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Unveiling the Bottlenecks: A Critical Study of Tribal Sub-plan Implementation in Odisha

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ABSTRACT

Background: The Tribal Sub-Plan (1974-79) targets tribal welfare through focused planning and resource use. Despite Odisha's 22.85% tribal population, outcomes remain poor. This paper highlights key implementation gaps-weak coordination, fund mismanagement, low participation and poor monitoring-and suggests reforms to enhance TSP effectiveness.

Methods: This study used an ex-post facto design to assess Tribal Sub-plan (TSP) implementation challenges in Odisha, focusing on agricultural constraints among tribal farmers. Kendujhar and Rayagada were purposively selected for their high tribal populations. Stratified random sampling ensured representation of diverse tribal subgroups. Primary data were collected through structured interviews and FGDs with selected beneficiaries, while secondary data from official reports supplemented field findings. Constraints were ranked by respondents and converted into percent positions using the formula: Per cent Position = 100 (Rij -0.5)/Nj, then into scores *via* Garrett's Ranking Table. Average scores determined the severity of each constraint, enabling objective prioritization and informed recommendations to strengthen TSP in tribal agriculture.

Result: The study identified key constraints across eight dimensions of rural development using Garrett's ranking technique. Among planning-related issues, improper situational analysis (mean score: 71.84) was a major challenge. In the economic domain, untimely release of sanctioned funds (74.05) and insufficient self-employment opportunities (68.13) ranked highest. In extension services, immediate field-level support (67.86) and incorrect field diagnostics (77.99) were key limitations. The most critical socio-psychological limitation was entrenched traditional value systems (78.17), a measure of resistance to change in behavior. Other limitations were poor technological adaptation, poor monitoring mechanisms and weak infrastructure. The results highlight the importance of participatory planning, timely finance, responsive extension systems and situation-specific technologies in reinforcing rural development outcomes.

Key words: Development constraints, Garrett's ranking technique, Participatory planning, Rural development, Socio-psychological barriers, Tribal communities.

INTRODUCTION

Tribal communities, the original inhabitants of India, comprise over 104 million people (8.4% of the population) and are integral to the nation's cultural fabric (Dash *et al*., 2019). Despite constitutional safeguards, they continue to face socio-economic marginalization and limited political participation (Saxena and Ganveer, 2013). Odisha, with 62 tribes forming 24% of its population, ranks second in tribal concentration after Madhya Pradesh (Dash *et al*., 2019), necessitating targeted, inclusive development (Sharma *et al*., 2019). Studies have shown that tribal farming households in Odisha face challenges in livelihood diversification, income stability and adoption of sustainable agricultural practices, further justifying the need for focused development interventions (Jayasingh *et al*., 2024; Meena *et al*., 2024). The Tribal Sub-plan (TSP), now the Scheduled Tribe Component, was introduced to bridge these gaps through focused resource allocation and integrated policies (Mutatkar, 2022; Devi and Dhal, 2020). However, implementation in Odisha faces persistent challenges such as poor last-mile delivery, administrative inefficiencies and weak community participation (Swamy, 2010; Devara and Deshmukh, 2017). Previous studies from Agricultural Science Digest also highlight that adoption of improved agricultural practices among tribal farmers remains low due to infrastructural, economic and social constraints, reflecting similar barriers faced under the TSP (Badhala and Kanojia, 2017; Jena and Mishra, 2022). Historical neglect, socio-cultural barriers, remoteness and inadequate infrastructure-especially affecting tribal women-further impede progress (Saravanan, 2018; Panda, 2005, 2021; Malyadri, 2020). This study critically explores these constraints through literature review, stakeholder

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engagement and field observations, offering evidence-based recommendations for more inclusive and sustainable tribal development in Odisha (Mohanta *et al.*, 2020; Velusamy, 2021).

MATERIALS AND METHODS

Study area

Odisha, situated on India's eastern coast between 17°49′ N-22°34′N latitude and 81°24′E-87°29′E longitude, holds strategic importance due to its climate, natural resources and socio-economic dynamics (Nanda *et al.*, 2020). Its 560 km Bay of Bengal coastline shapes both its economy and culture (Mohanty *et al.*, 2020). The state hosts the Mahanadi Delta, formed by the Mahanadi, Brahmani and Baitarini rivers, supporting diverse ecological and human systems (Hazra *et al.*, 2019). Odisha ranks second after Madhya Pradesh in tribal population, with Scheduled Tribes concentrated in its forested and hilly interiors (Dash *et al.*, 2019). These groups reflect vast cultural, linguistic and socio-economic diversity (Mohanty, 2018), yet many, like the Pengo tribe, remain socio-economically and educationally disadvantaged (Naik, 2017). Compared to other tribal-dominated states, Odisha shows both similarities and distinct patterns in tribal development.

Sample selection

Study of targeted phenomena in tribal populations involves a systematic approach, *i.e.*, an ex post facto design (Tripura, 2023). Kendujhar and Rayagada were chosen due to their high tribal concentration (Satpati and Sharma, 2020; Rowkith and Bhagwan, 2020). Stratified random sampling of blocks and panchayats facilitated subgroup diversification and enhanced generalizability (Kumar *et al.*, 2018; Rani *et al.*, 2020; Thamminaina *et al.*, 2020). This type of sampling captures population variability more effectively than simple random sampling (Ramya, 2020). Ex post facto study examines available data to investigate variable interactions (Shrivastava and Shrivastava, 2018). In tribal societies, where historical and socio-cultural variables hold significance, it yields information on complex interactions (Meghani *et al.*, 2024). Application of appropriate statistical tools provides research validity and reliability (Kondo *et al.*, 2014).

Data collection and analysis

Effective data collection using primary and secondary sources is essential to understand issues in Tribal Sub-Plans (TSP) (Dash *et al.*, 2019; Satpati and Sharma, 2020). Primary data from interviews and FGDs with tribal farmer beneficiaries provided insights into agricultural constraints and community-based solutions (Ramya, 2020; Beza *et al.*, 2016; Raveesha *et al.*, 2019). Constraints were ranked by perceived severity (Imtiaz and Rana, 2014) and converted to per cent positions using the formula: Per cent position = 100(Rij - 0.5)/Nj (Singh *et al.*, 2017; Mircioiu and Atkinson, 2017). Garrett's Ranking Table was then used to analyze ordinal data as interval data (Garrett and Woodworth, 1969; Nyaligwa *et al.*, 2016; Schwalm *et al.*, 2017). Average Garrett scores reflected the collective perception of severity, guiding prioritization and minimizing bias (Bansal *et al.*, 2022). High scores indicated urgent issues, while low scores suggested lower priority. Constraint programming models and decision-support tools can aid in addressing these prioritized challenges (Panda *et al.*, 2021).

RESULTS AND DISCUSSION

Planning constraints in tribal sub-plan execution

As per data in Table 1 the highest-ranked planning constraint is "Situational analysis not done properly" (Mean Garrett Score: 71.84), indicating a critical gap in the foundational understanding of field realities. This is closely followed by "Emphasis not given to indigenous knowledge" (64.56), showing a lack of appreciation for local wisdom. Additionally, "Participatory planning not emphasized" and "Lack of involvement of farmers in problem diagnosis" highlight a top-down approach that neglects stakeholder engagement. The lowest-ranked constraint, "Experience of the beneficiary not incorporated" (33.84), still points to the systemic undervaluation of local experience. Overall, the data reveals inadequate inclusivity and poor groundwork in the planning phase.

Program development constraints

As shown in Table 2 shows the top constraint is "Insufficient attempt for self-employment" (Mean Garrett Score: 68.13, Rank I), with substantial economic independence deficit. Second is "Inadequate scope for involvement of farm

Table 1: Planning related constraints.

C1	Constraints based on planning	Mean garrett score	Frequency	Percentage	Rank
i.	Situational analysis not done properly.	71.84	69	28.75	I
ii.	Lack of involvement of farmers in problem diagnosis.	48.04	31	12.91	IV
iii.	Planning hardly done from beneficiary perspective	40.71	25	10.41	V
iv.	Emphasis not given to indigenous knowledge	64.56	50	20.83	II
v.	Planning not done by experienced officials	34.42	16	6.66	VI
vi.	Participatory planning not emphasized	56.10	42	17.50	III
vii.	Experience of the beneficiary not incorporated	33.84	7	2.91	VII

women" (64.00, Rank II), with limited gender inclusion, followed by "Priority not given towards poverty alleviation aspects" (61.29, Rank III), with poor socio-economic need alignment. Lower ranked but notable are "No sustainable programming" (32.27, Rank VI) and "Programming not with essential need of the beneficiaries" (31.81, Rank VII). These results highlight the imperative of realignment towards self-employment, gender balance and poverty alleviation programs.

Technological constraint

As per Table 3 the most prominent technological constraint is the "Insufficient scope for immediate solving of field problems" (Mean Garrett Score: 67.86 Rank I), indicating that existing technologies often fail to address practical, on-site challenges. This is followed by "Inadequate discussion for clarification and understanding on suggested technologies" (65.02, Rank II), reflecting insufficient training and communication. "Affordability of technology" (65.27, Rank III) also poses a major barrier to adoption. These findings emphasize the need for field-relevant, affordable technologies supported by effective user education.

Economical constraint

As per Table 4, economic barriers significantly hinder program implementation. "Sanctioned funds not timely released" (74.05) tops the list, showing how administrative delays affect field outcomes. The absence of "Revolving funds for SHG activities" (59.27) and "Inadequate funds to cover all farm-based activities" (56.03) also rank high, revealing structural financial inadequacies. Interestingly, "High cost of suggested programmes" (33.50) was less of a concern, indicating that cost alone isn't as limiting as availability and timing of funds.

Socio-psychological constraint

As per Table 5, socio-cultural resistance remains a strong barrier, as "Strong value system restricts adoption" (78.17) and "Assumption on failure of suggested technology" (67.29) dominate the rankings. "No encouragement from family members" (61.008) reflects interpersonal barriers.

Table 2: Program development constraints.

C2	Constraints based on program development	Mean garrett score	Frequency	Percentage	Rank
i.	Not covering all farm based activities.	43.07	25	10.41	V
ii.	Programming not with essential need of the beneficiaries.	31.81	18	7.5	VII
iii.	No sustainable programming.	32.27	15	6.25	VI
iv.	Programme has not focused on in proper resource utilization.	51.73	30	12.5	IV
v.	Insufficient attempt for self-employment.	68.13	74	30.83	I
vi.	Priority not given towards poverty alleviation aspects.	61.29	36	15	III
vii.	Inadequate scope for involvement of farm women.	64.00	42	17.5	II

Table 3: Technological constraints.

C3	Constraint based on technology	Mean garrett score	Frequency	Percentage	Rank
i.	Lack of need based training to develop competency.	26.81	2	0.83	VIII
ii.	Inadequate discussion for clarification and understanding on suggested technologies.	65.02	52	21.66	II
iii.	No exposure visit to develop confidence of the beneficiaries.	52.82	30	12.5	IV
iv.	Irregularity in information flow.	44.76	15	6.25	VI
v.	Adequate demonstration not conducted.	46.65	18	7.5	V
vi.	Lack of language specific literature supply for reference.	30.78	12	5	VII
vii.	Insufficient scope for immediate solving of field problems.	67.86	68	28.33	I
viii.	Affordability of technology.	65.27	45	18.75	III

Table 4: Economy constraints.

C4	Constraints based on economy	Mean garrett score	Frequency	Percentage	Rank
i.	Inadequate funds to cover all farm based activities.	56.03	30	12.5	III
ii.	Insufficient fund for training and demonstrations.	54.79	21	8.75	V
iii.	Sanctioned funds not timely released.	74.05	71	29.5	I
iv.	Poor attempt in liasoning with credit institution.	41.42	15	6.25	VII
v.	Credit institutions not interested to sanction required amount.	55.29	26	10.83	IV
vi.	No revolving funds for SHG activities.	59.27	48	20	II
vii.	High cost of suggested programmes.	33.50	10	4.16	VIII
viii.	Insurance coverage not done from the project fund.	42.82	19	7.91	VI

In contrast, "Inadequate attempt to organize beneficiaries" (28.15) and "Poor extension approaches" (30.375) highlight institutional gaps in community mobilization and awareness efforts. Addressing these deeply rooted psychological factors is crucial for behavioral change and adoption.

Extension services constraints

Effective extension services are crucial for translating innovation into practice. The top constraint, as shown in Table 6, is "Not properly diagnosing field situations" (Mean Garrett Score: 77.99), reflecting planning-related shortcomings. This is followed by "Inadequate extension activities for motivation" (64.17) and "Planned programmes not timely implemented" (62.06), highlighting gaps between planning and execution. In contrast, "Insufficient incentives to implement planned programmes" (21.10) ranked lowest, indicating it is a lesser concern compared to systemic and operational issues.

Monitoring and evaluation constraint

As per Table 7, robust monitoring and evaluation (MandE) systems are vital for accountability and adaptive management. Key constraints include insufficient conflict resolution efforts (Mean Garrett Score: 75.88 Rank I), which hinder stakeholder cooperation and project progress. The lack of prompt action on field issues (67.96, Rank II) allows problems to persist, while delays in input availability (63.15, Rank III) reflect poor logistical oversight. These deficiencies weaken the responsiveness and effectiveness of TSP implementation.

Infrastructural constraint

Adequate infrastructure is essential for sustainable development, yet critical gaps persist. The most severe constraint, as shown in Table 8, is the lack of funds for repair and maintenance of created assets (Mean Garrett Score: 71.95, Rank I), leading to infrastructure deterioration

Table 5: Socio-psychological constraints.

C5	Constraints based on Socio-psychological factor	Mean Garrett score	Frequency	Percentage	Rank
i.	Poor extension approaches to develop consciousness	30.375	10	4.16	VII
ii.	Inadequate attempt to change behavior of the people.	36.5	15	6.25	VI
iii.	Strong value system restrict adoption	78.17	64	26.66	I
iv.	Assumption on failure of suggested technology	67.29	50	20.83	II
v.	Inadequate attempt to organize beneficiaries	28.15	1	0.41	VIII
vi.	Prejudice against natural calamities	52.925	30	12.5	IV
vii.	No emphasize for cluster approach	45.575	21	8.75	V
viii.	No encouragement from family members	61.008	49	20.41	III

Table 6: Extension services constraints.

C6	Constraints based on extension services	Mean garrett score	Frequency	Percentage	Rank
i.	Poor extension service at village level	41.88	27	11.25	V
ii.	Lack of sincerity and interest of the project personnel	41.55	21	8.75	VI
iii.	Project staffs not experienced and knowledgeable	35.46	16	6.66	VII
iv.	Not properly diagnosing field situation	77.99	58	24.16	I
v.	Inadequate extension activities for motivation	64.17	41	17.08	II
vi.	Poor service and supply system	55.77	35	14.58	IV
vii.	Planned programme not timely implemented	62.06	31	12.91	III
viii.	Insufficient incentives to implement planned programmes	21.10	11	4.58	VIII

Table 7: Monitoring and evaluation constraints.

C7	Constraint based on monitoring andevaluation	Mean garrett score	Frequency	Percentage	Rank
i.	Poor team spirit among project personnel	23.03	2	0.83	VIII
ii.	Lack of friendly approach of the project personnel	30.80	7	2.91	VII
iii.	Inadequate attempt for cluster approach	44.26	20	8.33	V
iv.	Casual approach in implementation of activities	52.40	27	11.25	IV
v.	Irregular supervision and monitoring of activities	42.50	14	5.08	VI
vi.	No immediate action to solve field problems	67.96	58	24.16	II
vii.	Insufficient attempt for conflict resolution	75.88	73	30.41	I
viii.	Poor attempt to ensure timely availability of inputs	63.15	39	16.25%	III

Table 8: Infrastructural constraint.

C8	Constraints based on infrastructural support	Mean garrett score	Frequency	Percentage	Rank
i.	Insufficient attempt for farm mechanization	42.82	13	5.41	VI
ii.	No sincere effort for irrigation facilities	67.58	53	22.08	II
iii.	Adequate incentives not provided to purchase farm implements	49.43	17	7.08	V
iv.	No attempts for custom hiring services	53.20	25	10.41	IV
v.	Funds not provided for repair and maintenance of assets created	71.95	81	33.75	I
vi.	Sincere efforts not made to conserve rain water	58.88	41	17.08	III
vii.	No attempt for remunerative sale price of the produce.	29.90	8	3.33	VII
viii.	Not liasoning with traders and business for immediate disposal of the produce.	26.21	2	0.83	VIII

and reduced long-term returns. The absence of sincere efforts to develop irrigation facilities (67.58, Rank II) and conserve rainwater (58.88, Rank III) further highlights deficiencies in water management infrastructure, undermining agricultural productivity and sustainability.

CONCLUSION

The study highlights that effective Tribal Sub-plan (TSP) implementation demands an integrated, bottom-up approach that addresses planning, technological, financial, socio-cultural and institutional constraints. Key strategies include participatory planning, timely resource allocation, capacity building and governance reforms. Strengthening local institutions and honoring indigenous knowledge are vital to ensure inclusive, resilient and sustainable development in tribal regions. These findings offer actionable insights for policymakers to enhance the impact of TSP in Odisha.

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Informed consent

All participants involved in the interviews and surveys provided informed consent prior to their inclusion in the study. Ethical standards were maintained throughout the research process.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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