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Impact of Kaleshwaram Lift Irrigation Project (KLIP Link-4) on women's economic empowerment and decision-making in Telangana

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Abstract

The present study analysed the impact of the Kaleshwaram Lift Irrigation Project (KLIP Link-4) on women's economic empowerment and decision-making in Telangana. The study was conducted among 240 women respondents from the KLIP Link-4 command area using primary data collected through a structured interview schedule. Descriptive statistics such as frequencies, percentages and averages were employed for analysis.

The results revealed that 81.67 per cent of women participated in agricultural activities, mainly crop cultivation and livestock rearing, while bidi making served as an important supplementary livelihood activity. About 75.83 per cent of respondents owned agricultural land, though ownership was predominantly joint with spouses. Women's participation was relatively higher in household expenditure decisions (72.50%) and children's education (68.93%), whereas independent participation in agricultural input and crop sale decisions remained comparatively low. Access to institutional resources was moderate, with 67.50 per cent having access to extension services and 72.50 per cent obtaining credit mainly through Self-Help Groups (SHGs). Nearly 96.70 per cent possessed bank accounts, indicating substantial financial inclusion. The findings further indicated that although women actively contributed to farm and non-farm livelihoods, their economic contribution had not fully translated into independent financial autonomy and decision-making authority. The study concludes that irrigation development projects such as KLIP can contribute significantly to rural women's empowerment when supported with gender-inclusive policies, institutional support, credit access and leadership development initiatives.

Keywords: Women empowerment, KLIP Link-4, irrigation, decision-making, financial autonomy, agricultural participation, Telangana

1. Introduction

Women constitute a significant proportion of the agricultural workforce in India and play a crucial role in crop production, livestock management, post-harvest operations and household food security. Despite their substantial contribution to agriculture and allied sectors, women often face limited access to productive resources such as land, credit, irrigation, extension services and institutional decision-making. Gender disparities in ownership, financial autonomy and agricultural decision-making continue to restrict the overall empowerment and livelihood opportunities of rural women. In recent years, women's empowerment has emerged as an important dimension of sustainable agricultural and rural development, particularly in irrigation command areas where access to water resources can influence agricultural productivity, income generation and livelihood diversification.

Irrigation development projects are considered important instruments for improving agricultural growth, enhancing cropping intensity and strengthening rural livelihoods. Beyond productivity enhancement, irrigation can also contribute to social and economic empowerment by increasing women's participation in agriculture, improving access to resources and expanding livelihood opportunities. However, the benefits of irrigation projects are not always distributed equally among men and women. Women often

continue to remain marginal participants in decision-making related to crop planning, input use, credit utilization and marketing despite their active involvement in agricultural labour. Therefore, understanding the gender dimensions of irrigation interventions has become increasingly important for inclusive rural development policies.

The Kaleshwaram Lift Irrigation Project (KLIP), one of the world's largest multi-stage lift irrigation projects, was initiated by the Government of Telangana to provide irrigation facilities, drinking water and industrial water supply across drought-prone regions of the state. The project has significantly altered the agricultural landscape in several command areas through improved water availability, crop intensification and expansion of agricultural activities. Among its various components, KLIP Link-4 has played an important role in enhancing irrigation access and supporting rural livelihoods in the study area. Increased irrigation availability under the project has encouraged agricultural participation, income-generating activities and institutional engagement among rural households, including women farmers and agricultural labourers.

Although several studies have examined the economic and agricultural impacts of irrigation projects, limited empirical research is available on the gender dimensions of irrigation development, particularly in the context of the Kaleshwaram Lift Irrigation Project. Existing studies largely focus on crop

productivity, water management and farm income, while relatively less attention has been paid to women's economic empowerment, financial autonomy, participation in decision-making and access to institutional resources in irrigation command areas. In this context, the present study attempts to analyse the impact of KLIP Link-4 on women's economic empowerment and decision-making in Telangana. The specific objectives of the study were:

1. To analyse the socio-economic characteristics of women beneficiaries under KLIP Link-4.
2. To examine women's participation in agricultural activities and household decision-making.
3. To assess women's access to productive resources, credit, extension services and irrigation facilities.
4. To evaluate the impact of KLIP Link-4 on women's economic empowerment and financial autonomy.

2. Review of Literature

Women constitute a major share of the agricultural workforce in India and contribute significantly to crop cultivation, livestock management and household food security. However, despite their active involvement in agriculture, women continue to face inequalities in access to productive resources, institutional support and decision-making authority. Several studies have highlighted that women's participation in agriculture often remains undervalued and inadequately recognized within rural economies.

Bhattacharya (2025) ^[2] reported that rural women participate extensively in agricultural and allied activities, yet their ownership of productive resources and participation in major farm decisions remain limited. Similarly, Baruah *et al.* (2022) ^[1] observed that collective action models such as Self-Help Groups (SHGs) improved women's participation and bargaining power in farming activities. However, socio-cultural constraints continued to restrict women's independent control over agricultural resources and income.

Land ownership has been recognized as an important indicator of women's empowerment and economic security. Khan (2025) ^[8] noted that although women contribute substantially to agricultural labour, only a limited proportion possess land ownership rights independently. Mahato *et al.* (2024) ^[9] further highlighted that women's landownership in India remains significantly lower than men's despite legal reforms and inheritance provisions. Most landholdings continue to be either jointly owned or registered in male members' names, limiting women's effective control over land resources.

Decision-making participation is another important dimension of empowerment. Deshmukh *et al.* (2025) ^[5] reported that women's independent decision-making in agricultural activities remained low across rural households in India, with most farm decisions being taken jointly or dominated by male members. Similarly, Meinzen-Dick *et al.* (2024) ^[10] emphasized that decisions related to agricultural inputs and resource allocation often remain resistant to gender transformation due to existing institutional and social norms.

Access to institutional resources such as extension services, credit and digital technologies has gained increasing importance in improving women's agricultural participation.

Challa (2024) ^[3] observed that although women's access to agricultural extension services has improved through institutional programmes and SHGs, barriers related to literacy, mobility and time constraints continue to limit effective participation. Panda (2021) ^[12] reported that mobile phone usage and digital agricultural applications improved women's access to agricultural information and market linkages, though digital literacy gaps persisted among rural women.

Financial inclusion and credit access have also emerged as important contributors to women's empowerment. Nagouda *et al.* (2022) ^[11] found that participation in SHG-Bank Linkage Programmes significantly improved women's access to formal credit institutions and enhanced financial literacy among rural households. Similarly, Duvendack *et al.* (2023) ^[6] reported that targeted financial inclusion programmes substantially increased bank account ownership and institutional credit access among rural women in India.

Women's workload and time poverty remain major concerns in rural agricultural systems. Studies by Choudhary and Kumar (2024) ^[4] emphasized that rural women often carry a triple burden involving domestic responsibilities, agricultural labour and community participation. Jamuna (2023) ^[6] further observed that home-based occupations such as bidi making increase women's work burden while providing limited economic returns and inadequate labour protection.

Although previous studies have examined women's participation in agriculture, irrigation development and rural empowerment separately, limited empirical evidence is available regarding the impact of large-scale irrigation projects on women's economic empowerment and decision-making behaviour in Telangana. In particular, studies focusing on the gender dimensions of the Kaleshwaram Lift Irrigation Project (KLIP) remain limited. Therefore, the present study attempts to examine the impact of KLIP Link-4 on women's economic empowerment, resource access and decision-making participation in the irrigation command area.

3. Methodology

The present study was conducted in the command area of Kaleshwaram Lift Irrigation Project (KLIP) Link-4 in Telangana state. The study focused on analysing the impact of irrigation development on women's economic empowerment, participation in agriculture and household decision-making.

A multistage sampling technique was adopted for selection of respondents. Villages falling under the KLIP Link-4 command area were purposively selected based on irrigation coverage and agricultural activity. From the selected villages, women respondents engaged in agricultural and allied activities were identified and selected randomly for the study. A total sample of 240 women respondents was considered for the analysis.

Primary data were collected during 2025 through a pre-tested structured interview schedule covering socio-economic characteristics, agricultural participation, decision-making behaviour, access to resources, financial inclusion and empowerment indicators. Both farm and non-farm livelihood activities of women were included in the investigation.

The collected data were analysed using simple statistical tools such as frequency, percentage and mean analysis. The results were presented in tabular form and interpreted to understand the extent of women's participation and empowerment under the KLIP Link-4 command area.

4. Results and Discussion

4.1 Socio-economic Profile of Women Respondents

The socio-economic characteristics of respondents from Table 1 revealed that a majority of women (65.00%) belonged to the middle age group of 41–60 years, indicating active participation of economically productive age groups in agricultural activities. Only a small proportion of respondents were above 60 years of age. Educational analysis showed that nearly half of the respondents (49.00%) had no formal education, while only a limited proportion had completed higher secondary education and graduation. This reflects the persistence of low educational attainment among rural women in the study area.

With respect to marital status, the majority of respondents were married (72.91%), followed by single and widowed women. The findings indicate that married women constitute the major workforce in agricultural and household activities under the KLIP Link-4 command area. Low literacy and traditional gender roles continue to influence women's participation and access to decision-making opportunities.

Table 1: Socio-economic Profile of Women Respondents

Variables	Category	Frequency	Percentage
Age	20-40	78	32.50
	41-60	156	65.00
	Above 60	6	2.50
Education	No formal education	118	49.00
	Primary	38	16.00
	Secondary	50	21.00
	Higher secondary	26	11.00
	Graduation & above	7	3.00
Marital status	Married	175	72.91
	Single	34	14.17
	Widow	31	12.92

Source: Primary survey, 2025

4.2 Women's Participation in Agriculture

Women's participation in agriculture and allied sectors was found to be substantial in the study area. About 81.67 per cent of respondents were actively involved in agricultural activities such as crop cultivation, livestock management and agricultural labour operations. Crop cultivation emerged as the dominant activity among women respondents, while bidi making served as an important supplementary livelihood source for a large proportion of households.

The study further revealed that women contributed significantly to both productive and reproductive labour. On average, women spent 6–8 hours daily on agricultural and livestock activities in addition to 4–5 hours on domestic work including cooking, childcare, bidi making and household management. Participation in community-related activities such as SHGs and village meetings further increased women's workload. These findings indicate the existence of time poverty and invisible labour burden among rural women despite their active economic

contribution.

Although women participated extensively in agricultural activities, their annual income levels and control over productive resources remained comparatively limited. The results suggest that women continue to play a crucial but undervalued role in sustaining rural livelihoods under irrigated agricultural systems. Similar findings were reported by Bhattacharya (2025) ^[2].

Table 2: Women's Participation in Agricultural and Allied Activities

Particulars	Frequency	Percentage
Participation in agriculture	196	81.67
Crop cultivation	155	64.58
Livestock	18	7.50
Crop cultivation + Livestock	23	9.58
Bidi making	211	87.92
Participation in crop selection decisions	154	64.17
Participation in crop sale decisions	119	49.58

Source: Primary survey, 2025

Table 3: Workload and Time Allocation of Women Respondents

Activity	Average Time Spent (Hours/day)
Domestic work	4–5
Agricultural activities	6–8
Community activities	1–2

Source: Primary survey, 2025

4.3 Decision-Making Power of Women Respondents

Decision-making participation among women varied across agricultural and household domains. The study revealed that crop selection decisions were primarily taken jointly within households (57.81%), while independent decision-making by women remained relatively low. Similar trends were observed in decisions related to the use and purchase of agricultural inputs, where spouses or joint decisions dominated.

In contrast, women showed relatively higher participation in household expenditure and children's education decisions. About 72.50 per cent of respondents participated in household expenditure decisions, while 68.93 per cent participated in decisions related to children's education. This indicates that women possess greater involvement in household welfare decisions than in productive agricultural decisions.

The findings suggest that although women actively contribute to agriculture, independent control over farm-related decisions remains limited due to prevailing socio-cultural norms and gendered division of authority within households. Women's participation is therefore more consultative and joint rather than fully autonomous. These findings are consistent with Deshmukh *et al.* (2025) ^[5].

Table 4: Decision-Making Participation of Women Respondents

Decision Area	Self	Joint	Spouse	Others
Crop selection	8.86	57.81	20.67	13.75
Use of agricultural inputs	8.33	36.67	42.50	12.50
Purchase of agricultural inputs	9.58	36.67	40.42	13.33
Household expenditure	72.50	-	-	27.50
Children's education	68.93	-	-	31.07

Source: Primary survey, 2025

4.4 Access to Resources and Institutional Services

Access to institutional resources among women respondents was moderate under the KLIP Link-4 command area. Around 67.50 per cent of respondents reported access to agricultural extension services and training programmes through institutions such as Rythu Vedikas, SHGs and agricultural departments. Training programmes mainly focused on crop management, soil health, irrigation practices and input utilization. Financial inclusion among respondents was relatively high, with 96.70 per cent possessing bank accounts. About 72.50 per cent of women had access to credit facilities, mainly through Self-Help Groups, banks and cooperative institutions. Credit was primarily utilized for farm inputs, livestock activities and micro-enterprise purposes. Digital engagement among respondents showed moderate adoption of mobile phones and agricultural applications. Nearly one-third of respondents used mobile phones and agricultural-related applications regularly, while others reported limited or occasional usage due to digital literacy and accessibility constraints. The respondents reported receiving irrigation water from KLIP Link-4 for approximately 3–3.5 months annually. Decisions regarding irrigation water use were largely taken jointly within households, indicating partial inclusion of women in irrigation-related decision-making. Similar observations were reported by Challa (2024) [3].

Table 5: Access to Resources and Institutional Services

Particulars	Frequency	Percentage
Access to extension services	162	67.50
Possession of bank account	232	96.70
Access to credit	174	72.50
Daily mobile/agri-app usage	72	30.00
Weekly mobile/agri-app usage	51	21.25
Access to KLIP irrigation water	240	100.00

Source: Primary survey, 2025

4.5 Economic Empowerment and Social Participation

The findings indicated that a majority of respondents had their own source of income through agricultural and allied activities. However, independent financial autonomy among women remained comparatively limited. About 72.50 per cent of respondents reported having control over their income, whereas in several households financial decisions were either jointly managed or controlled by spouses and other family members. Participation in collective institutions such as Self-Help Groups (SHGs), DWACRA groups and farmer organizations was relatively high, with 72.50 per cent of respondents being members of such organizations. These institutions played an important role in improving women’s access to credit, training and community participation. Despite high membership levels, leadership participation among women remained limited. Only a small proportion of respondents held positions such as President, Secretary or Treasurer within community organizations. Similarly, participation in formal political institutions such as Gram Panchayats was comparatively low. The overall findings indicate that irrigation development under KLIP Link-4 has enhanced women’s participation in agriculture, income generation and institutional activities.

However, empowerment in terms of independent decision-making, leadership representation and financial autonomy remains incomplete. Similar results were observed by Nagouda *et al.* (2022) [11].

Table 6: Economic Empowerment and Social Participation

Particulars	Frequency	Percentage
Joint ownership	125	52.08
Own name	57	23.75
No land	58	24.17
Own source of income	196	81.67
Control over income	174	72.50
Membership in SHGs/cooperatives	174	72.50
Leadership positions held	58	24.17
Participation in Gram Panchayat	46	19.17
Participation in political organizations	32	13.33

Source: Primary survey, 2025

5. Conclusion and Policy Implications

The study concluded that the Kaleshwaram Lift Irrigation Project (KLIP Link-4) has positively influenced women’s participation in agricultural and allied activities through improved irrigation access, livelihood opportunities and institutional engagement. Women actively contributed to crop cultivation, livestock management, household welfare and community activities under the irrigated agricultural system. However, despite increased economic participation, women’s independent control over productive resources, agricultural decisions and financial matters remained limited. Most agricultural decisions continued to be dominated by joint or spouse-led decision-making structures. Leadership participation and political representation among women were also relatively low. The findings highlight the need for gender-sensitive agricultural policies and institutional interventions to strengthen women’s empowerment in irrigation command areas. Greater emphasis should be given to women-oriented extension services, leadership development programmes, land ownership rights, digital literacy initiatives and financial autonomy enhancement. Strengthening SHGs and promoting women’s participation in irrigation management institutions can further improve inclusive rural development and long-term gender equity under irrigation projects. The study is based on cross-sectional primary data collected from selected beneficiaries under KLIP Link-4 and may not represent all irrigation command areas of Telangana.

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