



REVIEW ARTICLE

Bridging equity gaps in India's paddy procurement system: a systematic review

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Received: 19 April 2026; Accepted: 22 May 2026; Available online: Version 1.0: 07 August 2026

Cite this article: Devaadarshini B, Parimalarangan R, Vidhyavathi A, Moghana LS, Vasanthi R. Bridging equity gaps in India's paddy procurement system: a systematic review. Plant Science Today. 2026;13(sp5):01–10. <https://doi.org/10.14719/pst.15092>

Abstract

Ensuring equitable agricultural procurement systems is essential for improving the livelihood security of marginalised farming groups in India. This review examines the extent to which paddy procurement mechanisms address the needs of smallholder, tenant and women farmers. Following preferred reporting items for systematic reviews and meta-analyses (PRISMA)-guided screening, peer-reviewed articles, policy documents and empirical reports were analysed to identify the key factors influencing participation, including access to procurement centres, awareness of minimum support price (MSP), institutional constraints, land tenure issues and market structures. The findings indicate that, despite the expansion of procurement systems, their reach remains uneven due to structural and institutional barriers. Small and fragmented landholdings, lack of formal tenancy recognition, limited infrastructure and gender-based disparities continue to restrict participation in formal procurement channels. These patterns suggest that access conditions, institutional capacity and awareness levels play a decisive role in shaping participation outcomes rather than policy availability alone. The analysis further highlights that disparities in implementation across regions further influence the effectiveness of procurement systems. Future research should focus on evaluating the performance of digital procurement platforms, examining regional variations in policy implementation and analysing institutional mechanisms that promote the inclusion of marginalised farming groups, thereby strengthening the overall effectiveness and equity of procurement systems.

Keywords: equity; inclusiveness; India; minimum support price; paddy procurement; smallholder farmers; tenant farmers; women farmers

Introduction

Agriculture plays a vital role in promoting both food security and economic development, which are closely interconnected. In India agriculture contributes significantly to rural employment and remains central to ensuring food security. Over the past 2 decades, improving women's access to scientific knowledge, modern technologies and agricultural inputs has been identified as a key factor influencing productivity and decision-making in agricultural systems. Approximately 70 % of the Indian population resides in rural areas and farming remains the primary source of income for nearly 60 % of households (1). Women make substantial contributions to agricultural production, with approximately 78 % of economically active women engaged in agriculture compared with 63 % of men. Globally, women constitute nearly 50 % of working-age population, underscoring their importance in both household and economic systems (2). Agriculture supports the food requirements of nearly 17 % of the global population while utilising only 2.3 % of arable land and 4.2 % of freshwater resources (3). Estimates indicate that over the last decade, women account for over 25 % of the global farming population. In India, nearly 74 % of the female workforce is employed in agriculture, reflecting their

significant contribution to the sector (4). Rice cultivation represents a major livelihood activity among rural women in India, with demand for rice in Asia projected to increase substantially over the next 3 decades due to population growth (5). Recent studies have reported that higher yields and household income are observed when women cultivate rice independently with institutional support, highlighting the potential benefits of gender-responsive agricultural interventions (6).

Women play a central role in agricultural systems through their contributions to household nutrition, labour management, income generation and unpaid family work (7). They are actively involved in planting, weeding, harvesting, transportation, processing and marketing of agricultural products (8). Despite their extensive involvement, they remain under-represented in decision-making processes and face limited access to productive resources (9). Reducing gender disparities requires improved access to health, education, economic opportunities and technology, as conceptualised in the multidimensional SHEET framework, which integrates these key dimensions of empowerment (10). Women also possess valuable indigenous knowledge in managing agriculture and natural resources, including seed conservation, processing and value-addition practices.

The growth of agricultural economies depends significantly on smallholder farmers, who continue to face structural challenges arising from socio-cultural norms and institutional constraints (11). These challenges are reinforced by entrenched social and political structures that sustain unequal access to resources (12). Persistent inequalities based on gender, class and ethnicity shape access to markets and decision-making processes, limiting the social and economic mobility among marginalised groups (13). Although recent development research has increasingly recognised marginalisation in rural livelihoods, limited attention has been given to informal social and political structures that constrain participation (14). Technical and market-oriented approaches often overlook these underlying factors, thereby reducing their overall effectiveness in addressing inequality. This issue remains particularly relevant in emerging economies and warrants further empirical investigation (15).

Reliance on top-down, government-led strategies such as policy reforms and large-scale development programmes continues to limit inclusive agricultural development (16). These approaches often fail to incorporate the perspectives and needs of smallholder, thereby reducing their effectiveness in rural settings (17). Informal power relations, social obligations and household hierarchies influence access to agricultural resources such as improved seeds, mechanisation and credit. Evidence suggests that agricultural support programmes and market-oriented interventions often remain inaccessible to marginalised farmers due to entrenched socio-economic inequalities (18, 19). Similarly, the Anchor Borrowers' Programme, a government-led agricultural financing initiative designed to improve smallholder farmers' access to credit and agricultural inputs, has shown limited inclusiveness due to structural and institutional constraints (20).

These findings indicate that policy frameworks focused solely on economic and technological efficiency are insufficient to address the socio-cultural factors influencing agricultural decision-making. Failure to consider local norms, belief systems and informal institutions may reduce policy effectiveness and perpetuate existing inequalities. Structural inequalities remain deeply embedded within rural social systems and extend beyond economic dimensions alone (21, 22). Therefore, reassessing the participation of marginalised groups within these institutional contexts is essential for achieving sustainable development (23). Evidence from other developing regions further highlights the influence of socio-cultural and institutional structures on access to agricultural resources and participation outcomes (24, 25).

Methodology

This study employed a systematic review approach to analyse the effectiveness of rice procurement regulations in India with respect to inclusivity and equity among smallholder, tenant and women farmers. The review was conducted in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) framework to ensure transparency and methodological rigour (26). A total of 1365 records were initially identified through database searches. After removal of 839 duplicate records using EndNote, 526 records remained for screening. Following title and abstract screening, 102 records were excluded and 424 reports were sought for retrieval. Of these, 138 reports were unavailable, resulting in 286 reports assessed for eligibility. During full-text assessment, studies were excluded because they were out of scope ($n = 37$),

involved an incorrect population ($n = 9$), were conceptual in nature ($n = 113$), fell outside the study focus ($n = 10$) or were comparative studies not directly relevant to the review objectives ($n = 17$). Finally, 82 studies met the inclusion criteria and were included in the review. The study selection process is presented in Fig. 1.

Relevant literature published between 2000–2024 was identified through searches of major academic databases, including Scopus, Web of Science, Google Scholar, JSTOR, AGRIS and EBSCOhost. In addition, government reports from the Ministry of Agriculture, the Food Corporation of India (FCI), NITI Aayog and state procurement agencies were also reviewed. A structured search strategy was applied using keywords such as paddy procurement, minimum support price, smallholder farmers, tenant farmers, women farmers, agricultural equity and inclusive procurement systems.

The literature selection process involved screening titles, abstracts and full texts to assess relevance and eligibility. Only English-language studies directly related to paddy or food-grain procurement in India were included.

Data were extracted using a standardised template that captured study design, location, farmer categories, procurement mechanisms, institutional barriers and policy outcomes. The findings were synthesised using thematic analysis. Key themes included access to procurement centres, landholding constraints, lack of formal tenancy records, gender disparities, technological barriers and regional variations in procurement systems. Owing to the heterogeneity of the included studies, a narrative synthesis approach was adopted.

Historical context of agricultural policy reforms

Pre-structural adjustment era

Prior to the implementation of structural adjustment programmes, many developing countries maintained substantial government involvement in agricultural policies. Governments played a central role in supporting agriculture through input subsidies for seeds, fertilisers and pesticides as well as price support mechanisms aimed at stabilising farm incomes and reduce exposure to market fluctuations. These interventions were aimed at enhancing agricultural production and strengthening food security. Significant investments were also made in rural infrastructure, including irrigation systems, roads and storage facilities, which improved agricultural productivity and market access (27). In addition, agricultural extension programmes facilitated the transfer of knowledge and skills to smallholder farmers, contributing to the adoption of improved farming practices.

However, these policy approaches were associated with several challenges. Evidence indicates that excessive reliance on subsidies and price supports created fiscal pressures and contributed to structural inefficiencies. Furthermore, centralised policy frameworks often failed to account for local agro-ecological and socio-economic conditions, thereby limiting their effectiveness in certain regions (28).

Structural adjustment programmes (SAPs)

International financial organisations such as the World Bank and the International Monetary Fund began Structural Adjustment Programmes (SAPs) during the 1980s and 1990s. These programmes fundamentally reshaped agricultural policy by promoting market-oriented economic reforms aimed at improving

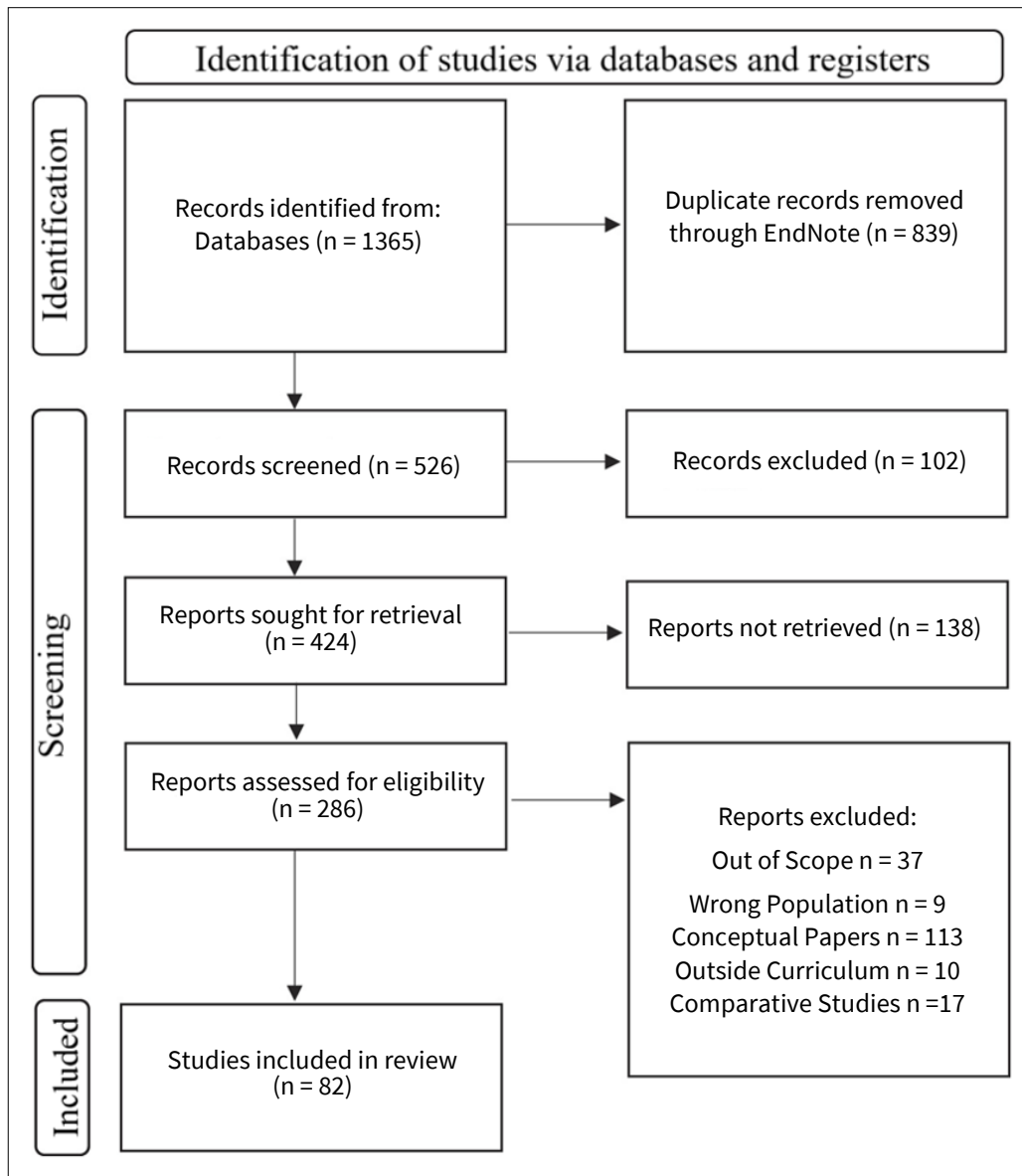


Fig. 1. Prisma diagram for literature review process.

macroeconomic stability and efficiency. Structural adjustment programmes (SAPs) sought to make economies more stable and organised by implementing reforms that were market-friendly. In the agricultural sector, these reforms emphasised market liberalisation, reduced government intervention and privatisation.

Under SAPs, market liberalisation meant removing price controls and subsidies, allowing market forces to operate in the agricultural production and trade. The goal of this change was to make things more efficient and competitive within the sector (29). For smallholder farmers, reduced government support often resulted in greater exposure to market fluctuations and higher input costs. The privatisation of agricultural support services and the withdrawal of state services further worsened these challenges. Consequently, many smallholders experienced limited access to essential inputs and services, which negatively affected agricultural productivity and livelihood security rather than benefiting them. The removal of subsidies and support systems, combined with increased competition from global markets, contributed to income instability among smallholder farming households. Similar patterns were observed in several developing regions, including Sub-Saharan Africa and Latin America, where agricultural reform programmes reduced state support and increased exposure to market volatility, adversely affecting smallholder livelihoods (30).

Post-SAP reforms

Following the limitations associated with SAPs, agricultural policy increasingly shifted towards sustainable agriculture and rural development. Governments and international organisations introduced targeted support programmes to enhance the productivity and resilience of smallholder farmers recognising their critical role in food security and rural livelihoods. These initiatives included measures to improve access to credit, markets and agricultural technologies. For instance, programmes that promote microfinance were established to assist smallholder farmers access the capital they needed to invest in modern farming methods (31). Greater emphasis was also placed on long-term environmental sustainability through methods such as organic farming and conservation agriculture. Land tenure reforms were also gained a significant focus, with efforts to formalise land rights and provide smallholder farmers with legal legitimacy (32). Secure land tenure was considered essential to encourage investment in land improvements and the adoption of long-term farming methods. However, in many places, the effectiveness of these reforms was often constrained by implementation challenges and persistent land-related disputes. Delays in land record digitisation and inconsistencies in ownership documentation often limited the successful implementation of land tenure reforms. In several

regions, overlapping land claims and unclear tenancy arrangements further restricted farmers' ability to secure legal recognition and access institutional benefits.

Procurement policy and operations

Public procurement systems in India are designed to stabilise agricultural prices, ensure food security and support farm incomes through mechanisms such as the minimum support price (MSP). These systems operate through both centralised and decentralised frameworks, with varying degrees of state involvement. Evidence indicates that decentralised procurement systems can enhance local-level efficiency, reduce transportation costs and enable better alignment with regional consumption patterns (33–35).

Public procurement mechanisms have been associated with improved agricultural income outcomes and more effective market functioning when supported by adequate pricing policies and operational efficiencies (36). However, challenges in implementation persist across regions, particularly in states with inadequate procurement infrastructure and limited institutional capacity, where farmers often continue to depend on informal market channels (37). Studies examining price behaviour and procurement performance further highlight the role of public procurement in influencing market outcomes and farmer returns (38).

These disparities highlight that procurement outcomes are shaped not only by policy design but also by institutional capacity, infrastructure availability and implementation effectiveness. Policy evaluations further indicate that strengthening institutional mechanisms, improving storage and procurement infrastructure and enhancing coordination among agencies are essential for improving system efficiency and farmer participation (39).

Impact of government intervention in the procurement of paddy

Evidence suggests that procurement interventions influence market outcomes by improving price realisation and reducing farmers' vulnerability to market fluctuations. These interventions can enhance farmer participation by reducing transaction costs and increasing direct access to procurement centres. Procurement at support prices can exert upward pressure on market prices, thereby reducing the likelihood of distress sales and enabling farmers to secure more stable returns (40). Increased government intervention in procurement systems is also associated with enhanced market competition and reduced dependence on private intermediaries. The establishment of procurement centres contributes to more competitive pricing structures, which positively influences returns even for crops not directly procured. These effects may extend beyond direct participants, as improved market conditions contribute to higher price realisation across a broader group of farmers (41).

Government intervention in procurement systems can enhance market competition and improve price realisation for farmers. The establishment of procurement centres contributes to increased competition among private buyers, resulting in higher prices and reduced dependence on intermediaries. In regions where procurement centres were operational, wheat prices exceeded the MSP, with farmers receiving higher prices (up to Rs. 1600 per quintal) than those observed in areas lacking procurement facilities. Farmers participating in procurement channels also secured higher returns, with an average increase of Rs. 1457 per quintal during the 2012–13 marketing season. In contrast, villages without procurement centres

recorded comparatively lower prices, indicating the role of institutional presence in influencing market outcomes (42).

Regional and seasonal variations in procurement effectiveness have also been reported. Procurement performance differed significantly between cropping seasons, with higher achievement rates observed during the Boro season than during the Aman season. While larger farms recorded higher net returns, small and marginal farmers often faced higher production costs, indicating an unequal distribution of benefits within procurement systems (43).

Furthermore, limitations in procurement implementation reduce the effectiveness of these systems under certain conditions. In some regions, the MSP mechanism has not been consistently utilised for procurement due to procedural delays and restricted procurement periods, which discourage farmer participation (44). At a broader level, higher procurement levels are associated with increased agricultural income, as states with greater procurement volumes have recorded higher farm revenues. Empirical estimates suggest that a 1 % increase in paddy procurement corresponds to an increase of approximately Rs. 221 per acre in farm income, while wheat procurement contributes to an increase of about Rs. 100 per acre (45).

Evidence indicates that the effectiveness of procurement systems varies significantly across regions, influencing farmers' access to remunerative prices and market participation. In states with low procurement intensity, small and marginal farmers are more likely to rely on private traders and often receive prices below the MSP. In contrast, greater engagement with regulated markets and public procurement agencies is associated with improved price realisation, particularly in regions with stronger procurement infrastructure (46).

At the same time, policy outcomes are not consistently positive across different contexts. Although MSP policies can stimulate production, they may also impose fiscal burdens and reduce competitiveness in international markets when procurement prices exceed prevailing market equilibrium levels. This is particularly evident where rising production costs necessitate continuous increases in support prices to maintain farmer profitability (47).

Market access constraints continue to affect smallholder participation, as dependence on local intermediaries remains higher among farmers with smaller landholdings. This structural limitation contributes to lower price realisation in informal markets compared with formal procurement channels, indicating disparities in access to institutional mechanisms (48). Regional disparities further demonstrate the uneven performance of procurement systems, with states such as Punjab, Madhya Pradesh and Kerala showing relatively effective implementation, while several other states exhibit limited impact, resulting in continued dependence on private markets (49). Regional variations in procurement effectiveness and outcomes are summarised in Table 1.

Institutional capacity also plays a critical role in determining procurement outcomes. Strong state-level implementation, supported by agencies such as the Food Corporation of India (FCI), facilitates effective procurement operations and stable price realisation. However, the expansion of procurement has not proportionately increased the number of participating farmers, indicating limitations in outreach and inclusiveness (50).

Table 1. Regional variation in procurement effectiveness

Region/state category	Procurement intensity	Farmer participation	Price realisation	Key limitation
High-performing states (Punjab, Madhya Pradesh, Kerala)	High	High	Above MSP or stable	Limited inclusiveness of marginal farmers
Moderate-performing states	Moderate	Uneven	Close to MSP	Infrastructure gaps and awareness issues
Low-performing states (Bihar, Odisha, etc.)	Low	Low	Below MSP	Dependence on intermediaries
Regions with weak infrastructure	Low	Limited	Highly variable	Lack of procurement centres

MSP: minimum support price.

Comparative evidence also suggests that participation in procurement systems improves farm-level returns. Farmers engaged in procurement channels record higher net returns and lower transaction-related costs than those operating in open markets, as reflected in improved input-output ratios and reduced marketing expenses (51).

Evidence indicates that government price-support policies influence both producer incentives and market outcomes. Increases in government procurement prices are associated with higher farm-gate prices, contributing to improved economic returns for farmers through the stabilisation of minimum price levels and enhanced input affordability. However, such interventions also generate broader market effects, as increases in procurement prices are transmitted to consumer markets, resulting in higher retail prices. Empirical observations indicate that a rise of 18–20 % in government purchase prices corresponded with increases in grain and rice prices over the same period, alongside a measurable inflationary effect of approximately 0.41 % on consumer prices (52). The key mechanisms through which procurement policies influence farmer outcomes are summarised in Table 2.

Factors affecting paddy procurement

Evidence indicates that farmer participation in procurement systems is influenced by multiple structural, informational and institutional factors. Limited awareness of procurement mechanisms remains a major constraint, as a substantial proportion of farmers lack knowledge of MSP provisions, with awareness largely concentrated in regions where procurement operations are more active. Even among informed farmers, participation remains constrained due to limited access to nearby procurement centres and buyers, highlighting the importance of physical accessibility in determining market engagement (53).

Market structure and farm-level characteristics also contribute to disparities in participation. Small and marginal farmers are more dependent on local intermediaries due to higher transportation costs, limited access to market information and lower marketed surplus. This dependence results in lower price realisation through informal channels compared with regulated markets. In contrast, larger farmers with greater bargaining capacity and better

access to institutional channels are more likely to transact through formal procurement systems and secure relatively higher returns (54).

Participation levels are further shaped by socio-economic and institutional conditions. Factors such as familiarity with procurement procedures, price incentives, political linkages, transportation availability and administrative practices influence farmers' decisions to engage with procurement systems. Collectively these factors indicate that institutional efficiency and governance play critical roles in shaping participation outcomes (55).

Geographical and infrastructural factors further influence the selection of market channels. The availability of storage facilities, distance from procurement centres and proximity to private buyers significantly affect farmers' marketing decisions. Similarly, household-level characteristics such as education, age and family support, along with familiarity with digital procurement systems, influence adoption patterns and participation in formal procurement channels (56, 57).

Overall, the effectiveness of procurement systems is determined by the interaction of economic, institutional and infrastructural factors. Variations in awareness, access and institutional support contribute to uneven participation among farmer groups, highlighting the need for targeted interventions that address both structural constraints and information gaps. The interrelated determinants shaping participation in procurement systems across farmer groups are systematically summarised in Table 3.

Empowering women farmers

Evidence indicates that women farmers face substantial barriers in accessing procurement systems due to institutional and informational constraints. Limited awareness of procurement procedures and MSP mechanisms restricts participation in formal markets (58). Restricted access to procurement centres and administrative complexities further constrain engagement, particularly in regions with weak outreach mechanisms (59). Financial constraints and dependence on informal borrowing also influence decision-making capacity and market engagement (60, 61).

Table 2. Mechanisms linking procurement policies to farmer outcomes

Policy mechanism	Direct effect	Indirect effect	Affected farmer group
MSP procurement	Price assurance	Market price increase	Smallholders
Procurement centres	Market access	Increased competition	All farmers
Institutional access	Participation	Inclusion/exclusion dynamics	Women, tenants
Market intermediaries	Price distortion	Reduced bargaining power	Smallholders
Digital procurement	Transparency	Uneven access	Marginal farmers

MSP: minimum support price.

Table 3. Determinants of participation in paddy procurement systems across farmer categories

Determinant	Smallholder farmers	Tenant farmers	Women farmers	Implication for procurement systems
Institutional access	Limited access to procurement centres and administrative support	Excluded due to lack of formal recognition	Limited outreach and institutional inclusion	Reduces participation in formal procurement channels
Land tenure status	Fragmented and marginal landholdings	Absence of legal tenancy documentation	Restricted land ownership rights	Limits eligibility for MSP and procurement benefits
Market access	High dependence on intermediaries	Reliance on informal channels	Limited mobility and bargaining capacity	Results in lower price realization
Information and awareness	Uneven awareness of MSP and procurement processes	Low awareness due to exclusion from formal systems	Limited access to extension services and information	Constrains informed participation in procurement
Financial access	Limited access to institutional credit	No eligibility for formal credit	Dependence on informal borrowing	Reduces capacity to engage in procurement markets
Socio-cultural constraints	Moderate constraints	High structural exclusion	Gender norms limit decision-making and mobility	Reinforces participation inequalities

Structural inequalities related to land ownership and resource access further limit participation. The absence of recognised land titles and tenancy documentation restricts eligibility for procurement benefits and institutional support (62). In addition, dependence on informal credit systems and limited access to market information reduce effective participation in procurement channels (63, 64).

These barriers operate in an interconnected manner, wherein institutional access, resource ownership and socio-cultural norms jointly shape participation outcomes. Studies indicate that participation improves when women are integrated into farmer organisations and institutional networks (65). Collective action and farmer groups strengthen access to resources, enable knowledge exchange and enhance market participation. Training, access to information and institutional support mechanisms further improve engagement in procurement systems (66–68). Gender-based disparities in decision-making and control over resources also affect bargaining capacity and price realisation (69, 70).

Economic implications

Market access and price volatility

Policy reforms that have promoted greater openness in agricultural markets have had different effects on the ease of market entry for smallholder farmers. Market liberalisation has created additional opportunities, enabling farmers to expand their market reach. However, increased competition and exposure to global market forces have also contributed to greater price volatility. Smallholder farmers are particularly exposed to price fluctuations due to limited financial stability and lower bargaining power compared with larger agribusinesses. This can result in income instability and increased financial risk. Addressing infrastructure constraints, strengthening market information systems and promoting value chain integration are essential for improving market access among smallholder farmers (71). Setting up cooperatives and producer groups can further assist farmers improving bargaining capacity and market visibility, thereby reducing vulnerability to market fluctuations.

Access to credit and financial services

Smallholder farmers require access to credit and financial services to invest in technologies and management practices that enhance productivity. Reforms in agricultural policy have sought to make it easier for people to access financial services in several ways, such as promoting microfinance and mobile banking. However, even with these efforts, many smallholders still have difficulties in obtaining

credit due to high interest rates, strict lending standards and a lack of collateral. Microfinance has become an important way to support smallholder farmers by providing financial products tailored to their specific needs (72). However, the effectiveness of microfinance varies from region to region and factors such as repayment rates and the long-term viability of microfinance institutions can affect outcomes. Policymakers need to address these problems to ensure that smallholder farmers can access financial services and receive the benefits they need.

Land tenure and property rights

Secure land tenure is essential for smallholder farmers to invest in land improvements and adopt sustainable farming methods. Changes to agricultural policy have sought to improve land tenure systems by formalising land rights and providing smallholders with greater legal legitimacy (73). These reforms aim to enhance tenure security, encourage investment and reduce conflicts associated with land ownership. However, implementing land tenure reforms remains challenging. The process of formalising property ownership is often hindered by bureaucratic inefficiencies, corruption and disputes over land ownership. Ensuring effective implementation of land tenure reforms and promoting equitable access to agricultural resources are essential for sustainable development and enabling smallholder farmers to obtain long-term benefits.

Implications for theory, policy and practice

This study contributes to theoretical and applied knowledge through three interlinked pathways.

Rethinking structural inequalities through a culturally embedded lens

Culturally sanctioned systems of socio-religious ideology, familial hierarchies and inherited authority, together with legal processes such as land ownership and economic stratification contribute to the perpetuation of structural inequalities in rural environments (74). The findings demonstrate that socio-cultural and institutional structures function as power centres that influence access to resources, services and social legitimacy, thereby reinforcing exclusion through socially embedded beliefs and practices. Patronage networks and political affiliations are necessary for long-term agricultural development outcomes because of informal, culturally sanctioned mechanisms that support these power centres, including the ability of influential actors to facilitate access to documentation, development benefits and community-level support.

The findings also raise concerns regarding the assumptions underlying externally driven sustainability initiatives and highlight the complex roles of local power holders, including landlords, traders and informal lenders, in shaping development outcomes. The strategic use of religious narratives within debates surrounding sustainable development is an innovative concept and represents an important dimension requiring further investigation. Smallholders may become further influenced by such belief systems which can mould their perceptions and decisions by generating concerns regarding persecution, social exclusion, religious opposition and the loss of traditional knowledge systems when adopting sustainability oriented transformations.

The study sheds light on an underexplored dimension of rural development: the way in which collectivist family structures, particularly gerontocracy decision-making, limit creativity. Even where younger and educated farmers are present, respect for elder authority may influence adoption decisions. In addition to being imposed from outside, these studies show that structural inequalities are also maintained inside the families.

A rethinking of sustainable transitions is required to address these systemic inequalities. The study challenges the assumption that individuals always behave in their own self-interest by using a cultural political economy framework to demonstrate the ways in which collective narratives, normative authority and social legitimacy all work together to constrain the ability of individuals to alter their conduct over time. These internalised norms are not well handled by current models which focus primarily on technical interventions or individual motivations (75). Therefore, this study offers a culturally sensitive critique of traditional development frameworks while advancing a contextualised theory of sustainability resistance.

Advancing theories of sustainable transitions through localised agency

The study's analysis of the acceptance of sustainable practices in socially conservative contexts offers substantial insights into the adoption of sustainable agricultural ideas. Findings from the The Growing Together initiative show that community-based change agents, especially educated young smallholders, may mediate conflicts between established power structures and external actors promoting sustainability. In light of current theoretical demands for more complex explanations of sustainability transitions, this model of behaviour change is based on cultural factors and operates within communities (76).

This research sheds light on how cooperatives, religious networks and local kinship hierarchies are able to become socially acceptable spaces for change agents to establish sustainable practices. By showing that cultural legitimacy and entrenched leadership are essential to the long-term success of sustainability transitions, this study adds to the existing body of knowledge.

The effectiveness of multi-stakeholder cooperatives in smallholder settings

Markets can be transformed, ethical procurement methods integrated and long-standing inequitable trade practices can be challenged via locally adapted cooperative models, as seen on the Growing Together platform. These models can include smallholders, exporters, non-governmental organisations (NGOs) and sustainability oriented farmers. Through interest-free loans and

Sharia-compliant financing mechanisms, better livestock, direct access to markets, capacity-building programs and social protection against local cartels, these cooperatives greatly reduce smallholders' dependence on wholesalers and landlords.

landlords. This increases their ability to achieve chances of long-term survival by making them more self-sufficient. This perspective expands self-sustainability idea by highlighting inclusive governance systems, recasting local elites as allies rather than rivals in the fight for equitable sustainability (77). The previous findings also support, the arguments emphasising the significance of cooperation across multiple levels within development ecosystems (78, 79). Also, for those working in postcolonial or semi-feudal agricultural settings, this paradigm offers a scalable foundation for interacting with smallholders.

Challenges in paddy procurement

Evidence indicates that multiple structural and institutional constraints continue to limit the effectiveness of paddy procurement systems in India (80). Inadequate and underutilised storage infrastructure contributes to postharvest losses and operational inefficiencies, while continued dependence on rented storage reflects suboptimal capacity utilisation within existing institutional arrangements. At the same time, limited procurement incentives relative to market conditions reduce farmers' willingness to participate in formal procurement channels, particularly when private traders offer comparable prices with fewer procedural barriers. Insufficient procurement infrastructure, including an inadequate number and uneven distribution of procurement centres, further increases transaction costs and delays, disproportionately affecting smallholder farmers. In addition, declining participation of rice millers disrupts procurement operations and contributes to delays in processing and payments, thereby weakening system efficiency. These challenges are further reinforced by socio-cultural and institutional factors, where traditional norms, hierarchical decision-making structures and limited access to information constrain farmer participation. However, emerging evidence suggests that the involvement of younger and more educated farmers can improve awareness, institutional engagement and adoption of improved practices, thereby enhancing resilience within rural agricultural systems (81, 82).

Conclusion

This review indicates that India's paddy procurement system contributes to price stabilisation and food security but remains uneven in terms of inclusiveness. Participation is shaped not only by policy design but also by institutional accessibility, awareness and socio-economic constraints, with smallholder, tenant and women farmers facing persistent barriers such as limited tenancy recognition and inadequate access to procurement infrastructure.

The findings highlight that procurement outcomes vary considerably across regions, with stronger institutional capacity associated with improved participation and price realisation. This suggests that policy expansion alone is insufficient to ensure equitable access to procurement systems.

The review contributes to existing knowledge by demonstrating that exclusion from procurement systems is driven

by interconnected institutional, infrastructural and access-related factors rather than policy availability alone.

Future research should focus on state-level implementation differences, evaluate the effectiveness of digital procurement platforms and examine institutional mechanisms that can improve inclusion among marginalised farmer groups.

Authors' contributions

DB conceptualised the study, curated the data and prepared the original draft of the manuscript. PR and VR supervised the research and contributed to the review and revision of the manuscript. VA developed the methodology and performed validation. MLS conducted the data analysis and assisted in the review and revision of the manuscript. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

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Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

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Publisher information: Plant Science Today is published by HORIZON e-Publishing Group with support from Empirion Publishers Private Limited, Thiruvananthapuram, India.