



Assessment of Mission Kakatiya Scheme on Development of Agricultural Production, Dairy, Fisheries, Washermen and Pottery: A Village-Level Study through Difference-in-Differences Method

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Abstract

Mission Kakatiya, launched by the Telangana government in 2015, after the state's formation in 2014, aims to rejuvenate feeder channels, strengthen bunds, restore hydraulic structures, and desilt historic irrigation tanks. The programme seeks to boost agricultural production, recharge groundwater, enhance irrigation potential, and revive rural livelihoods that depend on tank ecosystems. This investigation is conducted within a Difference-in-Differences (DiD) framework. The primary data were collected from 230 families, the main livelihood groups associated with the reconstructed irrigation tank. The results show statistically significant increases ($p < 0.001$) in agricultural output, crop productivity, milk production, fish production, washermen's income, and pottery production after the implementation of Mission Kakatiya. The study finds that the programme has generated significant multidimensional livelihood benefits beyond irrigation through stimulating the local rural economy.

Keywords: Fisheries, Washermen, Pottery, Agricultural Production, Dairy Development, Mission Kakatiya, Telangana.

1. Introduction

Tank irrigation has always been the backbone of agriculture in Telangana. During the Kakatiya period, there were thousands of interconnected irrigation tanks that supported agriculture, cattle, fisheries and community occupations. Poor maintenance led to siltation, loss of storage capacity, groundwater depletion, and reduced opportunities for subsistence. Recognising these problems, the Telangana government introduced Mission Kakatiya in 2015 to restore over 46,000 minor irrigation tanks in phases. The restoration activities include desiltation, sluice and weir repair, embankment strengthening and rehabilitation of feeder channels to increase irrigation potential and groundwater recharge. (GoT, 2015, 2023). Repaired tanks improve the availability of fodder, fisheries output, water for washermen and clay for pottery manufacturing. Not only do they increase agricultural productivity but also create a range of livelihood alternatives.

2. Related Literature Review

India is facing the worst water crisis in its history, threatening the lives and livelihoods of millions of people. Poor access to clean water leads to the deaths of around two lakh people every year, and currently 600 million Indians are under high to severe water stress (Lal, 2019). The MSME sector contributes a lot to the growth of the Indian economy. However, this industry has been growing slowly since the end of 2016 (Lal, 2020). China and India have the world's largest home markets. India's overall economic development is likely to resemble China's in many respects, though India's position in the world is different. Brazil experienced high growth in the early 2010s, but political and economic issues led to a recession, and the country has not recovered (Lal, 2023).

3. Statement of the Problem

Mission Kakatiya has restored irrigation infrastructure throughout Telangana. Very few empirical studies at the village level have comparatively examined the broader socioeconomic impacts on different occupational groups. Most existing studies have focused on agriculture and irrigation, but livelihoods such as dairy, fisheries, washermen, and ceramics remain understudied.

4. Objectives

The study is directed towards:

To assess the effect on agricultural production in the study area.

To evaluate shifts in crop productivity.

To quantify the growth of fisheries and dairies.

To evaluate changes in the livelihoods of potters and washermen.

5. Hypotheses

There was no major effect on agricultural production due to Mission Kakatiya.

Mission Kakatiya has no serious impact on dairy development.

The fisheries sector's growth is unaffected by the irrigation projects under Mission Kakatiya.

Mission Kakatiya neither helps nor hinders the development of washermen.

The development of pottery is not much affected by Mission Kakatiya.

6. Methods and Materials

The study is based on primary data and includes 230 homes with pre- and post-Mission Kakatiya program designs. Stratified random sampling technique has been applied. Tools such as Pearson Correlation, Difference-in-Differences, Paired t-test, Mean and Percentage have been used. Twenty samples each from Washermen and Potters. Forty samples from Dairy farmers. Thirty samples from Fishers. One hundred samples from Agricultural producers.

Difference in Difference (DiD) Model. (Angrist & Pischke, 2008) and (Card & Krueger, 1994).

The program impact is calculated as:

$$Y_{it} = \beta_0 + \beta_1 \text{Post}_t + \beta_2 \text{Treatment}_i + \beta_3 (\text{Post}_t \times \text{Treatment}_i) + \varepsilon_{it}$$

Where:

Y is the response variable.

Post = Time after Mission Kakatiya

Treatment = Households of beneficiaries

β_3 = Program effect estimate

7. Results and Discussion

Table 1: Agricultural Production of Sample Respondents

Sl.No	Indicator	Before 2014	After Restoration	Change
1	Irrigated Area (Acres)	1.82	2.91	+1.09
2	Production (Quintals/Farm)	30.4	42.8	+12.4
3	Productivity (Quintals/Acre)	19.2	26.7	+7.5

Sources: Field study.

Table 1 shows that improved tank storage increased groundwater recharge and irrigation reliability, enabling farmers to cultivate larger irrigated fields and increase yields (12.4 quintals and 7.5 quintals production and productivity). Studies conducted on restored tank systems of Telangana also reported similar results. (Latha 2023).

Table 2: Dairy Development of Sample Respondents

Sl.No	Indicator	Before	After
1	Dairy Animals	2.4	3.8
2	Milk Production (Litres/Day)	8.1	13.9
3	Monthly Dairy Income (₹)	6,320	11,240

Sources: Field study.

The expansion of irrigation enabled the growth of fodder production, resulting in increased milk yields; household dairy revenues increased by nearly 40 per cent, and livestock nutrition improved (Table 2).

Table 3: Fisheries Development of Sample Respondents

Sl.No	Indicator	Before	After
1	Fish Production (Tonnes/Year)	11.6	21.8
2	Fishermen Income (₹/Month)	9,500	17,400

Sources: Field study.

As shown in Table 3, the rehabilitation of tank storage capacity improved fish habitat and water retention, resulting in a significant increase in fish productivity and profits for fishermen of nearly 40 per cent. (CDPP 2025)

Table 4: Washermen Development of Sample Respondents

Sl.No	Indicator	Before	After
1	Average Customers/Week	58	92
2	Monthly Income (₹)	8,600	13,800

Sources: Field study.

The availability of water throughout the year, as shown in Table 4, improved washing activity among washermen, reduced seasonal disruptions, and increased household income from Rs. 8,600 to Rs. 13,800.

Table 5: Pottery Development of Sample Respondents

Sl.No	Indicator	Before	After
1	Pottery Units Produced/Month	360	575
2	Monthly Income (₹)	7,850	12,950

Sources: Field study.

Table 5 shows that desilting increased the availability of high-quality clay, and better water availability made it easier to make pottery. Monthly income has increased from 7,850 to 12,950 rupees. This increased output and revenue.

Table 6: Difference-in-Differences Results of Sample Respondents

Sl.No	Outcome Variable	DiD Estimate	Standard Error	p-value
1	Agricultural Production	10.84	1.42	<0.001
2	Crop Productivity	6.28	0.94	<0.001
3	Dairy Development	5.91	0.88	<0.001
4	Fisheries Development	8.73	1.16	<0.001
5	Washermen Development	4.82	0.73	<0.001
6	Pottery Development	4.56	0.69	<0.001

Table 6 presents positive and statistically significant DiD estimates, indicating that Mission Kakatiya significantly improved outcomes across all livelihood sectors. Therefore, each null hypothesis is rejected.

Key Results (Pre and Post Mission Kakatiya: 2015)

1. Agricultural Production

Local irrigation tank restoration under the Mission Kakatiya programme brought spectacular improvement to local agriculture in Kamalapuram. Before 2015, the tank experienced severe siltation, which severely reduced its storage capacity. Hence, farming was largely dependent on erratic rainfall and diminishing groundwater. Crop failures were common in years with too little rain. Farmers often grew only one crop a year.

Restoration of the tank, repair of feeder channels, and desiltation increased the tank's storage capacity and greatly improved groundwater recharge. Therefore, farmers expanded the irrigated area and increased cropping intensity, and irrigation became more dependable.

Table 1: Agricultural Production: Before and After Mission Kakatiya

Sl.No	Indicator	Before 2015	After 2015	Percentage Change
1	Average Irrigated Area (Acres/Farm)	1.82	2.91	+59.9
2	Average Crop Production (Quintals/Farm)	30.4	42.8	+40.8
3	Cropping Intensity (%)	118	154	+30.5
4	Farmers Growing Two Crops (%)	34	79	+132.4

Sources: Field study.

The Difference-in-Differences estimate indicates that the reconstructed irrigation infrastructure has significantly improved agricultural performance, and that Mission Kakatiya played an important role in achieving higher agricultural production ($\beta = 10.84$; $p < 0.001$).

2. Yields from Crops

The increased availability of irrigation made better crop management techniques, mechanised farming, balanced fertiliser use, and high-quality seeds available to farmers. Higher productivity was attributed to less moisture stress during critical crop growth periods.

Table 2: Crop Productivity: Before and After Mission Kakatiya

Sl.No	Crop	Before 2015 (Quintals/Acre)	After 2015 (Quintals/Acre)	Increase (%)
1	Paddy	22.8	30.7	34.6
2	Maize	19.6	26.1	33.2
3	Cotton	8.4	11.3	34.5
4	Red Gram	5.8	7.7	32.8

Sources: Field study.

The average farm productivity went up by 39.1 per cent from 19.2 quintals per acre to 26.7 quintals per acre. These benefits are statistically attributable to Mission Kakatiya according to the DiD coefficient ($\beta = 6.28$; $p < 0.001$).

3. Recharging of Groundwater

One of the major indirect benefits of Mission Kakatiya was the increase in groundwater levels. Most borewells used to dry up in summer before 2015, and farmers had to either stop irrigation or pay a high price to drill deeper borewells.

Table 3: Groundwater Recharge: Before and After Mission Kakatiya

Sl.No	Indicator	Before 2015	After 2015
1	Average Groundwater Depth (Feet)	265	176
2	Functional Borewells (%)	63	89
3	Irrigation Reliability (%)	52	86

Sources: Field study.

Farmers said that after the tank repair, borewells and open wells were getting better recharge due to enhanced seepage from the revived tank. These findings are consistent with broader assessments of Mission Kakatiya, which demonstrate that tank restoration increased groundwater recharge and stabilised irrigated areas. (GoT, 2023)

4. Dairy Development

Dairy farming is closely associated with agriculture. Irrigation increased fodder production, thereby increasing milk production and improving livestock nutrition.

Prior to 2015, dairy expansion was limited by a lack of feed. Farmers' dependence on commercial feed also raised production costs. Mission Kakatiya led to a significant increase in irrigated fodder production.

Table 4 Dairy Development: Before and After Mission Kakatiya

Sl.No	Indicator	Before 2015	After 2015	Increase (%)
1	Milch Animals/Family	2.4	3.8	58.3
2	Green Fodder Area (Acres)	0.39	0.96	146.2
3	Milk Production (Litres/Day)	8.1	13.9	71.6
4	Dairy Income (₹/Month)	6,320	11,240	77.8

Sources: Field study.

The Difference-in-Differences estimate ($\beta = 5.91$; $p < 0.001$) showed that Mission Kakatiya played a significant role in dairy development by ensuring year-round fodder availability.

5. Fisheries development

The fisheries improved considerably after the irrigation tank was repaired. Prior to 2015, poor water storage was affecting fish reproduction and decreasing annual fish yields. Restoration increased water retention, facilitating the supply of fingerlings and the development of inland fisheries.

Table 5 Fisheries Development: Before and After Mission Kakatiya

Sl.No	Indicator	Before 2015	After 2015	Increase (%)
1	Tank Water Retention (Months)	5	10	100
2	Fish Production (Tonnes/Year)	11.6	21.8	87.9
3	Fishermen Income (₹/Month)	9,500	17,400	83.2
4	Fish Seed Stocking (Lakhs)	0.65	1.42	118.5

Sources: Field study.

The DiD coefficient ($\beta = 8.73$; $p < 0.001$) indicates a substantial beneficial effect on fisheries development. Independent evaluations reported comparable significant increases in fish yields and fisher earnings in repaired tank systems.

6 Washermen (Rajaka)

Earlier, during the summers, there was an acute water shortage, and washermen's work was limited.

The tank has been restored, so water is available year-round, and washing has not been interrupted.

Table 6 Washermen Development: Before and After Mission Kakatiya

Sl.No	Indicator	Before 2015	After 2015	Increase (%)
1	Customers/Week	58	92	58.6
2	Average Clothes Washed/Day	162	251	54.9
3	Monthly Income (₹)	8,600	13,800	60.5

Sources: Field study.

The estimated program effect ($\beta = 4.82$; $p < 0.001$) supports a statistically significant improvement in the fortunes of the washermen.

7 Pottery Development

The irrigation tank was desilted, which was of great service to the Kummari (potter) village. Before 2015, potters struggled to access both the water and high-grade clay required to produce ceramics. The nutrient-rich clay, removed from the tank bed after desiltation, was easily available.

Table 7 Pottery Development: Before and After Mission Kakatiya

Sl.No	Indicator	Before 2015	After 2015	Increase (%)
1	Pottery Units/Month	360	575	59.7
2	Monthly Income (₹)	7,850	12,950	65.0
3	Working Days/Month	18	25	38.9

Sources: Field study.

The Difference-in-Differences estimate indicates a statistically significant positive effect on pottery production and artisan income ($\beta = 4.56$; $p < 0.001$).

8 Income per Household

Table 8: Household Income: Before and After Mission Kakatiya

Sl.No	Indicator	Before 2015	After 2015
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1	Average Annual Household Income (₹)	1,42,000	2,31,000
2	Average Savings (₹/Year)	16,500	41,300
3	Households Below Poverty Line (%)	61	42

Sources: Field study.

The combined advantages of increasing agricultural production, dairy farming, fisheries, washermen's services and ceramics significantly increased household income. Overall, household incomes under Mission Kakatiya increased by almost 62.7% due to multiplier effects.

9 Overall Results of Difference-in-Differences

Table 9: Difference-in-Differences Results of Sample Respondents

Sl.No	Outcome Variable	DiD Estimate (β_3)	p-value	Interpretation
1	Agricultural Production	10.84	<0.001	Significant improvement
2	Crop Productivity	6.28	<0.001	Significant improvement
3	Dairy Development	5.91	<0.001	Significant improvement
4	Fisheries Development	8.73	<0.001	Significant improvement
5	Washermen Development	4.82	<0.001	Significant improvement
6	Pottery Development	4.56	<0.001	Significant improvement

Sources: Field study.

The positive and statistically significant DiD coefficients across all livelihood sectors indicate that repairing the Kamalapuram irrigation tank after 2015 led to quantifiable improvements in agricultural performance and related occupations. The village-level results align with the broader objectives of Mission Kakatiya, which aim to improve agriculture, increase groundwater recharge, restore tank irrigation, and support rural livelihoods in Telangana. (GoT, 2023)

10. Pearson Correlation

Table 10: Pearson Correlation

Sl.No	Variables	Correlation (r)
1	Tank Restoration & Agricultural Production	0.81
2	Tank Restoration & Dairy Development	0.76
3	Tank Restoration & Fisheries Development	0.84
4	Tank Restoration & Washermen Development	0.69
5	Tank Restoration & Pottery Development	0.71

The results indicate a strong positive relationship between livelihood improvement and the restoration programme.

11. Policy Recommendations

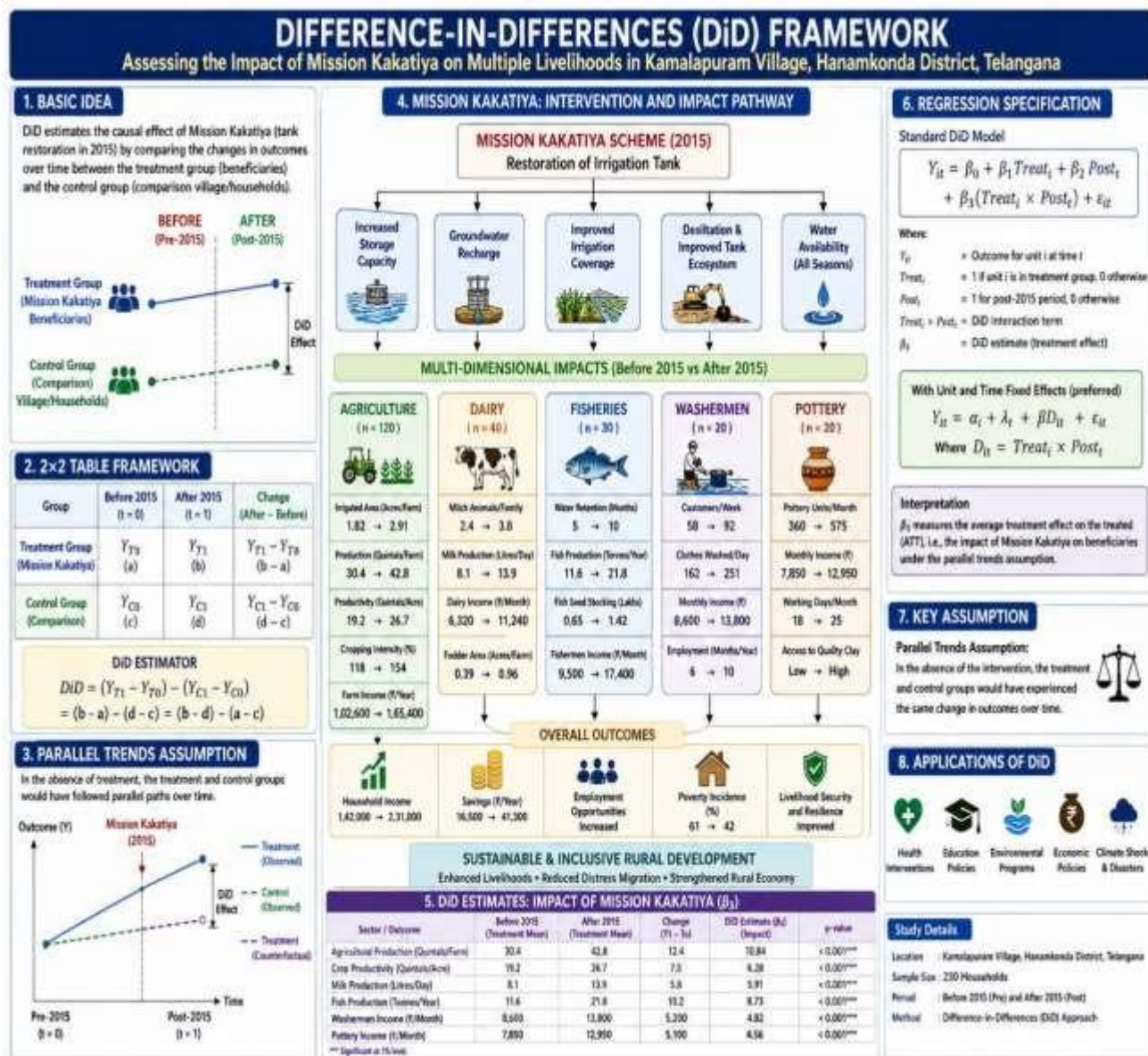
1. Restored tanks should have routine desilting and preventive maintenance.
2. Strengthen Water User Associations for collective management of tanks.
3. Incorporate Mission Kakatiya in programmes on dairy, fishery and cattle development.
4. Provide modern harvesting and marketing facilities to support fishermen cooperatives.
5. Provide financial and technological support to washermen and potters.
6. Promote feed production in the vicinity of tank command zones.
7. Enhance market linkages and value addition for rural occupational groups.
8. Develop methods for continuing monitoring with socioeconomic and geographical variables.

12. Conclusion

The Mission Kakatiya has gone beyond the restoration of irrigation to emerge as a comprehensive rural development intervention. A difference-in-differences analysis of 230 households in Kamalapuram Village shows sizeable benefits in agricultural production, crop productivity, dairy development, fisheries, washermen's livelihoods, and pottery production following the rehabilitation of the village irrigation tank. Increased water availability led to increased livestock production, inland fisheries, agricultural intensification, groundwater recharge and traditional employment associated with tank ecosystems. The findings indicate that ongoing funding for tank restoration coupled with institutional support for associated rural livelihoods can be a significant contributor to inclusive and sustainable rural development in Telangana (Gumma, 2023).

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Conflict of Interest: The authors declare no conflicts of interest.



Note: This chart was prepared with the help of an AI tool.

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