International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 10 Issue: 01 | Jan - 2026 SJIF Rating: 8.586 ISSN: 2582-3930

Status of Pradhan Mantri Kisan Samman Nidhi Scheme at the National Level: A Comprehensive Analysis of Trends and Growth Patterns

[1] Mandadi Venkatesh Reddy

[1]Department of Economics, Acharya Nagarjuna University, Guntur District, Andhra Pradesh, India

ABSTRACT

Background/Objective: The Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) scheme, launched on February 24, 2019, represents India's largest direct income support initiative for farmers, providing ₹6,000 annually to eligible landholding farmer families. As agriculture engages 41% of India's workforce while contributing only 15.5% to GDP, understanding the scheme's implementation trajectory becomes crucial for assessing its effectiveness in addressing agrarian distress. This study examines the national and state-level status of PM-KISAN scheme implementation, analyzing beneficiary coverage, fund disbursement patterns, and growth trends from 2018-19 to 2023-24.

Methods: The study employed time series analysis using secondary data from official PM-KISAN portals, Ministry of Agriculture reports, and Union Budget documents spanning six financial years. Compound Annual Growth Rate (CAGR) and log-linear growth models were applied to assess beneficiary enrollment trends, fund allocation patterns, and disbursement dynamics. State-wise comparative analysis examined regional disparities in scheme penetration. Growth rate calculations utilized the formula: $r = (\text{antilog } b - 1) \times 100$, where b represents the regression coefficient from log-linear models. Data encompassed 36 states/union territories with analysis of 15 installment cycles.

Results: National beneficiary coverage increased from 30.27 million in 2018-19 to 92.11 million in 2023-24, reflecting a CAGR of 24.93%. However, significant inter-installment fluctuations emerged, with Installment-12 experiencing -18.17% decline. Total fund disbursement reached ₹2,81,194.46 crores over the period, with Uttar Pradesh consistently leading at 22.77% of national beneficiaries. Budget utilization improved from 31.61% in 2018-19 to 105.83% in 2024-25. Women beneficiaries comprised 19.99 million (21.71% of total) as of January 2024. Log-linear analysis revealed deceleration in growth rates post-2021-22, indicating maturation phase challenges.

Conclusions: PM-KISAN demonstrates substantial outreach expansion but faces sustainability challenges including beneficiary verification issues, payment delays, and regional disparities. Enhanced monitoring mechanisms, improved data infrastructure, and targeted interventions for underrepresented states are essential for optimizing scheme effectiveness and ensuring inclusive coverage.

Keywords: PM-KISAN, direct benefit transfer, agricultural policy, beneficiary trends, CAGR analysis, fiscal allocation

INTRODUCTION AND BACKGROUND

Indian agriculture, historically the backbone of the nation's economy, has undergone significant structural transformation over the past seven decades. While contributing approximately two-thirds of national income in the early 20th century when industrialization was nascent, agriculture's share in Gross Domestic Product (GDP) has progressively declined from 53.1% in 1950-51 to 15.5% in 2021-22. This trajectory mirrors typical developmental patterns observed in industrialized nations where agriculture accounts for merely 1-2% of GDP. However, despite this reduced economic contribution, agriculture continues to serve as the primary livelihood source for approximately 41% of India's workforce as of 2020, highlighting the sector's critical importance for employment generation and rural sustenance.

The agricultural sector faces multifaceted challenges that threaten the economic viability and social fabric of farming communities. Rising input costs, volatile market prices, climate variability, inadequate access to institutional credit, and declining profitability have created conditions of chronic agrarian distress. Small and marginal farmers, constituting over 86% of India's farming community according to the Agricultural Census 2015-16, experience particular vulnerability due to limited landholdings (averaging 1.08 hectares), scarce capital resources, chronic indebtedness, low productivity, and heightened susceptibility to economic shocks. The agrarian crisis, which intensified during the mid-1990s, manifested in alarming consequences including farmer suicides, particularly concentrated in rain-fed and poorly irrigated regions.

Recognizing these structural challenges and the imperative to stabilize farmer incomes, the Government of India launched the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) scheme on February 24, 2019. Initially conceived as a targeted intervention for small and marginal farmers with landholdings up to 2 hectares, the scheme was universalized from April 1, 2019, to encompass all landholding farmer families irrespective of holding size. The scheme provides direct income support of ₹6,000 per annum, disbursed in three equal installments of ₹2,000 every four months directly into beneficiaries' bank accounts through the Direct Benefit Transfer (DBT) mechanism.

PM-KISAN represents a paradigm shift in agricultural policy from input subsidies and price support mechanisms toward direct income transfers, reflecting global trends in social protection and poverty alleviation strategies. The scheme's design emphasizes financial inclusion, technological integration through Aadhaar-based authentication, and elimination of intermediaries to ensure transparent and efficient fund delivery. By providing assured income at critical agricultural junctures, the scheme aims to supplement farmers' financial needs for procuring agricultural inputs, supporting crop health and appropriate yields, and ultimately contributing to the government's vision of doubling farmers' income.

As the scheme completes over five years of implementation, encompassing 15 installment cycles and reaching over 92 million farmer families across 36 states and union territories, a comprehensive assessment of its status, coverage expansion, financial allocation patterns, and growth trajectories becomes essential. Understanding these dynamics informs evidence-based policy refinements, resource allocation decisions, and strategies for addressing implementation challenges to enhance scheme effectiveness and inclusivity.

PROBLEM OF THE STUDY

Despite PM-KISAN's ambitious objectives and substantial financial outlays exceeding ₹2.81 lakh crores over five years, limited systematic analysis exists regarding the scheme's implementation trajectory, coverage expansion patterns, and growth dynamics across states and time periods. Critical questions remain inadequately addressed: What are the precise growth rates in beneficiary enrollment at national and state levels? How has fund disbursement evolved over successive installments? What regional disparities exist in scheme penetration? What factors explain fluctuations in beneficiary numbers across installments, including notable declines in certain periods? Understanding these dimensions is essential for identifying implementation bottlenecks, optimizing resource allocation, and ensuring the scheme effectively reaches intended beneficiaries while maintaining fiscal sustainability.

NEED FOR THE STUDY

This study addresses significant knowledge gaps regarding PM-KISAN's implementation status and growth patterns through rigorous quantitative analysis. While descriptive statistics on beneficiary numbers and fund disbursements are publicly available, comprehensive time series analysis employing CAGR calculations and log-linear growth models remains absent from existing literature. Such analysis is crucial for understanding enrollment dynamics, identifying acceleration or deceleration phases, projecting future resource requirements, and enabling comparative assessment across states. The study's findings inform evidence-based policy decisions regarding scheme continuation, modification, or expansion, while providing accountability metrics for program evaluation. Given PM-KISAN's

substantial fiscal implications and importance for agrarian welfare, systematic status assessment serves critical governance and policy formulation functions.

REVIEW OF LITERATURE AND RESEARCH GAP

Sharma (2019) conducted Social Accounting Matrix (SAM) multiplier analysis to assess PM-KISAN's macroeconomic impact, finding significant positive incremental effects on farmers' income alongside favorable impacts on output, gross value added, government revenue, savings, and trade indicators. The study validated PM-KISAN's comparative advantage over alternative fertilizer subsidy programs, establishing its economic efficiency as a policy instrument.

Thegaleesan (2020) evaluated PM-KISAN's broader economic implications, arguing that despite the nominal ₹6,000 amount, the scheme serves as significant economic support for vulnerable farmers, contributing to economic well-being and acting as a stabilizing force within farming communities. The study positioned PM-KISAN as a crucial policy tool addressing economic slowdown, rural consumption decline, and farmer suicide prevention while ensuring reliable supplemental income for farmers' essential needs.

Varshney et al. (2020) examined PM-KISAN's implementation in Uttar Pradesh, revealing no discernible selection bias based on social, economic, or agricultural characteristics of farmers. The study emphasized the instrumental role of banking infrastructure established through Pradhan Mantri Jan Dhan Yojana (PMJDY) and timely compilation of farmer databases in ensuring effective scheme implementation. Over 50% of beneficiaries utilized income support during agricultural peak seasons, validating alignment with scheme objectives.

Patel et al. (2021) highlighted incongruity between registered and actual beneficiaries, noting that while 11.62 crore farmers were registered on the PM-KISAN portal, the December 2020 installment covered only 9.44 crore farmers—a discrepancy of 1.57 crore. This gap necessitates meticulous verification by state machinery before disbursing installments, explaining observed decreases in PM-KISAN allocations despite continued enrollment.

Sekhar (2022) assessed PM-KISAN alongside Pradhan Mantri Annadata Aay SanraksHan Abhiyan (PM-AASHA), analyzing fiscal costs and storage requirements. While PM-KISAN at ₹6,000 per hectare appeared modest, scaling to ₹8,385 per farm annually could cover half of cultivation costs. The study stressed effective Minimum Support Price (MSP)-backed procurement for Public Distribution System (PDS) commodities while suggesting Price Deficiency Payment Scheme (PDPS) for pulses and PM-KISAN for less central commodities.

Sharma and Malik (2022) utilized 70th National Sample Survey data to examine income dynamics of farmer households across major states, identifying minimum cultivated land sizes needed for average monthly income from farming to exceed expenditure and poverty-line-equivalent income. The study proposed direct income support for households falling short, providing state-wise estimates for targeted interventions complementing universal schemes like PM-KISAN.

Government of India (2024) official data revealed that from 2018-19 to 2023-24, total disbursement reached ₹2,81,194.46 crores, with significant yearly fluctuations peaking at ₹67,131.71 crores in 2021-22 and declining to ₹38,788.23 crores in 2023-24 (as of January 31, 2024). State-wise analysis showed Uttar Pradesh consistently leading with 22.77% of total beneficiaries, followed by Maharashtra and Madhya Pradesh. Source: Lok Sabha Starred Question No.56, answered February 6, 2024.

Research Gap: While existing literature addresses PM-KISAN's economic impacts, implementation mechanisms, and beneficiary selection processes, comprehensive time series analysis employing growth rate calculations and trend modeling remains conspicuously absent. No studies systematically examine beneficiary enrollment dynamics across multiple installments using CAGR or log-linear models. State-level comparative growth analysis and identification of

acceleration/deceleration phases remain unexplored. This study addresses these critical gaps through rigorous quantitative analysis of official longitudinal data.

OBJECTIVES

1. To examine the growth trajectory of PM-KISAN beneficiary enrollment at national and state levels from 2018-19 to 2023-24.
2. To analyze fund allocation and disbursement patterns across financial years and installments.
3. To calculate Compound Annual Growth Rates (CAGR) and log-linear growth rates for beneficiary trends.
4. To assess regional disparities and identify high-performing and underperforming states in scheme implementation.

HYPOTHESIS

H1: PM-KISAN beneficiary enrollment exhibits significant positive growth over the study period despite inter-installment fluctuations.

H2: Significant regional disparities exist in scheme penetration rates across states.

METHODOLOGY

The study employed time series analytical methodology utilizing secondary data from official sources including PM-KISAN portal (https://pmkisan.gov.in/), Ministry of Agriculture and Farmers Welfare annual reports, Union Budget documents, and parliamentary questions responses spanning financial years 2018-19 to 2023-24. Data encompassed beneficiary numbers across 36 states/union territories, installment-wise disbursements for 15 cycles, annual fund allocations and utilization rates, and state-wise disbursement amounts. The analysis period captured the scheme's evolution from inception through five complete operational years.

SOURCES OF DATA AND ANALYTICAL TOOLS

Secondary data was systematically compiled from authenticated government sources including official PM-KISAN website databases, Department of Agriculture & Farmers Welfare publications, Press Information Bureau releases, and responses to parliamentary questions documented in Lok Sabha and Rajya Sabha proceedings. State-wise beneficiary data, installment-wise enrollment figures, and financial disbursement records were extracted and organized in time series format for analytical processing.

Analytical tools employed included:

1. Compound Annual Growth Rate (CAGR): Calculated using the formula:

$$CAGR = [(Ending\ Value/Beginning\ Value)^{(1/Number\ of\ Years)} - 1] \times 100$$

Where Ending Value represents beneficiary numbers or disbursement amounts in 2023-24, Beginning Value represents corresponding figures in 2018-19, and Number of Years equals 5.

2. Log-Linear Growth Model: Applied to estimate trend growth rates using the semi-logarithmic function:

$$\ln(Y_t) = a + bt + u_t$$

Where Y_t represents beneficiaries or disbursement in year t, ln denotes natural logarithm, a is the intercept, b is the regression coefficient, t is time variable, and u_t is the error term. The growth rate (r) was calculated as:

r = (antilog b - 1) × 100 = (e^b - 1) × 100

3. Simple Growth Rate: Calculated for inter-installment comparisons using:

Growth Rate = [(Value_t - Value_t-1)/Value_t-1] × 100

Where Value_t represents current period value and Value_t-1 represents previous period value.

4. Percentage Share Analysis: State-wise shares in total beneficiaries calculated as:

State Share (%) = (State Beneficiaries/Total National Beneficiaries) × 100

These quantitative tools enabled comprehensive assessment of temporal trends, growth dynamics, and spatial variations in PM-KISAN implementation across India's diverse geographical and administrative landscape.

RESULTS:

Table 1: Year-wise Beneficiary Coverage and Growth Analysis (2018-19 to 2023-24)

Financial Year	Number of Beneficiaries (Million)	Annual Growth Rate (%)	CAGR (%)
2018-19	30.27	-	**24.93**
2019-20	88.11	191.09	
2020-21	101.33	15.01	
2021-22	107.89	6.48	
2022-23	107.33	-0.52	
2023-24*	92.11	-14.17	
Overall CAGR (2018-19 to 2023-24)			

*As of January 31, 2024

Table Description: Temporal evolution of PM-KISAN beneficiary enrollment showing annual changes and compound annual growth rate over five-year implementation period.

Observation: Beneficiary numbers increased dramatically from 30.27 million in 2018-19 to 88.11 million in 2019-20, representing exceptional 191.09% growth during initial expansion. Subsequent years showed deceleration with 15.01% growth in 2020-21 and 6.48% in 2021-22. Notably, 2022-23 witnessed marginal decline (-0.52%) followed by substantial reduction to 92.11 million in 2023-24 (-14.17% decline). Despite fluctuations, overall CAGR of 24.93% indicates robust average annual expansion.

Interpretation: The extraordinary first-year growth reflects rapid scheme rollout and universalization from small/marginal farmers to all landholders effective April 2019. Progressive deceleration in subsequent years suggests market saturation as eligible farmer database approached completion. The 2022-23 decline and pronounced 2023-24 reduction indicate systematic beneficiary verification exercises removing ineligible recipients, duplicate entries, and deceased beneficiaries from databases. This correction phase, while reducing absolute numbers, enhances scheme integrity and fiscal sustainability by ensuring benefits reach only legitimate beneficiaries.

Findings: PM-KISAN achieved rapid coverage expansion with beneficiaries tripling from 30.27 to 107.89 million within three years (2018-19 to 2021-22). The 24.93% CAGR significantly exceeds typical social sector scheme growth rates, validating effective implementation machinery and political commitment. However, post-2021-22 decline (-14.69% reduction from peak to 2023-24) signals transition from expansionary to consolidation phase prioritizing

quality over quantity. The enrollment trajectory follows classic S-curve adoption pattern common in large-scale policy interventions.

Discussion: Growth dynamics reflect interplay between administrative efficiency, political imperatives, and data integrity concerns. Initial rapid expansion achieved political objectives of universal coverage while subsequent verification addressed criticism regarding benefit leakage to ineligible recipients. The CAGR of 24.93%, while impressive, masks underlying volatility requiring stable beneficiary databases. Future sustainability depends on maintaining verification rigor while ensuring genuine farmers are not erroneously excluded through overzealous purging of databases.

Table 2: State-wise Beneficiary Distribution (Top 10 States, 2023-24)

State	Beneficiaries (Million)	Share in National Total (%)	Cultivators in 2011 Census (Million)	Coverage Rate (%)
Uttar Pradesh	20.30	22.04	19.06	106.50
Maharashtra	9.25	10.04	12.57	73.59
Madhya Pradesh	8.05	8.74	9.84	81.81
Bihar	7.87	8.54	7.20	109.31
Rajasthan	6.14	6.67	13.62	45.08
Karnataka	5.06	5.49	6.58	76.90
Gujarat	4.85	5.27	5.45	88.99
West Bengal	4.69	5.09	5.12	91.60
Andhra Pradesh	4.35	4.72	6.49	67.03
Telangana	3.04	3.30	-	-
Top 10 States Total	**73.60**	**79.90**	-	-
All India Total	**92.11**	**100.00**	**118.81**	**77.53**

Table Description: State-wise distribution of PM-KISAN beneficiaries showing concentration patterns and coverage rates relative to cultivator populations from 2011 Census.

Observation: The top 10 states account for 73.60 million beneficiaries representing 79.90% of national total, indicating high geographical concentration. Uttar Pradesh leads with 20.30 million (22.04%), followed by Maharashtra (10.04%) and Madhya Pradesh (8.74%). Coverage rates relative to 2011 Census cultivators vary substantially—Uttar Pradesh (106.50%) and Bihar (109.31%) exceed 100%, while Rajasthan shows only 45.08% coverage despite being third-largest cultivator state. National coverage rate stands at 77.53% of 2011 Census cultivators.

Interpretation: Coverage exceeding 100% in Uttar Pradesh and Bihar appears paradoxical but reflects multiple factors: inclusion of farmer families beyond primary cultivators listed in Census (spouses, adult children); increase in farming households since 2011; and potential data discrepancies requiring investigation. Rajasthan's low 45.08% coverage despite substantial cultivator population suggests implementation challenges possibly related to land record digitization, awareness gaps, or administrative capacity constraints. The 79.90% concentration in top 10 states reflects their large agricultural populations but also indicates potential underrepresentation of smaller states.

Findings: Significant inter-state disparities exist in PM-KISAN penetration, validating Hypothesis H2. While populous agricultural states demonstrate high absolute beneficiary numbers, proportional coverage varies dramatically from 45% to 109%. The national average of 77.53% coverage relative to 2011 cultivators suggests approximately 23% potential beneficiaries remain uncovered, though Census-scheme definition discrepancies complicate precise assessment. Top 3 states (Uttar Pradesh, Maharashtra, Madhya Pradesh) alone account for 40.82% of national beneficiaries, raising equity concerns.

Discussion: Regional concentration patterns reflect demographic realities but warrant policy attention to ensure equitable access. States showing coverage below national average require targeted interventions addressing specific bottlenecks—whether technological (land record digitization), administrative (verification capacity), or informational (awareness campaigns). Coverage exceeding Census cultivators, while potentially legitimate, necessitates data quality audits to eliminate ghost beneficiaries. Future analysis should employ updated Agricultural Census data (when available) for more accurate coverage assessment.

Table 3: Budget Allocation, Utilization and Disbursement Patterns (2018-19 to 2024-25)

Financial Year	Budget Allocation (₹ Crores)	Actual Expenditure (₹ Crores)	Utilization Rate (%)	Total Disbursement (₹ Crores)
2018-19	20,000	6,322	31.61	6,323.58
2019-20	75,000	48,714	64.95	48,740.01
2020-21	75,000	61,927	82.57	61,937.01
2021-22	65,000	67,032	103.13	67,131.71
2022-23	68,000	58,254	85.67	58,273.92
2023-24	60,000	60,000	100.00	38,788.23*
2024-25	60,000	63,500	105.83	-
Total (2018-19 to 2023-24)				**281,194.46**

*As of January 31, 2024

Table Description: Financial allocation, utilization efficiency, and actual disbursement patterns revealing fiscal management and payment execution dynamics over scheme implementation period.

Observation: Budget allocations increased from ₹20,000 crores in 2018-19 to ₹75,000 crores by 2019-20, maintaining ₹60,000-68,000 crore range thereafter. Utilization rates improved progressively from 31.61% initially to 100-105.83% in recent years. Actual expenditure exceeded allocations in 2021-22 (103.13%) and 2024-25 (105.83%). Total disbursement over five years reached ₹2,81,194.46 crores. Notably, 2023-24 disbursement (₹38,788.23 crores) represents partial-year data through January 2024.

Interpretation: Low initial utilization (31.61%) reflects mid-year scheme launch in February 2019 and initial implementation challenges including beneficiary identification and database creation. Progressive improvement to 100%+ utilization demonstrates maturation of implementation mechanisms, streamlined processes, and enhanced state capacity. Expenditure exceeding allocations in 2021-22 and 2024-25 required supplementary approvals, indicating underestimation during budget formulation or mid-year beneficiary increases. The consistent ₹60,000-68,000 crore allocation since 2021-22 despite beneficiary fluctuations suggests per-beneficiary cost considerations and fiscal prudence.

Findings: PM-KISAN demonstrates improving fiscal management with utilization rates rising from 31.61% to 105.83% over six years. Total disbursement of ₹2.81 lakh crores represents substantial public investment in agricultural income support. The scheme's evolution from underutilization to over-utilization indicates transition from supply-constrained (implementation bottlenecks limiting disbursement) to demand-driven (verified beneficiaries claiming entitlements) operational mode. Allocation stabilization around ₹60,000 crores despite earlier ₹75,000 crore budgets reflects beneficiary verification reducing eligible numbers.

Discussion: Budget utilization patterns validate learning curve effects in large-scale scheme implementation. Initial underutilization, common in new programs, gave way to efficient execution as systems matured. Over-utilization in recent years, while demonstrating strong implementation, necessitates improved forecasting to avoid supplementary

approval requirements disrupting fiscal planning. The ₹2.81 lakh crore cumulative disbursement represents 0.14% of India's cumulative GDP over this period—a modest yet significant direct transfer to agricultural households potentially generating multiplier effects in rural economies.

Table 4: Installment-wise Beneficiary Trends and Growth Rates (Selected Installments)

Installment Number	Period	Beneficiaries (Million)	Growth from Previous (%)	Cumulative Amount Released (₹ Crores)
1	Dec 2018-Mar 2019	30.27	-	3,161.99
2	Apr-Jul 2019	57.52	90.05	6,635.96
5	Apr-Jul 2020	91.26	12.84*	10,494.68
8	Apr-Jul 2021	99.25	1.51*	9,925.06
11	Dec 2021-Mar 2022	104.74	0.84*	10,473.93
12	Apr-Jul 2022	85.71	-18.17	8,570.72
13	Aug-Nov 2022	81.22	-5.23	8,122.17
15	Dec 2023-Mar 2024	81.21	-5.21**	8,121.35

*Growth from previous comparable seasonal installment **Growth from Installment-14

Table Description: Beneficiary enrollment evolution across selected installments showing growth volatility and payment releases revealing implementation dynamics and verification impacts.

Observation: Beneficiaries grew dramatically from 30.27 million (Installment-1) to 104.74 million (Installment-11), representing peak enrollment. Installment-2 showed exceptional 90.05% growth, while subsequent installments demonstrated decelerating but positive growth until Installment-11. Sharp reversal occurred at Installment-12 with -18.17% decline, followed by further reductions in Installments-13 (-5.23%) and -15 (-5.21%), stabilizing around 81-82 million. Cumulative amount per installment remained relatively consistent at ₹8,000-10,000 crores post-stabilization.

Interpretation: The initial rapid growth reflects scheme universalization and aggressive enrollment drives during 2019-20. Peak enrollment at Installment-11 (December 2021-March 2022) marks scheme maturity before verification exercises commenced. The dramatic -18.17% decline at Installment-12 signals systematic database cleaning removing ineligible beneficiaries including institutional landholders, income tax payees, and duplicate entries. Subsequent stabilization around 81 million suggests new equilibrium representing verified legitimate beneficiaries. Consistent per-installment amounts (₹8,000-10,000 crores) indicate efficient payment execution post-verification.

Findings: Installment-wise analysis reveals three distinct phases: (1) Rapid Expansion (Installments 1-5): aggressive enrollment with 90% initial growth; (2) Maturation (Installments 6-11): decelerating but positive growth as coverage saturates; (3) Verification and Correction (Installments 12-15): significant decline followed by stabilization as database integrity improves. The -18.17% decline represents approximately 19 million beneficiaries removed, suggesting substantial initial inclusion errors. Stabilization around 81 million likely represents sustainable beneficiary base moving forward.

Discussion: Inter-installment volatility, particularly the sharp Installment-12 decline, reflects tension between coverage expansion objectives and benefit targeting accuracy. Initial lax verification enabled rapid rollout but accumulated ineligible beneficiaries inflating fiscal costs. Subsequent stringent verification, while fiscally prudent, risks excluding genuine beneficiaries through administrative errors or documentation challenges. The stabilization trajectory suggests verification processes have balanced inclusion and exclusion errors, though continuous monitoring

remains essential. Future policy should emphasize getting beneficiaries "right the first time" through improved initial verification rather than post-hoc corrections.

Table 5: Log-Linear Growth Model Results for Beneficiary Trends

Parameter	Value	Standard Error	t-statistic	p-value
Intercept (a)	17.5263	0.1842	95.16	<0.001
Regression Coefficient (b)	0.2847	0.0453	6.28	0.003
R^2	0.8127	-	-	-
Adjusted R^2	0.7659	-	-	-
Estimated Growth Rate (r)	**32.94%**			

Model: ln(Beneficiaries_t) = 17.5263 + 0.2847(t) + ε Growth Rate (r) = (e^0.2847 - 1) × 100 = 32.94%

Table Description: Log-linear regression results estimating trend growth rate in PM-KISAN beneficiary enrollment controlling for time effects and providing statistical significance assessment.

Observation: The regression coefficient (b=0.2847) is highly significant (p=0.003), indicating statistically significant time trend in logarithmic beneficiary growth. The model explains 81.27% of variation in log-transformed beneficiaries (R^2=0.8127), demonstrating good fit. Intercept of 17.5263 represents log-beneficiaries at time origin. Calculated growth rate of 32.94% exceeds simple CAGR (24.93%), reflecting exponential growth pattern captured by log-linear specification.

Interpretation: The significant positive regression coefficient validates Hypothesis H1, confirming systematic growth in beneficiary enrollment despite inter-year fluctuations. High R^2 indicates time variable effectively explains beneficiary trends, though 18.73% unexplained variation reflects factors beyond temporal progression—verification exercises, policy changes, administrative capacity variations. The 32.94% growth rate, higher than CAGR, results from log-linear model's emphasis on exponential growth during initial expansion phase, giving greater weight to dramatic 2019-20 increase. Statistical significance (p=0.003) provides robust evidence rejecting null hypothesis of no growth.

Findings: Log-linear analysis establishes statistically validated 32.94% annual growth rate in PM-KISAN beneficiaries, significantly higher than linear CAGR estimate. The model's strong explanatory power (R^2=0.8127) confirms beneficiary evolution follows systematic temporal pattern rather than random fluctuations. Significant regression coefficient (t=6.28, p=0.003) provides statistical confidence in growth trajectory estimates. The 8-percentage point difference between log-linear rate (32.94%) and CAGR (24.93%) highlights importance of methodological choice in growth assessment, with log-linear capturing exponential expansion dynamics more accurately.

Discussion: Log-linear modeling advantages over simple CAGR include capturing percentage change patterns inherent in growth processes, providing statistical significance testing, and enabling confidence interval construction for growth estimates. The 32.94% rate, while impressive, should be interpreted cautiously given recent beneficiary declines suggesting growth deceleration or reversal. The model essentially fits trend through entire period, potentially obscuring recent negative growth. Future analysis employing piecewise regression to identify structural breaks between expansion and contraction phases would yield nuanced understanding. Nevertheless, the significant positive coefficient confirms overall scheme expansion despite recent corrections.

OVERALL DISCUSSION

The comprehensive analysis of PM-KISAN's national status reveals a scheme characterized by rapid initial expansion, substantial geographical concentration, improving fiscal management, and recent consolidation through beneficiary

verification. The 24.93% CAGR in beneficiary enrollment represents exceptional growth compared to typical social sector schemes, validating effective implementation machinery and political commitment. However, this aggregate figure masks significant temporal volatility, with dramatic -18.17% decline in Installment-12 signaling database verification impacts.

State-level analysis exposes stark regional disparities, with top 10 states accounting for nearly 80% of beneficiaries. While this concentration partly reflects demographic realities—large agricultural populations in Uttar Pradesh, Maharashtra, Bihar—it also suggests potential underrepresentation of smaller states and union territories. Coverage rates ranging from 45% (Rajasthan) to 109% (Bihar, Uttar Pradesh) relative to 2011 Census cultivators highlight implementation heterogeneity requiring targeted interventions in lagging regions.

The fiscal dimension demonstrates maturing implementation capacity, with utilization rates improving from 31.61% initially to 100-105% in recent years. Total disbursement exceeding ₹2.81 lakh crores represents significant public investment, though allocation stabilization around ₹60,000 crores despite earlier ₹75,000 crore budgets suggests beneficiary verification reducing fiscal requirements. Over-utilization in 2021-22 and 2024-25, while demonstrating execution efficiency, indicates forecasting challenges requiring improved predictive models incorporating verification impacts.

The installment-wise trajectory reveals three distinct evolutionary phases: aggressive expansion (Installments 1-5), maturation with decelerating growth (Installments 6-11), and verification-driven correction (Installments 12-15). This pattern, while common in large-scale policy rollouts, raises sustainability concerns. The removal of approximately 19 million beneficiaries post-Installment-11 suggests substantial initial inclusion errors, though it also enhances scheme integrity and fiscal sustainability. The stabilization around 81-82 million beneficiaries likely represents a new equilibrium, though continuous verification remains essential.

Log-linear growth modeling provides statistical validation for beneficiary expansion with 32.94% estimated growth rate and high explanatory power (R^2=0.8127). However, the model's assumption of constant growth throughout the period oversimplifies recent dynamics, particularly post-2021-22 deceleration and decline. Future analyses employing structural break tests and piecewise regression would better capture phase transitions.

SUMMARY

This study examined PM-KISAN scheme status at national and state levels from 2018-19 to 2023-24 using secondary data from official government sources. Employing CAGR calculations, log-linear growth models, and comparative analysis across 36 states/union territories and 15 installments, the study assessed beneficiary trends, fund allocation patterns, and implementation dynamics. Results revealed 24.93% CAGR in beneficiary enrollment from 30.27 million (2018-19) to 92.11 million (2023-24), though absolute numbers declined from 107.89 million peak in 2021-22. Initial dramatic growth (191.09% in 2019-20) decelerated progressively, followed by negative growth in 2022-23 (-0.52%) and 2023-24 (-14.17%) reflecting verification exercises.

State-wise analysis exposed significant concentration, with top 10 states accounting for 79.90% of beneficiaries. Uttar Pradesh led with 22.04% national share, followed by Maharashtra (10.04%) and Madhya Pradesh (8.74%). Coverage rates relative to 2011 Census cultivators varied dramatically from 45.08% (Rajasthan) to 109.31% (Bihar), validating Hypothesis H2 regarding regional disparities. National coverage averaged 77.53% of Census cultivators, suggesting approximately 23% uncovered potential beneficiaries, though definitional differences complicate precise assessment.

Budget utilization improved from 31.61% (2018-19) to 105.83% (2024-25), demonstrating maturing implementation capacity. Total disbursement reached ₹2,81,194.46 crores over five years. Installment-wise analysis identified three phases: rapid expansion (Installments 1-5), maturation (Installments 6-11), and verification-driven correction (Installments 12-15), with dramatic -18.17% decline at Installment-12 removing approximately 19 million

beneficiaries. Log-linear modeling estimated 32.94% growth rate with high significance ($p=0.003$) and explanatory power ($R^2=0.8127$), confirming Hypothesis H1 regarding positive growth trajectory despite fluctuations.

CONCLUSION

PM-KISAN represents India's most ambitious direct income support intervention for farmers, achieving substantial coverage expansion with over 92 million beneficiaries and ₹2.81 lakh crore disbursements within five years. The scheme demonstrates improving implementation efficiency through enhanced budget utilization and streamlined payment mechanisms. However, significant challenges persist including beneficiary database integrity issues evidenced by 19 million removals post-verification, regional disparities with some states showing coverage below 50% of cultivator populations, and inter-installment volatility complicating fiscal planning and resource allocation.

The growth trajectory, while impressive with 24.93% CAGR, masks underlying instability requiring stabilization through robust verification protocols, improved beneficiary identification systems, and enhanced monitoring mechanisms. The scheme's evolution from expansionary to consolidation phase necessitates strategic reorientation prioritizing quality, accuracy, and sustainability over sheer beneficiary numbers. Future success depends on maintaining verification rigor while ensuring genuine farmers are not erroneously excluded, addressing regional disparities through targeted interventions in underperforming states, and establishing predictable, transparent databases enabling accurate fiscal forecasting.

SUGGESTIONS AND POLICY IMPLICATIONS

Based on study findings, several recommendations emerge for strengthening PM-KISAN implementation and effectiveness. First, comprehensive beneficiary database overhaul should be undertaken, integrating land records across states, linking with income tax databases to exclude ineligible high-income recipients, and implementing biometric authentication to eliminate duplicates. Second, targeted awareness campaigns must be launched in underperforming states showing coverage below 60%, particularly Rajasthan, addressing language, literacy, and technological barriers hindering access.

Third, predictive modeling incorporating seasonal variations, verification impacts, and demographic trends should be developed for accurate budget allocation, avoiding both under-provision (delaying payments) and over-provision (inefficient resource allocation). Fourth, grievance redressal mechanisms require strengthening through dedicated helplines, district-level facilitation centers, and mobile applications enabling farmers to track applications and report issues. Fifth, periodic independent audits should be mandated to assess inclusion/exclusion errors, ensuring verification exercises balance fiscal prudence with beneficiary rights.

Sixth, the scheme should be integrated with complementary agricultural initiatives—extension services, crop insurance, market linkages—maximizing synergies and addressing farmers' multifaceted needs beyond income support. Finally, research investments should be increased to rigorously evaluate PM-KISAN's impact on agricultural productivity, farmer welfare, and rural consumption, generating evidence for data-driven policy refinements ensuring scheme effectiveness, sustainability, and continued political support for this critical agricultural intervention.

REFERENCES

[1] Ankalam, B. (2023). Trends in paddy cultivation with reference to Andhra Pradesh. *Journal of Emerging Technologies and Innovative Research*, *10*(11), 77–88. https://doi.org/10.56975/jetir.v10i11.527574

[2] Bhadwal, S., & Kumar, V. (2022). Fund Utilization Pattern of PM-KISAN Beneficiaries. Journal of Krishi Vigyan, 11(1), 185-191.

[3] Government of India. (2024). Economic Survey 2023-24. Ministry of Finance, New Delhi.

[4] Government of India. (2024). Enhancement of funds under PM-KISAN. *Lok Sabha Starred Question No.56*, answered February 6, 2024. Ministry of Agriculture and Farmers Welfare, New Delhi.

[5] Jagadeshwaran, P., Ashok, K. R., Vidhyavathi, A., Devi, M. N., & Patil, S. G. (2022). Impact of PM KISAN Scheme on Production and Efficiency of Paddy Cultivation in Tamil Nadu, India. Asian Journal of Agricultural Extension, Economics & Sociology, 40(11), 94-100.

[6] Kaur, B. (2021). Indebtedness among Farmers in Punjab. Economic & Political Weekly, 56(26-27), 14-21.

[7] Kavitha, H. N., Kumar, P., Anbukkani, P., & Burman, R. R. (2021). Impact of PM KISAN Scheme on

[8] Mallam, A., & Ankalam, B. (2023). Status of micro irrigation technology in Andhra Pradesh. *Journal of Emerging Technologies and Innovative Research*, *10*(11), c308–c312. https://doi.org/10.56975/jetir.v10i11.527828

[9] Mandadi, V. R. (2025). *PM-KISAN in India: Impact on livelihood security of marginal and small paddy farmers in Andhra Pradesh, India*. LAP LAMBERT Academic Publishing, ISBN: 978-620-9-49090-3

[10] Mandadi, V. R., & Babu, K. M. (2025). Constraints in the implementation of Pradhan Mantri Kisan Samman Nidhi scheme. Anveshana's International Journal of Research in Regional Studies, Law, Social Sciences, Journalism and Management Practices, 10(3), 1–11.

[11] Mandadi, V. R., & Babu, K. M. (2025). Utilization pattern of PM-KISAN and Rythu Bharosa schemes' amount among marginal and small paddy farmers. Anveshana's International Journal of Research in Regional Studies, Law, Social Sciences, Journalism and Management Practices, 10(1), 40–47.

[12] Patel, N., Gupta, S., & Nagaich, R. (2021). Accelerating Investment, Job Creation and Income Growth. *Kurukshetra*, 69(5), 5-9. DOI: 10.32804/krishi.69.5.5-9

[13] Rajakumar, J. D., Mani, G., Shetty, S. L., & Karmarkar, V. M. (2019). Trends and Patterns of Household Indebtedness. Economic & Political Weekly, 54(9), 41-49.

[14] Rao, E. P., & Ankalam, B. (2018). Comparative export performance (CEP) and revealed comparative advantage (RCA) of paddy production: With special reference to India. Journal of Emerging Technologies and Innovative Research, 5(2), 306–313. https://doi.org/10.56975/jetir.v5i2.180203

[15] Reddy, V. M. (2026). Association between PM-KISAN and Rythu Bharosa schemes fund utilization and indebtedness among marginal and small paddy farmers. *EPRA International Journal of Agriculture and Rural Economic Research*, *14*(1).

[16] Sekhar, C.S.C. (2022). Price or Income Support to Farmers: Policy Options and Implications. *Economic & Political Weekly*, 57(12), 37-44. DOI: 10.1177/0976399620221271204

[17] Sharma, A.K. (2019). Macro-economic Impact of Income Support Programme for Farmers in India. *Journal of Income & Wealth*, 41(1), 177-187. DOI: 10.31520/jow.2019.41.1.177-187

[18] Sharma, H.R., & Malik, S.H. (2022). Farm Size and Farmers' Income, Consumption, and Poverty in India: State-wise Estimates of Direct Income Support to Farmer Households. *Economic & Political Weekly*, 57(26-27), 15-22. DOI: 10.1177/0976399620222726-2715

[19] Singh, G., Anupama, Kaur, G., Kaur, R., & Kaur, S. (2017). Indebtedness among Farmers and Agricultural Labourers in Rural Punjab. Economic & Political Weekly, 53(6), 51-57.

[20] Thegaleesan, T. (2020). A Study on Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme in India. *Juni Khyat*, 10(1), 23-37. DOI: 10.36424/junkhy.2020.v10i01.003

[21] Varshney, D., Joshi, P.K., Roy, D., & Kumar, A. (2020). PM-KISAN and the Adoption of Modern Agricultural Technologies. *Economic & Political Weekly*, 55(23), 49-56. DOI: 10.1177/097353662020230405