the interconnections between themes were not simply assumed but were supported by the data, allowing for a more comprehensive and contextually grounded interpretation.
8. **Contextualising findings:** The synthesised data was placed in a broader context, including considering the socio-cultural, historical, or institutional factors influencing the research phenomenon.
9. **Interpretation and theory development:** In qualitative research, synthesis goes beyond merely summarising data; it involves a rigorous process of interpretation (Wolcott, 1994). Interpretation is crucial in uncovering meaning from the data and plays a key role in theory development. The aim is for theory to evolve naturally from the data rather than being imposed by preconceived frameworks (Strauss & Corbin, 1990). Therefore, while interpretation organises and structures the data, it must remain responsive to emerging insights (Sharp, 2004). This ensures that the findings are grounded in the data, facilitating the development of context specific and theory driven results (Szablewska & Kubacki, 2023). The researcher aims to provide explanations or insights about the underlying meanings, mechanisms, and processes that shape the observed phenomenon in

Chapter 7, leading to theoretical contributions. This could involve developing new theories, refining existing ones, or challenging prevailing assumptions.

Applying the eight-stage process above ensures that conclusions are preceded by and based on available data. This study's research questions showed significant interpretational variability (Wolcott, 1994); therefore, an aggregated summary of the relevant findings is presented in **Chapter 6**.

4.9 Methodological limitations

The overarching research paradigms of this study carry the inherent limitation of producing multiple, potentially conflicting conclusions without a clear method for determining the most appropriate one (Stroud, 2000). Consequently, while this study's findings may offer valuable insights, they do not represent the definitive or exclusive 'truth' to the research questions. To address this limitation, alternative interpretations of the data were explored through discussions, with more substantial evidence as the basis for accepting conclusions as potentially valid (Bunge, 2004; Hennink et al., 2020; Stroud, 2000).

A second limitation is the use of the case study approach. This methodology may not fully capture all possible dimensions, interpretations, or dynamic contextual factors necessary for broader generalisations (Yin, 2015). However, the objective of this research was not to achieve statistical generalisation. Instead, it aimed to uncover new insights into sustainability challenges, their role in perpetuating exploitative practices, and intermediaries' contributions to sustainability compliance. These insights inform and refine theoretical frameworks concerning intermediary performance and sustainability compliance within MTSCs in developing countries. Given the highly context-specific nature of this inquiry, the analytical generalisation is appropriate and sufficient (Yin, 2015).

As with any qualitative research, this study inevitably faces specific operational challenges that can influence its outcomes. These include potential limitations in sampling, coding, categorisation, and interpretation. For instance, different perspectives may arise during the sampling process if the selection of participants does not fully represent the diversity of perspectives within the studied population, leading to skewed or limited insights (Yin, 2015). Similarly, during the coding and categorisation phases, the researcher's prior knowledge, beliefs, and assumptions may shape how data is classified and interpreted. Furthermore, the subjective nature of interpretation in qualitative research means that multiple interpretations of the same data are possible, introducing the risk of the researcher's personal point of view influencing the conclusions (Doyle et al., 2009). Although inherent in qualitative methodologies, these limitations are not exclusive to this research; similar challenges may arise in quantitative research, where limitations can occur in sampling, data collection processes, and analysis techniques, potentially affecting the validity and reliability of results

(Saunders et al., 2019). Acknowledging and mitigating these limitations through reflexivity, transparency, and triangulation of data sources can help enhance the robustness and credibility of the findings (Oltmann, 2016; Yin, 2015).

Another widely recognised limitation of qualitative research is the difficulty of fully separating empirical data from the researcher's subjective influence (Hennink et al., 2020). The researcher, a Pakistani national, acknowledges this challenge, although the research team of four worked together to enhance the credibility of the findings during the data analysis. Despite efforts to follow best practices, such as constant comparison methods, the potential for passive researcher influence may not be eliminated entirely.

Lastly, the study acknowledges constraints related to the quality and availability of data. In developing countries, niche subjects often have limited data availability due to systemic issues, including lower incomes, weak institutions, and inadequate infrastructure (Raleigh et al., 2023). Additionally, societal factors such as Pakistan's high power distance culture, religious sensitivities, and restricted access to primary data posed further challenges. Nevertheless, exhaustive efforts were undertaken through iterative data collection methods to gather as much relevant information as possible.

4.10 Achieving reliability

This study employs a combination of diverse data collection methods to achieve reliability. Secondary data such as company reports, annual sustainable development progress, the company's official available data, and CSR data from the Ministry of Labour and local union councils were consulted to reaffirm the findings. The researcher was fully engaged in their cultural setting and discussed with various other groups to get accurate data, such as meeting with local NGO officials and chambers of commerce. In 2024, the research field was revisited, and additional data was collected to confirm the primary analysis of the data. The secondary data and second research visit provided necessary contextual information. Surveys were not employed in this study due to two primary constraints: the challenge of accessing a statistically significant sample and the limited education levels among many lower-tier respondents, which impedes their comprehensive understanding of the research phenomenon. Achieving statistical generalisability is not the primary objective of this case study.

Three key techniques—member-checking, triangulation, and saturation were employed to ensure reliability. These methods are discussed in **chapter 6** on findings.

- **Member-checking:** This technique was used to align the researcher's interpretations with the participants' perspectives. Participants were asked whether the researcher's summaries accurately reflected their thoughts, thus validating the interpretations (McKenna et al., 2011). In this study, member-checking was integrated into the interview process,

where the researcher recapped discussions for confirmation or clarification. The researcher also conducted follow-up visits to ensure consistent findings by meeting respondents multiple times. However, this approach can be resource-intensive and may pose the risk of data alteration (Merriam & Grenier, 2019).

- **Triangulation:** Triangulation ensures the robustness of conclusions by corroborating evidence across multiple perspectives or methodologies. It may involve various forms (Merriam & Grenier, 2019; Yin, 2015), such as:

Source triangulation: Collecting data from multiple sources and considering conclusions only when verified by all.

Method triangulation: Applying diverse data collection or analysis methods.

Researcher/interpreter triangulation: Engaging multiple researchers for analysis and interpretation.

This study incorporated triangulation at three levels:

- *Source-level triangulation:* Evidence was considered valid only when corroborated by multiple respondents regarding a particular question or scenario. Unverified data from other sources was excluded.
- *Analysis-level triangulation:* Themes were derived only from data groups with multiple related codes.
- *Synthesis-level triangulation:* Research questions were addressed only using themes supported by evidence from multiple sources.
- **Saturation:** Achieving saturation ensures that the collected data comprehensively covers all significant aspects of the studied phenomenon, confirming that missing data does not undermine the conclusions (Saunders et al., 2018). This study verified saturation through a sequential data collection and analysis approach, focusing on sustainability challenges and intermediary roles. Successive respondents from comparable groups (e.g., lower-tier suppliers or progressive farmers) were assessed to identify emerging themes. Data collection ceased only when no new themes were identified, ensuring that conclusions were based on exhaustive evidence.

The next chapter discusses how reliability was achieved using the above methods in this research.

4.11 Key learning of Chapter 4

The following objectives are achieved in Chapter 4.

- **Research purpose and design:** The design was informed by the need to explore sustainability compliance, and grounded theory was chosen for its flexibility in theory generation.

- Grounded theory approach: Grounded theory guided data collection and analysis, allowing for the development of novel insights grounded in empirical data.
- Unit of analysis and data collection: The researcher focused on MTSCs, utilising primary data collection methods such as participant observation and stakeholder interviews.
- Data interpretation: The chapter elaborates on how the collected data was analysed, ensuring the robustness of findings.
- Methodological limitations: The researcher identified certain methodological limitations and addressed how these were mitigated.
- Achieving reliability: The chapter discusses how reliability was ensured through cross-checking data sources and employing triangulation techniques.

The next chapter builds on this methodological foundation by discussing the data collection process, including the ethical considerations, piloting exercises, and various field methods used to gather empirical data from stakeholders in the crop agri-food MTSCs.

Chapter 5

Data Collection

Chapter 5 explains the data collection methodologies used to investigate research objectives. This chapter delves into the practical aspects of data collection, providing an in-depth account of how the empirical data was gathered for this study. It outlines the research process, including participant observation, focus group discussions, workshops, and semi-structured interviews conducted with key stakeholders across Pakistan's rice industry. This chapter also highlights the ethical considerations integral to the research process, ensuring that participants' confidentiality is protected and ensured. A piloting exercise was carried out to refine the data collection tools and ensure they were fit for purpose. The inclusion of secondary data alongside primary data allowed for a more comprehensive understanding of sustainability challenges and managing strategies within MTSCs.

5.1 Research process

The field research for this study commenced in March 2022. The two key informants from the targeted company played a significant role in facilitating data collection in Punjab, Pakistan. This phase of the research was particularly critical as it required direct engagement with farming communities and an in-depth understanding of local socio-economic and cultural contexts. The selection of these key informants was deliberate, given their extensive experience and involvement in NRSP's sustainable agriculture initiatives. Their professional expertise and familiarity with local languages, norms, and operational dynamics significantly enhanced access to participants and the data collection process. However, relying on key informants also necessitated a critical and reflexive approach to increase the credibility of the research findings. While their assistance in facilitating access to farming communities and navigating local customs was invaluable, their embedded position within the organisation and its sustainability initiatives posed challenges regarding the objectivity of data collection. The researcher maintained a critical distance by triangulating data from multiple sources, including independent farmers, non-affiliated stakeholders, and documentary evidence to ensure a balanced perspective. Furthermore, to counteract any potential influence exerted by the key informants, the researcher conducted interviews independently whenever possible and adopted an open-ended questioning approach to elicit diverse and unfiltered participant responses.

Key informants played a crucial role as translators, facilitating communication between the researcher and participants, particularly in cases where language barriers existed (Houston & Sudman, 1975). To enhance reliability, the researcher cross-validated translated responses with multiple sources (McKenna et al., 2011). By employing these strategies, the

research maintained a critical stance, ensuring that the informants' facilitative role did not unduly influence data interpretation or compromise the study's analytical rigour (Yin, 2015). Besides the two primary key informants, various others supported the second phase; one was a supply chain lead (British-Pakistani serving as a European country head). S/he mainly managed the interaction with international buyers from North America and Europe about their opinions on modern slavery challenges in their MTSC businesses in Pakistan. The other two were from distinct religious sects³. There were also two more. While these informants played a critical role in facilitating the field visits, their influence on the research process was systematically controlled by interacting with various other religious scholars of the area informally to ensure the findings remained representative of the broader socio-cultural landscape rather than being shaped by specific religious perspectives. This approach reinforced the credibility and objectivity of the study while acknowledging the complex interplay between religious identity and socio-economic behaviour in the research context. The following were the key informants who facilitated the first field visit.

5.1.1 Regional team lead for micro-financing schemes

The first key informant was the regional team lead for the micro-financing schemes of NRSP. This individual was responsible for ensuring that financial support was available to farmers, which included providing essential resources such as quality seeds, sustainable fertilisers, agricultural machinery, etc. The regional team lead's role also extended beyond merely managing financial resources. He had an in-depth understanding of farmers' challenges in accessing quality inputs and how financial support mechanisms could address these challenges. His knowledge of sustainable practices and role in integrating these practices into the financial support structure made him an essential research tool for exploring the operational aspects of sustainability compliance within the APCL NRSP supply chain.

5.1.2 District development officer

The second key informant was the district development officer at NRSP, who was responsible for managing the integration of farmers into the APCL NRSP rice supply chain. This informant's duties included organising community development programs, workshops, and seminars on sustainable farming practices. The district development officer's role was central to educating farmers about sustainability and facilitating their participation in the APCL NRSP supply chain. Their involvement in community outreach and capacity-building initiatives provided a comprehensive perspective on sustainability's educational and developmental aspects. The district development officer's expertise in organising educational programs and active engagement with community members helped significantly

³ Their particular groups cannot be mentioned due to ethical concerns.

understand how sustainability practices were disseminated and adopted within the farming communities. His familiarity with local culture and regional languages further enabled effective communication and trust-building with the participants.

5.1.3 Ethical considerations

In conducting this research, a high priority was placed on ensuring all participants' anonymity, respect, and ethical measures (Butler, 2002; Payne, 2000; Wax, 1982). To ensure the success and ethical integrity of the respondents in the whole research process, the following measures were taken:

- **Anonymity:** Lower-tier participants were assured that their identities would be protected, as they were reluctant to share their information. No personally identifiable information was recorded or reported in the final publication, encouraging open and honest communication from the participants. Pseudonyms were used in the research notes with the consent and choice of the respondents.
- **Respect:** The interviews were conducted with respect for the participants' time, knowledge, and perspectives. The researcher sensitively approached the data collection method to the participants' experiences and cultural contexts, particularly among farming communities.
- **Informed consent:** Participants were fully informed about the research's purpose, scope, and the potential impact of the published results. They were made aware that their contributions would highlight efforts in sustainability compliance, which could positively influence Broader business operations (Payne, 2000).
- **Cultural and religious sensitivities:** Participants did not allow us to record their voices in any form due to cultural and religious sensitivities. They did not reveal anything about these sensitivities. They also requested that the research be conducted at their locations to accommodate their time constraints and other cultural obligations. As a result, informal settings were preferred for data collection, and only research notes were taken (Czarniawska-Joerges, 1992).
- **Ethical conduct:** During the ethnographic phase, interviewers spent their whole time with the farming communities, and they understood how to probe deeper into relevant issues without causing discomfort or distress to the participants. This was achieved by obtaining the consent of the communities' elders, who always start the conversation with the guests due to their norms, particularly in focus group discussions.

These ethical considerations were integral to the research methodology, ensuring the process was conducted with integrity and respect for all participants while safeguarding their anonymity and contributions.

5.2 Piloting exercise: Objectives and execution

Focusing the high power-distant and collectivistic orientations of the research locale, the piloting exercise aimed to achieve several key objectives:

- **Familiarisation with farming communities**

The pilot study involved engaging with farming communities to introduce the research objectives and educate them about its purpose. This step helped establish rapport with the participants and ensure their cooperation throughout the research. The researcher and key informants worked together to explain the study's goals, address concerns, and reassure participants about their anonymity.

- **Building trust and confidence**

Building trust with the farming communities was a primary focus of the piloting exercise. The researcher, supported by key informants, worked to create an environment where participants felt comfortable sharing their experiences and perspectives. This trust was essential for obtaining honest and reliable data (Bell & Bryman, 2007). The participants, particularly lower tiers, were not aware of the research concept and how this research could impact their farming activities. Trust was vital to obtaining candid and valuable insights (Bell & Bryman, 2007). The researcher invested time with the support of key informants in explaining the research's benefits to the participants, particularly emphasising how their involvement could bring attention to their challenges for sustainable development. Most respondents were very kind, telling the researcher they were happy if their support helped him to complete his degree. They are not concerned about whether the research benefited them or not.

- **Adaptation of research techniques**

The piloting exercise allowed for the assessment and modification of research techniques. The researcher used feedback from the pilot phase to refine interview guides, adjust data collection methods, and make necessary amendments to ensure the research was well-suited to the local context.

- **Reporting and feedback**

Upon completing the piloting exercise, a report detailing the outcomes was generated. This report, supported by input from the key informants, provided insights into the effectiveness of the research methods and highlighted areas for improvement. The findings and recommendations from the pilot study were shared with stakeholders, including APCL and NRSP representatives, to ensure alignment with the study's objectives and to address any potential issues before proceeding with the full-scale research.

After piloting, the data collection process started with participant observation and field visits.

5.3 Participant observation and field Visits

Immersing within farming communities in 2022, the researcher lived with them.

Understanding the socio-cultural dynamics of the Pakistani farming communities required establishing strong trust and rapport with participants. The researcher actively engaged in community activities and shared personal experiences to build mutual trust. This openness helped create a more comfortable environment for participants to share their true perspectives and experiences, demonstrating the depth of the researchers' engagement with the community.

The researcher engaged in daily activities such as planting, harvesting, attending community meetings, and participating in cultural and religious activities such as Eid and marriage ceremonies. This approach was specifically chosen to capture the sociocultural dynamics and agricultural practices from an insider's perspective, providing first-hand data that would be difficult to obtain through traditional methods. The choice of participant observation was driven by the need to overcome the limitations inherent in conventional data collection methods in Pakistani communities, which often fall short in contexts with low literacy levels and incomplete data among lower-tier suppliers. By integrating into the community, the researcher could gather rich, contextual information critical for understanding the socio-cultural factors influencing sustainability compliance.

- **Execution and engagement**

The immersive nature of participant observation means that researchers' interactions with participants could inadvertently affect the data collected. This could manifest as participants altering their behaviour due to the awareness of being observed, potentially skewing the findings (Yin, 2015). The researcher adopted a reflexive approach throughout the research process. For instance, a research diary was maintained as a systematic tool to document observations and respondents' reflections during the data collection (Kemp, 2012; Saunders et al., 2019). This technique facilitated ongoing self-assessment, allowing the researcher to examine how personal perspectives or interactions with participants might influence interpretations (Bryman & Bell, 2007). The systematic use of reflexive documentation complemented other measures, such as triangulation and participant validation, reinforcing the study's methodological rigour (Mehra, 2002).

- **Gathering tangible evidence**

To capture a comprehensive view of sustainability practices and challenges, the researcher interacted with a diverse range of participants within the community during field visits. The researcher cross-verified their integration insights by visiting the fields and directly interacting with the farmers engaged in their agricultural activities. This approach ensured that the research captured a broad spectrum of views on sustainability, providing a more

balanced and representative understanding of local perceptions and practices. The researcher specifically met old farmers who were the heads of farming communities and managing agricultural practices; their views were important as they talked about the traditional cultural and agricultural practices, the role of local landlords and how they carried ancestral socio-economic practices in their farming and livelihoods. Field visits ensure a comprehensive and tangible analysis of sustainability challenges and compliance practices. Log and jotting techniques were used to document key observations and significant instances throughout the field visits (Yin, 2015). These preliminary observations were subsequently validated through further investigation in later phases of the research process. The researcher also consistently employed 'emic orientation' (Bryman & Bell, 2007) with the farming communities, intended to gather insights into traditional family structures, farming practices, and the challenges faced in sustainability compliance.

The next phase was focus group discussion.

5.4 Focus group discussions

The researcher conducted FGDs to understand farmers' socio-economic, cultural, and religious challenges and investigate how progressive farmers influence adopting sustainable practices among lower-tier farmers. This approach was chosen to capture various experiences and insights from different farmer groups, highlighting the dynamics of sustainability compliance and the role of peer influence (Oltmann, 2016).

- **Execution and engagement**

The FGDs were organised in familiar and comfortable settings to promote open dialogue among participants. Key informants led the sessions, managing group dynamics to encourage equal participation of various farming communities. The selection of participants was strategically planned to include a diverse range of perspectives. Lower-tier farmers, who typically face more significant challenges and constraints, were contrasted with progressive farmers, who have successfully adopted sustainable practices. This contrast was intended to comprehensively understand the barriers and facilitators in adopting sustainability practices. The FGDs revealed several key insights. Lower-tier farmers highlighted financial constraints, limited access to resources, and a lack of education as major obstacles to adopting sustainable practices. These challenges emphasised the need for support and understanding in the agricultural community. Cultural and religious beliefs also emerged as influential factors, with some farmers adhering to traditional methods and expressing scepticism towards new techniques. (This provided a new orientation of this research which is slavery phenomenon in supply chains, and this was also investigated and discussed in the following chapters).

FGDs provided rich qualitative data, but there were potential challenges to conformity of the findings, where participants may adjust their responses based on the opinions of others in the group (Sussman et al., 1991). This issue can influence the authenticity and credibility of the data, as participants might withhold their genuine opinions or conform to perceived group norms (Amineh & Asl, 2015; Morgan, 1996). The researcher conducted a structured session with key informants to ensure the independence of various viewpoints. This session facilitated open and critical discussions, allowing informants to articulate their perspectives without external influence. This session was conducted in a setting that promoted candid dialogue, ensuring that the insights gathered were as independent and representative as possible. The researcher encouraged individual contributions by asking direct questions and ensuring that all participants had the opportunity to voice their perspectives for the conformity of the findings (Petersen & Gencel, 2013).

Another limitation is the influence of group dynamics on the discussion. In a group setting, dominant voices can overshadow quieter participants, leading to an uneven representation of views (Krueger, 1994). To mitigate this issue, sometimes the researcher asked particular respondents to give their viewpoints by giving examples of his personal viewpoints, ensuring that all participants had an equal opportunity to contribute. This approach helped to balance the discussion and capture a more comprehensive range of perspectives.

The FGDs also faced challenges related to the diverse literacy levels of participants. Lower-tier farmers, who often had limited education, struggled to articulate their experiences and opinions effectively. To overcome this barrier, key informants helped, used clear and simple local language, and provided explanations when necessary. Key informants also consulted with the researcher before probing questions and clarified the research objectives in informal settings. The informal setting of the FGDs also helped create a comfortable environment where participants felt more at ease sharing their experiences.

The sample protocol, highlighted in **Appendix 5.1⁴**, was designed for FGD. It focused on the lived experiences of the lower-tier farmers, focusing on the multifaceted challenges they face, the impact of these challenges on their livelihoods, and their perspectives on potential improvements and future expectations. These questions aimed to uncover the immediate and systemic issues that impact their daily lives and agricultural practices.

The sample protocol highlighted in **Appendix 5.2** for FGD is designed to gather detailed insights into progressive farmers' experiences, challenges, and perspectives on sustainability compliance. This protocol aims to delve into the progressive farmers' leadership roles, the impact of partnerships and modern practices, their efforts in education

⁴ The readers must remember that these questions were only used as guidelines due to the informal setting. Various other discussions occurred in every phase, such as personal interests, who we are and what we do, etc.

and advocacy, and the challenges they face in promoting sustainability and inclusivity in agriculture. The questions are designed to uncover their strategic approaches and practical actions in transforming their farming communities.

5.5 Workshops and seminars

Participation in workshops and seminars aimed at understanding the programs designed to assist farmers in comprehending and adhering to sustainability standards. The researcher attended events focusing on monitoring, transparency, and training practices pertinent to sustainability compliance. These workshops and seminars were instrumental in imparting knowledge and fostering collaboration among various stakeholders, including buying firm representatives (Ayers, 2019; Storvang et al., 2018).

- **Execution and engagement**

The workshops and seminars were a combination of presentations, interactive sessions, and practical demonstrations on sustainability practices. Educational materials were distributed to participants to support their learning, and various opportunities were provided for questions and discussions from APCL NRSP. The sessions were collaboratively organised with local NGOs and buying firms that maintained professional partnerships with the NRSP to support the sustainable development of smallholders. This strategic collaboration included diverse perspectives and expertise, fostering a comprehensive and well-informed discussion on sustainability challenges and solutions. Participants were drawn from a diverse pool, including farmers, local agricultural officers, and representatives from buying firms. This diversity was intentional, as it brought together individuals with varying knowledge and experience in sustainability practices. Including buying firm representatives was particularly valuable as it provided insights into the practical aspects of engaging with suppliers and ensuring product traceability. This multi-stakeholder approach was crucial for understanding the complexities of sustainability compliance from different vantage points.

The engagement strategies employed during the workshops and seminars aimed to foster an environment conducive to learning and collaboration. Interactive elements, such as group discussions and hands-on demonstrations, enhanced understanding and facilitated the practical application of sustainability concepts. The sessions encouraged participants to share their experiences and challenges, enriching the dialogue and providing a collaborative problem-solving platform.

- **Critical evaluation and mitigation of limitations**

While workshops and seminars offered substantial benefits regarding knowledge dissemination and stakeholder collaboration, they also presented several limitations. One significant challenge was ensuring the relevance and applicability of the content presented. Given the varied backgrounds and levels of understanding among participants, it was

necessary to tailor the material to address the attendees' specific needs and knowledge gaps.

As the researcher understood and observed, the workshops and seminars were designed flexibly to mitigate this limitation. The content was adapted based on pre-event booklets, pamphlets, and participant feedback, ensuring that the topics covered aligned with the attendees' interests and needs. However, there was a lack of support for the illiterate farmers to help them understand sustainable farming practices, which was later overcome through social mobilisers but not comprehensively.

Another challenge was the dependence on active participation from attendees. The effectiveness of the workshops and seminars hinged on the engagement and willingness of participants to contribute to discussions and apply the knowledge gained. To overcome this, the researcher requested that APCL NRSP allow his active involvement, such as engaging with the attendees and discussing their presentation formats and materials. This facilitated open discussions and provided practical examples relevant to the participants' contexts. The diverse composition of participants also introduced the potential for varying levels of prior knowledge and interest in sustainability practices. Some attendees, particularly those from lower-tier farming communities, had limited exposure to sustainability concepts, which could impact their ability to benefit from the workshops fully. To address this, the key informants introduced us to educated young farmers from the lower tiers attending these sessions, and they explained the foundational concepts of these sessions and practically demonstrated key points. Progressive farmers also supported us immensely in these sessions and took us to interactive sessions with the farming communities, buyers, and exporters.

The next phase was semi-structured interviews to validate these findings and further explore research questions 2 and 3. The researcher conducted detailed semi-structured interviews.

5.6 Semi-structured interviews

Semi-structured interviews were conducted with various stakeholders, including district development officers, social mobilisers, monitoring and evaluation officers, microfinance officers, progressive farmers, and supply chain officials. In-depth interviews were also conducted with the representatives of the buying firms to understand how they comply with sustainable practices within their MTSCs while working with APCL NRSP. These interviews aimed to understand the sustainability challenges faced by different tiers and the management strategies employed to address these challenges.

Semi-structured interviews offered flexibility and depth, allowing the researcher to explore specific topics while uncovering new insights. The diverse range of interviewees provided a holistic understanding of the challenges and strategies related to sustainability compliance. It

helped us to probe, negate or any other findings collected before the interviews by other methods. However, the success of these interviews relied on the interviewees' willingness to share information and the interviewers' skill in probing deeper into relevant issues (Denzin & Lincoln, 1998; Mueller, 2019; Oltmann, 2016). This was achieved by building trust, especially with social mobilisers (McGrath et al., 2019; Potter & Hepburn, 2005) and educating APCL NRSP officials that this research would highlight their efforts in sustainability compliance, which can Broaden their business operations.

5.6.1 Interviews with social mobilisers (Intermediary-4)

Social mobilisers working under district development officers of NRSP played fundamental roles in facilitating communication and engagement between farmers and other stakeholders. They were local graduates from the farming communities. Social mobilisers were involved in educating farmers about sustainable practices, addressing their concerns, and providing support to implement them. They worked closely with the local communities to foster trust and encourage the adoption of new methods. These interviews underscored the process of comprehensive training programs and better infrastructure to support sustainable farming practices from APCL NRSP. This helped to understand the social mobilisers' experiences, strategies, and the effectiveness of their initiatives in supporting and empowering farmers, particularly female farmers, highlighted in **Appendix 5.3**.

5.6.2 Interviews with monitoring and evaluation officers and microfinance officers (Intermediary-3)

Microfinance officers highlighted the crucial role of financial support in promoting sustainable practices. They shared examples of successful microfinance initiatives that enabled farmers to invest in sustainable technologies and practices. Monitoring and evaluation officers discussed the challenges of ensuring compliance with sustainability standards. They highlighted the need for robust monitoring mechanisms, regular assessments, and feedback loops to ensure continuous improvement.

Appendix 5.4 Sample interview protocol with the Microfinance Manager at NRSP bank. This protocol was designed to explore the nuances of how NRSP's microfinance initiatives are structured, the challenges faced in promoting and implementing these schemes, and their impact on the farming community. It aimed to reveal detailed information about the processes, strategies, and outcomes related to microfinance in the context of sustainable agriculture:

5.6.3 Interviews with Progressive farmers (intermediary-2)

During focus group discussions, progressive farmers provided valuable insights into their experiences with sustainable farming practices. The researcher also conducted their interviews as he explored they performed the most critical role in managing sustainability compliance. As respected and influential community leaders, their role was critical in

Pakistan's highly power-distant and collectivistic society. They emphasised the benefits of these practices, such as improved yields and soil health. They discussed their challenges and cultural and religious issues, including resistance from other farmers, financial constraints, and limited resource access.

These interviews highlighted the importance of community engagement, education, and progressive farmers' roles as community leaders in demonstrating the viability of sustainable practices to other farmers. **Appendix 5.5** protocol designed to gather detailed insights into progressive farmers' experiences, motivations, and strategies:

5.6.4 Interviews with APCL NRSP supply chain Officials (Intermediary-1)

Interviews with supply chain officials, including the general manager, chief executive, company engineer, export manager, supply chain lead, and supply chain financial analyst, provided insights into the management strategies adopted to address sustainability challenges. Primarily, they highlighted the governance challenges they face for the sustainability compliance of APCL NRSP MTSC. These officials discussed their roles in ensuring compliance, promoting sustainable practices, and facilitating communication between different supply chain tiers. These interviews highlighted the need for a cohesive strategy that integrates the efforts of all stakeholders to ensure sustainability compliance. The sample interview protocol with APCL NRSP supply chain officials is highlighted in **Appendix 5.6**. This protocol is designed to gain insights into the CEO's background, challenges faced by APCL NRSP, and their strategies to protect and empower farmers. Interviews with them explored the role of various intermediaries, technological advancements, and engagement with international buyers in promoting sustainable agricultural practices.

5.6.5 Interviews with buying firms and exporters

Interviews with representatives from buying firms and exporters aimed to understand the management strategies employed to mitigate sustainability challenges. These interviews provided insights into the strategic approaches to supplier engagement, alignment with sustainability goals, and mechanisms ensuring product traceability. Interviews with buying firms also aimed to gather insights into the buyer's perspective on sustainability, practices, and challenges in ensuring sustainable sourcing. It also explored their relationship with APCL NRSP, the evaluation of suppliers, and the impact of their sustainability initiatives on the local farming community.

Based on the interviews with the buyers and exporters, a sample interview protocol designed to explore their experiences, expectations, and insights regarding sustainable rice sourcing from APCL NRSP is highlighted in **Appendix 5.7**.

5.6.6 Interviews with wholesalers, regional head of NGO, and member of chambers of commerce

Interviews with wholesalers, the regional head of an NGO, and a member of the chambers of commerce provided insights into the broader context of sustainability practices, including cultural metrology, credit practices, and input standards. These interviews highlighted the evolution of sustainable agricultural practices in traditional communities and the role of external stakeholders in promoting sustainability. They also highlighted the importance of cultural and economic factors in shaping agricultural practices and emphasised the role of NGOs and commerce chambers in advocating for sustainability and supporting farmers. The following data collection phase was attending the workshops and seminars conducted by APCL NRSP.

5.7 Secondary data

In this study, secondary data collection through archival documents was employed to complement primary research methods, particularly to investigate third-party practices of sustainability compliance. This approach included examining internal and external documents, including data from various farming communities, annual sustainable development reports from NRSP, internal meeting materials, and official presentations. Additionally, external records such as the company's website⁵ and published materials⁶ within the company's database were discussed. The researcher also tried to understand from the respondents of APCL NRSP how this data is published and on what basis this data is shared with the buying firms. The researcher also visited the Ministry of Labour, the local government, district, and subdivisional administrative offices. These visits were to cross-verify the NRSP's data about the farming communities and APCL NRSP supply chain stakeholders.

Archival documents provided valuable insights into the research context and offered a detailed backdrop against which the primary data could be interpreted. Internal documents supplied critical information on the operational aspects and historical context of NRSP's sustainability initiatives. Annual reports and internal materials revealed how sustainability practices were implemented, monitored, and evolved.

External records, such as the company's website and published materials, supplemented this understanding by offering a perspective on how APCL and NRSP communicated their sustainability efforts to external stakeholders, what information is available to everyone and what information is only with their business partners on sustainable farming. These sources

⁵ CSR initiatives launched by the company.

⁶ Target groups for CSR and rural development programs.

were instrumental in understanding the public narrative and the alignment between reported activities and actual practices.

While enriching the research, using archival documents also posed several limitations. One key limitation was the potential for outdated or incomplete information (Church et al. (2002; Johnston, 2014). The researcher request that APCL provide updated data that fully reflects the current situation, which can lead to gaps in understanding. The researcher cross-referenced archival data with more recent primary data collected through interviews and observations. This triangulation approach helped ensure that the archival documents' findings were accurate and relevant, providing a more comprehensive picture of the sustainability practices and challenges. The biggest challenge in this phase was time constraints, and APCL officials just showed and discussed their internal records with us, which allowed us to keep short notes about this information. The company did not provide us with their internal record.

Another limitation was presenting the actual data in the company documents potential (Smith, 2008). Internal documents, such as annual reports and meeting materials, may present an idealised view of sustainability efforts and might not capture the organisation's challenges and how they mitigate them, especially religious issues. To address this, participant observation during 2024 (second field visit) helped us determine whether what has been presented in the archival data is present physically.

The archival documents also provided a retrospective view, which could be less effective in capturing the dynamic nature of ongoing sustainability challenges. To overcome this, the researcher again incorporated real-time data from fieldwork and interviews in the 2024 field visit, ensuring that the analysis reflected current conditions and practices (Andrews et al., 2012; Irwin, 2013). This approach allowed the researcher to contextualise historical data within the present-day challenges and developments in sustainability compliance.

The researcher also recognised the importance of understanding the context in which archival documents were produced. By critically analysing notes from internal documents and external communications, the team assessed the credibility and relevance of the information provided. This was all done in 2024 by physically staying with the farming communities. This critical examination was essential for identifying gaps or limitations in the data and ensuring the conclusions were well-supported. The researcher also conducted several meetings with key informants to understand multiple concepts which slightly differed from the published data in contrast to on-ground realities.

These issues arose as the researcher translated some data from the Google translator, and the real meaning differed according to the cultural context. The researcher had to arrange several meetings with key informants to clarify every word's meaning according to the context, which the researcher thought was essential to discuss in his findings. The

researcher remained cautious as minor misinterpretations, particularly issues such as modern slavery, bring severe complications for the researcher and respondents. The translation phase took almost 14 months to justify and clarify every data line. Finally, the key informants approved the data when the relevant findings were presented.

“However, they requested the researcher not to disclose any information about the lower-tier respondents regarding honour killing and genetic disorders due to intra-caste marriages.

And religious information can only be revealed anonymously when necessary”.

5.8 Key learning of Chapter 5

The researcher achieved the following learning outcome in Chapter 5.

- **Research process:** This chapter details the chronological steps taken during the data collection phase, including preparation, field visits, and the piloting exercise.
- **Ethical considerations:** Ethical protocols were strictly followed to ensure respect for participant confidentiality and cultural sensitivities.
- **Piloting exercise:** A piloting phase allowed the researcher to refine his data collection instruments and approach, ensuring their effectiveness in the field.
- **Participant observation and field visits:** Direct engagement with farming communities provided rich, first-hand data essential for understanding local dynamics.
- **Focus group discussions and interviews:** These qualitative methods provided deep insights into the lived experiences of different stakeholders.
- **Secondary data:** The use of secondary data complemented the primary findings, offering a more comprehensive perspective.

The next chapter will present the key findings from this data collection process, focusing on the research objectives and synthesising insights from interviews, focus groups, and other qualitative methods.

Chapter 6

Case study findings

Chapter 6 presents the study's core findings, organised around the research objectives. This chapter highlights the sustainability challenges lower tiers, intermediaries, and buyers face in MTSCs of the Rice industry of APCL NRSP. It further expands on the roles of various stakeholders within the MTSC, particularly the roles of intermediaries in facilitating or hindering sustainability compliance. The chapter includes a detailed synthesis of the research's key findings. This chapter also discusses the reliability and universality of these findings, providing a comprehensive synthesis that ensures academic rigour and how reliability checks have been applied.

6.1 Data organisation

Field notes were primarily reviewed and discussed with the key informants. Then, relevant data was translated into English.⁷ Following an initial dataset review, a rigorous qualitative coding framework was developed to guide the data analysis. Adaira and Pastorib (2011) and Bryman and Bell (2011) define qualitative coding as systematically identifying and extracting relevant data to discern patterns, categories, and themes. A code represents the qualitative essence of the phenomenon under investigation (Linneberg & Korsgaard, 2019). Although no standardised method for coding exists, adopting a focused coding strategy enhances the findings' precision and relevance (Elliott, 2018; Wicks, 2017).

This study employed a hybrid coding strategy, integrating deductive and inductive approaches (**discussed in Chapter 3, Section 3.6.2, and Table 3.4**). Initially, deductive coding was applied based on a pre-defined framework to extract descriptive data. This was followed by a recursive inductive strategy that allowed conceptual codes to emerge organically through in-depth analysis. Deductive coding was primarily used to address research questions 1 and 3, particularly by coding the four dimensions of sustainability challenges related to the first research objective. However, as the data evolved, inductive themes such as "socio-cultural slavery" and "psychological confinement" emerged, reflecting the flexibility of the coding process. In parallel, research objective three was addressed using similar analytical processes.

For research question 2, an entirely inductive coding approach was adopted. Because the focus was on inductive analysis, the concepts and roles of intermediaries, as discussed in Section 2.4 (The Role of Intermediaries in Sustainability Compliance within MTSCs), were also considered. During the analysis, the structure and management of MTSCs through

⁷ The field notes were written in Saraiki, Punjabi, Urdu and English

intermediaries emerged inductively, allowing themes to develop and facilitating a cross-comparative analytical method.

6.2 Conceptual framework development

The conceptual framework for the study's first objective is based on a hybrid model that integrates systemic and structural sustainability approaches. Specifically, it draws upon the triple-bottom-line (TBL) and environmental, social, and governance (ESG) frameworks. The TBL model, systemic in nature, provided invaluable insights into sustainability challenges across social, economic, and environmental dimensions (Gahlaut et al., 2024; Santiago et al., 2023). Few studies have applied a systemic approach to understanding and managing multifaceted sustainability challenges encompassing all TBL aspects (Senyo & Osabutey, 2023). To provide a holistic understanding of sustainability in MTSCs, this study established a link between the ESG model, focusing on governance structures for sustainable development, and the TBL approach by adopting Gellynck and Molnár's (2009) chain governance model. This governance mechanism, viewed from a multi-tier network perspective, reveals how the 'governance orientations' (structural) of a business influence the systemic integration of the TBL, highlighting interdependencies and relationships among stakeholders, ultimately contributing to a deeper understanding of sustainability challenges and potential solutions (Alkaraan et al., 2022; Boström et al., 2015; Chininga et al., 2023; Gellynck & Molnár, 2009; Truant et al., 2024).

The ESG focused governance mechanism also addresses the diverse needs of multiple firm stakeholders, including employees, customers, suppliers, and the local community, in facilitating SD (Shalender et al., 2023; Truant et al., 2024). This model aligns with the study's goal of uncovering sustainability dynamics in MTSCs, particularly with the rice industry in Pakistan.

The conceptual model for objective two was developed based on discussions in **Chapter 2**. Intermediaries are central to aligning sustainability objectives between buyers and suppliers, establishing institutional connections rooted in structural, economic, and social ties (Christopher & Brummer, 2023; Cole & Aitken, 2020). The strength of these relationships varies, ranging from strong, investment-based partnerships to medium bonds based on technical support (Schreiber et al., 2023; Yu et al., 2023). Conversely, relationships centred on addressing social sustainability challenges are considered weaker, especially in developing countries, where intermediaries often neglect corporate social responsibility (CSR) fundamentals (Kumar & Agrawal, 2023; Schreiber et al., 2023; Yu et al., 2023). Intermediaries strategically evaluate supplier sustainability practices, reducing the burden of multiple audits and socio-environmental compliance certifications (Chen et al., 2023; Kuijpers et al., 2023). By acting as 'strategic intermediaries,' they offer suppliers a streamlined process for showcasing their sustainability credentials, thereby benefiting both

buyers and suppliers (Chen et al., 2023; Cholez et al., 2023; Marttinen & Kähkönen, 2022). This facilitation of mutual benefits underscores intermediaries' role in reducing information asymmetry and addressing knowledge gaps in sustainability compliance.

However, the literature has largely overlooked how intermediaries beyond the first tier facilitate sustainable practices in MTSCs, particularly in societies with unique cultural and societal characteristics, such as those found in collectivist and power-distant contexts (Boso et al., 2023; Essien et al., 2024). By better understanding local needs, the nuanced role of intermediaries in providing a cohesive platform through social networking for sustainability compliance in MTSCs remains underexplored. This gap in knowledge highlights the need for further academic inquiry into the distinctive contributions and challenges intermediaries face. The extant literature underscores the need to explore the structural, economic, and social functions of intermediaries about lower-tier suppliers and the holistic sustainability phenomenon within MTSCs (Miandar et al., 2023; Najjar & Yasin, 2023). This trilateral relationship between intermediaries, suppliers, and buying firms further complements the conceptual framework underpinning the study's second objective.

To address research question 3, the study drew upon sustainable management frameworks from Mena et al. (2013), and Tachizawa and Wong (2015), discussed briefly in **Figure 2.7**. These frameworks, which emphasise direct, indirect, and third-party collaborative management strategies, have gained prominence due to the increasing complexity of multi-tier relationships in international business. The direct management approach, characterised by closed connections between buying firms and sub-suppliers, is facilitated by first-tier suppliers' direct identification of these suppliers (Carter et al., 2015; Chae et al., 2024). This approach allows immediate interventions, such as training and contingency planning for sustainability compliance (Tachizawa & Wong, 2015).

In contrast, the indirect management strategy, which aligns with Mena et al.'s (2013) open supply chain structures, operates without direct connections to sub-suppliers. Instead, first-tier suppliers take on a mediating role to ensure sustainability compliance. Third-party management strategies involve collaboration with external entities, such as government or non-governmental organisations, to monitor sub-suppliers through social audits and certifications, contributing to inclusive SD (Gong et al., 2018; Koberg & Logoni, 2019; Tachizawa & Wong, 2015).

The conceptual models developed in this study were continually refined through triangulation methods, comparing emergent variables against the existing literature. Many of the findings were novel, contributing significantly to theoretical advancements in the field. For example, the second objective comprehensively examined the entire product formation process, incorporating on-the-ground realities. Although the coding process was challenging, it played a critical role in analysing the entire product development cycle and clarifying the distinct

roles of intermediaries. Notably, it revealed how first-tier intermediaries influence other intermediaries along the supply chain. These findings are particularly significant for two reasons: (1) they provide detailed insights into the complete product formation cycle, and (2) they offer a granular analysis of the different roles intermediaries play across various tiers, from the fourth tier to the first.

6.3 Research questions and thematic grouping

The case study findings are synthesised in tabular form, and their interpretation is discussed in chapter 7.

- **Research Question 1** was organised into four main themes: social, environmental, economic, and governance dimensions. These themes captured the broad sustainability challenges and provided a structured framework for analysing how these dimensions interact in multi-tier agri-food supply chains.
- **Research Question 2** was also grouped into four major themes based on the roles of different intermediaries: (1) social mobilisers (Tier-4 intermediaries), (2) Bank NRSP (Tier-3 intermediary), (3) progressive farmers (Tier-2 intermediary), and (4) APCL (Tier-1 intermediary). This analysis reflected the hierarchical nature of sustainability compliance in MTSCs and each intermediary's varying levels of roles.
- **Research Question 3** was classified into three overarching themes: (1) direct management strategy, (2) indirect management strategy, and (3) management through third parties. These themes highlight the strategic approaches buying firms adopt to manage sustainability compliance in MTSCs, illustrating the complexity of relationships between buyers, intermediaries, and suppliers across different tiers.

This comprehensive and iterative research analysis underscores its contribution to the academic literature, particularly in elucidating the intricate dynamics of sustainability challenges and intermediary roles in MTSCs. The research team and key informants were crucial in validating the identified variables, ensuring they were consistent with the study's objectives. This iterative process of cross-checking and validation informed the research findings, which are discussed further in the subsequent sections that detail the study's empirical setting and data collection process.

6.4 Primary findings

6.4.1 RQ. 1: Sustainability challenges for lower-tier suppliers and governance challenges for the buying firms and intermediaries?

The following findings highlight the sustainability challenges for the lower-tiers suppliers and governance challenges for the intermediaries and buying firms.

Table 6.1 highlights the sustainability challenges affecting lower-tier suppliers, buying firms, and intermediaries in the MTSC, and reflects how the thematic process was adopted by identifying themes, categories, and subcategories.

Table 6. 1. Sustainability challenges.

Themes	Categories	Sub-categories and Interpretation from the research notes/codes
Economic	Price instability and currency fluctuations	Price instability: Fluctuating prices for crops and inputs. led. Currency fluctuations: Changes in currency value impacted import costs for agricultural inputs.
	Dependence on non-renewable energy	Energy costs: The high costs of non-renewable energy sources. Environmental impact: Dependence on fossil fuels contributed to environmental degradation.
	Gender-based Wage Disparities	Wage inequality: Women often received lower wages. Employment opportunities: Gender disparities affected access to job opportunities in the sector.
	Manipulative weighing practices	Underweight measures: Farmers faced manipulative weighing practices (<i>chungi, Thala, Maashki</i>) that resulted in less payment for their produce. Lack of regulation: Inadequate regulation allowed such practices to persist.
	Cattle theft and high-interest payments	Theft: Theft of cattle reduced farmers' assets and income and kept them under constant psychological stress. High-interest rates: Farmers faced high-interest payments on loans, increasing financial strain.
	Market saturation and price volatility	Oversupply: Excess supply of rice in the market sometimes depressed prices. Price fluctuations: Unpredictable price changes impacted farmers' profitability.
	Unfair sales commissions	High commissions: Farmers faced high sales commissions, reducing their profit margins. Lack of Transparency: Unclear commission structures impacted financial fairness.
Environmental	Manual crop cutting and stubble burning	Crop cutting: Manual methods were labour-intensive and less efficient. Stubble burning: Burning crop residues contributed to air pollution and soil degradation.
	Use of prohibited chemicals	Health risks: Using banned chemicals poses health risks to farmers and consumers. Environmental damage: Prohibited chemicals harmed ecosystems and biodiversity.
	Deforestation for domestic energy	Forest clearing: Trees were cut down to gather fuel, leading to deforestation. Loss of biodiversity: Deforestation reduced habitat for wildlife.
	Water wastage and pollution	Inefficient use: Excessive use of water resources led to wastage. Pollution: Contaminants from agricultural runoff polluted water sources.
	Soil degradation from monoculture farming	Nutrient depletion: Continuous planting of the same crops depleted soil nutrients. Reduced fertility: Soil quality decreased, affecting crop yields.
	Environmental impact of brick kilns	Air pollution: Emissions from brick kilns contributed to poor air quality. Resource depletion: Brick kilns consumed significant amounts of natural resources, which caused smog and severe health challenges.
	Lack of sustainable waste management	Waste accumulation: Poor waste management practices contribute to environmental pollution. Resource misuse: Inefficient waste management led to the loss of recyclable resources.
Social	Child labour	Education impact: Children working in agriculture missed out on education. Health risks: Child labour exposes children to hazardous working conditions.
	Sexual harassment and honour killing	Harassment: Sexual harassment in agriculture affects workers' safety and well-being. Honour-based violence: Honour killings impacted individuals' (females) rights and safety.

	Intra-family marriages and thalassemia	Health issues: Intra-family and intra-caste marriages increased the prevalence of genetic disorders like Thalassemia. Health costs: Managing genetic conditions imposed additional health costs.
	Health Issues from polluted water	Disease: Contaminated water sources led to health problems such as waterborne diseases. Reduced Quality of Life: Poor water quality badly affected overall health and productivity.
	Unemployment among educated youth	Job opportunities: Lack of employment opportunities for educated youth limited economic growth and caused emotional stress. Skill underutilisation: Educated individuals' skills remain underutilised due to less opportunities.
	Gender disparities in the labour market	Employment Gaps: Women faced fewer employment opportunities and lower wages. Economic inequality: Gender disparities contributed to broader economic inequality.
	Lack of health and safety measures	Risk exposure: Inadequate health and safety measures exposed workers to risks and accidents. Poor working Conditions: Substandard safety practices impacted workers' well-being.
	Social exclusion of marginalised groups	Exclusion: Marginalised groups faced social and economic exclusion, limiting their access to resources and opportunities. Inequality: Social exclusion of lower-castes exacerbated inequality within farming communities.
Governance	Absence of sustainable policies	Policy gaps: Lack of sustainable policies delayed progress towards environmental and economic goals. Implementation challenges: Ineffective policies affected the implementation of sustainable practices.
	Resistance to change in farming practices	Cultural barriers: Resistance to new practices due to cultural norms and traditional beliefs. (Slavery). Implementation Issues: Difficulty adopting modern, sustainable farming methods due to socio-cultural solid influence.
	Impact of political instability	Policy inconsistency: Political instability led to inconsistent agricultural policies. Development delays: Instability impacted progress and investment in agriculture.
	Corruption and bribery	Financial mismanagement: Corruption led to the misallocation of resources and funds. Ineffective governance: Bribery undermined fair governance and policy implementation.
	Lack of product traceability	Quality control issues: Difficulty in tracing products affected quality assurance and market access. Consumer confidence: Lack of traceability challenged consumer trust.
	Compromised grain quality	Quality issues: Poor monitoring and traceability standards resulted in compromised grain quality. Market impact: Compromised quality affected market value and consumer trust.
	Insufficient transparency in financial reporting	Financial complexity: Lack of transparency in financial reporting led to mismanagement and inefficiency. Trust issues: Poor financial transparency affects stakeholder confidence.
	Ineffective monitoring of sustainability compliance	Compliance issues: Inadequate monitoring of sustainability practices hindered progress. Implementation gaps: Ineffective monitoring affected the enforcement of sustainability standards.

6.5 RQ 2: What roles do different levels of intermediaries play for sustainability compliance in the MTSC of the crop agri-food industry?

6.5.1 Intermediary 4: Social Mobilisers

The analysis revealed a distinctive approach to managing MTSC by identifying four key intermediaries that ensured sustainability compliance within the APCL NRSP framework. The findings detailing their involvement are outlined below. Social mobilisers were local graduates who worked under the development office of NRSP. **Table 6.2** presents the strategies adopted by different intermediaries in APCL NRSP MTSC and their impact.

Table 6.2 Roles of different Intermediaries.

Themes	Categories	Categories and Interpretation from Research Notes/Codes
Intermediary 4: Social Mobilisers	Strategies and Impact	Farmer registration and documentation: Social mobilisers register farming communities under the APCL NRSP platform. This formalisation ensures compliance tracking and eligibility for resources.
		Technology-driven monitoring: Social mobilisers use GPS tracking and smartphones to monitor farming activities, ensuring real-time compliance with sustainability practices. Continuous inspections and video call options for emergencies keep mobilisers in touch with local farmers.
		Environmental and cattle management training: Mobilisers train farmers on sustainable water use, pollution reduction, and responsible animal care. They ensure proper waste disposal practices to protect local water bodies and promote animal welfare.
		Female mobilisers: Female social mobilisers address gender-specific issues and overcome socio-cultural barriers. They engage directly with female farmers, offering equal access to training and resources in male-dominated settings.
		Community trust building: Mobilisers, familiar with local customs and values, build trust between the APCL NRSP and farmers, ensuring cultural sensitivity and effectively promoting sustainable initiatives.
		Educational seminars: Mobilisers conduct seminars to debunk local myths and counter-wholesaler propaganda. These seminars promote eco-friendly alternatives and address harmful practices like stubble burning.
		Collective resource purchasing: Mobilisers facilitate bulk purchases of seeds, fertilisers, and equipment for farmers, allowing cost savings and improved market positioning.
		Market improvements: Mobilisers' efforts to improve market linkages and combat wholesaler exploitation have led to fairer pricing, higher income stability, and better investment by farmers in sustainable practices.
		Educational aspirations: Success stories from female mobilisers have inspired young girls in the community to pursue education and careers in agriculture, contributing to rural development.

Intermediary 3: NRSP Bank	Strategies and Impact	Farmer credit management: The NRSP Bank offers farmers credit and loan disbursement services, enabling them to access critical inputs like seeds, fertilisers, and equipment.
		Interest-free loans: In compliance with Islamic principles, the NRSP Bank provides low-interest or interest-free loans, ensuring farmers avoid burdensome debt and adhere to local religious values.
		Field monitoring: The development office conducts field visits to ensure farmers follow sustainable practices and provide necessary feedback, helping ensure compliance with APCL's sustainability goals.
		Islamic-compliant loans: To address cultural and religious concerns, local religious scholars offer and validate Islamic-compliant loans, encouraging greater financial participation among farmers.
		Promoting sustainable practices: The NRSP Bank promotes sustainable farming practices through workshops and loan incentives for adopting eco-friendly methods like crop diversification and renewable energy solutions.
		Financial empowerment: Farmers are financially empowered through transparent, low-interest, or interest-free loans, which allow them to invest in sustainable practices and improve their livelihoods.
		Stronger market position: Farmers have reduced dependence on wholesalers, improved financial independence, and gained stronger bargaining power, leading to better prices for their produce.
Intermediary 2: Progressive Farmers	Strategies and Impacts	Bridging the gap: Progressive farmers facilitated connections between smallholders and APCL, enhancing access to resources, promoting fair trade, and ensuring equity.
		Support mechanisms: Helped farmers adopt sustainable farming practices, aligning with APCL's objectives to reduce exploitation and enhance economic opportunities.
		Education and training: Provided knowledge on modern technologies and sustainable practices (crop diversification, soil health), empowering farmers through practical learning.
		Knowledge-sharing: Created platforms for peer learning, improving farmers' decision-making abilities regarding sustainable farming methods.
		Trust-building: Developed trust within farming communities, ensuring sustainability practices were culturally relevant and widely accepted.

		Young farmers and women's empowerment: Involved local stakeholders to address gender inclusion, water scarcity, and organic farming, driving community-based initiatives.
		Pest control and organic farming: Encouraged biological pest control, organic fertilisers, and responsible pesticide management, reducing environmental impact.
		Renewable energy: Collaborated with NRSP to install weather stations and solar-powered tube wells, improving water management and farm sustainability.
		Machinery & resource sharing: Created a system where modern machinery was shared among farmers, fostering collective ownership and sustainability-compliant projects.
		Alternative income sources: Promoted activities like beekeeping, poultry farming, and goat farming to diversify income and reduce dependency on traditional crops.
		Emotional well-being: Addressed emotional challenges young farmers face due to poverty, offering socio-emotional support and discouraging adverse mental health outcomes.
		Moral & legal aid: Provided legal and moral protection against coercive tactics used by wholesalers, safeguarding farmers' rights with support from APCL and NRSP.
		Community programs: Organised educational programs to promote ethical Islamic business practices, countering religious manipulation by local wholesalers.
		Enhanced social cohesion: Strengthened local communities by promoting collaboration and fair practices.
		Global market access: Strengthened market linkages by ensuring compliance with sustainability standards, giving farmers access to international buyers and better prices.
		Income diversification and renewable energy: Helped build economic resilience through diversification of income sources and using renewable energy solutions.
Intermediary 1: APCL NRSP	Strategies and Impacts	Multi-tier compliance: APCL extended sustainability compliance across all supply chain tiers, comprehensively addressing environmental, social, and cultural sustainability.
		Sustainability as a core objective: The company integrated sustainability beyond economic gains, ensuring long-term environmental conservation and social equity.

		Accountability: Farmer registration upon entry with traceability codes ensured complete accountability, reducing fraud and enhancing transparency in the supply chain.
		Streamlined product traceability: The registration process helped track product origin, maintaining ethical sourcing and quality standards.
		Reducing social strain: Farmers without adequate machinery were supported, reducing their dependence on exploitative intermediaries.
		Lower environmental footprint: Logistical support reduced environmental impacts by minimising inefficient farming practices.
		Inclusive atmosphere: Farmers were treated with dignity, provided with vouchers, refreshments, and waiting rooms, fostering a more supportive and inclusive environment.
		Sustainable energy adoption: Solar-powered tube wells and steam turbines helped farmers transition to cleaner energy sources, promoting environmental sustainability.
		Eliminating stubble burning: Bio-fuels and bio-fertilisers contributed to reduced stubble burning, mitigating a key environmental hazard and preserving air quality.
		Aflatoxin prevention: Advanced temperature and moisture control technologies reduced aflatoxin contamination, improving product quality and safety.
		Destoning & preservation: Destoning technologies ensured cleaner and more marketable rice, improving farmers' profitability.
		Quality-based pricing: APCL's lab-based quality testing ensured fair compensation based on rice quality, bypassing traditional exploitative practices.
		Fair compensation: Farmers received fair prices, preventing income losses from manipulative practices by traditional middlemen.
		Eliminating fraud: Advanced measurement equipment eliminated vibration cuts, preventing the farmers' exploitation by local wholesalers.

		Islamic business principles: Accredited weighing reinforced fairness, transparency, and adherence to ethical Islamic business principles, fostering trust among farmers.
		Enhancing credibility: External accreditation promoted transparency and increased farmers' confidence in the system.
		Timely payments: Immediate payments enabled farmers to reinvest quickly in their farms, improving financial liquidity and reducing the need for exploitative loans.
		Encouraging sustainability: Financial subsidies were provided to farmers adopting sustainable practices, promoting long-term investment in eco-friendly farming techniques.
		Incentivising compliance: The subsidy model encouraged wider adoption of sustainable practices, contributing to community-wide environmental benefits.
		Pollution reduction: The transition to eco-friendly energy and bio-fuels helped significantly reduce pollution levels and the environmental impact of rice farming.
		Additional income: The opportunity to sell crop residues provided farmers with a supplementary source of income, diversifying their revenue streams.

6.6 Research Question 3: What strategies have been used by the buying firms and different levels of intermediaries to address the sustainability challenges?

Table 6. 3 presents the summary of the theme and categories, highlighting the management strategies of the buying firms.

Table 6.3 Summary of the themes and categories highlighting the management strategies of the buying firms.

Themes	Categories	Sub-Categories with Explanation
Direct Management Approach	Transitional interaction between buyers and lower-tier suppliers	Buyer engagement with Lower-Tier suppliers: Buying firms directly engage with lower-tier suppliers (farmers) in the APCL NRSP supply chain through intermediaries (progressive farmers). Workshops and forums: Progressive farmers organise workshops focusing on CSR, quality standards, and sustainability. Buyers visit farm sites annually to assess compliance with sustainability practices, and progressive farmers ensure they are prepared and informed about sustainability issues.
	Training and workshops with external experts	External technical expertise: Buying firms sponsor workshops involving external experts on sustainable agricultural methods, pest control, and crop quality enhancement. Collaboration with government: The training is aligned with local (Federal Ministry of Agriculture, Punjab government) and international standards, ensuring compliance with sustainability regulations.
	Supporting higher education in Agriculture	Higher education initiatives: Buying firms sponsor young graduates from farming communities to pursue advanced degrees in agriculture. It also negates misconceptions by local wholesalers, showcasing buyers' positive role in the community.
	Impact of direct management	Product quality improvement: Direct engagement leads to better handling of product issues, like mixed grains and labour exploitation, enhancing overall quality. Trust building: Direct relationships build trust between buyers and farmers, foster long-term partnerships, and ensure product traceability. External training: Expert workshops equip farmers with skills to enhance agricultural quality and sustainability, improving socio-economic conditions through higher education sponsorships.
Indirect Management Approach	Driven compliance through APCL	Intermediary-Driven compliance: APCL oversees farming practices, technical support, and sustainability audits for lower-tier suppliers, ensuring adherence to best practices.
	Polycentric management system	Decentralised authority: APCL uses a polycentric system involving multiple units (progressive farmers and social mobilisers) to ensure compliance in different regions. This system allows intermediaries to address local challenges while maintaining overall supply chain integrity.
	Impact of Indirect Management	Enhanced product standards: APCL's centralised management of sustainability compliance provides a streamlined, efficient, and transparent supply chain. Supply chain transparency: APCL's state-of-the-art processing facility ensures

		high-quality standards, energy efficiency, and waste reduction, improving buyer trust and enhancing supply chain sustainability.
Third-Party Management Approach	<i>Sustainability certificates</i>	<i>Verified sustainability compliance:</i> APCL collaborates with international bodies like SGS to obtain ISO certifications (ISO 9001; ISO 14001), ensuring that products meet global sustainability and quality standards. These third-party certifications enhance trust between buyers and suppliers by verifying compliance.
	<i>Collaborating with NRSP for social sustainability</i>	<i>Social development initiatives:</i> NRSP collaborates with buyers on projects like WISE (Water, Immunisation, Sanitation, and Education), addressing key social issues in farming communities. NRSP ensures compliance with social sustainability practices, improving farmers' living conditions. This collaboration strengthens the supply chain's social fabric and sustainability efforts.
	<i>Monitoring and evaluation through external stakeholders</i>	<i>Third-party audits:</i> External stakeholders, including NGOs and international agencies, assess farming practices and seed quality to ensure compliance with sustainability standards. These evaluations are included in APCL's sustainability reports shared with buyers, providing transparency and accountability.
	<i>Impact of third-party management</i>	<i>Improved quality standards:</i> Third-party certifications and audits verify sustainability compliance, enhancing trust between buyers and suppliers. <i>Improved socio-economic conditions:</i> NRSP's social initiatives improve access to clean water, sanitation, and education, enabling farmers to balance their socio-economic conditions and integrate social sustainability into the supply chain. <i>Accountability checks:</i> Third-party evaluations add a layer of accountability, ensuring rigorous enforcement of sustainability compliance across the supply chain.

6.7 Expanding the roles of various other stakeholders in APCL MTSC

The researcher also conducted interviews with various stakeholders, as mentioned in the table above, and their findings helped extensively understand the sustainability phenomenon. However, through this broader examination of stakeholders, including wholesalers, financial analysts, and supply chain leads, the study provides a holistic view of the complex and interconnected dynamics of APCL's MTSC. These findings offer a deeper understanding of how stakeholders perceive and engage with sustainability challenges, especially in a context marked by long-standing socio-cultural practices and economic constraints.

One of the crucial contributions was the explicit examination of the role of wholesalers, a significant component of Pakistan's agricultural landscape. These wholesalers have long been entrenched within local communities, pivotal in shaping agricultural practices and socio-economic dynamics over decades. It was essential to scrutinise what they practised and claimed and how much they cooperated with local farmers. The analysis revealed the depth of their influence, particularly in perpetuating socio-cultural practices that have, over generations, invisibly chained lower-tier farmers, creating a cycle of dependency and limited mobility.

Additionally, the study presented findings from the financial analyst working within APCL NRSP, who provided crucial insights into the economic challenges and viability of the APCL MTSC. His perspective was particularly enlightening, as economic issues were identified as primary obstacles, with many other challenges—such as child labour—stemming from this economic dimension. His analysis helped to define how APCL NRSP's initiatives, mainly through microfinance and credit facilitation, offer vital support to lower-tier farmers, helping to alleviate some of the economic burdens deeply intertwined with other sustainability challenges.

The supply chain lead's focus on integrating technology for product traceability addressed one of the universal challenges MTSCs face, ensuring transparency and accountability across all tiers. His insights pointed to the growing need for technological solutions in tracking product movement and ensuring compliance with sustainability standards, a challenge for APCL and MTSCs globally.

Tables 6.4 and 6.5 outline the key perspectives of the supply chain lead and financial analyst on sustainability and operational practices within APCL NRSP. **Table 6.7** highlights the role of wholesalers in Pakistan's Rice supply chain. These tables' categories and synthesis are only for reference, as the findings from these MTSC stakeholders have already been discussed above.

Table 6.4 Findings of the interview with the supply chain lead of APCL NRSP

Categories	Synthesis of Findings
Position and background	Previously head of supply chain at another unit, with a master's degree in business supply chains from the University of USA, currently working at APCL.
Supply chain management	Ensures compliance with environmental standards and sustainability risks. Utilises traceability tools and GPS to monitor product cycle.
Sustainability practices	Implements policies for water conservation, organic farming, and renewable energy. Promotes agroecology and circular economy. Prevents stubble burning and promotes biofuels.
Stakeholder engagement	Engages with farmers, buyers, and NGOs. Conducts seminars and workshops on sustainability. Facilitates transparency and fair practices throughout the supply chain.
Technology and innovation	Uses blockchain technology for traceability. Develop eco-friendly packaging solutions. Implements advanced data analytics and digital tracking systems.
Financial and economic support	Offers supplier incentives and credit to encourage sustainable practices. Plans partnerships with renewable energy providers. Introduces drip irrigation systems and crop insurance.
Community and environmental impact	Invests in climate-resilient crops and local community projects. Conducts market research to identify export opportunities. Strengthens relationships with export partners and stakeholders.
Training and compliance	Provides regular staff training on data accuracy and sustainability practices. Engages in continuous improvement and auditing to ensure compliance.

Table 6.5 Findings of interview with financial analyst NRSP

Categories	Synthesis of Findings
Position and background	Chartered Accountant with ACCA, working with NRSP for 4 years, focusing on APCL supply chain finances.
Financial oversight	Examines the financial impact of sustainability initiatives in APCL. Collaborates with NRSP departments and external organisations to align budgets with sustainability goals.
Financial planning	Tracks export finances and identifies growth opportunities. Organises financial planning for R&D projects and sustainable farming practices. Quantifies environmental and social benefits.
Risk management	Evaluate the financial risks of sustainability initiatives. Identifies cost-effective projects aligning with NRSP goals.
Transparency and reporting	Ensures transparent financial reporting for stakeholders. Coordinates with the development office to secure funding. Provides financial insights for collaborations and mergers.
Economic viability	Measures economic returns on investments in sustainable technologies. Manages price volatility and develops strategies to mitigate market impacts.
Farmer support	Formulates financial policies for fair pricing. Designs credit programs and explores crop insurance options. Encourages transparency in transactions.

Policy development	Working on policies to support local farmers and enhance financial stability. Engages with research centres and progressive farmers.
Sustainability integration	Evaluate the economic viability of sustainable practices. Supports financial stability through strategic planning and policy development.

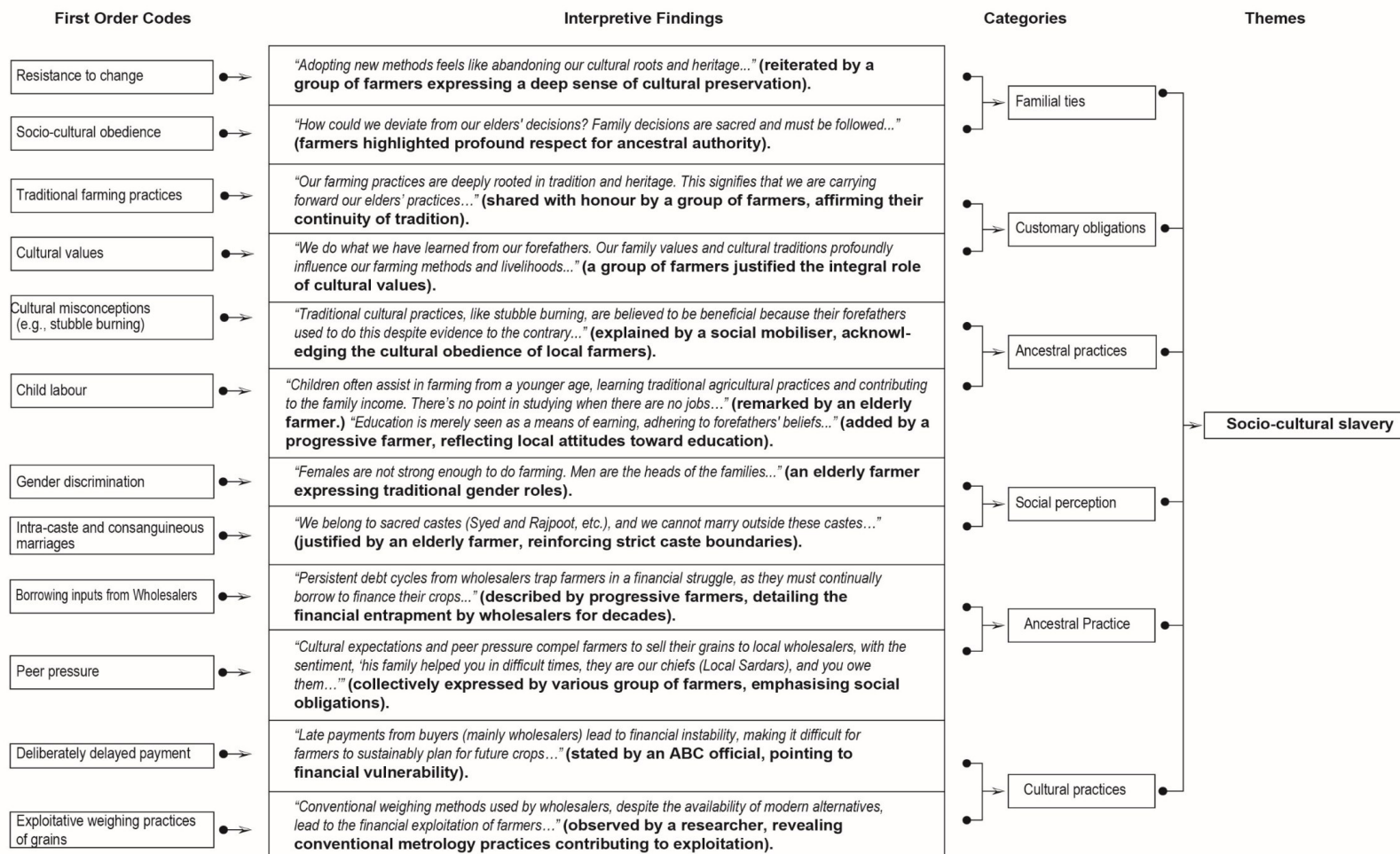
Table 6.6 Highlights a comprehensive synthesis of the key findings from the interviews with the wholesalers.

Categories	Sub-Categories and Interpretations
Strong historical and cultural ties with farmers	<p>Generational bonds: Wholesalers emphasise deep-rooted, multi-generational connections with farmers built on mutual trust and traditional practices.</p> <p>Credit and resource dependency: Wholesalers offer resources and credit in return for crops, positioning themselves as essential to the farming community.</p> <p>Thala system (Cultural Trap): Wholesalers use this manipulative metrology practice, giving leftover grains to lower castes who work for them to reinforce their influence by maintaining control through cultural norms.</p> <p>Maashki system (Cultural Trap): This system further ties labourers to wholesalers, ensuring their loyalty through minimal, symbolic rewards.</p> <p>Cultural continuity: Wholesalers argue that these traditional systems are vital for maintaining community stability despite modernisation pressures.</p>
Provision of agricultural inputs and financial support	<p>Input supply: Wholesalers provide seeds, fertilisers, and sprays, often on credit, claiming it is essential support for farmers who lack financial resources.</p> <p>Debt cycle: High-interest credit systems trap farmers in a continuous cycle of debt, ensuring long-term dependency.</p> <p>One-stop-shop dependency: Farmers become reliant on wholesalers for all agricultural needs, further solidifying their control.</p> <p>Low-quality inputs: Wholesalers supply compromised inputs at inflated prices, creating additional challenges for farmers.</p>
Challenges with farmer education and practices	<p>Support for traditional practices: Wholesalers encourage ancestral farming practices, potentially hindering innovation.</p> <p>Ignored crop management advice: Wholesalers claim they provide advice, but farmers often disregard it, leading to poorer crop quality and lower market prices.</p>
Fair trade and transparency in transactions	<p>Claimed fair trade practices: Wholesalers highlight their commitment to fair trade, but farmers contest these claims.</p> <p>Perceived price inequity: Farmers feel pricing mechanisms are unfair; wholesalers blame poor-quality crops that cannot be paid at higher rates.</p> <p>Controlled pricing mechanism: Wholesalers control the local market pricing structure despite promoting transparency, benefiting their personal interests.</p>
Impact of government policies and market conditions	<p>Policy criticism: Wholesalers criticise high taxes and operational costs, claiming these strain their businesses and hurt farmers.</p> <p>Blame on corruption: They attribute the agricultural sector's decline to government inefficiency, though they benefit from systemic connections.</p> <p>Benefiting from government Ties: Despite criticism, wholesalers maintain integration with government systems, securing privileges.</p> <p>Market taxes: They argue that taxes like 'Chungi' are essential but add financial strain on farmers.</p>
Resistance to external influences and market changes	<p>Opposition to large corporations: Wholesalers resist large companies and foreign support for sustainability compliance, accusing them of undermining local systems and exploiting farmers.</p> <p>Community distrust: External influences may erode trust between farmers and wholesalers, causing division within the community. Therefore, wholesalers oppose this.</p>
Preservation of local traditions and practices	<p>Cultural preservation commitment: Wholesalers maintain traditional practices like 'Thala' and 'Maashki,' seeing them vital to social cohesion.</p> <p>Resistance to modernisation: Despite external pressures, wholesalers remain committed to traditional systems, viewing them as essential to cultural heritage.</p>

Market union and community involvement	<p>Union control over pricing: Wholesalers, through market unions, actively participate in setting crop prices and managing infrastructure, often benefiting themselves.</p> <p>Advocacy with limits: Though they claim to advocate for farmers, their efforts are constrained by self-interest and systemic limitations.</p>
Religious manipulation and fanaticism	<p>Religious argument against foreign Support: Wholesalers use religious rhetoric, claiming that accepting foreign support violates Islamic ethics to prevent farmers from seeking external assistance.</p> <p>Bank loans framed as un-Islamic: Wholesalers discourage bank loans by framing them as violations of Islamic principles, trapping farmers in informal credit systems dominated by wholesalers.</p>
Exploitation through Police and Illegitimate Sources	<p>Use of police and illegitimate sources: Wholesalers, often being local landlords, use their influence over the police and other illegitimate sources to trap farmers.</p> <p>Cattle theft and loan repayment: Sometimes, wholesalers engage in cattle theft as retribution when farmers fail to repay loans, further consolidating their control.</p> <p>Resistance to sustainable farming: Most wholesalers view sustainable farming practices as threatening their business model and resist changes that promote sustainability.</p>

The following is a sample of the thematic structure, as shown in **Figure 6.2**, for reference.

The relevant themes were explicitly confirmed during the second visit to the research, aimed at understanding the decades-long sociocultural and religious phenomenon of slavery.



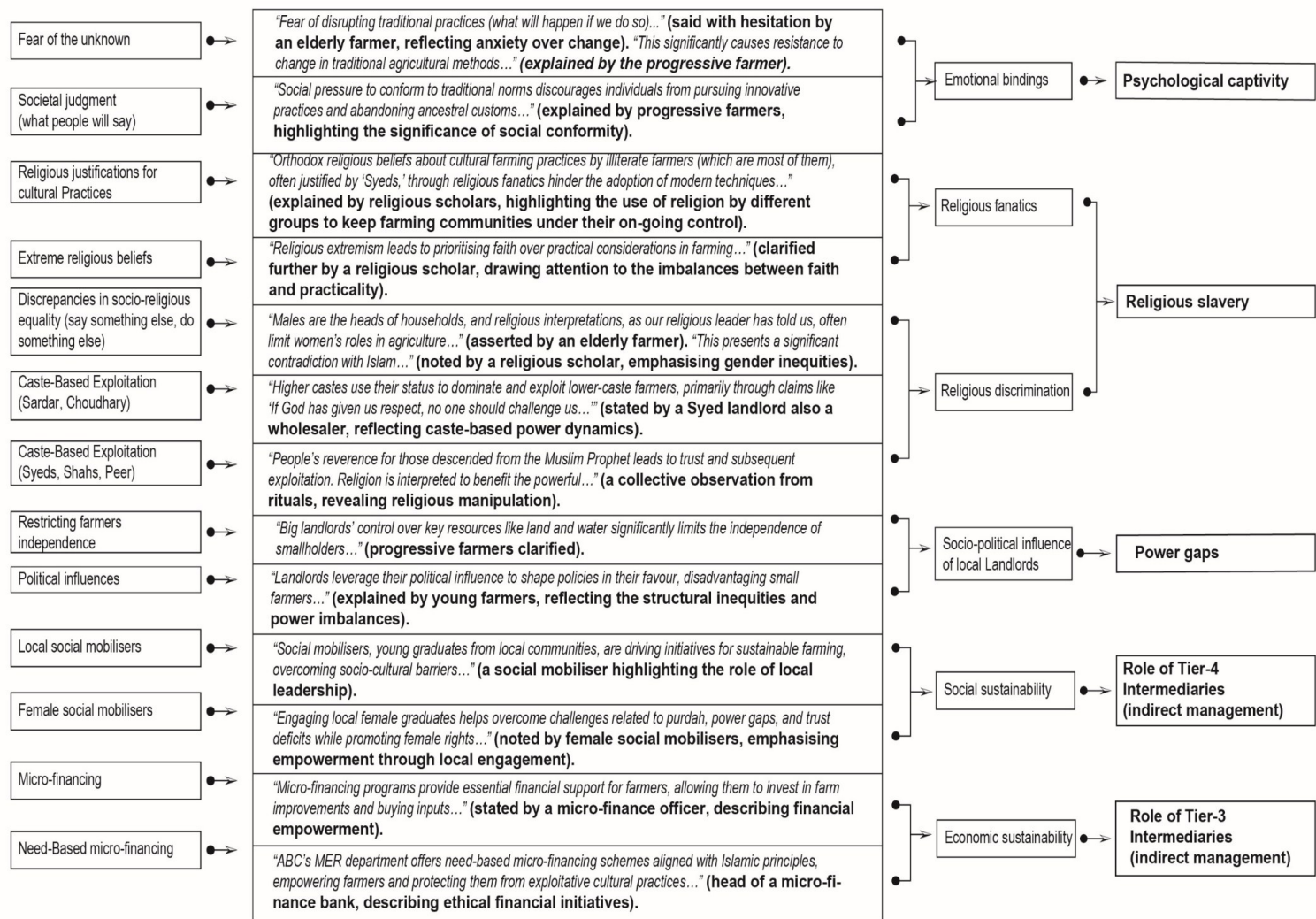




Figure 6. 1 Example of analytical coding structure.

At this point, it is imperative to clarify that the discussion section will comprehensively address the research objectives and focus on the phenomenon of slavery as it emerged from the analytical phase. The themes were rigorously validated through the respondents' narratives, with their insights revisited to ensure consistency and reliability. The findings are framed within thematic and narrative analyses, closely aligned with the primary three established research objectives. Moreover, they thoroughly examine socio-cultural slavery and its management strategies within sustainability compliance in an MTSC. This analysis offers a novel contribution, capturing not only the emergent themes but also the personal stories of respondents, thereby adding depth and reliability to the research.

The rigorous process of theme generation and re-confirmation, which the researcher will discuss in the following sections, ensures the robustness of the findings. This research's reliability is underpinned by the thorough methodology employed to substantiate the overarching conclusions related to socio-cultural slavery and sustainability in the supply chain context.

6.10 Ensuring reliability

In qualitative research, the reliability of findings is essential for ensuring that the results are credible, consistent, and transferable. This study employs three core strategies to ensure reliability: member-checking, triangulation, and saturation. These methods have been applied rigorously to confirm the trustworthiness and accuracy of the data and the analysis.

- **Member-checking**

Member-checking is a process in which the researcher seeks to verify the accuracy of the collected data by returning it to participants for confirmation (Birt et al., 2016). During the research process, member-checking was implemented to ensure that the researcher's interpretation of the participants' responses aligned with their intended meaning. This was crucial for ensuring that emerging themes were rooted in participants' realities rather than researcher bias (Birt et al., 2016). For instance, when a point of ambiguity arose regarding some social challenges faced by lower-tier suppliers, the researcher sought clarification through the following exchange:

- **Researcher:** *"Why do you think children should not pursue higher education?"*
- **Respondent:** *"There are no government jobs for us; the elite fills all positions. Previously, there were jobs such as gatekeepers or gardeners in government schools or basic health units, but now we must pay bribes to get these jobs. We cannot afford food, so how can we pay for jobs?"*

Why this question? As discussed above, the mental framework of the researcher is how the researcher should work in research. These findings had ambiguities in researcher's mind that maybe due to cultural challenges and poverty, lower tiers do not send their kids to

education. To confirm this, the member-checking method was consistently applied to different participants to ensure a robust understanding of these key themes. For example, interviews with an older farmer, a progressive farmer, and a social mobiliser yielded the same insights, further confirming the accuracy of the data. The other benefit of this method was that it cleared multiple variables, such as bribery, corruption, reason for child labour, lack of resources, policy implementation, etc.

In addition to real-time clarifications, member-checking was conducted at the thematic level. A final report detailing the research findings was shared with the APCL NRSP, and feedback was affirmatively received. A comment from a regional team lead of NRSP emphasised the precision and clarity of the findings:

"Thank you for sharing the primary explanation of your research findings. It is great to hear that the process is moving smoothly towards producing the final document. I discussed the explanations of your findings with my other colleagues; we endorse your report."

- **Triangulation**

Triangulation involves cross-verifying data from multiple sources to ensure that the themes identified are consistent and well-supported (Renz et al., 2018). This method was applied in developing themes by cross-referencing evidence from at least three different sources ($n \geq 3$), for instance, within the same research groups, such as social mobilisers with social mobilisers and intermediaries with intermediaries' groups. For example, responses from different participants were compared and confirmed through repeated questioning and subsequent analysis. By using triangulation, the study reduces the possibility of bias or misinterpretation and strengthens the credibility of the findings. This triangulation was consistently applied to the relevant data for the research objectives.

- **Respondent 1 (Progressive Farmer, Tier 2 Intermediary):**

"We have been pushing lower-tier farmers to adopt sustainable practices, but many still consider it costly. The transition is slow due to economic and cultural issues. However, the social mobilisers try to convince them. We have shown how reducing pesticide use can lead to higher long-term profits, but traditional methods are hard to leave behind."

- **Respondent 2 (Social Mobiliser, Tier 4 Intermediary):**

"When we talk to lower-tier farmers, they often mention short-term financial challenges. Our role is to help them understand the long-term benefits, but without immediate financial relief, it is difficult for them to change."

- **Respondent 3 (Supply Chain Official, Tier 1 Intermediary):**

"From the company's perspective, there is a clear push towards sustainability. However, compliance is difficult at the lower levels of the supply chain. Progressive farmers and social mobilisers act as crucial links but face resistance from traditional"

farming practices and groups, especially when no direct economic benefit is visible in the short term. Farmers have loans from wholesalers based on strict and illegal regulations. They are bound to get the low-quality inputs from these wholesalers due to normative family respect and then have to sell their crops according to the set rates again from these wholesalers”.

The above triangulation highlights a consistent theme across the tiers: the challenge of encouraging lower-tier farmers to adopt sustainable practices due to perceived costs and resistance to change despite efforts from intermediaries.

- **Saturation**

Data saturation is a key criterion for determining when to conclude data collection (Mwita, 2022). This was achieved through two field visits conducted in 2023 and 2024. In the second visit, follow-up informal interviews with participants from the 2023 dataset provided an opportunity to reaffirm the identified themes. By this point, the researcher had developed good relationships with the community, allowing for more open and comprehensive discussions. The emergence of no new themes during the second visit indicated that no additional significant themes were emerging, suggesting that theoretical saturation had been reached. There were no new emergent viewpoints about the slavery phenomenon as well. The respondents had no idea about modern slavery; their narratives were entirely based on socio-cultural and religious practices in their agricultural practices. This also signalled that the data collection had thoroughly covered the research questions, and the research had sufficient data for the slavery phenomenon, which needed to be confirmed through narrative analysis.

The combination of a carefully selected sample size and triangulation of methods ensured that all key themes had been identified, and the lack of new information on the second visit supports this claim. For instance, in saturation, repeated data collection indicates no new themes or findings emerge, confirming that the key issues have been fully explored.

- **Respondent 1 (Lower-tier farmer, field visit 2023):**

“The company wants us to use registered pesticide. They say it’s good for the land, but where should we get it even if we do not have enough resources? Everyone here is immoral and dishonest; we cannot believe in anyone. Our wholesalers are our local landlords who have supported us for generations. I have a family to feed and cannot take the risk.”

- **Respondent 2 (Lower-tier Farmers, focus group discussion 2023):**

“It is hard to follow all these rules about sustainability. Moreover, by the way, I never heard about sustainability, nor did my elders tell me. The money the company wants to loan us is insufficient to cover all my costs. This is not according to the principles

of Islam. Maybe if I follow company advice, there will be environmental benefits, but I need to make a living first. And no one knows what happens in the future”.

- **Respondent 3 (Lower-tier Farmer, informal Group discussion 2024):**

“We’ve heard about how important sustainability is from my nephew, who is working as a social mobiliser with the company, but I can’t afford to make changes unless I see immediate returns. It’s not easy to follow these practices when we’re just trying to survive. And why to switch my farming practices, which is from our ancestors?”

The above analysis confirms multiple variables of the research through saturation, for instance,

- *Cultural practices,*
- *Influence of local wholesalers,*
- *No understanding of sustainable farming,*
- *Economic challenges,*
- *Sense of corrupt practices,*
- *Influence of religion,*
- *Family structures.*

The following analysis further demonstrates that critical issues, such as the provision of loans to lower-tier farmers and their unpredictable behaviours, have been comprehensively examined, reaching a point of data saturation. These behaviours, however, are influenced by a range of factors, particularly the role of local dealers who often market their products to farmers with exaggerated promises, claiming their offerings will significantly improve yields. In reality, many of these products are fraudulent or of poor quality, and due to the farmers' limited training and education, they are often unable to utilise them effectively.

This combination of misleading practices and inadequate farmer education has generated considerable resistance and scepticism among farmers, leading to a pervasive sense of uncertainty. A recurring question arises in their minds: "What will happen?" This concern is compounded by their past experiences, as highlighted in the findings and discussed below, where farmers who fail to repay loans are often subjected to intimidation tactics, such as false police charges or cattle theft. These systemic issues further complicate their trust in sustainable agricultural inputs and loan systems, exacerbating their vulnerabilities within the supply chain.

- **Respondent 1 (Microfinance Officer, Tier 3 Intermediary, field visit 2023):**

“We’ve been promoting sustainable farming practices by providing loans to farmers. However, many lower-tier farmers are still hesitant to take on debt, even if it’s for sustainability initiatives for their benefit. They are concerned about repayment and the lack of immediate returns from such practices. They ask us a question: if we will not be able to pay the loan, then what will happen?”

- **Respondent 2 (District development officer, semi-structured interview 2023):**
“Our role is to connect lower-tier farmers with resources to promote sustainable practices. Yet, a lot of resistance comes from socio-economic factors heavily influencing these farmers. They need more than just financial assistance; they require long-term assurance that these practices will yield benefits.”
- **Respondent 3 (Lower-Tier Farmer, informal group discussion 2024):**
“I received support from the company last year, but I’m still unsure whether it’s worth continuing, but I know the market is changing, and I have no choice but to adapt. I just hope it pays off soon.”
- **Respondent 4 (Social Mobiliser, informal group discussion, 2024):**
“We’ve continued our efforts to educate lower-tier farmers about sustainable practices. Many still view these practices as a long-term risk, despite seeing progressive farmers succeed. Changing their mindset is challenging, especially when the immediate financial returns aren’t clear.”

6.11 Universality of findings

The generalisability of the findings in this study is better understood through *analytical generalisation* rather than *statistical generalisation* due to the case study methodology employed (Yin, 2015). Analytical generalisation refers to extending findings to similar contexts where socio-economic, cultural, and operational structures align with those of the studied case. In this research, the South Asian context provides a relevant basis for such generalisation, given the historical and socio-economic commonalities across regional countries, such as Pakistan, India, and Bangladesh. These countries share deeply intertwined livelihoods, governance systems, and agri-food supply chain structures that have evolved over centuries. Therefore, the challenges and strategies observed in managing sustainability compliance through intermediaries in Pakistan’s rice industry are likely transferable to similar contexts within South Asia.

Additionally, the findings are considered reliable because no evidence indicates that the results would differ in similar situations. Qualitative research also naturally involves some degree of interpretational variability, and rigorously using reliability enhancing methods—such as triangulation, member-checking, and saturation minimises potential biases (Yin, 2015). The transparency of the research process, combined with the explicit presentation of the findings and data collection procedure, further reinforces the study’s replicability. As a result, it can be reasonably expected that similar findings would emerge if the research were conducted in other multi-tier agri-food supply chains in similar socio-economic and sustainability contexts.

6.12 Alternative explanations

It is essential in any qualitative research to consider potential alternative explanations that could challenge the validity of the findings. In this study, four key counterarguments are anticipated and addressed below:

- **Contradictory ideas**

A potential concern is that specific data points or comments within the dataset might directly contradict the identified themes. For example, most of the lower-tier suppliers were uneducated, and at some points, social mobilisers and key informants shared their views; some readers/participants might have expressed concerns that social mobilisers were from farming communities and reflected potential bias, while clarifying farmers' points of view. However, through member-checking and triangulation, any discrepancies between individual comments and the emerging themes were systematically addressed. The second field visit, even though challenging due to time and budget constraints, member-checking ensured that participants had the opportunity to clarify their perspectives. At the same time, triangulation validated the consistency of themes across multiple data sources. Therefore, the themes presented reflect the dominant views of the participants despite occasional contradictory statements.

- **Incoherence within themes**

Another possible critique is that specific themes may lack internal coherence, potentially consisting of disparate or unrelated ideas. A structured multi-stage thematic analysis was employed to mitigate this risk, including carefully skimming transcripts, systematic coding, and comparing and clustering similar concepts. This process was repeated over several iterations to refine the themes and ensure they were internally consistent. Each theme is supported by data from at least three different sources (source triangulation), further strengthening the themes' coherence and validity. These rigorous procedures significantly reduce the likelihood of incoherent or loosely connected themes.

- **Omission of relevant themes**

A third counter-argument concerns that some relevant themes may have been inadvertently omitted from the analysis. While it is impossible to guarantee that every potential theme was captured, the comprehensive approach taken in this study—including extensive field visits, multiple rounds of data collection, and member-checking—makes it unlikely that significant themes were missed. Furthermore, *theoretical saturation* was applied, meaning that data collection continued until no new themes or insights emerged. This process was further confirmed during the second round of fieldwork, supporting the conclusion that the most important and relevant themes have been identified and analysed.

- **Overlapping or duplicated Themes**

A final concern is the potential for some identified themes to overlap or represent different levels of abstraction of the same concept. Various similar themes emerged throughout the data, but they were often out of context or presented in different contexts. To address this, a detailed keyword analysis was conducted for different contexts (i.e., for various research objectives), and if the researcher needed clarification or further understanding of any theme, he cross-verified it. This analysis was conducted in collaboration with key informants and progressive farmers who were highly qualified and familiar with the sensitivities of the research process. These measures significantly reduce the likelihood of themes overlap or duplication, ensuring that the themes presented in the analysis are unique and represent different aspects of sustainability compliance in the agri-food supply chain.

- **Caution:** *'Directly discussing these findings with stakeholders, such as wholesalers or self-proclaimed religious leaders, may lead to denial or outright rejection of these realities in public forums. However, the dynamics behind the scenes would require significant inquiries targeting these groups/stakeholders (Molvi and local landlords working as wholesalers). Comprehensive longitudinal studies are essential to verify the data and capture the complexities involved, rather than relying on one-time, short-term assessments.'*

6.13 Key learning of Chapter 6

Each research objective is addressed with specific findings that answer the study's key questions. The following are the key learning outcomes of Chapter 6.

- **Sustainability challenges by integrating ESG and triple bottom-line approach:** This chapter provides unique aspects of sustainability challenges in MTSCs. It highlights the challenges throughout the product formation cycle, from producers to buyers.
- **Expanding the roles of stakeholders:** This chapter provides detailed insights into the roles of various intermediaries and stakeholders in the MTSC, especially regarding sustainability strategies.
- **Synthesis of interviews with key stakeholders:** A detailed synthesis of interviews with supply chain leads and wholesalers provides an in-depth understanding of the sustainability dynamics.
- **Novel analytical paradigms:** The research introduces new paradigms for interpreting the findings, offering alternative ways to understand sustainability challenges.
- **Phenomenon of slavery:** This chapter discusses how socio-cultural and religious phenomena perpetuate slavery.

- **Analytical structure:** Exemplifying coding structure and how narrative analysis shaped the foundation for theoretical interpretations and discussion in the next chapter.
- **Ensuring reliability:** The findings are cross-checked for reliability, ensuring their robustness.
- **Universality of findings:** The findings are applicable beyond the specific context of this study, offering broader insights into MTSC sustainability.

The next chapter will provide an in-depth discussion of these findings through the dot-connecting process by linking them to the research questions. It will also explore the implications of these findings for both theory and practice.

Chapter 7

Discussion of the case study findings

Chapter 7 discusses the research findings, highlighting the sustainability challenges and governance mechanisms identified in MTSCs. This addresses the research questions by linking empirical evidence with theoretical insights, offering a nuanced interpretation of the data, and highlighting the roles of buying firms, intermediaries and other stakeholders in sustainability compliance in MTSCs. This examines how sustainability challenges are tied to socio-cultural practices and how intermediaries play varying roles in shaping sustainability outcomes. This chapter also introduces a novel perspective on slavery within MTSCs, arguing that what the researcher has observed is not a form of modern slavery but a centuries-old entrenched phenomenon. The discussion extends beyond the MTSC framework, offering contributions to both theory and practice regarding sustainability compliance and highlighting this research's interdisciplinary impact.

7.1 From data to theory: The discussion process

The research findings are synthesised and linked in discussion to generate new insights. It is not merely a presentation of data but an analytical process that connects empirical findings, allowing the researcher to propose grounded theories. A critical part of the discussion involves the process of dot-connecting, which refers to the methodical linking of empirical findings with theoretical constructs, ensuring the data is described and interpreted within a broader academic context (Strauss & Corbin, 1990).

Following Glaser & Strauss (1967) and Strauss & Corbin (1990), constant comparison by coding the data line by line identifies recurring themes that eventually form the basis for substantive theories. Dot-connecting in the discussion involves more than merely aligning data with theories. It requires the researcher to draw connections between categories, themes, and the literature, ensuring that the discussion builds a cohesive theoretical framework. Grounded theories emerge not from pre-existing theoretical assumptions but through an iterative process of comparing data and connecting them (Glaser & Strauss, 1967). This constant comparison leads to theory-building deeply grounded in participants' lived experiences, making the emergent theory more contextually relevant and applicable. By connecting these dots between empirical findings and established theories, the researcher builds a comprehensive narrative explaining how sustainability challenges emerged in this research and how compliance strategies were devised and managed in MTSCs. This approach contributes to academic knowledge and provides practical implications, offering insights into how sustainability initiatives can be better implemented in

complex MTSCs. The conclusion chapter will present an analytical summary based on this discussion and compare it with existing theories.

7.2 Discussion, theoretical contribution and practical implications of RQ 1

The complexity of MTSCs reveals multiple sustainability challenges, especially for lower-tier suppliers. The rice industry in Pakistan serves as a key case study for understanding these sustainability challenges. This industry relies on a deeply entrenched structure that links lower-tier suppliers (farmers) with intermediaries and buyers. Each actor in the supply chain faces distinct sustainability challenges, further compounded by historical, cultural, and financial factors. These challenges have been discussed below.

7.2.1 Challenges for lower-tier suppliers

- **Economic Sustainability Challenges**

Rice farming communities of Pakistan face various economic sustainability challenges and limit their financial autonomy. These challenges have been discussed extensively in the literature, highlighting that agricultural supply chains in developing economies are riddled with barriers to financial sustainability (Chen et al., 2024; Willer et al., 2024). However, this study adds a critical layer to the existing discourse by emphasising how market volatility, currency fluctuations, and dependence on non-renewable energy sources exacerbate farmers' vulnerability in Pakistan. This nuanced understanding expands current theoretical frameworks on economic sustainability by drawing attention to additional complexities faced by lower-tier suppliers in developing markets. For instance, stable currency environments are often assumed in many theoretical models, especially in developed economies where institutional safeguards mitigate fluctuations. This study critically reveals that macroeconomic instability in developing countries creates an additional layer of uncertainty for lower-tier suppliers (Famuyiwa, 2024; Igwe et al., 2024). The impact of currency volatility on economic stability and supply chain sustainability has not been sufficiently incorporated into existing models, which often take a more simplistic view of global supply chains (Bachev, 2024; Brauw & Bulte, 2021; Jha, 2025). This research, therefore, contributes an important extension to the theory of economic sustainability by highlighting how macroeconomic volatility must be accounted for in developing economies when assessing supply chain resilience.

The dependence on non-renewable energy sources within Pakistan's agricultural supply chains adds another complexity to economic sustainability that is largely overlooked in the literature. The potential benefits of renewable energy adoption in agriculture are discussed mainly in the literature; however, they often fail to consider farmers' energy access challenges in developing countries (Chen et al., 2024; Ghauri et al., 2024). The study's findings highlight that energy poverty, defined as inadequate access to energy resources, is

a significant barrier to achieving long-term financial resilience for farmers in Pakistan. This dimension of energy infrastructure and its impact on financial stability represents a novel contribution to the theory of economic sustainability, urging future research to integrate energy access as a critical factor in assessing the viability of agricultural supply chains in developing markets.

Another key economic challenge is gender-based wage inequality within the rice supply chain of Pakistan, which persists despite women's substantial contributions to agricultural labour. This study provides a critical addition by exploring how cultural and social norms within Pakistan perpetuate gender disparities and economic inequalities. The findings demonstrate that the belief in men's entitlement to higher wages despite equal labour contributions from women is rooted in historical and cultural narratives. This perspective is frequently considered a social challenge in the literature (Adefila et al., 2024; Glazebrook et al., 2020; Phiri et al., 2022). However, it extends current discussions on economic sustainability challenges in MTSCs by introducing the concept of gendered labour hierarchies, which remain underexplored in the supply chain literature.

The financial exploitative practices prevalent in Pakistan's rice supply chain, such as price manipulation, exemplify the power imbalances, which align with existing research on power dynamics in MTSCs (Grimm et al., 2014). The study extends this discourse by focusing on informal governance mechanisms and cultural metrology practices such as weight manipulation (e.g., artificially inflating jute bags), imposition of hidden cultural charges such as *Chungi* and *Thala* and undisclosed commissions that are often overlooked in discussions about formal contractual agreements and market forces. Prior studies have typically focused on economic rationalities and contractual frameworks (Bachev, 2024; Brauw & Bulte, 2021; Jha, 2025) but have largely overlooked the cultural narratives that underpin such practices. By incorporating historical and religious contexts as drivers of exploitative behaviour, this study challenges the assumption that economic failure or institutional inadequacies are the sole causes of exploitation. Instead, it advocates for a multidimensional approach to governance that integrates cultural, historical, and social factors to address the root causes of exploitation in agricultural MTSCs.

The study also delves into the financial dependency of farmers on local wholesalers and the coercion tactics used to recover loans, such as cattle theft or false police cases, which trap farmers in cycles of exploitation. This aspect of the rice supply chain has been largely underexplored in sustainable supply chain theory, which focuses on more conventional financial practices. Existing research on financial exclusion highlights barriers to accessing formal credit systems in developing economies (Battistelli et al., 2022; Yimer, 2025). However, this study expands this discourse by revealing how coercive tactics used to recover culturally enforced loans add an emotional toll to farmers' already precarious

economic situation, thus revealing a darker side to agricultural supply chain dynamics that is often overlooked. This intersection of financial exploitation and emotional distress presents a critical perspective on the full scope of exploitation in agricultural supply chains, urging the need for more comprehensive models that account for both the economic and emotional dimensions of supply chain vulnerability.

- **Environmental Sustainability Challenges**

A complex interplay of cultural beliefs, economic pressures, and outdated practices shapes the environmental sustainability challenges within Pakistan's rice industry. A significant hurdle to achieving environmental sustainability in the rice supply chain is the persistent reliance on traditional farming methods contributing to environmental degradation. Stubble burning is particularly detrimental and widespread in Pakistan's rice farming communities. This practice is responsible for air pollution, smog, and various health impacts, a well-documented concern in environmental studies (Kumar & Sing, 2022; Panjala et al., 2025). While existing literature extensively addresses the environmental consequences of such practices, this study critically explores the underlying cultural and psychological factors that perpetuate them. Farmers often rationalise stubble burning to enhance soil health and seed yield, a belief rooted in generational knowledge. One farmer articulated, "We do this because seeds fix and yield well in the soil." This belief reflects the cognitive lock-in phenomenon, where deeply ingrained practices persist despite compelling evidence of their harmful environmental effects (Abudu et al., 2025; Maharjan et al., 2025; Nur, 2025).

Despite the clear environmental and health risks, the resistance to adopting alternative farming practices underscores the need to address not only technical and economic barriers but also the psychological inertia embedded in farming communities (Khan et al., 2025; Ozuzu et al., 2025). This finding extends current environmental sustainability theories by emphasising that effective interventions must consider local cultural contexts and the social construction of farming knowledge.

Environmental sustainability in the rice supply chain is further compromised by the widespread use of unapproved and hazardous chemicals sold by local dealers. These chemicals, often substandard or illegal, pose significant environmental and financial risks to farmers (Abduraup et al., 2025; Ibrahim et al., 2025; Tran et al., 2025). Cutting trees to fulfil the farming communities' energy and fuel needs contributes to deforestation, soil erosion, and biodiversity loss. It introduces a novel dimension by exploring how economic necessity and lack of access to alternative energy sources drive deforestation in rural farming communities. Farmers often resort to cutting trees for cooking and heating due to limited access to modern energy sources.

This research demonstrates that economic survival often takes precedence over environmental considerations in the decision-making processes of lower-tier suppliers. While

much of the existing literature on environmental sustainability emphasises market incentives and government policy (Feng et al., 2025; Ibrahim et al., 2025), this study reveals that any push for sustainable practices must acknowledge the broader socioeconomic context in which these decisions occur. The intersection of energy poverty, limited alternatives, and the economic imperatives farmers face provides a critical perspective on natural resource depletion and sustainability, enriching the theory of sustainable supply chains by integrating energy access into the discourse.

Another significant environmental issue identified in this study is the inefficiency of traditional irrigation methods, such as raw watercourses, which result in substantial water wastage (Shinde, 2025). Agricultural sustainability literature extensively documents water scarcity and inefficient irrigation practices (Jamali et al., 2025). However, this study uncovers an additional layer of complexity of water pollution due to cultural beliefs. The direct discharge of chemical and sanitary waste into local watercourses exacerbates the challenges farmers face, who must contend with dwindling water resources and rising costs due to water contamination.

Monoculture farming in Pakistan's rice sector also contributes to environmental degradation by reducing soil fertility, promoting pest outbreaks, and diminishing biodiversity (Islam et al., 2022; Mattalia et al., 2025; Mihrete & Mihretu, 2025). While monocropping's adverse effects on long-term agricultural productivity are widely recognised, this study introduces a novel cultural barrier to transitioning away from monoculture farmers' deep attachment to traditional farming practices passed down through generations. The reluctance to adopt crop rotation or diversify farming systems stems from a strong cultural commitment to tradition, which has not been thoroughly explored in sustainable agricultural literature. The resistance to altering crop patterns is poignantly captured in the words of an elderly farmer: "How could we change the crop patterns of our ancestors?" This insight adds a nuanced dimension to the theory of agricultural sustainability by showing that cultural preservation and identity can be significant obstacles to implementing more sustainable agricultural practices.

Illegal brick kilns operating in rice fields, which burn plastic and other waste materials, pose a significant environmental challenge. These kilns release harmful pollutants into the atmosphere, contributing to air pollution and respiratory illnesses (Ahmed et al., 2022; Boyd et al., 2024). Such kilns reflect a broader issue of informal economic practices that drive environmental degradation in rural areas. Farmers often view these brick kilns as a supplementary source of income, complicating efforts to phase out their operations. This economic dependence on environmentally harmful practices is rarely addressed in existing supply chain sustainability literature, which focuses on formal sector governance and regulatory frameworks. The challenge here is not only the environmental impact but also the economic necessity that forces farmers to rely on such sources of income

- **Social Sustainability Challenges**

The social sustainability challenges ranging from child labour and sexual harassment to water inequality, caste-based social structures, and health impacts are rooted in deeply ingrained cultural, religious and economic systems that perpetuate social injustices in the rice industry of Pakistan. Child labour, for instance, remains pervasive in Pakistan's rice farming communities, mainly due to cultural norms that view children as essential contributors to the household's economic survival rather than as individuals whose rights are being compromised. The findings suggest that the intergenerational transmission of social norms plays a critical role in perpetuating child labour, with farmers viewing their children's labour as an integral aspect of agricultural life. This cycle of labour exploitation, seen as essential for the family's economic stability, is compounded by limited opportunities for social mobility and economic diversification (Khan et al., 2025; Termeer et al., 2023).

Sexual harassment remains another profound issue, especially for female workers within agricultural communities. Despite its prevalence, sexual harassment is often underreported due to the fear of honour-based violence and the broader societal repercussions for women who challenge such abuses (D'Lima et al., 2020). In rural societies, where patriarchal and honour-based norms are entrenched, women who attempt to report harassment face severe social sanctions, including the threat of violence. However, this study makes an important contribution by examining how economic dependency and a lack of legal protection for women exacerbate their vulnerability in Pakistan's rice industry.

Water inequality is another prominent social sustainability issue in Pakistan's rice growing regions, where smallholders often receive disproportionately less water due to the inequitable distribution of water resources. This systemic water inequality exacerbates socioeconomic disparities and entrenches poverty within these rural communities (Okyere, 2025; Zewdie et al., 2024). Although the issue of resource inequality is widely discussed in the literature, this research introduces a novel perspective by framing water access not merely as an environmental concern but as a central social justice issue. The unequal distribution of water exacerbates social and economic disparities, hindering smallholders' ability to achieve economic stability and thus perpetuating a cycle of poverty. This insight enriches the social sustainability theory by emphasising the role of equitable resource distribution in promoting social equity within agricultural supply chains.

In rural farming communities, social traditions and caste-based norms intensely shape family and marital relationships, often influencing social mobility. Marriages within specific caste groups remain common, often guided by religious and social customs. This cultural practice has led to a high incidence of genetic disorders, such as thalassemia, within certain farming communities. The farmers justify these practices by emphasising, 'We belong to a particular

caste system and cannot marry outside of it,' which encapsulates the deeply rooted sociocultural norms and religious practices that govern family life.

The social implications of caste-based practices extend beyond marriage patterns to health outcomes, as the prevalence of genetic disorders places a significant burden on affected families. While caste-based practices have been studied in the context of social exclusion (Bishwakarma & Roongtawanreongsri, 2025; Kar et al., 2025; Sunam et al., 2025), this study makes a unique contribution by linking cultural traditions to health sustainability. This research underscores that social sustainability cannot be realised without addressing entrenched cultural practices that directly impact individuals' health and well-being (Gupta & Sing, 2025).

Limited social mobility and lack of career prospects for educated youth in rural areas have further exacerbated the social sustainability challenges in these farming communities. By emphasising the psychological and emotional costs of economic inequality and the lack of opportunities, this study contributes to the literature on social sustainability. It suggests that policies aimed at increasing educational and economic opportunities for young people in rural areas are crucial to improving social sustainability within agricultural supply chains.

- **Governance Sustainability Challenges for Intermediaries and Buyers**

The governance sustainability challenges within Pakistan's rice industry are deeply entrenched in structural and systemic issues, including weak regulatory frameworks, cultural norms, and political instability. These factors collectively undermine the effectiveness of sustainability practices, particularly for intermediaries and buyers who face substantial resistance from lower-tier suppliers. A significant governance challenge in Pakistan's rice industry is the weak regulatory framework, which inhibits the enforcement of sustainability practices across the MTSC. Smallholder farmers, particularly at the lower tiers of the supply chain, are often reluctant to adopt sustainability standards because of economic pressures and a cultural attachment to traditional farming practices.

Cultural norms significantly influence the governance challenges intermediaries and buyers face. The deeply ingrained traditional values and practices of farmers create substantial barriers to the effective implementation and monitoring of sustainability regulations. As one respondent from APCL indicated, "The traditional cultural norms, values, and practices also prevent us from implementing and then monitoring the agricultural practices, which raises concerns about sustainability compliance with standards and regulations from our buyers." This issue expands upon existing research that uniquely identifies cultural resistance as a critical factor hindering governance compliance, particularly in rural agricultural settings. It emphasises the need for cultural sensitivity to be incorporated into governance strategies to improve sustainability outcomes. Furthermore, the study reveals how cultural norms create a feedback loop: entrenched values hinder sustainability initiatives and generate resistance to

regulatory compliance. This feedback loop necessitates a rethinking of governance theory, particularly in contexts where cultural traditions play a decisive role in shaping compliance with sustainability standards (Agarwal et al., 2023). This research suggests that social innovation is necessary to foster a cultural shift that can encourage smallholder farmers to engage with sustainability standards (Agarwal et al., 2023; Gerard et al., 2023).

The governance challenges in the rice industry are further exacerbated by political instability and corruption. Political factors, such as local interest groups, wholesalers, and middlemen, manipulate the supply chain to their advantage, undermining governance efforts and sustainability initiatives. One respondent explained, "Some wholesalers obtain illegal third-party sustainability certificates through bribery and political connections and exert influence on local farmers to sell their export-quality crops at local rates against their will." This finding aligns with broader research on corruption and political instability in global supply chains, where these factors disrupt the enforcement of ethical practices and sustainable development initiatives (Bednarski et al., 2025; Rehman et al., 2025). However, this study adds a critical layer to this body of literature by identifying the specific roles of local power dynamics, such as manipulating prices and illegally acquiring sustainability certifications, in perpetuating governance failures. This research underscores the importance of addressing local political structures and corruption as critical components of sustainable governance. The study highlights the problem of lack of transparency and traceability in the rice supply chain. The absence of robust traceability systems and insufficient documentation practices create significant governance challenges for buyers, who struggle to ensure that the rice they purchase meets sustainability and ethical standards. As stakeholders from buying firms highlighted, "The absence of product traceability, especially when purchased from local wholesalers or brokers, and insufficient legal documentation contribute to transparency issues." This is consistent with existing literature on supply chain transparency and traceability, emphasising these factors' importance in ensuring the integrity of sustainability programs (Gupta & Shankar, 2024; Nayal et al., 2025). However, this research provides a novel perspective by examining how local governance failures, specifically at the intermediary level, exacerbate these transparency issues. The inability of buyers to trace the origins and quality of the products they purchase undermines the effectiveness of sustainability initiatives. This highlights the need for improved documentation systems, traceability technologies, and institutional reforms that can address the root causes of governance challenges within the supply chain.

The study draws attention to the power imbalance between intermediaries and buyers, with local wholesalers exerting significant control over the supply chain. This power dynamic often leads to the concealment of unsustainable practices, making it harder for buyers to enforce sustainability standards. This finding suggests that creating shared governance

frameworks, wherein intermediaries and buyers collaborate to improve transparency, is essential for ensuring the long-term success of sustainability efforts in the rice supply chain. It calls for a multi-stakeholder approach to governance that fosters cooperation between all actors in MTSCs rather than relying solely on top-down enforcement.

7.2.2 Sustainability challenges: Roots of invisible chains

RQ 1 (B). The analysis of sustainability challenges revealed new insights into how these issues perpetuate slavery within MTSCs. Building on findings from the second research visit, this discussion explores how the intersection of culture, religion, and society shapes slavery dynamics. Using a narrative lens, it highlights how sustainability challenges reinforce exploitative practices in MTSCs, a unique and unexplored dimension in supply chain literature.

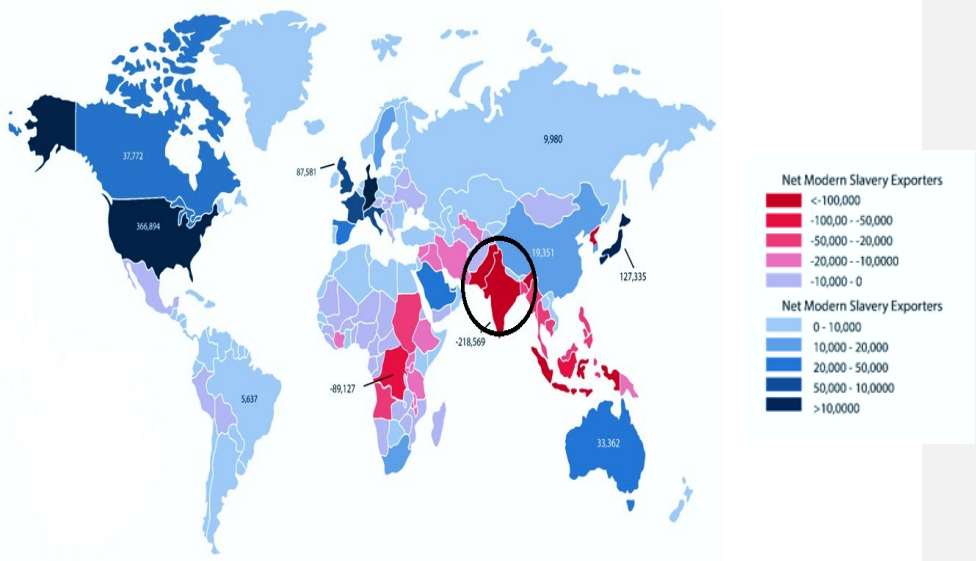
The research analysis, after contrasting and comparing with the existing data, clarified that what the researcher is observing from the research data is not an emerging issue of 'modern slavery' but rather a centuries-old phenomenon shaped and perpetuated by entrenched socio-cultural practices in Pakistan and prevalent in other South Asian countries (**See Map 1 and Figure 7.1**). The analytical discussion reflected that, unfortunately, only a few scholars from the supply chain focused on this issue, and these are the factors that have been underexplored in existing supply chain literature (LeBaron et al., 2021; Lotfi & Walker (2024)). The reason is apparent: the sensitivities of primary research in this domain can create life-threatening challenges, especially in the volatile environment of Pakistan, India and Bangladesh, where people do not compromise on culture and religion. Similar could happen in any part of the world due to sensitivities.

To clarify and investigate this slavery phenomenon further, the researcher returned to the field and lived within the farming communities, where he conducted informal interviews and gathered life histories. This immersive approach allowed us to gain nuanced insights into how these dynamics are deeply woven into local cultural practices. This was the extremely sensitive part of the research. The researcher had to gather the local communities' narratives analytically. Local landlords and progressive farmers supported us immensely and remained with us throughout the process.

"However, they consistently emphasised and confirmed reassurance that the researcher cannot highlight the participants' identity in any situation".

The narratives shared by the farming communities revealed that the chains binding them are not merely economic but socio-cultural and religious—subtle yet powerful forces that have remained largely invisible in mainstream analysis. In addition to field research, the researcher engaged with various stakeholders, including religious scholars, as religion is Pakistan's most significant and sensitive part. The researcher conducted informal discussions with buying firms, aided by key informants from different regions of the world.

This analytical journey was both complex and challenging, requiring us to address a wide range of perspectives.



Map. 1 Net modern slavery patterns of importers/exporters—source: Shilling et al. (2021).

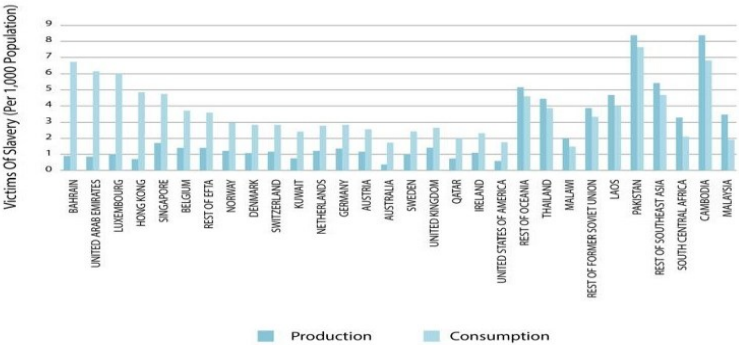


Figure 7. 2 The estimated prevalence of modern slavery footprints (excluding North Korea) moving from production-based to consumption-based accounting. Source: Shilling et al. (2021).

The phenomenon of slavery in Pakistan's agricultural society is deeply rooted in socio-cultural and religious traditions that have endured for centuries. These traditions perpetuate a system of oppression where small-scale farmers or lower tiers in MTSCs remain economically, socially, and psychologically enslaved to large landowners. The sustainability challenges in this context only reinforce the status quo, as power asymmetry, political influence, and cultural practices ensure that the oppressive relationships remain intact (Samonova, 2019; Kara, 2017).

The power asymmetry between landowners and small-scale farmers is at the heart of this system, which leads to a profound and sustained economic and social dependency. The big landowners, who control most of the resources, exploit this imbalance to maintain their dominance, perpetuating a form of slavery that has existed for generations. This power imbalance is further reinforced by the political influence of landowners who occupy vital positions in policy-making and governance, preventing the implementation of reforms that could empower farmers (Landman & Silverman, 2019; Segrave et al., 2017). Their involvement in politics ensures that the vulnerable remain oppressed and bound to the land in much the same way as their forefathers.

The generational master-tenant relationships play a pivotal role in this entrenched system of psychological captivity. Farmers are conditioned into a state of obedience and loyalty to landowners, a relationship that reinforces long-standing exploitative hierarchies. The hierarchical dynamics are further compounded by socio-economic exploitation, where landowners systematically deprive farmers of education and economic opportunities (Kara, 2014). The lack of access to education ensures that farmers remain unaware of their rights, trapped in a cycle of poverty that mirrors the slavery phenomenon that has existed for centuries.

Socio-cultural forces are central to maintaining this system. Landlords often justify their authority as divinely sanctioned, positioning themselves as economic and local leaders. This justification, rooted in local cultural and religious traditions, makes it difficult for farmers to challenge the status quo. The farmers, steeped in cultural traditions of loyalty to local lords, resist change in their lifestyles even when it could benefit them. This resistance to change due to socio-cultural boundaries prevents farmers from adopting more sustainable agricultural practices, ensuring they remain tied to exploitative systems (Kapardis et al., 2025). Religious manipulation further sustains these slavery-like conditions. So-called religious leaders, often aligned with landowners, manipulated farming practices, promoting beliefs in divine control over sustainable practices (Pargas & Schiel, 2023). These non-scientific and irrational practices keep farmers dependent on traditional methods and local authority, preventing them from seeking external advice that could improve their circumstances. The

manipulation fosters an environment where farmers are unwilling or unable to embrace innovation, reinforcing their economic and social subjugation.

Economic exploitation by wholesalers is another dimension of this systemic oppression. Wholesalers exploit farmers through unfair trade practices, including high commissions, delayed payments, and financial manipulation. These tactics trap farmers in financial dependency, further resembling slavery, as they are unable to escape the economic control exerted over them. The lack of technical agricultural education and reliance on outdated methods ensures that farmers remain in economic hardship, with little hope for improvement. Cultural practices and marriage traditions, such as intra-caste marriages and '*Watta Satta*', reinforce social and economic control (Kara, 2017). These practices keep families tied to the same exploitative systems, contributing to the continued oppression and lack of freedom. The cycle of these exploitative practices extends to child labour and early marriages, which are considered culturally acceptable, widely practised and economically necessary in rural communities. These practices perpetuate the generational cycles of poverty and servitude, locking entire families into a state of dependency. Women, in particular, face sexual exploitation and gender-based violence, with societal and legal barriers preventing them from seeking justice or protection (Walby & Shire, 2024). This further entrenches landowners' control over the most vulnerable farming community members, reinforcing the age-old dynamics of power and subjugation. Distrust of external advice, often fuelled by misinformation spread by local leaders and wholesalers that it is against Islamic teachings, prevents farmers from seeking technical help that could liberate them from their dependence on exploitative practices.

These farmers' socioeconomic hardship and debt cycles ensure they remain bound to the land and landowners. Generational debts force them to continue working under suboptimal conditions, with the threat of losing property or imprisonment hanging over them (Fynn-Paul, 2022). These debt cycles, much like the forced labour of slaves, strip farmers of any autonomy they might have had. The above discussion reflects that the sustainability challenges in Pakistan's agricultural society do not merely introduce modern forms of exploitation but sustain a centuries-old system of slavery. This ongoing phenomenon, rooted in socio-cultural and religious traditions, ensures that small-scale farmers remain economically, socially, and psychologically enslaved to large landowners, with little hope for emancipation. The entrenched power structures, cultural norms, and religious manipulations that have long defined rural life in Pakistan continue to uphold this slavery phenomenon, preventing meaningful change or progress. However, the discussion below highlights how breaking these so-called cultural norms through good governance can be challenged. **Table 7.1** highlights the sustainability challenges and how they shape the slavery phenomenon in Pakistan's MTSCs in the crop agri-food sector.

Table 7. 1 Unveiling Insights: Slavery phenomenon across farming communities.

Theme	Findings	Relation to Slavery Phenomenon
Power asymmetry and exploitation	Significant power imbalances exist between large-scale landowners and small-scale farmers.	Power asymmetry perpetuates economic and social dependency, maintaining a system of contemporary slavery.
Political influence	Landowners are involved in politics and policy-making, hindering reforms.	Political influence prevents the implementation of reforms, keeping farmers dependent and vulnerable.
Master-tenant relationships	Generational master-tenant relationships lead to psychological captivity.	Long-standing hierarchical relationships reinforce obedience and exploitation, perpetuating modern slavery dynamics.
Socio-economic exploitation	Systematic deprivation by landowners and lack of access to education keep farmers unaware of their rights.	Socioeconomic control and lack of education keep farmers in a cycle of poverty and dependency, akin to slavery.
Cultural and religious justifications	Landlords justify authority as divinely sanctioned; farmers resist change due to cultural traditions and loyalty to local lords.	Cultural and religious beliefs reinforce exploitation and prevent change with a notion of 'what the souls of our ancestors will say' sustaining slavery-like conditions.
Resistance to change	Farmers resist change due to deep-rooted cultural traditions and family loyalty to local lords.	Resistance to change due to peer pressures and fear of what people will say prevents adopting sustainable practices, maintaining dependence on exploitative systems.
Economic exploitation by wholesalers	High commissions, delayed payments, and financial manipulation by wholesalers.	Economic exploitation through unfair practices traps farmers in financial dependency, a characteristic of slavery.
Financial constraints and conventional practices	Lack of technical agricultural education leads to adherence to conventional farming methods and inadequate irrigation systems.	Financial constraints and reliance on outdated practices trap farmers in economic hardship, reinforcing slavery-like conditions.
Religious manipulation	Spiritual leaders manipulating farming practices; belief in divine control over agriculture.	Religious manipulation (everything is in God's hands) sustains non-scientific practices and dependence, contributing to a slavery-like state.
Child labour and marriages	Child labour and early marriages are seen as culturally acceptable and economically necessary.	Child labour and early marriages perpetuate cycles of poverty, emotional burdens at an early age and exploitation, captivating the young population into a permanent state of psychological slavery.
Sexual exploitation and gender-based violence	Workplace harassment of females; societal and legal barriers to reporting.	Sexual exploitation and lack of legal recourse create unsafe environments, reinforcing control and exploitation of local leaders.
Legal exploitation	Absence of legal documentation for land and supply chain operations; landlords deny land rights to tenants.	Lack of legal protection and documentation enhances vulnerability and exploitation, promote dependence over local landlords.
Distrust of external advice	Misinformation about external agricultural advice by local leaders, portraying technical experts as foreign agents.	Distrust of external advice maintains dependence on local authorities and traditional practices, perpetuating exploitation.

<i>Socioeconomic hardship and debt cycles</i>	Generational debts and family obligations force farmers to work in suboptimal conditions; debts often lead to loss of property and illegal imprisonment by landlords.	Socioeconomic hardship and debt cycles ensure continuous exploitation and lack of autonomy, characteristic of modern slavery.
<i>Cultural practices and marriage traditions</i>	Intra-caste and consanguineous marriages cause genetic disorders; 'Watta Satta' marriages reinforce social and economic control.	Cultural practices like forced marriages reinforce social control and dependency, particularly over females and kids, contributing to a slavery-like state.
<i>Supply Chain exploitation</i>	Landlords provide low-quality inputs, leading to debt and economic traps; wholesalers manipulate metrology and payments, further exploiting farmers.	Exploitative supply chain practices keep farmers in debt due to low quality inputs and output is minimum intact financial dependency of farmers.

7.2.3 Theoretical contributions

The first objective of the research makes several significant theoretical contributions to the study of sustainability challenges in MTSCs, particularly from the perspective of developing economies. It addresses the critical areas proposed by Senyo and Osabutey (2023) and Kähkönen et al. (2023) while comprehensively examining the sustainability challenges faced by lower-tier suppliers and governance issues encountered by intermediaries and buyers.

Below are the key theoretical contributions in detail:

- **Integration of the Triple Bottom Line (TBL) and ESG Models**

One of the most significant contributions of this research is the integration of the TBL and ESG models through chain governance to analyse various variables for sustainability compliance, such as the economic, environmental, social and governance dimensions of sustainability within MTSCs. This is probably one of the pioneer investigations that comprehensively highlights the systemic nature of sustainability challenges in MTSCs. This hybrid model provides a comprehensive framework to understand the complexity of sustainability in MTSCs, especially in developing countries where lower-tier suppliers face systemic challenges distinct from those in more developed markets. The first objective also significantly addresses the direction of comprehensive research regarding the governance dimensions in the supply chain proposed by Boström et al. (2015). These advance the understanding of governance challenges within MTSCs by focusing on the role of intermediaries and the power dynamics they exert over lower-tier suppliers. This dimension fundamentally complements the study of Boström et al. (2015).

This research addresses Senyo and Osabutey's (2023) call for a holistic investigation of sustainability in MTSCs by offering a more inclusive perspective that collectively examines these three dimensions.

- **Cultural and religious influences on supply chain sustainability**

Another significant contribution of the first objective is the research's exploration of how cultural and normative values and religious beliefs shape power dynamics within the supply chain and disrupt efforts to implement sustainable practices. In the Pakistani rice industry, for instance, the persistence of exploitative practices such as traditional farming methods (e.g., stubble burning) is reinforced by deeply entrenched cultural norms. This highlights the cultural embeddedness of supply chains in developing economies and how these normative values shape the behaviour of various actors, including lower-tier suppliers and intermediaries. The research responds to Gruchmann's (2022) suggestion to focus on the actions and relationships of intermediaries by showing how culture compels power structures and prevents the enforcement of sustainability initiatives, offering insights into how societies interact within the supply chain.

- **Social sustainability and societal interaction in MTSCs**

Another significant theoretical contribution of objective one is its examination of social sustainability within MTSCs, particularly in labour practices and resource distribution and how it disrupts environmental, economic and governance sustainability. A detailed investigation in sensitive environments such as Pakistan has never been explored, and challenges such as honour killing in the supply chain have been discussed probably for the first time in literature. The findings underscore how societal structures, such as gender roles (Tabassum, 2025) and child labour (LeBaron et al., 2021) intersect with supply chain operations. The persistence of child labour, considering it as '*this is how we do*,' highlights how societal norms perpetuate unsustainable labour practices in the MTSCs. This objective also highlights how child labour is promoted. The objective also addresses the research call of Kähkönen et al. (2023), who call for a comprehensive exploration of how sustainability challenges differ across tiers and regions, particularly in developing economies.

- **Advancing social network analysis**

The first objective probably reflects a pioneering understanding of social network analysis: how the relational embeddedness of societies transverses into organisational or structural embeddedness (Chatterji et al., 2020). This highlights how different MTSC segments, from individuals to families and then families to whole villages, including wholesalers, local chiefs, and religious leaders, penetrate and work in a social system.

- **Normative power structures and supply chain disruption**

Finally, this research highlights how normative power structures disrupt the flow of sustainability in MTSCs. For instance, cultural norms around patriarchal wage systems, caste-based marriages, and traditional farming methods create a structural rigidity that prevents the adoption of modern, sustainable practices. These findings contribute to a deeper understanding of how normative pressures in developing societies influence the behaviour of lower-tier suppliers and how these pressures challenge the implementation of sustainability across the MTSC operations (Moussa et al., 2022). This theoretical insight offers a novel perspective on how social and cultural forces shape the interactions and relationships within MTSCs, complicating the governance and sustainability efforts of buying firms and intermediaries.

7.2.4 Theoretical and practical contribution regarding the phenomenon of slavery

- **Power asymmetries and neocolonial hierarchies**

The discussion reveals that contemporary slavery in Pakistani farming communities is deeply rooted in power imbalances reminiscent of colonial structures. Large-scale landowners, descendants of colonial-era chiefs, control small farmers through political influence and social hierarchies. This highlights a new theoretical line of thought by linking modern slavery in agricultural systems to enduring neocolonial hierarchies, where historical caste and social

class divisions continue to perpetuate socio-economic dependency and exploitation (Satriadi et al., 2025). This opens up new dimensions for understanding how colonial legacies manifest in modern forms of exploitation.

- **Psychological and cultural captivity**

A new contribution is the concept of psychological slavery, where farmers' obedience to landlords is not only economic but also rooted in generational socio-cultural norms. The notion of 'psychological captivity' expands the understanding of slavery by incorporating sociocultural factors that go beyond economic constraints (Piatt et al., 2025). This introduces a theoretical shift from viewing slavery merely as a form of economic exploitation to seeing it as an intergenerational sociocultural phenomenon.

- **Cultural and religious influences on slavery**

The discussion shows the role of sociocultural and religious norms in reinforcing contemporary slavery. Practices like intra-caste marriages, child labour, and child marriages are explored as both contributing and maintaining factors of bondage (Thorat & Aquil, 2021). This adds to existing scholarship on how cultural values and religious dogmas impact economic exploitation and social behaviour.

- **Invisible confinements**

Similarly, the discussion highlights the role of invisible, socio-religious confinements, suggesting new lines of inquiry into cultural hegemony and how norms of obedience and economic control are sustained without direct coercion (Middlemass, 2025). The research expands cultural studies and power theories, focusing on subtle mechanisms perpetuating generational exploitation.

- **Intersectionality in agricultural slavery**

This discussion offers a more comprehensive view of the intersection between gender, class, and labour exploitation. It provides theoretical contributions to intersectionality by revealing how various social determinants—caste, gender, religious belief, and class contribute to the stratification and exploitation of lower-tiers or small-farming communities (Kapardis et al., 2025).

- **Socioeconomic and environmental impacts of conventional practices**

The discussion presents the new argument that slavery in farming communities extends beyond human exploitation to environmental degradation. Ancestral bindings in agricultural practices such as stubble burning create a form of environmental slavery, where traditional farming methods contribute to ecological harm. This unique dimension broadens the theoretical framework of slavery, tying it to sustainability and environmental justice.

7.2.5 New lines of thought

- **Religious and cultural justifications of exploitation**

The discussion points to how cultural and religious narratives—like "*God's will*" or religious traditions— are used to justify exploitation. This leads to the development of new avenues for research on the intersection of religion, culture, and slavery, particularly in how these are manipulated to maintain control.

7.3 Discussion, theoretical contribution and practical implications of RQ 2

By sensing traditional, religious, and culturally diverse practices unique to Pakistan, APCL NRSP, a key intermediary in the rice industry's MTSC, employed a comprehensive bottom-up strategy to integrate lower-tier suppliers into mainstream business operations. The following section explores intermediaries' various roles in complying with MTSCs, as highlighted below.

7.3.1 Social networking of lower-tiers: collectivistic approach (Social Mobilisers, Tier 4 Intermediaries)

APCL's strategy to promote sustainable agricultural practices is based on social networking, positioning it as an outreach platform for smallholder farmers before the rice farming season. NRSP's HRD office is at the core of this strategy, which operates as a 4th-tier intermediary in the supply chain. Trained social mobilisers, typically native graduates from local farming communities, represent a key component of this strategy. By leveraging social networks embedded within rural communities, APCL strengthens relationships with lower-tier suppliers and promotes sustainability practices that align with local cultural and social structures.

The concept of social networking within this strategy is deeply embedded in social sustainability theory, where collectivistic values play a crucial role in addressing the needs of lower-tier suppliers. This approach mirrors the findings of Han et al. (2020) and Xavier et al. (2023), who highlighted that collective action, particularly in culturally cohesive communities, can enhance the adoption of sustainable practices by fostering trust and solidarity. In this case, the social mobilisers' deep-rooted ties to farming communities allow them to act as bridges between lower-tier suppliers and more formal institutional structures, fostering inclusivity in sustainability efforts.

The social mobilisers' role in facilitating communication among farmers and local communities emphasises the relevance of community-based participatory models in the literature (Arowosegbe et al., 2024; Kumar et al., 2025). By engaging farmers in the initial stages of the farming season, social mobilisers can better understand their challenges, allowing for the customisation of interventions. This asserts that bottom-up approaches tailored to local needs tend to succeed more than top-down enforcement, especially in agricultural contexts where local knowledge and traditions are deeply entrenched (Runck et al., 2022; Valve et al., 2025). The critical advantage of this strategy is that it empowers

farmers, who are often at the mercy of more significant supply chain actors, by creating a shared sense of ownership over sustainability practices.

Community-based interventions such as awareness seminars and participatory workshops by APCL NRSP in the rice sector further reinforce this bottom-up model, promoting an environment where local farmers not only receive training but also engage in dialogue about their challenges and aspirations (Aboah et al., 2025; Mishra et al., 2024). As one of the social mobilisers explained, “This community-based approach helped us to customise interventions to address the specific needs and challenges faced by each farmer’s group.” This insight aligns with Bastias et al. (2025), who emphasised that interventions rooted in the socio-cultural fabric of local communities enhance local agency and contribute to more successful sustainability outcomes.

Moreover, introducing modern information technology through geo-fencing and central monitoring at APCL illustrates a shift towards digital inclusion in agriculture. This technological initiative reflects that access to modern technologies can bridge the power gaps between large-scale and smallholder farmers (Shirazi & Hajli, 2021; Sulfiana, 2025). However, while technological adoption is promising, it is crucial to critically assess whether the infrastructural and educational barriers in rural areas might hinder its widespread implementation (Feurich et al., 2024; Sun et al., 2024; Zhang & Fan, 2024).

Social mobilisers also play an essential role in knowledge dissemination by educating farmers on sustainable farming practices, including water conservation, the use of renewable energy, and bio-fertilisers. Sustainability literacy among lower-tier suppliers is extremely important to foster long-term adoption of green practices (Bennett & Grabs, 2025; Setyadi et al., 2025). By providing farmers with theoretical knowledge and practical guidance on implementation, the mobilisers ensure that sustainability becomes a tangible and actionable concept for these rural communities.

Integrating local knowledge and modern farming techniques reflects a hybrid approach that blends traditional practices with innovations, enabling more sustainable farming. However, the contextualisation of these interventions in culturally specific settings cannot be understated. The farmers’ understanding of sustainability is shaped by their socio-economic conditions, cultural practices, and historical experiences. Thus, any top-down imposition of sustainability practices without considering local traditions risks alienating farmers and undermining long-term adoption (Sanusi et al., 2025; Tseng et al., 2025).

7.3.2 Credits for farmers: Need-based approach (NRSP Bank, Tier 3 Intermediaries)

In Pakistan’s rice industry, access to financial resources is one of the most significant barriers to adopting sustainable farming practices. Recognising this, NRSP’s Microfinance Bank, acting as a 3rd-tier intermediary, addresses the critical challenge of financial exclusion by offering need-based micro-financing schemes designed to empower farmers. This

initiative is crucial for ensuring farmers can invest in sustainable methods, increasing productivity and supporting long-term growth.

NRSP's microfinance model exemplifies a bottom-up financial inclusion approach, which aligns with the growing body of literature advocating for integrating financial services into rural agricultural supply chains. According to Brauw et al. (2021), microfinance is pivotal in lifting marginalised communities out of poverty by offering access to credit that would otherwise be unavailable through traditional banking systems. In the case of Pakistan's rural areas, where most farmers operate within an informal economy, the need-based credit schemes offered by NRSP act as a lifeline, enabling farmers to purchase sustainable inputs such as quality seeds, fertilisers, and irrigation equipment.

The strategic placement of the microfinance bank next to APCL's main gate further enhances its accessibility, making financial services more available to farmers and thus mitigating the geographical accessibility barriers often encountered by rural communities (Wasan et al., 2023; Zlati et al., 2023).

The microfinance bank's sensitivity to local cultural and religious concerns is particularly critical to this intervention. Many farmers, particularly in rural Pakistan, are cautious about engaging in conventional banking systems due to religious prohibitions on interest-bearing loans. This concern significantly limits the adoption of formal financial services. NRSP's decision to integrate Islamic financing principles into their offerings represents a contextually appropriate solution, allowing farmers to align their financial practices with their religious beliefs. Islamic finance is an effective tool for fostering economic inclusion in Muslim-majority societies, where conventional banking systems often face resistance (Anggara & Nuraeni, 2025; Zain et al., 2024).

The relationship between NRSP and local religious scholars to provide 'fatwas' (religious rulings) is a strategic effort to address farmers' religious anxieties. By embedding religious principles into the design of financial products, NRSP has effectively overcome one of the key barriers to financial inclusion in rural farming communities.

Furthermore, the educational sessions conducted by the microfinance bank in collaboration with muftis and religious scholars go beyond financial literacy to encompass business ethics and gender rights, which are often marginalised in traditional farming communities. This initiative aims to bridge the gap between traditional Islamic values and modern business practices, fostering a more inclusive and equitable approach to development. Integrating gender-sensitive approaches into financial interventions in patriarchal societies can lead to more sustainable and inclusive outcomes, especially when empowering women farmers with financial knowledge and resources (Handayani et al., 2022; O'Brien et al., 2019; Qizam et al., 2025; Quisumbing et al., 2019).

Critically, while NRSP's approach provides a holistic framework for financial empowerment, there remains a concern regarding the sustainability of such initiatives. For instance, microfinance can provide a temporary financial solution without addressing deeper issues such as the structural power imbalances within rural markets; it risks merely reinforcing the status quo (Ndlovu et al., 2025).

7.3.3 Change Agents: Action-oriented approach (Progressive Farmers, Tier 2 Intermediaries)

In the third phase of NRSP's sustainability intervention in Pakistan's rice industry, progressive farmers were strategically introduced as tier-2 intermediaries, pivotal in facilitating sustainability compliance across the MTSC. Progressive farmers, who are well-educated, own personal land holdings and are respected figures within their communities, serve as cultural and social change agents within the supply chain. By leveraging the respect these farmers hold within their communities, NRSP ensures that peer influence is central to promoting sustainable agriculture (Wicklow & Shortall, 2024).

With the support of APCL NRSP, the introduction of model farms by these progressive farmers equipped with modern farming facilities and weather stations represents a holistic approach to farming innovation, where progressive farmers not only promote the adoption of new technologies but also ensure that the benefits of these innovations are locally tailored (Yang et al., 2024). As practical demonstrations of modern agricultural practices, model farms serve as effective platforms for showcasing the advantages of sustainable farming and reducing knowledge gaps among local farmers (Arora et al., 2025; Mazumdar et al., 2025). These farms, designed to test new seed varieties and fertiliser trials, acted as living laboratories, fostering a culture of experimentation and knowledge-sharing.

The key strength of this intervention lies in the socio-cultural context of its implementation. For instance, progressive farmers were not merely tasked with disseminating technical knowledge; instead, they acted as bridges between the traditional farming community and the modern agricultural practices advocated by NRSP. Their role extended beyond technical support to addressing broader cultural and emotional barriers to sustainable farming. Moreover, as local influencers, they facilitated the engagement of farmers in practical training sessions and field visits, providing free technical support. This approach helped build trust within the community. It ensured that adopting new practices was grounded in local realities, emphasising that community-based approaches to sustainability are often more successful than top-down interventions (Day & Singh, 2025).

A critical aspect of the progressive farmer's role was using portable soil testing labs to evaluate nutrient levels and optimise soil conditions. This practical tool helped farmers address immediate soil quality issues and raised awareness about the broader environmental impacts of unsustainable farming practices. The progressive farmers also

educated local communities on the dangers of waste disposal in canals, a significant issue due to the practice of dumping human and animal waste in water sources. By collaborating with social mobilisers, these farmers effectively communicated the importance of waste management for preserving water quality, a crucial step in mitigating environmental pollution. In addition to their environmental advocacy, progressive farmers were key in addressing youth unemployment in rural farming communities. By engaging young farmers in agriculture and showcasing the economic viability of farming, they helped shift the cultural narrative that salaried jobs were the only legitimate means of earning. However, the emotional challenges of young farmers should not be overlooked. The tragic incidents of suicides reported among young graduates, who faced intense pressure from their families for not securing salaried jobs, underscore the mental health challenges faced by rural youth. This underscores the need for a more holistic support system that addresses young farmers' economic and psychological needs (Abue et al., 2025; Lone & Baba, 2024).

The NRSP microfinance department's collaboration with progressive farmers to train young local farmers in using certified seeds and fertilisers further contributed to the economic sustainability of farming practices in the region. By emphasising economic viability and environmental sustainability, these farmers acted as multipliers, amplifying the impact of NRSP's sustainability initiatives.

7.3.4 Sustainability strategist: Holistic approach (APCL, Tier 1 Intermediary)

In sustainability compliance, APCL, as a tier-1 intermediary, plays a central role in shaping the rice industry's sustainable practices by orchestrating a comprehensive strategy that integrates all intermediaries within the MTSC. APCL's sustainability strategy begins at the rice harvesting process, where farmers' laden vehicles undergo registration at the company's gate. This step initiates a process of traceability, where each vehicle receives a specific code, which is cross-referenced with field codes assigned to farmers by social mobilisers (tier-4 intermediaries). This system ensures integrity in the grain collection process by aligning specific field locations with the harvested grains. Implementing such traceability systems is essential in building accountability and trust within supply chains, particularly in developing regions where local systems often lack the sophistication to ensure fairness (Madrewar et al., 2025; Thao et al., 2025).

In pursuit of fairness and social-environmental protection, APCL goes beyond traditional measures by creating a farmer-friendly environment at its gates. The company ensures that farmers' grains undergo quality testing at accredited labs, and their prices are determined after careful analysis of these tests. This transparent pricing mechanism helps eliminate the exploitative practices that local wholesalers have traditionally applied, such as vibration-induced measuring cuts, which systematically deprive farmers of their rightful payments.

Furthermore, APCL's grain quantification equipment at entry points has addressed the long-standing issue of unfair measurement practices by local brokers. APCL's approach represents a shift towards precision in grain measurements, ensuring that farmers receive fair payments based on accurate assessments. This measure is also consistent with Islamic financial principles, as emphasised by APCL's CEO, who ties the company's business practices to religious values. This alignment between business operations and religious ethics fosters a moral economy, where economic transactions are seen as part of a larger ethical framework, contributing to the long-term sustainability of the supply chain (Bannor et al., 2025; Shobur et al., 2025; Wright et al., 2025).

APCL's commitment to sustainability extends beyond financial fairness to include environmental protection and technological innovation. The company has adopted sustainable technologies such as steam turbines, bio-fertilisers, and biofuels to combat stubble burning, which had previously posed a severe environmental risk. By purchasing residues from farmers, APCL has provided an additional income stream for farmers while simultaneously addressing the greenhouse gas emissions resulting from stubble burning (Angola et al., 2025; Mugoni et al., 2025). This move demonstrates the company's commitment to reducing its carbon footprint and represents a win-win solution for farmers and the environment (Carvalho et al., 2025; Mohapatra et al., 2025).

APCL's storage facilities also exemplify the company's holistic approach to sustainability. By offering farmers affordable storage solutions with the option to withdraw a significant portion of their stored crops within 24 hours, APCL alleviates farmers' financial pressures when they expect prices to rise post-harvest. This flexibility supports farmers' financial autonomy, allowing them to manage their harvests based on market conditions. Providing such financial liquidity is crucial in empowering farmers, particularly in regions with limited access to capital and financial services (Obonyo et al., 2025; Şener et al., 2025).

The company's engagement in crop rotation by offering off-season seeds further encourages farmers to diversify their crops, enhancing soil health and agricultural sustainability. This practice aligns with the broader goal of sustainable land use and ensures that farmers remain resilient to market fluctuations and environmental stresses, crucial in maintaining long-term productivity (Sanusi et al., 2025; Vern et al., 2025). Solar tube well subsidies offered by APCL incentivise farmers who demonstrate exceptional compliance with sustainability practices, creating a feedback loop that rewards performance and encourages continuous improvement within developing countries (Asim et al., 2025).

By facilitating the integration of lower-tier stakeholders through programs like peer-to-peer learning, microfinance support, and access to modern technologies, APCL has created a systemic model for promoting sustainability throughout the rice supply chain. This approach starkly contrasts the traditional rice supply chain in Pakistan, where exploitation by local

dealers and lack of transparency have hindered the growth of the agricultural sector. Through its holistic sustainability strategy, APCL has transformed the MTSC of Basmati rice, setting a new benchmark for sustainable supply chains in Pakistan’s agricultural industry. **Figure 7.1** highlights the refined methodology of sustainability compliance in MTSCs through intermediaries.

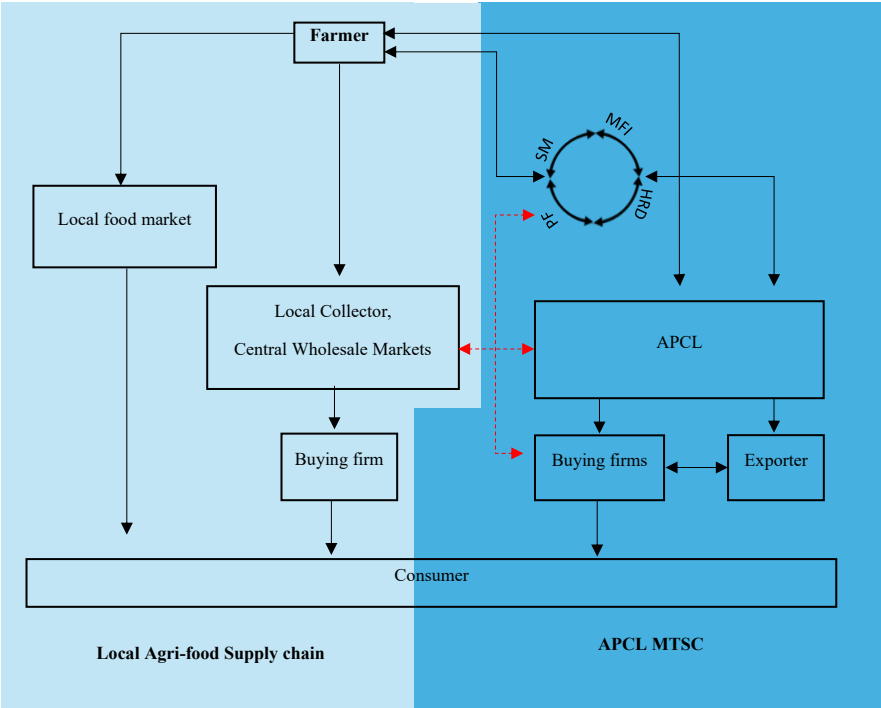


Figure 7. 2 Comparison of the existing local supply chain structure and the APCL NRSP MTSC in Punjab, Pakistan (APCL, Agri Processing Company Limited; HRD, human resource development; MFI, Microfinance institute; PF, progressive farmer; SM, social mobiliser).

7.3.5 Theoretical contributions

The second research objective provides a detailed examination of intermediaries' roles in promoting sustainability compliance in MTSC. The findings contribute new insights into how intermediaries support sustainability, manage risks, and facilitate relationships across tiers in the supply chain. Most importantly, they show how first-tier intermediaries based in the suppliers' locations contribute to developing inclusive strategies for all MTSC stakeholders to foster sustainable socioeconomic growth.

Below are the comprehensive theoretical contributions derived from this research:

- **Intermediaries as socio-technical and socioemotional support systems**

The research advances MTSC theory by demonstrating how intermediaries, particularly in this research tier-2 progressive farmers, offer socio-technical and socioemotional support to lower-tier suppliers. This research advances MTSC theories by revealing how intermediaries, particularly tier-2 progressive farmers, provide both socio-technical and socioemotional support to lower-tier suppliers. This extends the theoretical contributions of Al-Tabbaa et al. (2023), Cuevas-Rodríguez et al. (2023), Firiray & Gomez-Mejia (2021), Gomez-Mejia et al. (2024), and Hsueh et al. (2023), which suggest that emotional support can extend beyond family and extended networks to include business stakeholders. Specifically, this study highlights the importance of socio-emotional support in addressing issues such as modern slavery within MTSCs. The findings offer distinctive theoretical insights into how stakeholders in collectivist societies promote socioemotional alongside socio-technical support, positioning socioemotional support as a key compliance strategy for stakeholders across tiers and supply chains. Many sustainability experts have highlighted socio-technical support, but how this support works through socio-emotional support is driven potentially for the first time in MTSC literature. These progressive farmers serve as change agents, providing technical assistance and socioemotional support by fostering peer-to-peer learning and creating a sense of community among farmers. This aligns with Gruchmann (2022), who highlights the importance of intermediaries in building relationships that foster trust and compliance. The socio-emotional connection cultivated by progressive farmers is crucial in ensuring the cultural acceptance of sustainable practices, adding a new dimension to social learning theory within MTSCs. This also highlights the importance of peer cooperation in the diffusion of sustainability innovations and builds upon Mena et al. (2013) by showing how intermediaries at the second tier can foster peer-to-peer learning and create a ripple effect that encourages adopting sustainable practices across the entire supply chain.

- **Managing cultural sensitivities and religious education**

One of the key contributions of this research is its exploration of how cultural sensitivities and religious values shape the implementation of sustainability practices. In Pakistan's rice industry, where religious norms strongly influence decision-making, intermediaries like NRSP Microfinance Bank (tier 3) play a pivotal role by providing Islamic-compliant financial support to farmers. This approach, which includes working closely with local religious scholars to issue fatwas (religious sermons) supporting the legitimacy of microfinance, addresses a critical gap in the literature regarding integrating religious education into supply chain sustainability frameworks. This finding responds to Busch et al. (2024) and Cole & Aitken (2020) by illustrating how religious sensitivities must be managed to ensure the success of sustainability interventions in culturally conservative contexts. By offering religious education sessions on Islamic finance, business ethics, and gender rights, intermediaries help bridge

the gap between traditional values and modern business practices, enhancing sustainability compliance in MTSCs.

- **Product formation process and traceability**

This objective significantly contributes by comprehensively analysing the entire product formation process within the supply chain, particularly focusing on traceability and transparency, which are universal challenges in MTSCs. Life cycle assessment of a product is the key subject of sustainable development. However, traceability in a sensitive environment hidden from the world is the milestone achievement of researcher's second objective. At the first-tier level, APCL ensures that the entire product formation process, from harvesting to pricing—is transparent and sustainable. By implementing grain quantification systems and eliminating corrupt practices by local wholesalers, APCL ensures that farmers are compensated fairly, addressing the long-standing issue of exploitative weighing systems. Using geofencing, bio-fertilisers, and off-season soil management through crop rotation by APCL reflects an integration of sustainable technologies into the supply chain, reinforcing the circular economy model. This also contributes to the application of the circular economy model in technologically less advanced countries. This refines the MTSCs governance mechanism of Perri & Buchan (2018), Kumar & Beerepoot (2021), Guerrero et al. (2021), Kivimaa et al. (2019), and Kanada et al. (2020) by highlighting how intermediaries can enforce traceability and transparency throughout the MTSC, ensuring that sustainability practices are adhered to at every stage of the supply chain.

- **Sustainability as a community-based effort (Collectivistic Approach)**

A unique theoretical contribution of this study is its emphasis on community-based approaches to sustainability, mainly through the work of social mobilisers (tier-4 intermediaries). These mobilisers use social networks to engage with farmers collectively, ensuring that sustainability practices are socially accepted and integrated into local farming traditions. This collectivistic approach strengthens social cohesion and empowers marginalised groups, ensuring that lower-tier suppliers are not excluded from the sustainable development process. The research builds on Noviaristanti et al. (2023) by showing how intermediaries at the grassroots level can create local networks that foster inclusivity and equitable access to resources. Recruiting social mobilisers from the farming community shows how effectively the sensitivities of a society can be addressed through or within the society.

- **Holistic sustainability governance by first-tier intermediaries**

The second objective solves two consistent theoretical puzzles in sustainable supply chain literature: 1, How first-tier intermediaries based in the suppliers' locations contribute to developing inclusive strategies for all MTSC stakeholders to foster sustainable socioeconomic growth (Marttinen & Kähkönen, 2022; Miandar et al., 2023; Najjar & Yasin,

2023). 2. The assumptions that intermediaries' roles and actions are critical in shaping sustainability outcomes within MTSCs for the sustainable development of developing countries are examined (Reardon & Vos, 2023; Sharma et al., 2023; Sharma et al., 2024).

7.3.6 Practical Implication

- **Development of distinct governance model in MTSCs**

The second objective of the research has generated a unique governance model for MTSCs in which the integration of all the stakeholders has been ensured, and the traceability of the entire product formation is managed (*Figure 7.1*).

The current research established a refined and systematic methodology to ensure sustainability compliance through intermediaries for sustainability compliance within the MTSC of APCL NRSP in Punjab, Pakistan's rice industry. APCL played a strategic role in this model, orchestrating interactions and integrating all stakeholders in closed MTSC operations throughout the product formation cycle. Overall, a multi-level governance approach involving local intermediaries was adopted in the research for operational management, combining network analysis and an in-direct governance structure (AlMalki & Durugbo, 2023; Wilhelm & Villena, 2021). Decision-making power was distributed across different intermediaries, examining intersections between levels for sustainability compliance throughout the product cycle (Steinberg, 2023). The sustainability compliance practices of the APCL in Pakistan's rice industry demonstrate a holistic approach to responsible business practices for the sustainable development of lower-tier suppliers. From farmer engagement to post-harvest interventions, their strategies focus on fairness, transparency, and ethical conduct—a significant way towards a sustainable Pakistan. This governance mechanism in MTSCs can be a practical model for the supply chain practitioner for sustainable development, particularly in the developing world and, more precisely, the South Asian Region.

7.4 Discussion, Theoretical contribution and Practical implications of RQ 3

The study delves into the strategies adopted by buying organisations to address challenges within their MTSCs, explicitly focusing on sustainability compliance. Three principal strategies emerged in this research: the transitional management approach, indirect management leading to a polycentric framework, and management through third parties. The role of APCL was pivotal in facilitating these strategies. Although buying firms implemented different approaches depending on their policies, APCL maintained a central role in managing the supply chain's sustainability practices discussed below.

7.4.1 Transitional management approach: Fostering direct interaction

The transitional management approach emphasises the importance of establishing direct relationships between buyers and lower-tier suppliers as a means of enhancing communication, accountability, and transparency throughout the supply chain (Mena & Choi, 2013; Tachizawa & Wong, 2014). This approach extends beyond traditional supplier-buyer

dynamics, involving direct engagement with lower-tier actors, which empowers buyers to exert more control over product quality, environmental practices, and overall sustainability compliance. Buyers can address issues that may remain undetected in conventional supplier-buyer relationships by embedding sustainability practices throughout the supply chain (Arianpoor et al., 2025; Dai et al., 2025; Karaosman et al., 2024; Sheng et al., 2025). In this research, two buying firms successfully adopted this approach by fostering direct interaction with lower-tier suppliers with the support of progressive farmers, who acted as intermediaries. These progressive farmers, already well-established in their communities and equipped with modern agricultural practices, became the agents linking APCL, the buying firms, and lower-tier suppliers. Leveraging local intermediaries can enhance supply chain governance by overcoming the challenges of distance and complexity in MTSCs (Wilhelm et al., 2024).

The direct engagement strategy involved several proactive measures, including site visits by the buying firms each year before contract renewals. These visits were accompanied by workshops and interactive seminars focused on CSR practices, which created an opportunity for two-way communication between buyers and suppliers. This platform enabled the buying firms to address previous issues related to product quality (e.g., mixed grains) and sustainable farming practices (Mokadem et al., 2025; Siddiqi et al., 2025). It also allowed them to understand better the challenges faced by lower-tier suppliers.

The progressive farmers played a pivotal role in organising these workshops and interactive forums, ensuring all stakeholders across the supply chain were included in the discussions. These activities, sponsored by APCL at the request of the buying firms, helped create a collaborative framework, enabling the buyers to communicate expectations and concerns directly with lower-tier suppliers. The direct interaction also extended to engaging with young farmers within the community. By investing in the education and development of young graduates, the buying firms ensured that future farming practices would align with global sustainability standards, ultimately benefiting both the local community and the broader supply chain (Arianpoor et al., 2025; Dai et al., 2025).

This engagement was reinforced by introducing external technical experts who provided hands-on training on sustainable agricultural methods. These initiatives helped build trust and transparency, addressing previous concerns related to mixed product quality and exploitative labour practices. The transitional management approach effectively strengthened supplier relationships, fostering collaboration and dialogue between buying firms and the lower-tier suppliers. Directly engaging lower-tier suppliers in sustainability efforts, buying firms could exert influence over socioeconomic and environmental practices, ultimately reducing the likelihood of product quality issues and unethical labour practices (Anjomshoae et al., 2025; Bednarski et al., 2025; Karaosman et al., 2024; Sheng et al., 2025). Through this

strategy, buyers were able to address the root causes of issues, ensuring that all tiers of the supply chain operated in a manner consistent with sustainability principles (Chae et al., 2024; Chae et al., 2025; Wilhelm et al., 2024).

7.4.2 Indirect management leading to a Polycentric framework: A Shift in paradigm

The second management strategy identified in this study is indirect management, where buying firms control sub-suppliers through first-tier suppliers. In this case, APCL acts as a critical first-tier intermediary, ensuring sustainability compliance across the entire supply chain. By maintaining structural and economic ties with buying firms, APCL takes on the leading managerial role in sustainable practices, alleviating the administrative burden on the buying firms and enabling them to tap into APCL's global business network. Every action APCL takes to ensure sustainability compliance is carefully documented and reported to the buying firms, ensuring transparency and accountability. It was difficult for APCL NRSP to operate a transparent intermediary and challenge the entrenched interest groups in the area. A supply chain manager at APCL reflected on the challenges faced when starting their business in the area, "It was almost impossible for us to start our business because cartels had strong political and social influence over local farmers, and they blamed us as foreign agents." This underscores the cultural and political barriers APCL had to navigate in establishing a sustainable and transparent supply chain.

APCL used various intermediaries by adopting a polycentric framework for sustainability compliance. A polycentric system involves various units with some autonomy but coordinated within a broader compliance framework (Chathuranga et al., 2025; Duong et al., 2025). In this case, APCL engaged local and cultural groups as intermediaries, like progressive farmers and social mobilisers, who played an essential role in establishing trust among various supply chain actors, mainly between lower-tier suppliers and buyers. This framework was especially effective in addressing traceability, a critical issue in MTSCs (Calzolari et al., 2025; Cichosz et al., 2025). By involving progressive farmers and social mobilisers, APCL ensured the supply chain remained transparent, mainly due to sociocultural and religious factors, which must be quickly identified and effectively addressed (LeBaron et al., 2021; Wilhelm et al., 2024). The involvement of these cultural intermediaries fostered better communication and collaboration across the supply chain, which led to enhanced efficiency and better sustainability outcomes (Ghobakhloo et al., 2025; Tetteh et al., 2025).

One of the exporters emphasised, "APCL made our business transparent, cost-effective, and timesaving. From quality checks to monitoring and interacting with the entire supply chain, stakeholders can be managed under one platform." This approach benefited buying firms and empowered lower-tier suppliers, who received training and support through initiatives led by progressive farmers and social mobilisers. These initiatives ensured that suppliers were

well-equipped to meet the sustainability criteria set by first-tier buyers, contributing to a stronger, more resilient supply chain.

7.4.3 Third-party management: Optimising operations through external collaborations

The study identified reliance on third-party organisations as a key management strategy for ensuring sustainability compliance. The reliance on third-party certification is a widely recognised practice in global supply chains, as it helps firms manage complex supplier networks while maintaining credibility with stakeholders (Gualandris et al., 2015; Oyedijo et al., 2023; Meixell & Luoma, 2015). However, the effectiveness of such an approach varies depending on industry context, regulatory environment, and the level of supplier commitment. In this approach, buying firms engaged external stakeholders, such as government and non-government agencies, to verify adherence to environmental and social sustainability standards (Grimm et al., 2014; Oyedijo et al., 2023; Tachizawa & Wong, 2014). Most buying firms and exporters in this research required certifications from independent entities, such as chambers of commerce or NGOs, to maintain credibility. APCL NRSP, in collaboration with international organisations, played a pivotal role in obtaining these certifications, addressing previous concerns of buying firms over fraudulent documentation that had eroded trust within the industry. This challenge is consistent with broader supply chain literature, highlighting the risks of opportunistic behaviour among suppliers and the need for rigorous monitoring mechanisms (Nath et al., 2021; Wilhelm et al., 2016). Compared to industries with well-established regulatory oversight, sectors operating in fragmented regulatory environments, such as agriculture and textiles, face higher risks of fraudulent certifications and require more substantial third-party interventions (Ellram & Tate, 2025; Zhang et al., 2025).

For effective and comprehensive management, APCL sought certifications from globally recognised organisations like SGS, which reassured business partners regarding the authenticity of compliance claims. Holding an ISO 9001 certification and working towards ISO 14001 further underscored the company's commitment to sustainable practices. These certifications reinforced APCL's credibility and aligned with broader industry trends that emphasise independent verification as a responsible supply chain management cornerstone. Existing literature suggests that firms leveraging international standards, such as ISO certifications and Fair-Trade accreditations, are better positioned to access global markets and secure long-term buyer relationships (Vermeulen & Seuring, 2009; Zimmermann et al., 2025). However, while third-party certifications enhance supply chain legitimacy, they may also impose additional financial and administrative burdens on suppliers, particularly small and medium-sized enterprises (SMEs), potentially limiting their participation in sustainable supply chains (Boersma et al., 2025; Tachizawa et al., 2015).

Beyond certification, APCL implemented a code of conduct mandating environmental sustainability standards for lower-tier suppliers. In collaboration with NGOs, monitoring officers ensured compliance by overseeing the use of registered seeds and fertilisers that met sustainability requirements. These measures were systematically recorded in the company's database, facilitating traceability and accountability across the supply chain, a strategy that aligns with best practices in sustainable supply chain governance (Chae et al., 2024). Traceability is increasingly recognised as a critical element in responsible supply chains, with research indicating that digital tracking systems and blockchain technologies can further enhance transparency and minimise risks of greenwashing (Nadime et al., 2025; Ranasinghe et al., 2025). Nonetheless, challenges remain, as suppliers may lack the technical capabilities or incentives to fully comply with traceability requirements, necessitating continuous capacity-building initiatives (Bhattacharjee & Chakraborty, 2025; Martinen et al., 2024).

In addition to environmental initiatives, APCL NRSP actively pursued social sustainability through various development projects in rural communities. Partnering with organisations like the World Health Organization, the company addressed pressing social challenges, including low school enrolment, inadequate access to safe drinking water, sanitation deficiencies, and immunisation gaps. The Water, Immunization, Sanitation, and Education (WISE) project exemplified these efforts, improving farming communities' living conditions and fostering long-term socio-economic development. Literature on social sustainability in supply chains highlights the increasing expectations for firms to go beyond compliance and actively contribute to community well-being (Gruchmann, 2022; Kähkönen et al., 2023). However, social sustainability remains less standardised compared to environmental sustainability initiatives, with firms often adopting ad hoc approaches that vary significantly across regions and industries (Chae et al., 2024; Senyo & Osabutey, 2023).

Recognising these social sustainability efforts, buying firms closely monitored APCL NRSP's initiatives through published reports and social audits. Transparency in these evaluations was crucial, as emphasised by industry stakeholders who acknowledged APCL's affiliation with NRSP and its established reputation in rural socio-economic development. Ensuring transparency in social audits reinforced trust between suppliers and buyers, ultimately supporting the broader objective of sustainable and ethical supply chain management. While social audits have been widely adopted as a governance tool. However, research suggests that they are not always sufficient in preventing unethical practices, particularly when audits are pre-announced or influenced by conflicts of interest (Gemente et al., 2024; Hannibal & Kauppi, 2019). This calls for more robust mechanisms, such as unannounced inspections, multi-stakeholder collaborations, and grievance redressal mechanisms, to strengthen accountability and ensure meaningful improvements in social sustainability outcomes.

7.4.4 Theoretical contributions

The study's third objective represents a significant advancement in the literature on MTSC management by introducing novel insights into direct, indirect, and third-party management strategies. The theoretical contributions of the third objective are discussed below.

- **Direct Management: Theoretical contributions**

The direct management approach builds on existing studies, such as Mena et al. (2013), Tachizawa & Wong (2014), and Li & Choi (2009), which explore how firms can engage with lower-tier suppliers. These scholars emphasise that buyers should extend their control beyond first-tier suppliers to monitor social and environmental compliance in deeper tiers. This study expands on by incorporating the role of intermediaries like progressive farmers, who act as crucial conduits between the buying firms and lower-tier suppliers. Chae et al. (2024) also highlight the need for direct engagement to improve compliance; this study advances this by showing how such engagement can be managed efficiently through intermediaries.

Introducing intermediaries beyond tier-one, particularly progressive farmers, provides a refined perspective on how direct management can be practically implemented (Cole & Aitken, 2020; Rosca et al., 2022). This intermediary role strengthens communication channels, enhances transparency, and bridges information gaps between buying firms and lower-tier suppliers. This is an essential addition to the literature, as prior studies primarily focused on the direct relationships between buyers and suppliers without emphasising the intermediary's dynamic role beyond tier-one. Choksy et al. (2022) and Schoenherr et al. (2023) emphasise probing such investigations for the resilience of supply chains.

- **Indirect management: Polycentric framework**

Villena (2019) and Wilhelm et al. (2016) emphasise the role of first-tier suppliers in ensuring sustainability compliance among lower-tier suppliers. This research aligns with this but introduces a novel polycentric management framework to the indirect management approach. This is probably the first time the polycentric framework, primarily an international management model, has been significantly highlighted in business supply chains. This framework, involving multiple autonomous units (e.g., progressive farmers, social mobilisers), allows for decentralised sustainability governance across the supply chain, contributing to the literature on how indirect management can be enhanced.

The introduction of polycentric governance redefines how firms can manage sustainability in MTSCs. Involving various autonomous units with specific roles provides a more efficient and effective way to monitor compliance across multiple tiers. This research contributes to the ongoing discourse in MTSC literature by addressing the need for decentralised management as a means to enhance transparency and accountability, as emphasised by Amend et al. (2024), Cao et al. (2021), and Lacey-Barnacle (2024). This study clarifies how product

traceability can effectively be done by offering a decentralised management alternative, a critical challenge to sustainable business operations. It advances theoretical discussions on how decentralisation can address other major key concerns related to governance, transparency, and sustainability within MTSCs.

- **Social Sustainability initiatives: Collaborative efforts**

APCL NRSP's collaboration with international firms, NGOs, and government agencies to implement social sustainability projects (e.g., WISE) provides a model for how firms can contribute to community development while ensuring supply chain compliance. Such social sustainability initiatives create shared value for buying firms, intermediaries and suppliers (Nath et al., 2021; Wilhelm et al., 2016). They enhance supplier compliance, foster goodwill, and contribute to the socio-economic development of farming communities, securing a sustainable supply chain for the future. Social sustainability initiatives are critical in developing countries for a sustainable future (Ellram & Tate, 2025; Zhang et al., 2025).

7.5 Key learning of Chapter 7

The key learning outcomes of Chapter 7 are as follows:

- **RQ1: Sustainability challenges and slavery-Like conditions:** The chapter significantly highlights, probably the first time in supply chain literature how sustainability challenges in MTSCs can perpetuate slavery-like conditions, particularly in lower-tier suppliers.
- **RQ2: Intermediaries' role in sustainability:** The chapter explores how different tiers of intermediaries, from social mobilisers to financial institutions, facilitate or hinder sustainability compliance. Each tier's role is analysed in detail, showing how intermediaries or stakeholders can promote sustainable practices or act as barriers to compliance.
 - **Social networking (Tier 4):** Social mobilisers play a crucial role in fostering sustainability at the grassroots level by connecting lower-tier suppliers with essential resources and information.
 - **Credit facilitation (Tier 3):** Financial institutions, particularly microfinance banks, help lower-tier suppliers by providing access to credit, which is essential for implementing sustainable practices.
 - **Change agents (Tier 2):** Progressive farmers act as change agents, leading by example and encouraging other suppliers to adopt sustainable practices.
 - **Sustainability strategists (Tier 1):** Top-tier intermediaries, such as APCL, are responsible for developing and enforcing sustainability strategies across the entire supply chain.

- **RQ3: Management strategies of buying Firms:** The chapter reviews the management strategies employed by buying firms to overcome sustainability challenges in MTSCs. These strategies include fostering direct stakeholder engagement, decentralising governance structures, and collaborating with third-party organisations.
 - **Transitional management approach:** Buying firms directly interact with suppliers to promote sustainability and ensure compliance.
 - **Polycentric framework:** Decentralised governance structures allow for more flexible and adaptive sustainability management, particularly in complex supply chains.
 - **Third-party management:** External collaborations with NGOs and other organisations help buying firms optimise sustainability efforts by leveraging specialised expertise.

The next chapter will conclude the findings and discussions, offering a succinct analytical summary of the research. It will also provide actionable recommendations for policy, practice, and future research to improve sustainability compliance and management in MTSCs.

Chapter 8

Conclusion

Confronted with significant challenges, including sociocultural sensitivities and highly unstructured data, this research employed a systematic analytical approach. The study developed a coherent and in-depth understanding of a critical research phenomenon by carefully identifying and connecting patterns, relationships, and themes across fragmented data sources. Through this process, the study on sustainability compliance through intermediaries in MTSCs in Pakistan has reached the following key conclusions. These conclusions provide an analytical summary of the findings, emphasise the broader implications of the research, acknowledge its limitations, and suggest avenues for future exploration.

8.1 Analytical summary

- **Evolving nature of sustainability in MTSCs**

Sustainability challenges in Pakistan's agricultural MTSCs transcend economic and environmental dimensions, entangling socio-cultural, political, and historical complexities. The current literature highlights the central role of institutional frameworks and buyer-driven sustainability approaches, particularly in developed markets (Grabs & Carodenuto, 2021; Sancha et al., 2019; Shaw et al., 2024; Wilhelm & Villena, 2021). However, these frameworks are less effective in countries like Pakistan due to socio-political barriers and the disconnect between top-tier buyers and lower-tier suppliers. Research in developed economies suggests that multinational corporations can propagate sustainable practices across the supply chain (Kusi-Sarpong et al., 2023; Marttinen & Kähkönen, 2022; McGrath et al., 2021); the context in Pakistan shows that such models are ineffective due to local realities, i.e. religious hierarchies and power imbalances within the supply chain. Existing research on modern slavery has similarly focused on institutional and top-down interventions to curb exploitation (Bullock et al., 2024; Szablewska & Kubacki, 2023; Wilhelm et al., 2024). In Pakistan, however, this study shows that lower-tier suppliers are often insulated from such initiatives due to social and economic barriers. The findings challenge the assumption that global buyer-driven approaches can be universally applied, pointing to the need for more inclusive and culturally grounded solutions that address systemic inequality and historical exploitation.

- **Role of intermediaries in fostering sustainability**

This research presents a novel perspective on Pakistan's rice industry. Intermediaries such as APCL are critical in translating sustainability goals into culturally sensitive and economically viable practices for lower-tier suppliers. This finding contrasts with prior studies

that depict intermediaries beyond tier-one as barriers to transparency in MTSCs (Barkay et al., 2024; Cole & Aitken, 2020; Hofstetter & Villena, 2024).

This study highlighted that intermediaries assume a unique role in developing countries such as Pakistan by embedding sustainability into the socio-cultural fabric of rural supply chains, an aspect primarily overlooked in developed countries-centric literature. In this study, intermediaries facilitate financial and logistical support and help navigate the complex social dynamics that shape supplier behaviour. This finding expands upon recent studies by Cole and Shirgholami (2022); Gaitán-Cremaschi et al. (2024) and Noviaristanti et al. (2023), which explored the evolving role of intermediaries in MTSCs. The case of APCL exemplifies how intermediaries can enhance sustainability by offering socio-technical solutions to smallholders, enabling them to adopt environmentally friendly farming methods despite structural barriers.

Further, the conventional wisdom that buyer-supplier relationships alone drive sustainability (Ahemd & Shafiq, 2022; Carter et al., 2015; Huang et al., 2022) is called into question. In fragmented supply chains, like those in Pakistan, intermediaries emerge as indispensable for understanding and addressing the socio-political factors that constrain sustainable practices in lower tiers. This suggests a shift from the developed countries' models that advocate direct buyer-supplier engagements to more contextually sensitive frameworks involving local intermediaries and giving them powers at various levels of the product formation process as critical enablers of sustainability (Pennington & Meehan, 2023).

- **Distributed decision-making and buying firms' strategic shift**

This study also goes beyond supply chain literature and highlights international management models where top-down governance models where buyers dictate sustainability initiatives (Busse et al., 2016; Cao et al., 2024; Martinen & Kähkönen, 2022). In this study, APCL adopts a more distributed decision-making approach. This allows local stakeholders, including lower-tier suppliers, to shape sustainability policies, resulting in strategies better aligned with local contexts and more responsive to regional socio-economic-environmental challenges.

This shift reflects a departure from the traditional governance models contrary to those proposed in existing MTSC literature (Meehan & Pinnington, 2021). While firms in developed markets exert top-down control to enforce sustainability compliance (Wilhelm & Villena, 2021), APCL's decentralised governance structure enables more adaptive solutions to local sustainability issues, such as stubble burning and traditional practices in farming. Including local stakeholders facilitates better integration of socio-cultural considerations, challenging the prevailing assumption that centralised governance models are universally effective in Fostering sustainability (Sroufe et al., 2023). This has significantly refined the polycentric governance mechanisms of management.

- **Unintended consequences: Sustainability as a driver of socio-economic inequalities**

A key insight from this research is the paradoxical outcome of sustainability initiatives: while promoting environmental progress, they may exacerbate social inequalities. Current literature portrays sustainability as universally beneficial (Boyd et al., 2023). However, big landlords in developing countries such as Pakistan can afford to adopt sustainable practices, thus accessing premium markets, while smallholders and resource-constrained suppliers are left behind. This dynamic reinforces existing socio-economic disparities and undermines the inclusivity of sustainability efforts. This study's findings contradict the studies from developed economies, where sustainability initiatives are linked to economic and social upliftment (Bodendorf et al., 2023; Bodendorf et al., 2024). In Pakistan, sustainability programs often fail to account for the significant socio-economic and caste-based barriers that prevent lower-tier suppliers from engaging in sustainable practices. The research suggests that sustainability initiatives may deepen existing divides without targeted support for marginalised suppliers rather than foster equitable development.

- **Reconceptualising supply chain slavery in sustainability discussions**

Unlike in Western supply chains, where slavery-like conditions are considered outliers to be addressed through audits and compliance (Crane et al., 2022), in the developing South Asian world, including Pakistan, these conditions are normalised and perpetuated by caste-based systems (India, Nepal) and religious norms (Pakistan, Bangladesh). These findings challenge the existing literature's emphasis on interventions through NGOs and audit firms to tackle slavery challenges and suggest that a more systemic approach is required to address the intertwined issues of exploitation and sustainability (Christ et al., 2020). The research highlights the importance of cross-sector and cross-actor collaborations in MTSCs; however, it also has a distinct view that the local actors of MTSCs should be given autonomy in addressing modern slavery. This consideration provides novel dimensions by refining the recommendations of Alzoubi et al. (2023), Cruijssen (2020), Jraisat et al. (2023); Kadaf et al., 2023 Lehner & Elbert (2023) and Wilhelm et al., (2020); that what should be the mechanisms of cross-actor collaboration in cross-border supply chains to address sensitive sustainability issues. In countries like Pakistan, where socio-cultural barriers are deeply ingrained, no single actor—whether corporate, governmental, or NGO—can tackle the issue alone. Collaborative efforts involving religious leaders, progressive farmers, civil society organisations, and local NGOs are crucial in dismantling the sociocultural norms, perpetuating the phenomenon of slavery in the supply chains.

This study's success in these collaborative frameworks demonstrates that sustainability cannot be achieved through top-down interventions alone. As Song et al. (2023) argue, intermediaries and local stakeholders must be involved in the decision-making process to

ensure that sustainability efforts are culturally aligned and contextually relevant. This research provides a roadmap for future interventions, emphasising the importance of cross-sector collaboration in overcoming the complex sustainability challenges perpetuating the accepted phenomenon of slavery.

8.2 Research implications

This study presents several theoretical and practical implications for sustainability compliance in MTSCs. The research deepens understanding of how first-tier intermediaries in supplier regions can act as effective facilitators for sustainability, particularly in sensitive environments where direct management by buying firms may face challenges. The findings reinforce the importance of a socio-cultural and context-driven approach to managing sustainability in MTSCs, illustrating that first-tier intermediaries can promote sustainable socioeconomic growth by navigating complex local dynamics.

Practically, this research highlights the crucial role intermediaries play in indirect management, suggesting that when intermediaries engage external stakeholders, they enhance the sustainability of MTSCs. This has practical implications for businesses aligning their sustainability practices with local cultural norms and religious obligations. For instance, progressive farmers in developing economies (Tier-2 intermediaries), identified as change agents in research, can catalyse peer-to-peer learning and knowledge transfer, promoting sustainable practices throughout the supply chain. Multinational businesses and international buying firms can leverage such local influencers to foster social acceptance and ensure compliance with sustainability standards.

Additionally, integrating the triple-bottom-line approach and ESG model offers a multidimensional framework for understanding sustainability challenges within MTSCs. The research suggests that businesses must adopt tailored sustainability strategies, educate lower-tier suppliers, improve technological access, and foster socio-emotional support to bring marginalised suppliers into the mainstream. This has implications for supply chain management and broader CSR initiatives.

The research also contributes to academic theory by extending the current literature on sustainability in MTSCs. Specifically, it addresses calls from Gruchmann (2022), Marttinen and Kähkönen (2022), and Agrawal et al. (2024) by focusing on the role of intermediaries and the socio-cultural complexities of sustainability. The study offers insights into how businesses can enhance resilience and efficiency by managing lower-tier suppliers in developing countries. It also expands on the agency theory by demonstrating how different stakeholders (e.g., buyers, intermediaries, and farmers) form multi-level principal-agent relationships that influence sustainability outcomes.

8.3 Societal implication

The societal implications of this research are significant, particularly in the context of South Asian countries, where a shared history, culture, and religious traditions have shaped social structures and introduced a range of challenges. Social inequalities such as the caste system, honour killings, and rigid family traditions continue to impede progress across the region. These deeply rooted issues not only perpetuate social stratification but also contribute to socio-environmental problems, including deforestation, ecological degradation, and public health crises like open defecation, which are particularly prevalent in rural and marginalised communities.

This research addresses a critical intersection between social inequality and environmental harm. In South Asia, marginalised communities often engage in environmentally harmful practices due to economic pressures and limited access to sustainable alternatives. The inability to afford rising energy prices forces many to rely on natural resources, such as wood from forests, for their energy needs. This dependency on unsustainable practices accelerates deforestation and disrupts ecological balance, creating a vicious cycle of poverty and environmental degradation. These practices, though localised, have far-reaching implications, contributing to climate change, pollution, and biodiversity loss on a regional and global scale.

The other social impact is due to economic challenges; illegal brick kilns are set up, and child labour is promoted, which in turn causes serious environmental challenges. It suggests that the slavery phenomenon is not just social; it has a far-reaching impact on the broader dimensions of sustainability, and it ruins the holistic concept of sustainability.

A pivotal contribution of this research lies in the innovative model developed through APCL, particularly its integration of intermediaries, which addresses the global challenge of enhancing transparency and sustainability in MTSCs. This model not only improves the traceability of products—a growing concern in global markets—but also ensures that sustainability practices are culturally aligned and locally relevant. The capacity to trace products from local suppliers to international buyers strengthens accountability and fosters more sustainable practices across the region. By aligning sustainability efforts with local socio-cultural contexts, this approach increases the likelihood of adoption and long-term success.

By incorporating a socio-cultural approach to sustainability, the research underscores the critical role of local intermediaries in fostering sustainable socioeconomic growth. This approach recognises the importance of integrating sustainability initiatives with local cultural norms and traditions, ensuring they are accepted and effectively woven into everyday life's fabric. Empowering intermediaries as facilitators of change creates new opportunities to address entrenched social inequalities and environmental challenges across South Asia.

This is particularly crucial in regions where external management might be seen as intrusive or where local traditions require careful navigation to ensure the success of sustainability efforts.

This research represents a groundbreaking contribution in the Pakistani context, where sustainability challenges intersect with a highly sensitive and orthodox religious landscape. By addressing issues such as the persistence of slavery-like conditions within agricultural supply chains, the research offers an analysis of the problem and a solutions-based model. This model has the potential to open new avenues for addressing not only Pakistan's agricultural sustainability challenges but also those in other developing regions, including parts of Africa and the Middle East, where similar socio-cultural norms and slavery challenges persist.

8.4 Limitation of intermediaries

Despite the positive contributions of intermediaries, the study reveals substantial limitations to the roles of intermediaries. These intermediaries are often constrained by socio-cultural factors that shape their interactions with farmers and other stakeholders. For instance, religious and cultural sensitivities often inhibit open discussions on critical issues, such as female discrimination, child labour, and even honour killings. These barriers highlight that intermediaries, while crucial, cannot act alone in driving sustainability compliance. Their influence is limited when faced with deeply embedded cultural practices and systemic inequalities, such as land ownership concentration and social hierarchies.

- **Addressing socio-cultural challenges**

One of the most compelling aspects of this research is its focus on addressing sensitive issues that have traditionally been overlooked in sustainability discussions in agricultural supply chains. By engaging with topics such as honour killings, female discrimination, child labour, and the socio-cultural slavery of the lower tiers, the research challenges long-standing taboos. It provides a more holistic view of the constraints within MTSCs. For example, female discrimination is pervasive in decision-making within the farming sector and access to resources and opportunities. Child labour, often justified under the guise of family support, further entrenches cycles of poverty and limits educational opportunities for the younger generation.

- **Addressing religious challenges**

Religious fanaticism, such as framing foreign support and bank loans as un-Islamic, creates additional barriers to progress. Wholesalers, who are local landlords with strong ties to religious leaders, use religious arguments to dissuade farmers from engaging with modern financial systems or adopting sustainable farming practices. These manipulations maintain the status quo, making it difficult for progressive voices or external stakeholders to promote change.

The research also touches on socio-cultural religious slavery, where the hierarchical relationships between landlords and farmers mimic structures of dependency akin to slavery. These relationships are maintained through religious justification, socio-cultural norms, and economic dependency, all reinforcing the power imbalance in MTSCs. Brought by debt, social obligations, and religious expectations, farmers/lower tiers find it nearly impossible to break free from these cycles of exploitation.

- **Policy interventions and multi-stakeholder collaboration**

Given intermediaries' limitations in addressing these socio-cultural and religious challenges, the research emphasises the need for comprehensive policy interventions. Business stakeholders, including intermediaries, cannot bear the sole responsibility of resolving these deep-seated issues. Instead, a collaborative approach is required, involving government agencies, non-governmental organisations, religious leaders, and the farming communities themselves. Policy frameworks prioritising education, gender equity, labour rights, and economic empowerment must be developed and implemented with sensitivity to local cultural and religious contexts.

Businesses involved in MTSCs must recognise their role in advocating for broader systemic change. Simply focusing on economic efficiency or productivity will not address the root causes of exploitation and inequality. Instead, businesses must engage with stakeholders at multiple levels to promote more equitable, inclusive, and sustainable practices. This includes advocating for women's rights, supporting the education of children to break cycles of child labour, and challenging religious justifications for unethical practices.

8.5 Expanding the cross-disciplinary relevance and broader impacts of research

This research's interdisciplinary insights broaden the understanding of how business practices, social structures, and cultural traditions are deeply interconnected, with significant implications for humanities and social sciences scholars. Cultural sensitivities are prevalent everywhere, and this research provides evidence-based modalities to carry on the research in various 'overarching' ways. Every minor delicacy can bring novel dimensions to various disciplines and experts; how? It is highlighted below, and this also suggests comprehensive future research directions.

- In business studies, the research presents a pathway to understanding business ethnographies, an evolving business study research model from '*emic*' perspectives. It enables researcher and business experts to explore how cultural norms, values, and behaviours shape business practices, not just in agriculture. Immersing within these communities reveals how traditional customs and economic activities are influenced by cultural pressures, allowing researcher to examine the complexities of how longstanding,

inherited practices often guide business decisions. This perspective is invaluable in understanding how indigenous knowledge systems can support or resist external economic forces.

- Similarly, sociology delves into the mechanisms of social order, offering insights into how it evolves from relational embeddedness—where personal relationships govern social cohesion—to structural embeddedness, which reflects the broader institutional and systemic frameworks that regulate social interactions. This research is instrumental in exploring how such structures create and maintain '*social hierarchies*', particularly in business. It illuminates how norms and networks foster cooperation and reinforce power dynamics, sometimes preserving inequality and enabling exploitative practices within communities and industries.
- For international business experts, the research provides a nuanced understanding of polycentric models within global businesses, particularly multinationals. It illustrates how intermediaries, acting as distinct power centres, influence various product formation stages, including decision-making and resource allocation. These power dynamics often mirror the socio-political and cultural complexities of the regions where businesses operate, highlighting the need for multinational companies to adapt to local socio-cultural power structures. The research underscores the importance of recognising various actors as local and regional power centres, not merely logistical actors but also critical influencers who navigate and exploit power imbalances within the supply chain.
- Humanities experts, particularly those focused on social critique, will find this research illuminating for exploring how social order, culture, and religion are used as instruments of control, 'the biggest tool of modern slavery' in the contemporary business world and still needs to be comprehensively addressed". Religion, in many instances, acts as a tool for reinforcing unquestioning obedience, with specific practices used to enslave minds and exploit people's adherence to traditions. These psychological and social mechanisms can lead to a form of cultural entrapment, where individuals are conditioned to accept business practices, hierarchies, or policies that perpetuate exploitation, cloaked under the guise of tradition or divine will. The findings suggest that these elements are not merely benign or naturally occurring aspects of society but are often strategically exploited by those in power. Religious practices and cultural norms can be leveraged to maintain the status quo, ensuring that individuals remain obedient and compliant, sustaining economic and social exploitation. This research contributes to critical discussions about how culture and religion, often revered for their role in shaping identity and community, can also be manipulated to subjugate and control populations, leading to a form of mental, emotional and social enslavement.
- For modern sustainability and technology experts, the research challenges the notion that technological advancements are the sole path to sustainability. It critiques the simplistic

belief that technological advancement is the only way for sustainable development and can easily be integrated into traditional business practices without resistance. The research emphasises that deeply rooted socio-cultural norms often resist adopting new technologies, particularly in communities where religious and traditional practices dominate. This tension between modern innovation and cultural conservatism requires a more culturally sensitive approach, acknowledging that sustainable practices must align with the social and religious realities of the communities in which they are implemented.

- Finally, the findings of this study hold significant relevance for micro-economists, particularly in addressing how economic sustainability can help mitigate the victimisation of smallholders in developing countries across various business supply chains, not just in agriculture. This research highlights the role of third-tier intermediaries, i.e. Bank NRSP, collaborating with social mobilisers (Tier-4 intermediaries) to persuade local farming communities to embrace microfinancing for their benefit. Involving progressive farmers (Tier-2 intermediaries) who provide training to local farmers ensures that the provided finances to lower tiers are used accordingly. Another important factor is engaging sensitive actors, such as qualified religious scholars who educate farmers on Islamic financing. The study demonstrates how these efforts challenge the exploitative practices of mafias, such as wholesalers and middlemen, and debunk myths that sustain unsustainable methods. Micro-economists can apply this model to other contexts, especially in countries where livelihoods are shaped by solid relational and structural embeddedness, with religion and culture playing critical roles in daily life.

8.6 Limitations of the research

Despite its contributions, this study has certain limitations.

- One limitation of this study is its focus on a single case within the rice industry in Pakistan. The research employed stringent selection criteria to identify suitable participants; however, the concept of sustainability compliance was not widely familiar in the study's context. As a result, most companies did not meet the established criteria. Although two companies qualified, one declined to participate due to the sensitive nature of the research topic. Consequently, the study was limited to a single case, which may restrict the generalisability of its findings.
- The research was conducted in a high-power-distance society, where cultural and religious issues created barriers to investigating sensitive sustainability challenges, such as slavery and honour killings. The inability to record data during fieldwork due to cultural restrictions may have led to potential inaccuracies or misinterpretations. However, the research employed distinctive reliability measures, such as verbatim quotations and other measures discussed in the previous chapters. However, reliance on written notes remains a limitation.

- Methodologically, using a qualitative case study approach may limit the breadth of the findings. The study relied on purposive sampling in the second phase, which, while appropriate for exploring in-depth cases, may introduce limitation in generalisability of the research findings.

8.7 Future research directions

Based on the above, future research should explore the transferability of the findings to other agricultural contexts and sectors.

- Comparative studies across different global supply chains, particularly those in industries beyond agriculture, could provide further insights into how intermediaries and lower-tier suppliers manage sustainability challenges.
- Future research should explore the role of intermediaries in different power-distance societies and how these relationships impact the power dynamics within MTSCs. Understanding how intermediaries shift power balances could provide valuable insights into effective management and collaboration strategies in global supply chains. Investigating how sociocultural and religious practices intersect within other industries will also enhance the understanding of sustainability compliance in MTSCs.
- Taking the sociocultural and religious points forward, longitudinal studies are needed to track the root causes of modern slavery and other socio-environmental challenges in MTSCs over time. Future research can contribute to a more dynamic and nuanced understanding of slavery in global supply chains by examining how these issues evolve in response to changing socio-political and economic conditions.
- The economic implications of sustainable transformations within MTSCs warrant further investigation. Future studies should examine how businesses balance sustainability's socio-environmental responsibilities with their operations' financial viability. Understanding the cost structures associated with adopting sustainable practices in MTSCs can help businesses make more informed decisions and promote wider adoption of sustainability strategies.

8.8 Conclusion

This research provides critical insights into promoting sustainability compliance in agriculture-based developing countries. It highlights the necessity of addressing socio-economic disparities and ideological challenges within MTSCs by actively engaging intermediaries. These findings contribute to reducing inequalities and advancing decent work, aligning with Sustainable Development Goals (SDGs) 8, 9, and 10. Notably, the study expands the discourse on sustainability compliance by addressing challenges that have been relatively underexplored in MTSC literature, particularly in resource-constrained geographies. The study is grounded in an extensive review of 2,068 articles using a systematic map and evidence synthesis approach. This rigorous methodology allowed for the identification of

critical research gaps and the development of novel insights into sustainability challenges and management strategies. By integrating these findings with primary research, the study establishes the central role of intermediaries in navigating socio-cultural complexities and driving sustainability compliance in lower-tier supply chains.

The study has significant theoretical and practical implications. Theoretically, it enriches the sustainability and supply chain management literature by demonstrating the role of intermediaries as agents of change in fostering sustainability within lower tiers of MTSCs. It also underscores the importance of aligning corporate sustainability strategies with local socio-cultural norms to enhance compliance and social acceptance. Practically, businesses can leverage these insights to develop more effective sustainability strategies tailored to the unique challenges of developing economies. The findings suggest that companies must move beyond top-down sustainability models and instead integrate grassroots-level engagement, ensuring that sustainability policies are not only adopted but also internalized within local supply chain structures.

However, the study is not without limitations. First, its primary focus on agriculture-based MTSCs in developing countries may limit the generalisability of the findings to other industries or regions. While the role of intermediaries and socio-cultural alignment is emphasised, future research should explore how these dynamics unfold in diverse industrial sectors such as textiles, technology, or automotive supply chains. Additionally, this study primarily relies on qualitative insights, which, while rich in depth, may benefit from complementary quantitative assessments to enhance generalizability and empirical validation.

Finally, the research underscores the need for continued investigation into how different stakeholders in MTSCs can collaborate to achieve sustainability goals. A key takeaway is that sustainable transformation in global supply chains requires an integrated approach that considers the intersection of socio-cultural dynamics, local economic activities, and operational impacts. This intersection is particularly crucial in South Asian countries, home to one-quarter of the world's population and a significant share of global raw material production across multiple industries. Failure to account for these complex realities and the imposition of sustainability models from developed economies without contextual adaptation will hinder meaningful compliance. Therefore, understanding and addressing these intricate dynamics will be essential for businesses striving to achieve sustainability while maintaining economic viability in an increasingly interconnected and resource-constrained world.

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Appendices

Appendix 5.1 Sample protocol for lower-tier farmers in FGD. This was also used in the second research visit.

Sample Questions	Urdu Translation
1. Can you tell us about your farming experience as a local farmer?	کیا آپ ہمیں مقامی کسان کے طور پر اپنے تجربے کے بارے میں بتا سکتے ہیں؟
2. How long have you been working in rice farming?	آپ کتنے عرصے سے چاول کی کاشت کر رہے ہیں؟
3. What is your understanding of sustainable farming?	پائیداری کے چیلنجز کو سمجھنا
4. What are the biggest challenges you face in sustainable farming?	آپ کو پائیدار زراعت میں سب سے بڑے چیلنجز کیا نظر آتے ہیں؟
5. Can you describe any socio-economic issues affecting your farming practices?	کیا آپ کوئی سماجی و اقتصادی مسائل بیان کر سکتے ہیں جو آپ کی زراعتی مشقوں کو متاثر کرتے ہیں؟
6. Are there any environmental issues impacting your fields?	کیا آپ کے کھیتوں پر کوئی ماحولیاتی مسائل اثر انداز ہو رہے ہیں؟
7. How do you manage water distribution in your fields?	آپ اپنے کھیتوں میں پانی کی تقسیم کو کیسے منظم کرتے ہیں؟
8. Are there any problems with the health and safety measures in place?	کیا وہاں صحت اور حفاظتی اقدامات میں کوئی مسائل ہیں؟
9. Please tell us about your cultural farming practices.	روایتی طریقے اور خاندانی ڈھانچہ
10. How does the traditional family structure influence decision-making in farming?	روایتی خاندانی ڈھانچہ زراعت میں فیصلہ سازی پر کیسے اثر انداز ہوتا ہے؟
11. What traditional farming practices do you follow, and how do they impact sustainability?	آپ کون سے روایتی زراعتی طریقے اپناتے ہیں، اور یہ پائیداری پر کس طرح اثر انداز ہوتے ہیں؟
12. What is your relationship with the local landlords?	آپ کا مقامی زمینداروں کے ساتھ کیا تعلق ہے؟
13. What is your relationship with the local wholesalers?	آپ کا مقامی بول سیلرز کے ساتھ کیا تعلق ہے؟
14. Can you describe your experience as a farmer and how it has changed over the years?	کیا آپ اپنے بطور کسان تجربات بیان کر سکتے ہیں اور یہ سالوں میں کیسے بدلا ہے؟
15. What are the main challenges you face in farming today?	آج کل زراعت میں آپ کو سب سے بڑی مشکلات کیا ہیں؟
16. How does the lack of government support affect your farming practices and livelihood?	حکومت کی مدد نہ ہونے سے آپ کی زراعتی سرگرمیاں اور روزگار پر کیا اثرات مرتب ہوتے ہیں؟
17. What kind of support or resources do you think would help improve your situation as farmers?	آپ کے خیال میں کون سی مدد یا وسائل آپ کی صورتحال کو بہتر بنانے میں معاون ہو سکتے ہیں؟
18. Can you explain the impact of local market practices, such as <i>Chungi and Thala</i> , on your income from selling crops?	مقامی مارکیٹ کے طریقوں جیسے چنگی اور تھالا کا آپ کی فصلیں فروخت کرنے سے حاصل ہونے والی آمدنی پر کیا اثر ہوتا ہے؟
19. How do you and your family cope with the challenges of unemployment and high inflation?	بے روزگاری اور بلند افراط زر کے چیلنجز سے آپ اور آپ کا خاندان کیسے نمٹتا ہے؟
20. What are the main reasons you think the younger generation is not interested in farming?	آپ کے خیال میں نوجوان نسل زراعت میں دلچسپی کیوں نہیں لے رہی؟
21. Can you discuss the issues you face with irrigation and access to water for your crops?	آپ کو اپنی فصلوں کے لئے آبپاشی اور پانی کی رسائی کے مسائل کیا ہیں؟
22. How does the current energy situation (lack of gas and electricity) impact your daily life and farming activities?	موجودہ توانائی کی صورتحال (گیس اور بجلی کی کمی) آپ کی روزمرہ کی زندگی اور زراعتی سرگرمیوں پر کس طرح اثر انداز ہوتی ہے؟
23. What are your hopes and expectations for the future in terms of farming and overall living conditions?	زراعت اور مجموعی زندگی کے حالات کے حوالے سے آپ کی مستقبل کی امیدیں اور توقعات کیا ہیں؟

Appendix 5.2: Sample protocol with progressive farmers in group discussions

Sample Questions	Urdu Translation
1. How do you see your role as a village chief, and what responsibilities come with it?	آپ بطور گاؤں کے لیڈر اپنے کردار کو کیسے دیکھتے ہیں اور اس کے ساتھ کون سی ذمہ داریاں آتی ہیں؟
2. How has the partnership with APCL and NRSP impacted rice farming practices and opportunities in your community?	آپ کے ساتھ شراکت داری نے آپ کی APCL اور NRSP کمیونٹی میں چاول کی کاشتکاری کے طریقوں اور مواقع پر کیسے اثرات ڈالے ہیں؟
3. Can you describe the methods you use to educate and train fellow farmers on modern farming practices?	آپ اپنے ساتھی کسانوں کو جدید زراعتی طریقوں کی تعلیم دینے اور تربیت دینے کے لئے کن طریقوں کا استعمال کرتے ہیں؟
4. What are the main challenges you face in promoting sustainable farming, and how do you address them?	پائیدار زراعت کو فروغ دینے میں آپ کو کون سی بڑی مشکلات کا سامنا ہے اور آپ ان کو کیسے حل کرتے ہیں؟
5. How do you incorporate modern technology and renewable energy into your farming practices?	آپ اپنی زراعتی سرگرمیوں میں جدید ٹیکنالوجی اور قابل تجدید توانائی کو کیسے شامل کرتے ہیں؟
6. Can you discuss the importance of fair pricing and quality inputs for farmers, and how you advocate for these?	کسانوں کے لئے منصفانہ قیمتوں اور معیاری اشیاء کی اہمیت پر تبصرہ کریں، اور آپ ان کے لئے کیسے وکالت کرتے ہیں؟
7. How do you engage with and support unemployed youth in your community to involve them in agriculture?	آپ اپنی کمیونٹی کے بے روزگار نوجوانوں کو زراعت میں شامل کرنے کے لئے کیسے شامل کرتے ہیں اور ان کی حمایت کرتے ہیں؟
8. What strategies do you use to overcome resistance to change within the farming community?	زراعتی کمیونٹی میں تبدیلی کی مزاحمت پر قابو پانے کے لئے آپ کون سی حکمت عملی استعمال کرتے ہیں؟
9. How do you ensure the participation of female farmers in training and decision-making processes?	تربیتی اور فیصلہ سازی کے عمل میں خواتین کسانوں کی شمولیت کو یقینی بنانے کے لئے آپ کیا کرتے ہیں؟
10. How do you collaborate with various stakeholders to promote responsible sourcing and production practices?	ذمہ دار ذرائع اور پیداوار کے طریقوں کو فروغ دینے کے لئے مختلف شراکت داروں کے ساتھ آپ کیسے تعاون کرتے ہیں؟
11. Can you discuss your experience with community gatherings and their impact on farming decisions?	کیا آپ کمیونٹی کے اجتماعات کے تجربات پر بات کر سکتے ہیں اور یہ زراعتی فیصلوں پر کس طرح اثر انداز ہوتے ہیں؟
12. How do you perceive the future of rice farming in your community?	آپ اپنی کمیونٹی میں چاول کی کاشتکاری کے مستقبل کے بارے میں کیا سوچتے ہیں؟
13. What role does government policy play in supporting progressive farming?	ترقی پسند زراعت کی حمایت میں حکومت کی پالیسی کا کیا کردار ہے؟
14. How do you share knowledge and experiences with other farmers?	آپ دیگر کسانوں کے ساتھ علم اور تجربات کا تبادلہ کیسے کرتے ہیں؟
15. Can you discuss the impact of climate change on your farming practices?	کیا آپ اپنے زراعتی طریقوں پر موسمیاتی تبدیلی کے اثرات پر بات کر سکتے ہیں؟

Appendix 5.3: Sample protocol with social mobilisers (4th Tier Intermediary)

Sample Questions	Urdu Translation
1. Can you describe your role as a social mobiliser and the key responsibilities you handle?	کیا آپ سوشل موبلائزر کے طور پر اپنے کردار اور اہم ذمہ داریوں کی تفصیل بیان کر سکتی ہیں؟
2. How did you become involved in this field, and what challenges did you face as a female social mobiliser initially? (if respondent is female).	آپ اس میدان میں کیسے شامل ہوئیں اور بطور خاتون سوشل موبلائزر آپ نے ابتدا میں کون کون سی مشکلات کا سامنا کیا؟

3. What specific strategies do you use to organise and support female farmers in your managed villages?	آپ اپنے انتظام کردہ گاؤں میں خواتین کسانوں کو منظم اور سپورٹ کرنے کے لیے کون سی خاص حکمت عملی استعمال کرتی ہیں؟
4. How do you handle cases of sexual harassment in the field, and what measures are taken to protect female workers?	آپ میدان میں جنسی پراسانی کے معاملات کو کیسے سنبھالتی ہیں، اور خواتین کارکنوں کی حفاظت کے لیے کیا اقدامات کیے جاتے ہیں؟
5. Can you explain the role of social networking in promoting sustainable agricultural practices among farmers?	کسانوں میں پائیدار زراعتی طریقوں کو فروغ دینے میں سوشل نیٹ ورکنگ کا کیا کردار ہے؟
6. How does the APCL's approach to social mobilisation and community development and its impact local farmers and their farming practices?	اے پی سی ایل کی سوشل موبلائزیشن کی حکمت عملی مقامی کسانوں اور ان کی زراعتی طریقوں پر کیا اثر ڈالتی ہے؟
7. What are the main benefits and challenges of implementing geo-fencing and GPS technology in farming practices?	زراعتی طریقوں میں جیو-فینسنگ اور جی پی ایس ٹیکنالوجی کو نافذ کرنے کے اہم فوائد اور چیلنجز کیا ہیں؟
8. How do you ensure that new social mobilisers are effectively trained and supported in their roles?	آپ کیسے یقین دہانی کرتی ہیں کہ نئی سوشل موبلائزرز کو موثر طریقے سے تربیت دی جائے اور ان کے کردار میں مدد فراہم کی جائے؟
9. Can you provide examples of how social mobilisers have successfully empowered female farmers and improved their conditions?	کیا آپ مثالیں دے سکتی ہیں کہ سوشل موبلائزرز نے خواتین کسانوں کو کامیابی سے کیسے باختیار بنایا ہے اور ان کی حالات کو بہتر بنایا ہے؟
10. What role does community trust play in your work as a social mobiliser?	کمیونٹی کا اعتماد آپ کے سوشل موبلائزر کے طور پر کام میں کیا کردار ادا کرتا ہے؟
11. How do you deal with farmers' reluctance to adopt new practices?	آپ کسانوں کی نئی مشقیں اپنانے کی ہچکچاہٹ کا کیسے سامنا کرتی ہیں؟
12. What measures do you take to maintain transparent communication with farmers?	آپ کسانوں کے ساتھ شفاف مواصلات کو برقرار رکھنے کے لیے کون سی تدابیر اختیار کرتی ہیں؟
13. Can you discuss any recent success stories from your work with farmers?	کیا آپ کسانوں کے ساتھ اپنے کام سے حالیہ کامیابی کی کہانیوں پر بات کر سکتی ہیں؟
14. How do you approach training sessions to ensure maximum participation from farmers?	آپ تربیتی سیشنز میں کسانوں کی زیادہ سے زیادہ شمولیت کو یقینی بنانے کے لئے کس طرح پیش آتی ہیں؟
15. What are your long-term goals as a social mobiliser in agriculture?	زراعت میں سوشل موبلائزر کے طور پر آپ کے طویل مدتی اہداف کیا ہیں؟
16. How do you see APCL NRSP MTSCs?	
17. Do you meet with local Wholesalers and visit local Markets for sustainability compliance?	

Appendix 5.4: Sample protocol with NRSP Bank representatives

Sample Questions	Urdu Translation
1. What are the main services NRSP Bank offers to farmers in your region?	بینک آپ کے علاقے کے کسانوں کو کون سی اہم NRSP خدمات فراہم کرتا ہے؟
2. How does NRSP Bank assess the needs of farmers when offering financial services?	بینک مالی خدمات پیش کرتے وقت کسانوں کی ضروریات کا کیسے اندازہ لگاتا ہے؟
3. Can you discuss the challenges faced by NRSP Bank in providing loans to small farmers?	NRSP کیا آپ چھوٹے کسانوں کو قرض فراہم کرنے میں بینک کو درپیش چیلنجز پر بات کر سکتے ہیں؟
4. How does NRSP Bank support sustainable farming practices among its clients?	بینک اپنے کلائنٹس میں پائیدار زراعتی طریقوں NRSP کی حمایت کیسے کرتا ہے؟

5. What strategies does NRSP Bank use to ensure timely repayment of loans by farmers?	بینک کسانوں کے ذریعہ قرضوں کی بروقت واپسی کو یقینی بنانے کے لئے کون سی حکمت عملی استعمال کرتا ہے؟
6. Can you describe the role of interest-free loans in promoting sustainable practices?	پائیدار طریقوں کو فروغ دینے میں سود سے پاک قرضوں کا کیا کردار ہے؟
7. How does the bank engage with local communities to build trust and encourage savings?	بینک مقامی کمیونٹیز کے ساتھ اعتماد قائم کرنے اور بچت کی ترغیب دینے کے لئے کس طرح شامل ہوتا ہے؟
8. What feedback have you received from farmers about your banking services?	آپ کو کسانوں کی جانب سے آپ کی بینکنگ خدمات کے بارے میں کیا فیڈبیک ملا ہے؟
10. How do social mobilisers support giving loans to local farmers?	
11. Do you engage religious leaders in educating about financing?	
11. Can you discuss the role of digital banking in improving farmers' access to financial services?	کسانوں کو مالی خدمات تک رسائی میں ڈیجیٹل بینکنگ کا کیا کردار ہے؟
12. How do you measure the impact of NRSP Bank's services on farmers' livelihoods?	بینک کی خدمات کے کسانوں کی زندگیوں پر NRSP آپ اثرات کی پیمائش کیسے کرتے ہیں؟
13. Can you provide examples of successful loan repayment stories from your clients?	کیا آپ اپنے کلائنٹس کے کامیاب قرض کی واپسی کی کہانیوں کی مثالیں دے سکتے ہیں؟
14. How does NRSP Bank contribute to financial literacy among farmers?	بینک کسانوں میں مالی خواندگی میں کیا کردار ادا کرتا ہے؟
15. What are the bank's policies on ensuring fair treatment of all clients?	بینک کے تمام کلائنٹس کے ساتھ منصفانہ سلوک کو یقینی بنانے کی کیا پالیسیاں ہیں؟
16. How does NRSP Bank support young entrepreneurs in agriculture?	بینک زراعت میں نوجوان کاروباری افراد کی NRSP حمایت کیسے کرتا ہے؟
17. What future initiatives does NRSP Bank plan to introduce for farmers?	بینک کسانوں کے لیے مستقبل کی کون سی جدید NRSP اقدامات متعارف کرانے کا ارادہ رکھتا ہے؟
18. Does the government support you in financing schemes?	
19. What is your return mechanism for loans?	
20. Do you provide loans only to farmers or other stakeholders in APCL NRSP rice MTSC?	

Appendix 5.5: Sample protocol with progressive farmers (2nd Tier Intermediary)

English Questions	Urdu Translation
1. Can you describe your background and what motivated you to pursue modern agricultural practices?	آپ اپنا پس منظر بیان کر سکتے ہیں اور کیا چیز آپ کو جدید زرعی طریقوں کو اپنانے پر آمادہ کرتی ہے؟
2. How has your education abroad influenced your approach to farming in Pakistan?	بیرون ملک تعلیم نے پاکستان میں زراعت کے حوالے سے آپ کے نقطہ نظر کو کیسے متاثر کیا ہے؟
3. What specific modern farming techniques have you implemented on your farms, and how have they impacted productivity?	آپ نے اپنی زمینوں پر کون سے جدید زرعی طریقے نافذ کیے ہیں اور ان کا پیداوار پر کیا اثر پڑا ہے؟
4. How do you support and train local farmers in adopting these modern techniques?	مقامی کسانوں کو یہ جدید طریقے اپنانے میں آپ کیسے مدد کرتے ہیں اور تربیت دیتے ہیں؟
5. What are the main challenges you face in promoting sustainable agriculture, and how do you address them?	پائیدار زراعت کو فروغ دینے میں آپ کو کونسی بڑی مشکلات کا سامنا ہے اور آپ ان کو کیسے حل کرتے ہیں؟
6. How do you collaborate with NRSP and APCL to improve farming practices and support local farmers?	آپ کے ساتھ مل کر آپ زراعتی NRSP اور APCL طریقوں کو بہتر بنانے اور مقامی کسانوں کی مدد کیسے کرتے ہیں؟
7. Can you discuss the importance of soil health, crop rotation, and water management in your farming practices?	آپ کی زراعتی سرگرمیوں میں مٹی کی صحت، فصل کی تبدیلی، اور پانی کے انتظام کی اہمیت پر تبصرہ کریں؟

8. How do you ensure the participation of educated and skilled youth in farming, and what impact does this have?	تعلیم یافتہ اور ہنرمند نوجوانوں کو زراعت میں شامل کرنے کو کیسے یقینی بناتے ہیں اور اس کا کیا اثر ہوتا ہے؟
9. What role do you play in ensuring fair pricing and quality control in the agricultural supply chain?	زرعی سپلائی چین میں منصفانہ قیمتوں اور معیار کے کنٹرول کو یقینی بنانے میں آپ کا کیا کردار ہے؟
10. How do you see the future of sustainable farming in Pakistan, and what steps are necessary to achieve it?	پاکستان میں پائیدار زراعت کے مستقبل کو آپ کیسے دیکھتے ہیں اور اسے حاصل کرنے کے لئے کیا اقدامات ضروری ہیں؟
11. How do you collaborate with APCL NRSP for sustainable development?	آپ کے ساتھ پائیدار ترقی کے لئے APCL NRSP آپ کس طرح تعاون کرتے ہیں؟
12. How do you collaborate with Buying firms from APCL NRSP?	
13. How do you manage your model farms?	آپ اپنے ماڈل فارمز کا انتظام کس طرح کرتے ہیں؟
15. Do you seek help from government institutions?	کیا آپ حکومتی اداروں سے مدد مانگتے ہیں؟
16. How do you perceive socio-cultural practices in farming?	آپ زراعت میں سماجی و ثقافتی روایات کو کیسے دیکھتے ہیں؟
17. What is your perspective on the role of religion in agricultural practices?	آپ زرعی طریقوں میں مذہب کے کردار کے بارے میں کیا سوچتے ہیں؟
18. What strategies do you employ to mitigate the risks associated with climate change in farming?	آپ زراعت میں موسمیاتی تبدیلی سے متعلق خطرات کو کم کرنے کے لئے کونسی حکمت عملی اختیار کرتے ہیں؟
19. How do you engage with local communities to promote sustainable practices?	آپ مقامی کمیونٹی کے ساتھ پائیدار طریقوں کو فروغ دینے کے لئے کس طرح مشغول ہوتے ہیں؟
20. How do you incorporate traditional farming knowledge into modern practices?	آپ جدید طریقوں میں روایتی زراعت کی معلومات کو کیسے شامل کرتے ہیں؟
21. What incentives or support do you believe would encourage more farmers to adopt sustainable practices?	آپ کے خیال میں کون سے مراعات یا امداد زیادہ کسانوں کو پائیدار طریقے اپنانے کی ترغیب دیں گی؟
22. How do you measure the success of sustainable practices on your farms?	آپ اپنی زمینوں پر پائیدار طریقوں کی کامیابی کو کس طرح ناپتے ہیں؟

Appendix 5.6: Sample protocol with APCL NRSP (CEO) (1st Tier Intermediary)

English Questions	Urdu Translation
1. Can you describe your background and how it has influenced your role as the Chief Executive of APCL NRSP?	آپ کے جیف APCL NRSP آپ اپنے پس منظر اور ایگزیکٹو کے طور پر آپ کے کردار پر اس کے اثرات کو بیان کر سکتے ہیں؟
2. What are the primary challenges you face in promoting sustainable agricultural development in Pakistan?	پاکستان میں پائیدار زرعی ترقی کو فروغ دینے میں آپ کو کونسی بنیادی مشکلات کا سامنا ہے؟
3. How does APCL NRSP work to protect farmers from exploitation by brokers and local dealers?	کسانوں کو بروکروں اور مقامی APCL NRSP ڈیلروں کے استحصال سے بچانے کے لئے کیسے کام کرتا ہے؟
4. What measures are in place to ensure transparency and fairness in the weighing and payment processes for farmers?	کسانوں کے لئے وزن کرنے اور ادائیگی کے عمل میں شفافیت اور منصفانہ ہونے کو یقینی بنانے کے لئے کیا اقدامات کئے گئے ہیں؟
5. How does APCL NRSP address the issue of delayed payments to farmers and ensure timely compensation?	کسانوں کو تاخیر سے ادائیگیوں کے APCL NRSP مسئلے کو کیسے حل کرتا ہے اور بروقت معاوضہ کیسے یقینی بناتا ہے؟
6. Can you explain the role of progressive farmers in your initiatives and how they contribute to the sustainable growth of agriculture?	آپ کے اقدامات میں ترقی پسند کسانوں کے کردار کو بیان کریں اور وہ کس طرح زراعت کی پائیدار ترقی میں حصہ ڈالتے ہیں؟

7. How does APCL NRSP support farmers in adopting modern farming techniques and technologies?	کسانوں کو جدید زرعی طریقے اور APCL NRSP ٹیکنالوجیز اپنانے میں کیسے مدد کرتا ہے؟
8. What steps are being taken to ensure the quality and traceability of rice produced and exported by APCL NRSP?	APCL NRSP کے ذریعہ تیار اور برآمد کی جانے والی چاول کی کوالٹی اور ٹریس ایبلٹی کو یقینی بنانے کے لئے کیا اقدامات کئے جا رہے ہیں؟
9. How does APCL NRSP engage with international buyers and ensure compliance with their standards?	APCL NRSP بین الاقوامی خریداروں کے ساتھ کیسے مشغول ہوتا ہے اور ان کے معیارات کی تعمیل کیسے یقینی بناتا ہے؟
10. What role do technological advancements and innovation play in the operations of APCL NRSP and in supporting local farmers?	APCL NRSP کے آپریشنز میں تکنیکی ترقی اور جدت کا کیا کردار ہے اور مقامی کسانوں کی مدد میں ان کا کیا حصہ ہے؟
11. How does APCL NRSP address the issue of access to credit for farmers?	APCL NRSP کسانوں کے لئے کریڈٹ تک رسائی کے مسئلے کو کیسے حل کرتا ہے؟
12. What initiatives does APCL NRSP have in place for training farmers in sustainable practices?	APCL NRSP کے پاس کسانوں کو پائیدار طریقوں میں تربیت دینے کے لئے کیا اقدامات ہیں؟
13. How does APCL NRSP monitor and evaluate its sustainability initiatives?	APCL NRSP اپنے پائیداری کے اقدامات کی نگرانی اور اندازہ کس طرح لگاتا ہے؟
14. Can you describe the collaboration between APCL NRSP and other organisations or stakeholders?	اور دوسرے اداروں یا اسٹیک APCL NRSP ہولڈرز کے درمیان تعاون کی وضاحت کر سکتے ہیں؟
15. How does APCL NRSP ensure that farmers know their rights and the services available to them?	APCL NRSP یہ کس طرح یقینی بناتا ہے کہ کسان اپنے حقوق اور ان کے لئے دستیاب خدمات سے آگاہ ہیں؟
16. What feedback mechanisms are in place for farmers to express their concerns or suggestions to APCL NRSP?	APCL NRSP کو اپنی تشویشات یا تجاویز کا اظہار کرنے کے لئے کیا فیڈبیک کے طریقہ کار موجود ہیں؟
17. How does APCL NRSP approach the issue of gender equality in agriculture?	APCL NRSP زراعت میں صنفی مساوات کے مسئلے کو کیسے دیکھتا ہے؟
18. What are your long-term goals for APCL NRSP regarding sustainable agriculture in Pakistan?	APCL NRSP پاکستان میں پائیدار زراعت کے حوالے سے کے لئے آپ کے طویل مدتی اہداف کیا ہیں؟
19. How do you measure the impact of APCL NRSP's programs on local communities?	APCL NRSP کے پروگراموں کے مقامی کمیونٹیز پر اثرات کو کس طرح ناپتے ہیں؟
20. How do you engage with government policies and regulations related to agriculture?	آپ زراعت سے متعلق حکومتی پالیسیوں اور قوانین کے ساتھ کیسے مشغول ہوتے ہیں؟
21. How do you interact with buying firms?	
22. Do you face any resistance from the local stakeholders, such as wholesalers?	
23. How do progressive farmers facilitate your MTSC relationship with buying firms?	
24. What is the mechanism of APCL NRSP MTSC product traceability?	
25. Do you follow the same measuring mechanism as in the local market?	
26. What is your take on sustainability certifications?	
27. Please tell us about workshops and seminars you conduct for the farmer's training.	
28. How do you interact with third parties for sustainability compliance, such as NGOs?	
29. What are the major requirements of buying firms in managing sustainability compliance in MTSCs?	
30. Who are the major buyers of your product?	

Appendix 5.7: Sample protocol with buying Firms (1st Tier Intermediary)

English Questions	Urdu Translation
1. Can you describe your role in the buying firm and how it connects to the agricultural supply chain?	آپ خریداری فرم میں اپنے کردار کی وضاحت کر سکتے ہیں اور یہ زرعی سپلائی چین سے کیسے جڑتا ہے؟
2. How do buying firms ensure that farmers are paid fairly for their products?	خریداری کی کمپنیاں یہ کیسے یقینی بناتی ہیں کہ کسانوں کو ان کی پیداوار کی منصفانہ قیمت ملے؟
3. What are the key criteria you consider when selecting suppliers and sourcing agricultural products?	آپ جب سپلائرز کو منتخب کرتے ہیں اور زرعی مصنوعات کی خریداری کرتے ہیں تو کون سے اہم معیار مدنظر رکھتے ہیں؟
4. How do you work with farmers to improve the quality and standards of agricultural products?	آپ کسانوں کے ساتھ مل کر زرعی مصنوعات کے معیار اور معیارات کو بہتر بنانے کے لئے کس طرح کام کرتے ہیں؟
5. What role do sustainability and environmental concerns play in your sourcing decisions?	آپ کے خریداری کے فیصلوں میں پائیداری اور ماحولیاتی خدشات کا کیا کردار ہوتا ہے؟
6. How do you ensure compliance with food safety regulations in your supply chain?	آپ اپنی سپلائی چین میں فوڈ سیفٹی کے ضوابط کی تعمیل کو کیسے یقینی بناتے ہیں؟
7. Can you discuss the importance of traceability in the supply chain and how you implement it?	آپ سپلائی چین میں ٹریس ایبیلٹی کی اہمیت پر تبصرہ کریں اور آپ اسے کیسے نافذ کرتے ہیں؟
8. How do you engage with local communities to promote sustainable agricultural practices?	آپ مقامی کمیونٹی کے ساتھ پائیدار زرعی طریقوں کو فروغ دینے کے لئے کیسے مشغول ہوتے ہیں؟
9. What challenges do you face when working with farmers, and how do you address them?	کسانوں کے ساتھ کام کرتے وقت آپ کو کن چیلنجز کا سامنا کرنا پڑتا ہے اور آپ انہیں کیسے حل کرتے ہیں؟
10. How do you monitor and evaluate the performance of your suppliers?	آپ اپنے سپلائرز کی کارکردگی کی نگرانی اور اندازہ کس طرح لگاتے ہیں؟
11. How do you see the role of technology in improving agricultural practices among farmers?	آپ ٹیکنالوجی کے کردار کو کسانوں میں زرعی طریقوں کو بہتر بنانے کے حوالے سے کس طرح دیکھتے ہیں؟
12. What training or support do you provide to farmers to help them meet your standards?	آپ کسانوں کو آپ کے معیارات پر پورا اترنے میں مدد دینے کے لئے کیا تربیت یا مدد فراہم کرتے ہیں؟
13. How do you handle disputes or grievances raised by farmers in the supply chain?	آپ سپلائی چین میں کسانوں کی طرف سے اٹھائے جانے والے تنازعات یا شکایات کو کیسے سنبھالتے ہیں؟
14. What management strategies you implement for sustainability compliance? (Direct, indirect, third party)	آپ پائیداری کی تعمیل کے لیے کون سی انتظامی حکمت عملیوں کا نفاذ کرتے ہیں؟ (براہ راست، بالواسطہ، تیسری پارٹی؟)
15. What is your relationship with progressive farmers?	
16. What business mechanisms you follow with APCL NRSP for sustainability compliance?	
17. What strategy you think work more for sustainability compliance?	آپ کے خیال میں کون سی حکمت عملی پائیداری کی تعمیل کے لیے زیادہ موثر ہے؟
18. Can you explain the relationship between your firm and local governments or NGOs?	آپ کی فرم اور مقامی حکومتوں یا این جی او کے درمیان تعلق کی وضاحت کریں؟
19. How do you address issues related to fair trade and ethical sourcing in your operations?	آپ اپنے کاموں میں منصفانہ تجارت اور اخلاقی خریداری سے متعلق مسائل کو کیسے حل کرتے ہیں؟
20. What initiatives does your firm undertake to support the economic development of local farming communities?	آپ کی فرم مقامی زراعتی کمیونٹیز کی اقتصادی ترقی کی حمایت کے لئے کون سے اقدامات اٹھاتی ہے؟
21. How does your firm approach the challenges posed by climate change in agriculture?	آپ کی فرم زراعت میں موسمیاتی تبدیلی سے پیدا ہونے والے چیلنجز کو کیسے دیکھتی ہے؟
22. What is your long-term vision for sustainable sourcing in the agricultural sector?	آپ کے پاس زراعت کے شعبے میں پائیدار خریداری کے لئے کیا طویل مدتی وژن ہے؟
23. How do you measure the impact of your sourcing practices on local communities?	آپ اپنی خریداری کی مشقوں کے مقامی کمیونٹیز پر اثرات کو کس طرح ناپتے ہیں؟

24. What role does consumer demand play in shaping your sourcing decisions?	صارفین کی طلب آپ کے خریداری کے فیصلوں کو کس طرح متاثر کرتی ہے؟
25. Which sustainability-compliant certificates does your company demand from APCL NRSP?	
26. How do you see the CSR of APCL NRSP?	
27. How do you ensure the traceability of the product?	