

Strategic sustainable development: The role of intermediaries in managing the sustainability compliance of a multi-tier crop agri- food supply chain. A developing economy perspective

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RESEARCH ARTICLE

‘Strategic sustainable development: The role of intermediaries in managing the sustainability compliance of a multi-tier crop agri-food supply chain. A developing economy perspective’

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Abstract

This qualitative case study investigation highlights deeply entrenched sustainability challenges within a multi-tier supply chain of a developing country's crop agri-food sector. Focusing on the rice supply chain, the study reveals 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, especially in the lower-tiers previously considered ‘commodities with no value’. Social networking and progressive farmers played the inclusive roles of change agents in bringing all the 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 contributed to significant advances in Pakistan's rice industry towards sustainable development.

KEYWORDS

Agri Processing Company Limited, intermediaries, lower-tier suppliers, progressive farmers, social networking, sustainable development

1 | INTRODUCTION

Agri-food supply chains in a global context have recently witnessed a significant increase in multi-tier suppliers' collaboration in product formation until it is delivered to the end user. These suppliers are considered a major driving force for buying firms to achieve competitive advantages and contribute to an organisation's overall success (Purwanto et al., 2023; Rashidi et al., 2020). However, because of

their different geographies, the original product producers remain outside the visible horizon, facing and causing multidimensional sustainability challenges that are often ignored and not bothered (Kim et al., 2022). The lack of consideration raises severe doubts about sustainability's holistic nature.

Within this complex landscape, sustainability in the crop agri-food sector has emerged as a significant business objective to address different stakeholders' concerns, not just at the corporate level but also

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in maintaining compliance throughout business operations. The sustainability challenges in the crop agri-food sector go beyond the economic realm and are considered more operational. Grimm et al. (2014, 2016) have reported that these operational challenges have been witnessed predominantly due to the suppliers' divergent institutional and cultural contexts in geographically fragmented multi-tier supply chains (MTSC). These raw material producers are referred to as lower tiers in MTSC literature (Grimm et al., 2016). Managing sustainability compliance focusing on the institutional and cultural contexts of lower tiers in MTSCs has received limited attention from scholars and warrants significant focus to foster an inclusive and holistic agenda of sustainable development (SD) (Agrawal et al., 2024; Gruchmann, 2022; Kähkönen et al., 2023; Kusi-Sarpong et al., 2023; Marano et al., 2024; McLoughlin & Meehan, 2021; Senyo & Osabutey, 2023).

Recent literature highlights the importance of adopting holistically integrated sustainability dimensions that harmonise environmental, social and economic priorities to achieve enduring resilience and prosperity towards SD (Brglez et al., 2024; Dwivedi et al., 2021). The Brundtland Commission notably articulated this concept in its landmark report officially known as the World Commission on Environment and Development (Brundland, 1987), 'Our Common Future,' which defined SD as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. The advocates of 'our common future' consistently emphasise effective governance and inclusive policies to ensure equitable outcomes (Mathis et al., 2023). This requires significant collective and systemic actions to gain competitive advantages and social equity in any business (Appolloni et al., 2022; Muzamwese et al., 2024). Therefore, for any business pursuing sustainability compliance in their global MTSCs to gain organisational-level competitive advantages, a systemic approach related to social equity, environmental health and economic wealth of all the stakeholders is not just a requirement but a necessity without which SD is unlikely to materialise (D'Adamo et al., 2024; Gahlaut et al., 2024; Jaeger et al., 2021).

On a global scale, MTSCs of crop agri-food are generally extended between developed and developing countries (Petruzzelli et al., 2023). Major buyers are from developed countries, and suppliers are from developing countries. In these settings, to achieve competitive advantages, advancing technological development could offer distinct systemic approaches and governance mechanisms for promoting SD (Agrawal et al., 2023; Sharma, Bhatia, et al., 2024; Srivastava et al., 2022; Upadhyay et al., 2023). Blockchain technology, for instance, provides immutable records of transactions, ensuring transparency and traceability of products from raw materials to end users (Di Vaio et al., 2023; Jraisat, Jreissat, et al., 2023; Sharma, Tyagi, & Kazançoğlu, 2024). This capability is integral for verifying sustainable practices and compliance with environmental, social and governance (ESG) standards (Amatucci & Mollo, 2024). Similarly, IoT devices can monitor environmental conditions and optimise resource use by providing real-time data and analytics (Alkaraan et al., 2022; Srivastava et al., 2022; Upadhyay et al., 2023). By integrating IoT, businesses can track product lifecycles and implement predictive maintenance, minimising waste and supporting a resilient circular

economy (Caferra et al., 2023; Eisenreich et al., 2022; Kumar et al., 2024). Multi-criteria decision analysis (MCDA) could be utilised to enhance sustainability initiatives and reporting. This approach is particularly beneficial in the context of the circular economy, waste management and management accounting practices, which collectively work to foster a sustainability-conscious ecosystem (D'Adamo et al., 2022; Di Vaio et al., 2023; Sondh et al., 2024). The enhanced monitoring and data collection enables more effective closed-loop supply chains by ensuring timely interventions, reducing resource consumption and improving recycling efficiency (Bhattacharya et al., 2024; Sahoo et al., 2023).

Despite these advantages, technological advances also have limitations in the SD of MTSCs, particularly in developing countries where most lower-tier suppliers are based (Boström et al., 2015; Govindan et al., 2021; Kessler et al., 2022). For instance, the 'dynamic capabilities framework' provides a theoretical management lens, highlights that firms can navigate the supply chain complexities through technological and strategic advancement within MTSCs, and offers insights into firms' adaptability (Belhadi et al., 2022; Köhler et al., 2022). With its emphasis on firms' capacity to detect and respond to environmental shifts, this framework may insufficiently address the structural inequalities and technological disparities impeding lower-tier suppliers' innovation and adaptability (Gruchmann & Seuring, 2018; Heldt & Beske-Janssen, 2023). Moreover, it may neglect socio-economic and cultural factors influencing technological adoption and innovation in emerging economies, including levels of digital literacy, regulatory hurdles and market dynamics (D'Adamo & Gastaldi, 2023; Govindan et al., 2021; Sharma, Tyagi, & Kazançoğlu, 2024). Likewise, despite the proficiency of life cycle assessment (LCA) frameworks in evaluating environmental impacts, they frequently overlook sustainability's social and economic dimensions, which are significant for a comprehensive understanding of supply chain practices' broader effects on communities in developing nations (Fnais et al., 2022). Similarly, circular economy models may struggle to implement closed-loop systems in settings with limited infrastructure and resources in MTSCs (Hofstetter et al., 2021; Sharma et al., 2023). This may be attributed to information asymmetries between technology users and vendors, legal uncertainties and organisational transformations, each of which predominates in different technology clusters (Kessler et al., 2022).

In fostering technological innovation and cultivating a global culture of SD, one critical issue to address is the structural distance between MTSC actors and the consequences of their actions (D'Adamo & Gastaldi, 2023). Policy interventions must aim to reduce and eliminate these distances. Considering the SD Goals (SDGs) as a shared agenda among nations is a focal point for forward-looking policy and programmatic dialogue. Indeed, the current state of global sustainability governance is characterised by fragmentation, necessitating coordinated efforts to overcome it. In these circumstances, local stakeholders could act as potential economic and socio-technical intermediaries cost-effectively for global sustainable MTSCs. These intermediaries could provide socio-technical support to the lower tiers, develop proximity and sensitivity to their particular business operations and effectively integrate them into mainstream business,

fostering a pathway towards SD (Busch et al., 2024; Cole & Aitken, 2020; Gruchmann, 2022; Noviaristanti et al., 2023; Song et al., 2023; Wilhelm et al., 2020). The roles of intermediaries, particularly first-tier suppliers as intermediaries in MTSC literature, are well-documented. However, these intermediaries' influence on other suppliers' sustainability performance needs to be probed, mainly when business is between developed and developing countries. There is also a need to investigate how first-tier intermediaries based in the suppliers' locations contribute to developing inclusive strategies for all MTSC stakeholders to foster sustainable socioeconomic growth. This study addresses these gaps by examining the assumptions that intermediaries' roles and actions are critical in shaping sustainability outcomes within MTSCs for SD. A comprehensive investigation of these considerations would significantly contribute to understanding how to promote sustained, inclusive and sustainable economic growth in agriculture-based developing countries, advancing 'productive employment' and 'decent work' for all while 'reducing inequalities'. These inquiries align with the practical implications and societal relevance of SD Goals 2030 (SDG) 8, 9 and 10 agenda.

Within these specific settings of MTSC structures, the agricultural-based developing countries whose economies largely depend upon their crop exports represent a distinctive case that warrants investigating embedded sustainability challenges to enhance the prospect of sustainable business growth. To establish a link between developed and developing countries' MTSCs, this research only considered the suppliers of export-quality products for investigation. This study employed the following selection criteria for the research case: the understanding and sensitivity of businesses towards sustainability in their supply chains (Billah et al., 2023), stakeholders' requirements for sustainability compliance in supply chain management practices for SD (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). Based on these criteria, various industries of Pakistan's major export products, such as rice, oranges, mangoes, dates and pulses, were contacted through different sources.¹ Two companies were considered; however, APCL, a first-tier Basmati rice supplier, agreed to give access and fully participate in this research for academic, professional and sustainable farming considerations. 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 SD of Pakistan through agriculture—a contribution that other companies in Pakistan may not easily match.

Theoretically, this research started in September 2021 with a two-staged systematic review²: this 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 SD? 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 are further corroborated by the systematic study of Senyo and Osabutey (2023), which proposed various critical areas for future research: (1) investigating the social, environmental and economic dimensions of sustainability collectively in MTSCs, (2) considering the perspectives of non-supply chain members and external stakeholders for SD, (3) conducting rigorous empirical validation of sustainability assessment approaches and (4) future research should focus on the perspectives of emerging and developing economies. Similarly, the study of Kähkönen et al. (2023) also suggests studying the management of sustainability-related risks and the management of sustainability in supply chains in general where the original raw material suppliers and lower tiers are located, for example, in developing countries and ensuring that the data collection includes these suppliers. The other focus of this study corresponds with Gruchmann's (2022) proposal, which proposes that qualitative, empirical research through case studies should be done for a deeper understanding of intermediaries' actions and relationships for sustainable supply chains. Considering these recommendations, this study strategically directs its focus towards integrating lower-tier suppliers into MTSC networks by also targeting the research proposals of Marttinen and Kähkönen (2022), which are: (1) focusing on lower-tier suppliers in MTSCs is critical due to their often overlooked role in enhancing supply chain resilience and efficiency. (2) An in-depth study should also include multiple other supply chain tiers to extend the view towards SD.

These limitations identified by multiple researchers provided a robust justification and motivation for a qualitative investigation of Pakistan's crop agri-food sector,³ emphasising lower tiers. This research stands out for its distinctive approach, aiming to address multiple research gaps within a single study. It could substantially enhance theoretical and practical understanding within the existing literature on MTSC aiming for SD. The following research questions based on the above-stated assumptions have guided this research:

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

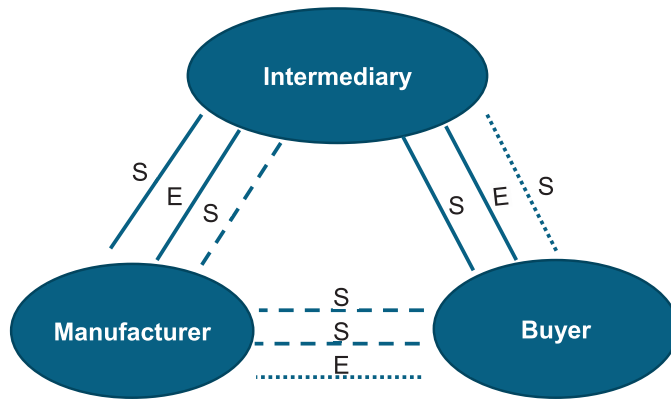
RQ2. What roles do different levels of intermediaries play for SD in the MTSC of the crop agri-food industry?

1.1 | Sustainable MTSC: Intermediaries and sustainability compliance

Intermediaries are paramount in harmonising sustainability objectives between buyers and suppliers, establishing institutional bonds that

Structural/ Technical	Economic	Social
Links, Ties, Connections	Investment	Commitment, Trust, Atmosphere, Business attraction

FIGURE 1 Explanation of the bonds and roles of intermediaries in MTSC. E, economical; S, social; ST, structural/technological.



hinge on structural, economic and social ties (Christopher Go & Brummer, 2024; Cole & Aitken, 2020). The strength of these relationships varies, with investment-based partnerships representing strong bonds and technical support-based ties categorised as medium bonds (Schreiber et al., 2023; Yu et al., 2024). Conversely, relationships primarily centred on addressing sustainability challenges, particularly in the realm of social sustainability, are regarded as weaker, possibly due to intermediaries neglecting corporate social responsibility fundamentals, especially in developing countries (Kumar & Agrawal, 2023; Schreiber et al., 2023; Yu et al., 2024) (See Figure 1).

Intermediaries strategically evaluate supplier sustainability practices in alleviating the burden of multiple audits and diverse socio-environmental compliance certifications (Chen et al., 2023; Kuijpers et al., 2023). Suppliers can efficiently showcase their socioeconomic sustainability credentials directly to intermediaries, offering a streamlined and cost-effective process beneficial for buyers and suppliers (Chen et al., 2023; Cholez et al., 2023; Marttinen & Kähkönen, 2022). This ‘strategic intermediary’ involvement streamlines processes and opens new business channels, facilitating robust access to varied markets for SD (Reardon & Vos, 2023; Sharma et al., 2023). By facilitating mutual benefits and service exchanges, the literature constantly highlights that intermediaries reduce information asymmetry and knowledge gaps for sustainability compliance.

However, the existing literature requires insights and exploration of how intermediaries beyond the first-tier adeptly facilitate sustainable phenomena in MTSCs with unique cultural and societal characteristics. This is particularly relevant in collectivist and power-distant societies, where suppliers are intricately connected to local supply chains and face ‘Meso-level’ barriers (Boso et al., 2023; Essien et al., 2024). By understanding the local needs, the nuanced role of intermediaries in providing a cohesive platform through social networking in such contexts for SD remains unexplored. This emphasises

the need for focused academic enquiry to understand their role's distinctive contributions and challenges. The extant literature also accentuates a striking gap in understanding the structural, economic and social functions of intermediaries connected to the holistic sustainability phenomenon within MTSC by involving lower-tier suppliers, intermediaries and buying firms (Miandar et al., 2023; Najjar & Yasin, 2023). This trilateral relationship of intermediaries will further complement the conceptual framework and analysis of the study's second objective, discussed below.

The remainder of the article is divided into various sections. Section 2 critically establishes the study's theoretical and conceptual framework. Section 3 subsequently describes the methods employed for data collection and analysis. Section 4 then presents the findings of each research question. Section 5 frames the discussion based on theoretical and pragmatic perspectives that lead to Section 6, the conclusion, and envisages future roadmaps for research on SD.

2 | THEORETICAL BACKGROUND

Qualitative inquiries into supply chains grounded in interpretive and constructionist paradigms primarily consider five major conventional theories: resource-based view (RBV), transaction cost economics (TCE), stakeholder theory, agency theory and social network theory. In the sustainable MTSCs, where collectivistic societal norms and high-power distance exist, the suitability of most used conventional theories, for instance, resource-RBV, TCE and agency theory, may encounter limitations (Ghadge et al., 2019; Nath et al., 2021; Vlachos & Polichronidou, 2024). These theories often emphasise individualistic motivations (Ferrigno et al., 2024), contractual relationships (Ferrigno et al., 2024) and economic efficiency (Ketokivi & Mahoney, 2020), which may not fully capture the complexities of

social dynamics and power structures inherent in such environments. In collectivist societies with high power distance, relationships are often based on trust, reciprocity and social norms rather than purely economic incentives (Dutta et al., 2022; Zhang et al., 2024). Therefore, overlooking these sociocultural factors in favour of conventional economic theories could lead to a misalignment between theoretical assumptions and practical realities, potentially undermining the effectiveness of sustainable MTSC management strategies. RBV, on the other hand, focuses on the firm's internal resources and capabilities and may overlook the intricate interdependencies and social dynamics inherent in MTSCs (Malhotra et al., 2024). Similarly, agency theory, which emphasises principal-agent relationships and individual motivations, may fail to adequately account for the collective decision-making processes and communal values in these settings (Cruz & Haugan, 2019). Moreover, TCE, which seeks to minimise transaction costs through contractual arrangements, may neglect the sociocultural nuances and power differentials that shape interactions within these supply chains (Ciliberti et al., 2020; Meinschmidt et al., 2018). Because of these critical factors, MTSCs require more nuanced theoretical approaches, incorporating cultural, social and institutional factors alongside traditional economic theories to understand better and address the sensitive, overlooked sustainability challenges in developing countries. Theoretical perspectives in MTSCs also provide insights into the effective management of lower-tier suppliers, emphasising their embeddedness in more extensive supply networks for SD (Kim & Choi, 2021). However, how this embeddedness occurs in MTSCs remains unclear due to a lack of concrete primary evidence. This study explores this phenomenon using the following theoretical framework.

The overall research framework drives two fundamental assumptions of social networking theory, which explores the multifaceted relationships within supply chains and their essential role in facilitating SD (Kim & Choi, 2021; Swierczek, 2023). The 'relational embeddedness' of social networking primarily evaluates the depth and quality of relationships between actors, impacting how interactions and outcomes are influenced across various supply chain tiers in MTSC (Dias et al., 2024; Swierczek, 2019). In collectivistic societies for SD, relational ties, trust and resilience are fundamentals for achieving common goals (Dogbe et al., 2020; Houé & Duchamp, 2021). The emphasis on relational embeddedness underscores the importance of effective information transfer and goal alignment through direct and indirect connections (Mazzola et al., 2016). Nonetheless, this approach may overlook the challenges of maintaining solid relational ties in geographically dispersed and culturally diverse supply chains, where trust and communication barriers can significantly hinder sustainability efforts (Dias et al., 2024). Moreover, implementing sustainability compliance initiatives often necessitates reconfiguring existing relationships within the network, transitioning from relational embeddedness towards the second assumption of the social networking theory, 'structural embeddedness' which is a key parameter of SD (Andrews et al., 2024; Taylor & Rosca, 2023). However, this transition is contingent upon the availability of resources and the capability of stakeholders' roles and 'social capital' to manage these shifts effectively for sustainability compliance.

Social capital theory in MTSC is the concept that social relationships and networks within and among different tiers of supply chains can create value and facilitate sustainable outcomes (Sakamoto, 2024; Zhou et al., 2024). In MTSC, the social capital theory emphasises the importance of social norms, cooperation and mutual support among supply chain actors that create strong social ties, that is, lower-tier suppliers, distributors and buyers (Djuric & Filipovic, 2015; Stotten, 2024). In MTSC, solid social ties lead to improved information sharing, better coordination, reduced transaction costs and enhanced problem-solving capabilities through collective decision-making (Appiah et al., 2023; Dias et al., 2024; Jayarathna et al., 2023). For instance, solid social capital could significantly facilitate the adoption of sustainable practices, such as environmental standards or fair labour practices, by fostering collaboration and collective action among supply chain actors (Hina et al., 2023; Othman & Ameer, 2023).

This study integrates the overarching assumptions of both theories to examine how Pakistan's rice industry's MTSC fosters SD. Social networking theory emphasises relational embeddedness, focusing on the quality and depth of relationships among supply chain actors, a significant element of collective societies such as Pakistan. In this research, theoretical assumptions will investigate how these relational ties evolve into structural embeddedness in the business environment, where formalised social networks support consistent interactions leading to efficient integration, such as the first-tier intermediary in this study. This integration promotes fairness and inclusivity and strengthens the supply chain's resilience and effectiveness, ultimately driving sustainable agricultural practices.

The conceptual framework of objective one is based on a hybrid model, which is systematically developed based on systemic and structural sustainability approaches, integrating a triple-bottom-line and an ESG model. The triple-bottom-line approach, systemic in nature, remained invaluable in analysing sustainability challenges, considering the social, economic and environmental dimensions (Gahlaut et al., 2024; Santiago et al., 2023). Few studies have taken a systemic approach to exploring and managing multifaceted sustainability challenges that cover all aspects of the triple-bottom-line approach (Senyo & Osabutey, 2023). To understand the sustainability phenomenon holistically and potentially pioneer investigation in the MTSCs of the agricultural industry, this study established a link between the ESG model, emphasising governance structures for SD, 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. It reveals how the 'governance orientations' (structural) of a business influence the triple-bottom-line (systemic) integration, interdependencies, and relationships of different stakeholders, leading to a better understanding of sustainability challenges and possible solutions (Alkaraan et al., 2022; Boström et al., 2015; Chininga et al., 2023; Gellynck & Molnár, 2009; Truant et al., 2024). ESG-focused governance mechanism involves satisfying the needs of multiple firm stakeholders, for example, employees, customers, suppliers and the local community, and so on, for SD (Shalender et al., 2023; Truant et al., 2024).

To address **RQ2**, the study obtained insights from central characteristics of sustainable management frameworks from Mena et al. (2013) and Tachizawa and Wong (2015). These strategies have gained prominence due to business expansion and the complex nature of multi-tier relationships in international business, emphasising direct, indirect and third-party collaborative management strategies. The direct management approach is characterised by buying firms establishing direct and closed connections with sub-suppliers, a process facilitated by identifying these suppliers via first-tier suppliers and transitional strategies (Carter et al., 2015; Chae et al., 2024). This hands-on strategy entails collaborating and monitoring sub-suppliers to ensure holistic sustainability compliance (Tachizawa & Wong, 2015). This approach offers high impact through bilateral actions (Jraisat, Upadhyay, et al., 2023), such as immediate training and implementing contingency plans for SD. In the indirect management strategy, which aligns with the open supply chain structures of Mena et al. (2013), buying firms operate without direct connections to sub-suppliers, relying solely on first-tier suppliers to monitor and collaborate with sub-suppliers for enhanced sustainability compliance (Jraisat, Upadhyay, et al., 2023; Tachizawa & Wong, 2015). First-tier suppliers play a significant role in facilitating sustainability practices and mediating roles without a direct connection between the buyer and the supplier's supplier (Chae et al., 2024; Villena & Gioia, 2020; Wilhelm & Villena, 2021). The third-party management strategy involves buying firms collaborating with external entities, such as government or non-government organisations, to monitor and certify sub-suppliers, focusing on efficient sustainability compliance through a robust monitoring mechanism and social audits, which ultimately leads to inclusive SD (Gong et al., 2018; Koberg & Longoni, 2019; Tachizawa & Wong, 2015). The following section discusses the empirical setting of the study and how the data were collected and analysed.

3 | DATA COLLECTION

3.1 | Empirical setting

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, which leads to continuous dependence on landowners and impeding SD in agriculture (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 SD (Ministry of Finance, Economic Survey of Pakistan 2022–23). The absence of an established supply chain and governance structures significantly disadvantages Basmati rice farmers and often leads to their exploitation (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 the vast majority of Pakistani rice farmers operate on small-scale farms (less than 10 hectares), which 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 SD 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 SD in Pakistan, leading to a substantial gap in the existing literature on the subject.

The research employed Yin's (2005) single case study methodology, focusing on APCL, a global processor in sustainable rice farming in Pakistan. 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.

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 Organisation, Asian Development Bank and various other international organisations.

3.2 | Methodology

The study followed an investigative interpretive phenomenology, in which 'knowledge and understanding are socially constructed' (Yanow & Ybema, 2009). This philosophical paradigm was appropriate as this research tried to understand sustainability challenges and the role of intermediaries that influence sustainability compliance holistically in MTSCs. Interpretive phenomenology focuses on exploring and interpreting the meanings individuals or groups ascribe to their experiences (Spencer et al., 2021). In the context of this study, it enabled an in-depth examination of how various stakeholders within MTSCs perceive and navigate sustainability challenges. The social constructionist underpinning of this approach recognises that these perceptions and understandings are shaped by social interactions, cultural norms and institutional contexts (Yanow & Ybema, 2009). By employing this paradigm, the research delved into intermediaries' nuanced and subjective experiences in MTSCs, uncovering how their actions and interactions impact sustainability compliance. This approach facilitated a holistic investigation, capturing the complexity and interdependence of factors influencing sustainability in MTSC for SD (Sharpe, 2004). Consequently, it provided rich, contextualised insights into the systemic nature of sustainability challenges, which might be overlooked by positivist or reductionist methodologies (Hoffman et al., 2013).

The study used multiple data sources: observations of the fields, focus group discussions with different stakeholders of the supply chain, semi-structured interviews and archival data to triangulate the findings for reliability purposes. Because of the cultural and religious sensitivity of the locale, most research components were performed in exceptionally informal settings, and additional effort was put into capturing the required data. We were aware of the potential biases stemming from the participants' roles and their potential influence on the gathered data. To address this situation, we merged as natives and collected data by living in different farming communities (Arthur & Owen, 2022). By doing so, we aimed to ensure that the integrity and validity of the data were not compromised (Alliegro, 2021).

The field research process started in January 2022 and was facilitated by two key informants. These key informants were assigned to this research project. They were associated with the NRSP of Pakistan, where they played an active role in sustainable agriculture initiatives within the country. The first informant, the regional team lead for micro-financing schemes for the farmers, was responsible for

ensuring financial support and facilitating the provision of quality seeds, sustainable fertilisers and agricultural machinery. The second informant, the district development officer at NRSP, managed the integration of farmers into the APCL rice supply chain by organising community development programs, workshops and seminars on sustainable farming practices. Besides professional expertise, key informants' understanding of SD, familiarity with local culture and regional languages, and active collaboration with external stakeholders enabled the research to thoroughly investigate the socio-economic and operational aspects of the SD initiatives in Pakistan.

The practical research began with a brief piloting exercise involving participating with farmer communities, educating them about the purpose of the study, and building trust and confidence in them. Their anonymity was ensured. Key informants acted as translators where needed. The pilot exercise allowed the research team to alter research techniques and amend the interview guides for the research. A report on the outcome of the piloting study supported by the key informants was generated and shared with the study's stakeholders before further research. The data collection process followed the theoretical sampling technique to foster the external validity of our research findings (Yin, 2005). Theoretical sampling involves selecting new cases or data points strategically chosen to develop further or refine emerging theoretical concepts through multiple data collection phases (Corbin & Strauss, 2014).

Data collection was in multiple phases: Phase 1 (14 March to 10 April 2023) was dedicated to field visits, participant observations and conducting focus group discussions with the farming communities.⁴ After piloting, the necessity for participant observations became apparent due to the collectivistic nature of the research locale, and most of the farmers were uneducated, aiming to comprehend the socio-economic, religious and cultural dimensions associated with sustainability challenges. The direct observation allowed us to gain unique insights and valuable data that would have been inaccessible through alternative research methods. By immersing ourselves in the farmers' daily activities, we witnessed firsthand the intricacies of their agricultural practices, utilising natural resources and integrating traditional knowledge with modern techniques. This in situ observation allowed us to understand the dynamic interactions between the farmers and their local environment, thereby exploring the intricate socio-economic, religious and ecological factors that shape their livelihoods.

After participant observation, the researcher conducted focus group discussions to ascertain a collective stance from diverse farming groups. This approach was adopted to corroborate our observational findings and community-based discussions, ensuring a comprehensive validation of our research outcomes within the research contexts. Detailed group discussions with farmers and progressive farmers further enabled us to gather rich qualitative data, including the farmers' perspectives on the challenges they face and their ideas for potential solutions. Because of their sociocultural sensitivities, there were no formal interviews with the lower-tier suppliers.

Phase 2 (14 April to 18 May 2023) included informal semi-structured interviews and interactions with company managers, social

mobilisers, progressive farmers, wholesalers and other stakeholders during sustainability workshops. Moreover, we met with buying firms' representatives in different sustainability seminars organised by the APCL and visited their processing units. A list of stakeholders involved in developing APCL NRSP sustainability strategy and responsible for managing lower-tier suppliers was generated for the interviews. Interviewees (28)⁵ were selected employing purposive sampling followed by theoretical sampling techniques from different working groups and levels of responsibilities in APCL MTSC. Some respondents were interviewed twice to verify various emerging concepts. The duration of the interviews was from 30 min to 3 h, following a conversational style because of the informal research setting (Swain & King, 2022). This approach complemented the broader insights gained from focus group discussions, offering a comprehensive view of stakeholder perspectives and contributing to a more robust analysis of sustainability challenges and managing strategies within the research context (Mahadevan & Moore, 2023). Because of the informal nature of the research setting and ethical measures, we remained focused on taking comprehensive notes throughout the interviews. After Phase 2, a primary research report was prepared, shared with the research team, and discussed with the company officials for feedback and validation. Phase 3, conducted online (30 May to 30 June), was primarily a validation phase that further confirmed the accuracy of data interpretations through member checking (Varpio et al., 2017), prompting minor changes related to sustainability compliance practices and the role of different intermediaries and other stakeholders. The primary data collection methods and their corresponding outcomes are outlined in Table 1.

3.3 | Data analysis

The research notes were translated into Urdu and then English. The qualitative analysis software NVivo (QSR International, 2023) was used to codify the data. Then, data categorisation and themes were generated. This process took place from July 2023 to September 2023. The data categorisation process comprised a comprehensive investigation of respondents' experiences and grounded realities to determine the substance and significance of the research phenomenon. This ensured consistency between observations, group discussions and interviews (Yin, 2005). Primarily, grounded themes were selected as the analytical method for the study, allowing for structured analysis within a case study context to gain novel insight (Sheikhhattar et al., 2022). The suitability of the thematic analysis extends to any research philosophy, provided that complementary processes are followed (Cotta et al., 2023). Themes included sustainability challenges for farmers and buying firms (environmental, social, economic and governance), the role of different tiers of intermediaries and sustainability compliance management strategies for smooth development (direct, indirect, through and third parties) and their effectiveness. We also highlighted substitute themes for analysis, for example, local farming techniques, benefits of applying information technology, local wholesalers' relations with farmers and the nature of

traditional purchasing contracts. The second analytical phase was narrative analysis. The respondents' interpretations were confirmed through member checking (Given, 2008). Selected themes were discussed with the heads of the farming communities and respondents from the APCL NRSP supply chain who participated in the research to validate the accurate findings. This technique improved the reliability of the findings significantly.

The pragmatic ontology of our research acknowledged plurality in human understanding and behavioural diversity in the investigative phenomenon (Pinnington & Meehan, 2023, p.26). Similarly, our constructionist epistemology encouraged us to recognise and probe emerging points of interest from respondents' viewpoints that would not have been easily possible in a positivist framework (Alvesson & Sandberg, 2023). These stances characterise 'the contextualism philosophical paradigm', where the researcher aims to understand how participants interpret their experiences within the particular setting of the study (Pinnington & Meehan, 2023; Spencer et al., 2021). The contextualism paradigm emphasises context and the diversity of meanings and is especially suitable for inquiries into behavioural responses (Hoffman et al., 2013).

The research team were constantly engaged in collaborative discussions during the analysis process. Guided by comprehensive reviews and various case analysis methodologies at this stage, it prevented the researchers from forming any field preconceptions and ensured the augmentation of original research insights. The research team consisted of four members from different nationalities. This diversity fostered richer discussions and helped challenge assumptions, promoting reflexivity (King & Brooks, 2016). To maintain uniformity and minimise inconsistencies in the data validity, inter-coder reliability cheques were conducted to assess agreement among researchers, ensuring consistency in interpretation (Cole, 2023). The iterative and inductive analysis confirmed that theoretical insights were firmly rooted in the data. Primary and secondary data information was triangulated to uncover biases, for instance, resulting from impression management (Tata & Prasad, 2015), to increase the validity of the overall research. Internal company documents were examined to validate research findings, including the data of different farming communities, annual SD reports of NRSP, prepared materials for internal meetings with different supply chain stakeholders, and official presentations in various seminars. External records included the company's website, and some published material in the company's database, were also examined. These documents helped to understand the research context, NRSP activities in compliance with corporate social responsibility, and challenges for sustainable growth in the crop agri-food sector. This also extended our understanding of APCL's role in sustainability compliance practices. To ensure the accuracy of the research findings, verbatims were used in italic quotations.

4 | FINDINGS

This section addresses each research question separately. The first conceptualises and offers a pragmatic view of sustainability

TABLE 1 Details of the data collection methods, respondents and findings.

Data collection methods	Numbers of interviews/detail of respondents	What were the objectives of these methods and what were the findings
Participant observation/ field visits	Exploring agricultural practices: A 3-week ethnographic immersion with the farming communities.	To observe the socio-cultural family structure of the producers. This methodology facilitated understanding how agricultural practices are implemented and local landlords' perception of sustainability compliance and challenges.
Focus group discussions (formal)	3 Discussions with lower-tier farmers (5–7 farmers, 3–4 h long) 2 Discussions with progressive farmers (3–4 progressive farmers, 2–3 h long) Total 05	To understand farmers' perspectives on socio-economic-cultural and religious challenges in farming and livelihoods. This methodology was critical to explore how progressive farmers influence bringing lower-tiers into the mainstream of sustainable supply chains and how effective they are in changing conventional farming practices into sustainable practices.
Workshops and seminars	Total 05	To understand what programs are conducted to help farmers understand sustainability compliance. This method ensured the investigation of monitoring, transparency and training practices for SD. Researchers also collaborated on buying firm representatives through these channels.
Semi-structured interviews	District development officer (1), Social mobilisers (03) (Tier-4 Intermediaries) Monitoring and evaluation officers (02) Microfinance officers (02) (Tier-3 Intermediaries) Progressive farmers (04) (Tier-2 Intermediaries) General manager, Chief executive and Company Engineer (Twice each) Supply chain officials (Export manager, supply chain lead, supply chain financial analyst) (01 Each) (Tier-1 Intermediaries) Total 19	What sustainability challenges do local farmers/lower-tiers/intermediaries/ stakeholders face? This helped to understand the diverse perspectives of various stakeholders. What management strategies APCL opt to address these challenges. How other levels of intermediaries (social mobilisers, progressive farmers and NRSP banks) execute their roles in addressing these challenges.
Semi-structured interviews	Buying firms and exporters (05) Total 05	To understand the management strategies buying firms determine to mitigate sustainability challenges and how effective these strategies are. This method provided insights into buying firms' strategic approaches to supplier engagement in SD, intermediaries' alignment with these firms' sustainability goals, and mechanisms ensuring product traceability.
Semi-structured interviews	Wholesalers (03) Regional head of NGO, Member of Chambers of Commerce (01 each) Total 04	This helped researchers to understand cultural metrology and credit practices, standards of input (seeds, fertilisers etc.), and how these practices have evolved over time. Interaction with third parties as external stakeholders in MTSC extended the transparency of various tier intermediaries' findings. What are their perceptions about sustainable farming practices and initiatives of APCL NRSP in Punjab Pakistan?

challenges. The second deepens our knowledge of how an intermediary as a first-tier supplier affects another supplier's sustainability performance and brings lower-tiers into the mainstream supply chain. The study's empirical results acknowledge the respondents' unique and situated perspectives. In this context, the following discussion devotes much of its content to the interviewees' statements. This deliberate approach aims to convey respondents' distinct viewpoints and personal experiences, enabling a holistic understanding of challenges and coping strategies for sustainable practices within the rice industry. It is worth noting that the selected participants are directly linked with the sustainable phenomenon of rice farming.

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

To investigate **RQ1**, the research employed the 'triple-bottom-line approach' and 'ESG' model. This hybrid model helped to comprehensively explore multidimensional sustainability challenges for lower-tiers: economic, environmental, social and myriad governance sustainability challenges faced by buying firms and intermediaries.

4.1.1 | Economic sustainability challenges

The research found numerous economic sustainability challenges that hinder the financial stability and prosperity of lower-tiers of Pakistan's rice industry. Broadly, the lack of price stability and currency fluctuations made it difficult for farmers to predict and plan their incomes effectively. The absence of renewable energy and reliance on non-renewable sources resulted in increased energy costs for farmers. Unfair mechanisms of daily wages for the labourers, with females being paid less. *'Farming requires considerable physical effort, and as men, we are equipped with the physical strength needed for the strenuous tasks in the fields. While women offer valuable assistance, their roles differ from ours. It is asserted that our higher wage is justified not only by our physical capabilities but also because, as the heads of families, we bear the primary responsibility for our households' overall management and well-being,'* articulated a participant directly addressing the discussion.

The exploitation of farmers by local wholesalers, who are basically local landlords, for high input costs such as fertilisers, pesticides and seeds, as well as fuel/diesel costs, added to the financial burden on farmers. Explicitly, brokers charge a 3% to 6% sale commission, and the hidden illegal charges, such as *'Chungi'*⁶, *'Maashki'*⁷ and *'Thala'*⁸, are said to be paid to *'Kammi'*⁹. These practices are traced back to traditional cultural and financial practices, further eroding farmers' earnings. *'The historical antecedents of these practices can be traced back to our forefathers. We are obligated to follow our ancestors' footprints. Kammi are poor people and have served us for centuries. The obligation to compensate these servers fell upon the landlords, primarily the farmers. This is also the order of our religion to serve the poor and needy'.* Wholesalers and brokers made it evident where they stand. When we asked the wholesalers why they do not pay this from their earnings, the answer was not friendly.

The local manipulative practise of measuring grain in jute bags, where each bag is treated as weighing an extra 1.5 kg beyond its actual weight, contributes to the manipulative practices of local wholesalers. This practise translates into a tangible consequence, whereby the quantity of grain ultimately delivered from a single truck or trolley is systematically reduced by an estimated 200–300 kg. This, combined with delayed payments from wholesalers, further disrupts farmers' cash flow, interrupting their capacity to invest in essential agricultural inputs. Despite farmers' awareness of these unfair practices, farmers faced significant challenges in addressing them due to their limited resources, ongoing dependence on local wholesalers, and their dominant authority within the system. This authority was manifested in various ways, including cattle theft, which local pesticide dealers sometimes coerced as a response to farmers' failure to remit high-interest payments for farming inputs. Such occurrences have surfaced as substantial challenges, severely impacting farmers' socio-economic and emotional well-being.

4.1.2 | Environmental sustainability challenges

The environmental challenges embedded in the existing agricultural practices highlight potential adverse impacts on ecological balance

and the overall well-being of the agricultural sector. Manual cutting of crops and stubble burning were standard practices that emerged as a significant reason for losing the quality of grain and smog in the local area, impacting air quality and public health. There was a myth about stubble burning: *'We do this because seeds fix and yield well in the soil'* (Farmers in deliberative discussion). The use of unapproved and prohibited chemicals, sold by local dealers for financial gain, had led to immense losses for smallholder farmers due to crop damage. Cutting trees was driven due to the lack of access to gas and other energy sources for domestic use, adversely affecting the environment by depleting valuable natural resources.

Water wastage due to the traditional irrigation systems (raw watercourse) and chemical and sanitary waste disposal into canals contributed to water pollution and scarcity concerns. The absence of a proper sanitation system has resulted in open defecation, contributing to health risks. Intensive monoculture farming for decades has led to soil degradation and reduced agricultural productivity. *'How could we change the crop patterns of our ancestors?'* questioned one of the elderly farmers, reflecting on the traditional and monoculture farming practices passed down through generations.

Moreover, there were brick kilns within the fields that were burning plastic and old shoes, releasing harmful gases, causing health issues and contributing to the prevailing smog problem in the region, affecting landowners and local communities. Land extraction for the raw material of the bricks also threatened natural habitats and ecosystems. *'These 'Bhattay'¹⁰ have been in operation for years; no one will die due to them, nor our forefathers. These are an extra source of income; our females and kids go there, work and get some extra money'.* A farmer articulated his position, refuting the essence of our probe. One of the groups of farmers was found very upset because of changing weather patterns, including heavy rains from March to August for the past 3 years. *'We live in kaccha houses,¹¹ excessive rains damage our houses and disrupt our traditional farming practices, causing us to suffer heavy losses'.*

4.1.3 | Social sustainability challenges

Various social sustainability challenges hindered the well-being and progress of lower-tiers in Pakistan's rice industry. One of the prominent issues was child labour, which is unfortunately considered more of a cultural norm than an alarming problem.¹² Another distressing concern was sexual harassment, which was underreported due to the fear of endangering women's lives (Honour killing¹³) (D'Lima et al., 2020). Inequality of resources, particularly regarding water distribution through the *'kachay khalay'*,¹⁴ significantly impacted the smallholders' well-being at the tail-end of water channels.

The Pakistani society is agricultural-based, and tribal and social relations are primarily based on agri-economic activities. Families involved in farming tend to marry within their families and castes. Religious connotation also influences them in terms of such marital relationships.

One of the most intriguing findings emerged when discussing the prevalence of thalassemia within a specific group of farmers, which

consequently sparked significant apprehensions regarding the enduring consequences of intra-family marriages. *'We belong to a particular caste system and cannot marry outside of it. Dukh-Sukh (Happiness or worries) are deemed to be in the hands of God, and we cannot evade the certainty of what is destined to occur,'* elucidated the elderly farmer, reflecting on the religious and socio-cultural complexities surrounding marriage practices in the community.

Furthermore, the increasing cases of liver and kidney diseases because of polluted water indicated the severe consequences of environmental issues on social well-being. The well-educated yet unemployed kids of the farmers were also a source of significant distress for their families, primarily stemming from the absence of suitable employment prospects. The caste system and tribal factors have contributed to the perpetuation of gender disparities within the labour market. The resultant male dominance perpetuated the systemic exploitation of female and migrant workers, creating an environment where fair employment practices are compromised.

4.1.4 | Governance sustainability challenges for the intermediaries

As articulated by the respondents, the buying firms and intermediaries faced two critical governance challenges that, in turn, exacerbated various other issues within the supply chain. A significant concern among these challenges was the absence of robust and sustainable policies, resulting in substantial gaps in adopting environment-friendly and socially responsible practices. Then, a distinct challenge identified in the responses was the reluctance of local farmers to embrace changes in traditional farming practices. This resistance posed a substantial hurdle in implementing new methods or technologies that could enhance efficiency, sustainability and the overall resilience of agricultural operations.

'Most local farmers are uneducated, poor and reluctant to adopt modern technology, which hinders efficiency and sustainability initiatives'. Moreover, *'The traditional cultural norms, values and practices also prevent us from implementing then monitoring the agricultural practices, which raises concerns about sustainability compliance with standards and regulations from our buyers'.* The chief officers of APCL brought attention to social and cultural impediments. The respondents' collective stance agreed that *'Political instability and war on terror created chaos in the market and caused buyers to stop or reduce their orders, leading to the selling of export-quality rice at local rates, affecting profitability and market credibility'.*

Corruption, predominately with instances of bribery issuing third-party certificates, undermined the reliability of sustainability claims. Political influence exacerbated the issue: *'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'.* To our dismay, the monitoring and evaluation officer expressed. *'For decades, these local wholesalers have exercised significant influence within the agricultural system, entrenching themselves deeply and, unfortunately, exploiting the*

vulnerable position of farmers. The enduring nature of their dominance reflects a systemic and structural imbalance that has persisted over time, perpetuating a cycle of exploitation. The entrenched power dynamic between local wholesalers and farmers not only hampers the economic prosperity of the latter but also contributes to the widening socio-economic disparities within the agricultural sector'. The General Manager expressed a profound sense of sorrow.

The buyers and exporters maintained that *'the absence of product traceability, especially when purchased from the local wholesalers or brokers, and insufficient legal documentation contribute to transparency issues'.* Moreover, as elucidated by the stakeholders, *'the compromised quality of grains due to mixed grains raises concerns about food safety and quality and has profound implications for consumer trust. This observation underscores the intricate interplay between agricultural practices, food quality assurance and ensuring consumer confidence in the agricultural supply chain'.*

4.2 | RQ2: What roles do different levels of intermediaries play for SD in the MTSC of the crop agri-food industry?

To address RQ2, the study employed insights from central characteristics of the trilateral (structural, economic and social) relationship of intermediaries in MTSCs and management frameworks from Mena et al. (2013) and Tachizawa and Wong (2015).

A comprehensive understanding of Pakistan's traditional, religious and culturally diverse diaspora and sensing corporate social responsibility for today's business requirements influenced APCL NRSP to implement a comprehensive bottom-up SD strategy. APCL, as a first-tier intermediary, involved different social and economic groups acting as intermediaries in the MTSC of the rice industry to bring the lower-tiers in its business mainstream. The research highlighted various intermediaries with distinctive roles in managing sustainable growth, as discussed below.

4.2.1 | Social networking of lower-tiers: Collectivistic approach (social mobiliser, tier 4 intermediaries)

The company's strategy for promoting sustainable agriculture practices begins with leveraging 'social networking' as a platform for outreach before the start of the rice farming season. The human resource development (HRD) office of NRSP assumes the role of a fourth tier intermediary in the APCL supply chain. The development office used trained social mobilisers (males/females) who were native graduates and represented a significant component of NRSP's strategy in organising their sustainable initiatives. Moreover, they belonged to native farming communities and were easily accessible.

The primary objective of social mobilisers is to raise awareness about sustainable socio-economic and ecological farming practices that revolve around the 'social networking' of local farming

communities, small-scale seeds and fertiliser providers. Working in teams across different villages, social mobilisers gather farmers and local communities, officially registering them with all their particulars and information with the HRD office for further communication. 'This community-based approach helped us to customise interventions to address the specific needs and challenges faced by each farmers' group', one of the social mobilisers contributed to the discussion. After registration, several awareness seminars are conducted in which lower-tier stakeholders put forth their farming challenges and practices.

The established challenges further allow social mobilisers to arrange various types of sustainable farming training through workshops and field visits. Farmers and their fields are allocated distinctive codes once these farming communities are well-versed in initial sustainable farming practices. A comprehensive training program about using modern information technology has been launched, leading to the initiative of innovative farming practices through geo-fencing. Subsequently, a central monitoring room is set up within the APCL head office to operationalise and keep all the records. A practical solution was formed by deploying a centralised geo-fencing system within large agricultural fields to address resource constraints and the challenge of individually tagging every animal. This singular device, strategically placed within a designated area, created a virtual perimeter, enabling collective monitoring of livestock activities in a 'cost-effective' and efficient means.

Using GPS-enabled smartphones, farmers, with their social mobilisers' help, record and share their location data during activities like planting and harvesting the paddy. This information is then sent to a central monitoring room, where authorities can track and analyse farming practices across different fields. Beyond simplifying livestock monitoring, the geo-fencing system significantly contributed to security against theft by promptly alerting farmers and APCL management to movements beyond the predefined boundaries. This integrated and revolutionary approach enhanced overall herd management by offering farmers a more secure and resilient agricultural environment and helped step-by-step crop monitoring. Social mobilisers primarily performed and monitored such initiatives for the farmers and APCL under the monitoring officers of NRSP. Social mobilisers educate farmers about different sustainable farming practices. For instance, how to save water and the environment, use renewable energy in farming, and understand the qualities of seeds and fertilisers—moreover, bio-fertilisers from locally produced animal and plant waste.

4.2.2 | Credits for farmers: Need-based approach (Bank NRSP, tier 3 intermediaries)

The social networking of tier-4 intermediaries brought the diverse farming stakeholders into a single platform. After a comprehensive evaluation of the needs of lower-tiers for sustainable agricultural practices, the MER (monitoring, evaluation and research) department offers need-based micro-financing schemes funded by NRSP. NRSP's Microfinance Bank, located next to APCL's main gate, operated as a third tier intermediary, providing short-term loans to farmers,

empowering them to invest in sustainable agricultural methods and enhance overall productivity. District evaluation and credit officers led these activities, facilitated by social mobilisers.

The significant challenge of these activities was to educate farmers about Islamic financing. Pakistan is a religiously entrenched society where religious fanatics are influential and are also used by some groups for personal gains. With a gratified tone, a group of farmers shared, 'As Muslims, we could not have loans on credit; it is forbidden in Islam, and the punishment is severe. However, we have been provided with different 'Fatawas'¹⁵ about the legitimacy of these credit schemes, which somehow made us content'. The objective of the need-based approach was 'human-centred' to bring equity and inclusivity to the vulnerable poor farmers who were being exploited by local cartels, particularly wholesalers, for decades.

For the last couple of years, the micro-finance bank has also facilitated various religious sessions featuring a local 'mufti'¹⁶ and other religious scholars who explained different facets of Islamic finance schemes, the Islamic cultural context in business, Islamic financial practices, and the legitimacy of insurance programs. They also highlighted the rights of females.

4.2.3 | Change agents: Action-oriented approach (progressive farmer, tier-2 intermediaries)

In the third phase, APCL NRSP introduced progressive farmers as tier-2 intermediaries for compliance in SD in its supply chain. APCL used them as socio-cultural tools to support peer-to-peer learning among lower-tiers. Progressive farmers worked in collaboration with fourth and first-tier intermediaries. These farmers, who were well equipped with modern agricultural machinery, well-educated, owned personal land holdings, and were respected among the local farming communities, acted as 'change agents' and advocated for sustainable practices within their communities. With the support of APCL NRSP, these farmers established different model farms equipped with modern farming facilities and weather stations. These model farms have tested various new seed varieties and fertiliser trials.

Progressive farmers share their knowledge and experiences to encourage adopting sustainable practices, responsible resource management, and environmental conservation among their fellow local farmers. This socio-ecological-system (SES) approach by progressive farmers caveated local farmers' understanding and significantly improved farmers' knowledge. It broadly impacted the importance of the social, economic, cultural and ecological factors that shape sustainable agricultural practices. Their fields were open for visits, and free technical support for the registered local farmers was ensured without any hurdle.

To help local farmers, progressive farmers used portable soil testing labs provided by APCL NRSP to evaluate nutrient levels in their fields and optimise soil conditions for crop growth. These labs were also used to monitor water quality and prevent issues such as phosphorus pollution and salinity in the fields. The major cause of these issues was using low-quality seeds and fertilisers and dumping local

waste in the canals. Progressive farmers engaged social mobilisers to educate local communities about the detrimental effects of disposing of human and animal waste in canals, emphasising the importance of proper waste management for water quality preservation. Furthermore, with the support of the Microfinance Department of NRSP, they trained young local farmers on the significance of utilising certified seeds and fertilisers for economic sustainability and promoting environmental sustainability in the region.

Progressive farmers collectively engaged the young population of lower-tiers from different areas in the youth engagement activities arranged by APCL. Recognising the challenges of unemployment, progressive farmers educated the parents of young farmers. They highlighted the valuable contributions of their young individuals in agriculture, from irrigating lands to helping with cultivation and managing livestock. This helped negate parents' perceptions that *'salaried jobs are the only respectable and good earnings occupations'*. Encouraging and appreciating young farmers to participate in family labour gave them a sense of pride in farming and helped them stabilise their emotional well-being. *'We ask from the parents; just imagine how much labour cost you would have to pay if your kids were not working with you in the fields. If you calculate that sum, your kids earn more than a salaried person. Moreover, we invite young, educated farmers to our fields and give training about using modern farming machinery and sustainable practices'*. With a progressive mindset, the respondents conveyed a comprehensive range of thoughts and opinions. There were a couple of incidents of suicide reported from young graduates because of family cursing for not having salaried jobs.

4.2.4 | Sustainability strategist: Holistic approach (APCL, tier-1 intermediary)

By ensuring all the sustainable activities from tier-4 to tier-2 intermediaries, the compliance strategy of APCL for SD begins from the rice harvesting process. Farmers' laden vehicles undergo registration at the company's gate, during which specific codes are generated and subsequently verified to ensure traceability. Following this, social mobilisers (tier-4 intermediaries) cross-reference these vehicle codes with previously issued field codes, aligning them with specific field locations. The APCL facilitates the farmers with no or old loading machinery for social-environmental protection. A particular waiting room with complimentary tea and drinks vouchers is provided to create a farmer-friendly environment. The farm-gate price for the grains is not prefixed; instead, it is determined after lab tests and quality measures of the rice, ensuring fairness for farmers. Open samples are collected for lab cheques, and a quality report is generated based on set parameters before initiating further processing.

In pursuit of forestalling corrupt cultural 'metrology' practices by the local wholesalers, those exploiting farmers for decades, APCL installed large-scale grain quantification equipment at the gate of entry. This strategic measure avoids the conventional application of local vibration-induced measuring cuts, systematically depriving farmers of their legitimate payments. This approach aims to enhance

the integrity of grain measurement procedures by promoting transparency, precision and reliability by generating a fair price mechanism. The company ensures weighing cheques are calibrated by accredited firms, maintaining integrity from a religious perspective as well, *'Many nations have been destroyed by God (Aad and Samood¹⁷) due to their unfair measuring activities in businesses. Unfortunately, our traditional local wholesalers and brokers prefer exploitative financial and cultural practices rather than considering Islamic principles,'* the chief executive officer and supply chain head offered a thorough and detailed explanation. Simultaneously, weight and price confirmation lead to the immediate issuance of cheques to farmers within 24 h, empowering them to invest in agricultural improvements. Farmers are allowed to monitor the whole process.

APCL's commitment to sustainable practices is not just about the environment but also about the people. The company enforces strict quality cheques, destoning, maintaining temperature and moisture levels and proper storage facilities within the APCL premises. Post-harvest interventions to reduce aflatoxin are integrated into their operations. The company embraces sustainable technologies, such as steam turbines, bio-fertilisers and biofuels, to avoid stubble burning and emissions of greenhouse gases. This shift has not only protected the environment but also improved the livelihood of farmers. Previously, stubble burning posed a severe environmental sustainability threat, but now APCL purchases the residues from farmers and stores them to produce energy. This has provided farmers with an additional source of income. With the extra income from residues and a fair price mechanism, APCL has empowered farmers to buy laser land levellers and pneumatic planters, enabling them to become independent entrepreneurs.

Moreover, *'APCL is the pioneer in providing storage facilities for farmers to store their grains on minimal rent. Sometimes farmers think prices will rise, so we have this facility for them. The farmers can also have 70% of their stored crops from NRSP bank within 24 h,'* the company engineer elaborated on the company's pioneer facility description. Once the harvesting process is completed, APCL offers an off-season supply of different seeds for crop rotation, encouraging sustainable farming practices. The review committee of APCL also extends subsidies for installing solar tube wells to suppliers who demonstrate exceptional sustainability-compliant production practices. This incentive serves as a recognition and support mechanism, encouraging and rewarding suppliers who exhibit high levels of performance and effectiveness within the APCL framework. In the entire phase of the rice supply chain, APCL emerged as a sustainability strategist that holistically brings the overall stakeholders into one platform by following a transparent and fully monitored mechanism.

The current research established a refined and systematic methodology to ensure sustainability compliance through intermediaries for SD within the MTSC of APCL NRSP in Punjab, Pakistan's rice industry. The complex and fragmented supply chain structures of Pakistan's rice industry highlight the necessity for systemic interventions by first-tier suppliers to implement significant sustainable measures throughout the supply chain. APCL has not just created a distinct model in sustainable agricultural MTSCs but is also a beacon

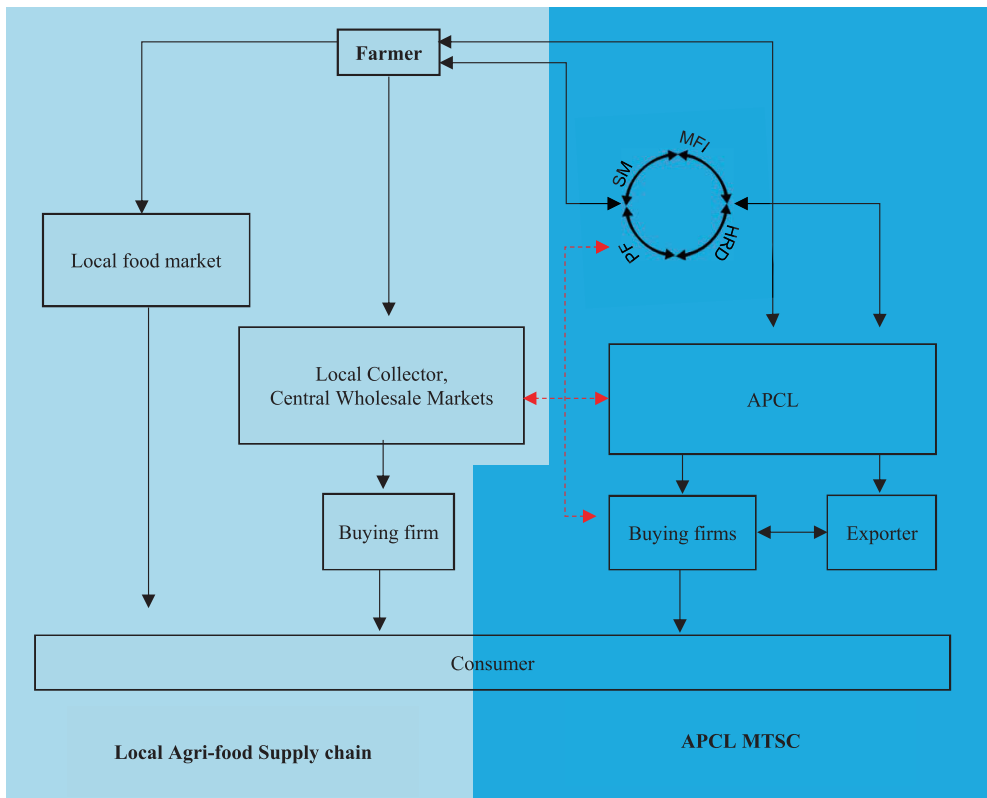


FIGURE 2 Comparison of the existing local supply chain structure and the APCL NRSP MTSC in Punjab, Pakistan (APCL, Agri Processing Company Limited; HRD, human resource development; MFI, Microfinance institute; PF, progressive farmer; SM, social mobiliser).

of hope for the future of sustainable supply chains, fostering consistent collaboration among all stakeholders to achieve maximum sustainability outcomes. APCL NRSP primarily regarded lower-tiers as valuable assets, incorporating them into the mainstream rice business by involving locally educated social mobilisers to navigate its sustainability compliance strategy. In the second phase, these lower-tiers received extended credit from NRSP Bank. The HRD department of NRSP ensured the provision of these credits and managed training programs for sustainable farming. Lower-tiers were then given access to peer-to-peer learning about modern farming techniques alongside progressive farmers. APCL played a strategic role in this model, orchestrating interactions and integrating all stakeholders in closed MTSC operations throughout the product formation cycle. This approach created a significantly different MTSC environment for Basmati rice, which led to the SD of Pakistan's agricultural industry compared to the country's existing supply chain structures, where suppliers are constantly exploited by the local dealers and wholesalers (See Figure 2).

5 | DISCUSSION

The qualitative research findings highlighted that the concept of sustainability in Pakistan is in its embryonic phase and has a very complex interpretation. This is mainly due to poverty and illiteracy, which are further influenced by cultural norms and religious values.

The first research objective delves deeply into the existing norms, political influence, religious beliefs, cultural practices and

traditional buyer–supplier dynamics that create sustainability challenges and shape MTSC governance structures—fundamentals missing in sustainable supply chain discourse and impeding SD. Focusing on the rice industry of Pakistan, the research analyses sustainability challenges throughout the product formation cycle, emphasising the lower-tiers. Identifying these challenges fills the substantial gaps in understanding the institutional and cultural phenomenon of sustainability in developing countries. By shifting the focus beyond conventional dimensions of sustainability, this research broadens and enriches scholarly inquiry, providing nuanced insights and advancing the academic dialogue on sustainable business practices within the realm of MTSC dynamics.

The second research objective highlights that organisations with a comprehensive understanding of sustainability related to sociocultural specificities can significantly enhance overall business performance, achieve network-level objectives, gain competitive advantages and promote SD. APCL, as a first-tier intermediary, has realised and actively integrated lower-tiers by valuing local cultural norms, religious sensitivities and relational embeddedness features in farming and livelihoods. By understanding these essential aspects of Pakistan's collectivistic society, APCL has strategically engaged various socioeconomic groups as intermediaries within its supply chain. This strategic engagement has enabled APCL to identify and address longstanding generational-wide sustainability challenges and exploit diverse management opportunities to transition local farmers and lower-tiers into structural embedded from relational ties in their MTSC. As a result, APCL contributes to advancing SD among Pakistani farmers by recognising their value and contributions beyond mere commodities,

thereby demonstrating the practical application of the research findings.

APCL's pragmatic interventions, including providing affordable long-term credit, subsidies and crop insurance programs for essential resources, have significantly enhanced farmers' economic sustainability. Socio-cultural support from local social mobilisers enhanced lower-tiers' knowledge about sustainable farming and economic growth. Socio-economic intermediaries such as progressive farmers, through socio-technical support, further enabled farmers to invest in modern farming technologies, equipment and infrastructure, facilitating the expansion of farming operations and transforming them into self-sustaining entrepreneurs. Farmers who had traditional agricultural practices and were exploited by local wholesalers because of their ancestors' obligations began to recognise the manipulative practices they had been subjected to. These measures significantly enhanced farmers' collective bargaining power with local wholesalers, who were buying their export products at low rates. Farmers also freed them from the vicious economic cycle of heavy interest burdens imposed by these wholesalers. This demonstrates that socioeconomic groups in societies can promote fair structural embeddedness in businesses, finding mutual ways for have-nots towards their SD (Hina et al., 2023; Othman & Ameer, 2023). This can be achieved by fostering interaction, encouraging participatory activities and creating a shared vision for SDG (D'Adamo & Gastaldi, 2023).

The research analysis demonstrates that progressive farmers' hands-on technical experience and effective engagement in farming through the 'socio-ecological system' with the cooperation of APCL NRSP about crop rotation, quality seeds and fertilisers, increasing their crop yield and improving environmental sustainability. Progressive farmers' understanding of 'socio-emotional wealth' captured the distinctive feature of various social groups working together, aligning with Gómez-Mejía and Herrero (2022) and Pont and Simon (2024) studies. It also proposes the importance of the stakeholders' contribution to improving socio-emotional wealth and alleviating social sustainability, which is highlighted in the literature by Al-Tabbaa et al. (2023), Block et al. (2023) and Gomez-Mejia et al. (2024). APCL initiatives, such as using residues as biofuels and encouraging renewable energy in farming, not only reduced stubble burning (a misconceived cultural myth about seed yielding and its productivity) but significantly caused environmental sustainability challenges. These moves can establish a roadmap for Pakistan to transition gradually towards a circular economy. This strategic path aims to enhance competitiveness, foster sustainable socio-economic growth and generate employment opportunities within the agricultural sector, consistent with the perspective of Agrawal, Dwivedi, et al. (2023) and D'Adamo et al. (2022) on the critical importance of embracing a circular bio-economy to achieve SDGs.

A bottom-up management approach led by a CEO with a farming background enabled a unique understanding of operational challenges. It offered a valuable perspective on effective strategic management within a highly power-distant developing society and underscored how sociocultural knowledge can be leveraged to use social capital sustainably. Facilitating direct collaborations between

various tiers in MTSC with buying firms led to a refined methodology for SD through intermediaries in this research. The direct interaction of cultural intermediaries and engaging third parties considerably added to the proposed governance mechanisms of MTSC by Carter et al. (2015), Chae et al. (2024), Mena et al. (2013) and Tachizawa and Wong (2015).

In the socio-economic landscape of Pakistan, families become intricately woven into the structural fabric of agriculture, particularly in cropping. This highlights how relational embeddedness brings entire families into structural embeddedness over time (Andrews et al., 2024; Swierczek, 2023). The structural embeddedness features the deep integration of familial relationships into the very structure of farming practices. These familial ties profoundly influence decision-making, resource distribution and labour allocation. Acknowledging this interconnection is essential for understanding the dynamics of agriculture in Pakistan, underscoring the importance of respecting social capital as family bonds that significantly influence the socio-economic aspects of farming. However, this also presented significant sustainability challenges, such as child labour, extending beyond the purview of the first-tier supplier. Outstandingly, phenomena such as intra-family marriages, instances of sexual harassment, and concerns associated with honour are deeply entrenched within the fabric of cultural norms, introducing an additional layer of complexity towards a sustainable operational landscape. The intricate nature of these issues, coupled with their nexus to religious beliefs, engenders difficulties for intermediaries in effecting measures to alleviate the prevailing circumstances. To address the societal stigma associated with female participation and the veil, local social mobilisers recruited from farming communities, including females, educated and provided essential training for women workers, thus breaking down the radical religious barriers. A deep understanding of sociocultural and religious sensitivities in the current business environment is essential to maintaining the ethical environment of business; otherwise, it could lead to severe business communities (Aftab & Ali, 2023; Qasim, 2023). By engaging with a qualified religious scholar to educate about a true sense of religion in businesses instead of religious fanaticism, the intermediaries sought to provide its stakeholders with valuable insights and understanding. These requisite interventions, therefore, provided a religiously well-versed and culturally attuned approach to overcoming the intricate socio-cultural and economic dynamics inherent in Pakistan's agricultural milieu. However, effectively addressing these multifaceted challenges necessitates implementing comprehensive actions and systemic changes. NGOs, local leaders and educational institutions could be the potential sources.

To eliminate the existing trust deficit challenges with external buying firms and exporters, APCL underlined the importance of establishing robust mechanisms for the monitoring and traceability of agricultural practices using technology-enabled transparency among different tiers throughout the supply chain. This execution also contributes to the literature on how resource-constrained suppliers in developing regions can be equipped with modern technologies and integrated into the MTSC mechanism through socio-technical support. The socio-technical support system can be strengthened by

incorporating techno-economic analysis, which could enhance the monitoring mechanisms essential for advancing product and process development (D'Adamo & Gastaldi, 2023). Overall, a multi-level governance approach involving local intermediaries was adopted in the research for operational management, combining network analysis and an indirect 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. This approach was mainly driven by a 'polycentricity' system from international business strategy proposed by Steinberg (2023). The sustainability compliance practices of the APCL in Pakistan's rice industry demonstrate a holistic approach to responsible business practices for SD. From farmer engagement to post-harvest interventions, their strategies focus on fairness, transparency and ethical conduct—a significant way towards a sustainable Pakistan. However, corruption and political decisions prioritising short-term gains and favouring specific interest groups can seriously undermine the long-term sustainability efforts in developing countries, including Pakistan.

6 | IMPLICATION, LIMITATIONS, FUTURE RESEARCH DIRECTIONS AND CONCLUSION

This research proposed innovative dimensions and modalities for SD and addressed critical gaps in sustainable MTSCs literature. This study investigates the primary assumptions related to the role of first-tier intermediaries based in supplier locations in formulating inclusive strategies that benefit all stakeholders within MTSCs, fostering sustainable socioeconomic growth. It also advances the theoretical constructs of lower-tier supplier management by demonstrating how first-tier intermediaries can be effective in sensitive environments for buying firms and achieving SDGs. The study further delves into the dynamics of indirect management, illustrating how it can complement direct management through the involvement of buying firms. It also highlights the capacity of first-tier intermediaries to engage external stakeholders in MTSCs to promote sustainable development in the agricultural sector, modifying the roles of third-party management.

The diverse research team has substantially enhanced the rigour, logical coherence of the findings, depth of analysis and responsiveness to various research inquiries, effectively addressing the scholarly calls for further contributions in SD literature. Primarily, the nature of the study answers Gruchmann's (2022) call for qualitative, empirical research through a case study, offering profound insights into the actions and relationships of intermediaries and lower-tier suppliers within MTSCs. Through a qualitative approach, this study explored the nuanced socio-economic and environmental challenges that arise from cultural practices, providing a comprehensive understanding of these complex dynamics. This in-depth investigation reveals how intermediaries navigate and influence sustainable supply chains, contributing valuable knowledge to the field. This comprehensively extends the current MTSC literature, focusing on the dyadic relationship between buyers and their first-tier suppliers.

The study adheres to Marttinen and Kähkönen's (2022) recommendation to enhance supply chain resilience and efficiency by focusing on the lower-tiers within MTSCs. By extending the analysis to encompass multiple supply chain tiers, including those in developing countries, this research incorporates the previously overlooked segments identified by Kähkönen et al. (2023). Investigating the management of sustainability-related risks at these lower-tiers not only enriches the data collection process but also ensures a more inclusive understanding of the entire supply chain for SD.

The study addresses critical areas Senyo and Osabutey (2023) highlighted, including the integrated examination of social, environmental and economic dimensions of sustainability and the impact of governance in emerging economies. It also responds to Agrawal et al.'s (2024) call to explore cultural aspects and supply chain visibility beyond tier-one suppliers. These comprehensive approaches uniquely position the study to address multiple gaps within a single investigation, offering innovative methodologies and a focused perspective.

Theoretically, the study demonstrates how social embeddedness fosters various social groups' progression towards structural embeddedness in sustainable MTSCs. These findings address the fundamental assumptions of Agrawal et al. (2024) and Wiktor-Mach (2020) concerning the tangible influence of culture across its diverse manifestations on SD. The role of values, norms and social practices in development is important and unique as they shape societal behaviours and aspirations, evolving in response to changing contexts and influences. Supporting cultural practices for SD in global businesses can yield profound effects by aligning corporate strategies with local cultural norms, enhancing social acceptance and sustainability outcomes. This study's unique contribution illustrates how global challenges can be tackled locally to ensure adherence to SDGs and foster sustainable practices throughout the supply chain.

The study's most pragmatic implication lies in its integration of the triple-bottom-line approach and ESG model, which uncover multi-dimensional sustainability challenges stakeholders face in MTSCs. By examining the entire product lifecycle from field to fork, the research provides profound insights into the roles and interactions of actors across different stages within the complex socio-cultural dynamics of MTSCs. Highlighting progressive farmers in developing countries as catalysts for change offers valuable peer-to-peer learning opportunities. These farmers can effectively enhance technological advancements in conventional agricultural settings through socio-technical support, making them cost-effective agents capable of navigating sustainability compliance efforts in various global sectors. This would also address significant hurdles in achieving SDGs in resource-constrained geographies, emphasising their critical role in advancing sustainable practices worldwide. This provides a practical orientation to Chatterjee et al. (2020) theoretical construct of how important social influence is and how it can influence other people's behaviour. Furthermore, technological advances can be implemented across various industries through educated and technically aware sociocultural groups under the systematic framework Upadhyay et al. (2023) identified. For instance, progressive farmers can significantly contribute to achieving shared innovation goals by accelerating interventions

through collaboration and modifying existing technologies rather than developing entirely new technological solutions in resource-constrained geographies in the agricultural industries. This approach provides a viable solution for enhancing efficiency and promoting sustainable agricultural practices.

The critical limitation of this study lies in the fact that the highly power-distant research locale, along with religious and cultural issues, created barriers to investigating sensitive sustainability challenges such as honour killing. Data recording was not allowed, and researchers had to rely solely on the written notes, which might lead to potential inaccuracies or misinterpreting of some information. Methodological limitations are acknowledged, such as using a qualitative research approach and employing a case study method. However, these limitations are considered preferable to those of the alternatives. Distinctive reliability measures for qualitative research, such as using verbatims to illustrate various concepts and member checking, significantly improved the reliability of the study.

This research suggests how organisational studies should be investigated when exploring sustainability phenomena in MTSC. This study draws a pragmatic structure through its empirical findings on how different social groups generate, accumulate and organise sustainability-oriented knowledge and how businesses could be sustainable and profitable using it. However, the key considerations are how MTSC businesses in different other sectors generate this knowledge in various cultural and business settings, then utilise it strategically and promote refined sustainability compliance methodology for SD. Future research may reveal these unknown variables and which types of MTSC business structures are most conducive to accessing and leveraging sustainability compliance, considering the significance of 'relational embeddedness' with a 'structural functionalism' view. Future research should explore several key areas to understand further and enhance the sustainability compliance in MTSCs. One critical area is the impact of mediated relationships on power dynamics, particularly in high-power distance societies. Investigating how these relationships shift power balances can provide insights into effective management and collaboration strategies within MTSCs. Future studies should examine the economic implications of adopting sustainable practices and how sustainable transformations influence cost structures in MTSCs to balance socio-environmental responsibility with financial viability. Future research should also investigate how socio-cultural and religious practices reflect the systematic slavery phenomenon and impede SD.

In conclusion, the research significantly contributes to understanding how to promote sustained, inclusive and sustainable economic growth in agriculture-based developing countries by 'reducing inequalities' and advancing towards 'productive employment' and 'decent work' aligning with the practical implications and societal relevance of SD Goals 2030 (SDG) 8, 9 and 10 agenda. To achieve SD for 240 million people, technological advances in agriculture and increasing exports of sustainable agricultural products are fundamentals for economic self-sufficiency. These measures could address socio-economic disparities alongside ideological challenges, help underprivileged farming communities in Pakistan, and strategically advance SD

initiatives. Of greater significance, Pakistan can effectively replicate its agricultural strategies of rapidly emerging economies such as Brazil, China and India to advance SD, as evident in the SD literature.

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ENDNOTES

- ¹ Ministry of Climate, Ministry of Planning Development and Special Initiatives and Provincial Planning and Development, The International Fund for Agricultural Development (IFAD). Sustainable Development Policy Institute (SDPI) and various agricultural academic and research institutions were also contacted.
- ² Systematic map Scopus-indexed and Web of Science articles from 2008 to 2023 ($n = 487$) focused on the MTSCs of the agri-food sector. Systematic review evidence synthesis ($n = 31$) focused explicitly on the MTSCs of the crop agri-food sector.
- ³ The fieldwork for this study was partially funded by the Charles Wallace Pakistan Trust (United Kingdom) to promote sustainable agricultural development in Pakistan.
- ⁴ Phase 1 was conducted in Dera Ghazi Khan, Gujrat, Gujranwala, Hyderabad and Sukker Divisions.
- ⁵ Interviews were conducted in Saraiki, Punjabi, and Urdu (Regional and National languages of Pakistan) with infrequent use of English.
- ⁶ Illegal deduction for the Assistant working in the central wholesaler market.
- ⁷ Servers of water and Tea.
- ⁸ Keeping some grains unethically and illegally.
- ⁹ The lowest people in Indian sub-continent culture: members of different artisan and service-providing castes, for example, barber, carpenter, cobbler, weaver, potter, and labourer, are jointly called *kammi*.
- ¹⁰ Brick kilns.
- ¹¹ Made of mud and clay.
- ¹² This consideration contrasts with the SDG 8.7.
- ¹³ The killing of a relative who is perceived to have brought dishonour to the family.
- ¹⁴ Raw irrigation watercourse system.

- ¹⁵ Religious rulings issued by Islamic scholars based on their interpretation of Islamic law (Sharia) and teachings from the Quran and Hadith.
- ¹⁶ Religious Scholar.
- ¹⁷ Two nations are mentioned in the religious book of the Muslims 'Quran'.

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