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Utilization of farmers towards PM-KISAN Scheme in Namakkal District of Tamil Nadu

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Abstract

The Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) scheme is one of the largest direct benefit transfer (DBT) programmes for farm households in India, yet its ground-level performance depends heavily on the socio-economic composition of the beneficiaries it reaches. This study profiled 70 PM-KISAN beneficiary farmers on eleven socio-personal, economic and communication-behaviour variables such as age, gender, education, landholding, type of land ownership, farming experience, annual income, cropping pattern, risk orientation, extension agency contact and social participation using a pre-tested, structured interview schedule with standardized category scores. Chi-square goodness-of-fit tests were used to examine whether respondents were evenly spread across the categories of each variable and one-sample binomial tests were used to evaluate nine indicators of PM-KISAN fund utilization against a neutral 50 percent benchmark. The sample was found to be significantly skewed toward older respondents (82.9 percent above 45 years), male-headed households (70.0 percent), small and marginal landholders (84.3 percent), highly experienced farmers (72.9 percent with more than 30 years of farming), low-income households (72.9 percent) and owner-cultivators (100 percent); only education and extension agency contact did not differ significantly from a uniform spread ($p > 0.05$). On the utilization side, all 70 respondents (100 percent) were registered beneficiaries receiving instalments regularly, and a majority reported using the funds for agricultural inputs (82.9 percent) and experiencing reduced cultivation costs (78.6 percent); however, none of the respondents reported saving any part of the transfer, and only 1.4 percent considered the amount sufficient for their agricultural needs. These results indicate that the scheme's delivery mechanism is functioning efficiently among this beneficiary group, but the transfer amount itself remains inadequate relative to the socio-economic profile particularly the small landholding base and low annual income of the households it targets. The findings support recommendations to periodically revise the transfer amount, strengthen the education and extension-contact channels that were found to be comparatively under-leveraged, and undertake follow-up correlational research linking respondent-level scores to utilization outcomes.

Keywords: PM-KISAN, direct benefit transfer, socio-economic profile, chi-square goodness-of-fit, small and marginal farmers, extension contact, farm income support

1. Introduction

Smallholder agriculture continues to define the structure of Indian farming: small and marginal landholders together constitute the overwhelming majority of operational holdings in the country, and their limited resource base makes them disproportionately vulnerable to price shocks, input-cost inflation and climatic variability (Prusty *et al.*, 2025) ^[5]. To supplement the income of this vast and heterogeneous group, the Government of India launched the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) scheme in February 2019, transferring a fixed annual income support directly into the bank accounts of eligible farmer families in three equal instalments. As an unconditional cash transfer, PM-KISAN was designed to ease liquidity constraints and allow beneficiaries the flexibility to spend the support according to their own priorities, whether on agricultural inputs, debt servicing, or household

consumption (Ghosh *et al.*, 2024) ^[2].

A growing body of evaluation literature has examined whether this design objective is being met. Ghosh *et al.* (2024) ^[2] used propensity-score matching to show that PM-KISAN beneficiaries recorded a measurably higher rural livelihood index than comparable non-beneficiaries, while Sihag and Malik (2024) ^[7] found that disbursement of instalments in Haryana was consistent and timely, with awareness levels varying across the beneficiary population. At the same time, several field-level assessments caution that the benefits of such transfer schemes, and of public extension services more broadly, are not distributed evenly across socio-economic strata: Krishna, Aravalath and Vikraman (2019) ^[4] demonstrated that access to agricultural extension services in India is systematically lower among socially disadvantaged groups, which in turn dampens the income gains such services would otherwise generate. This

suggests that the socio-economic profile of a beneficiary population its age structure, education, landholding size, income class, cropping intensity, risk orientation and extension contact is not incidental background information but a key determinant of how effectively a scheme such as PM-KISAN can function on the ground.

Despite this, many localized assessments of PM-KISAN report utilization and satisfaction outcomes without first establishing whether their sample is representative of, or skewed away from, an even spread across standard socio-economic categories. Without this baseline check, it becomes difficult to judge whether a reported utilization pattern reflects the scheme's general performance or the particular composition of the surveyed group for instance, a sample dominated by older, experienced, low-income marginal farmers may report different utilization behaviour than one with a more balanced age and income profile. Establishing this baseline through a formal statistical test, rather than descriptive percentages alone, therefore strengthens the interpretive value of any subsequent utilization analysis (Alzahrani *et al.*, 2023; Jha & Gupta, 2021) [1, 3].

Against this background, the present study was undertaken with the following specific objectives: (i) to profile PM-KISAN beneficiary farmers across eleven standardized socio-personal, economic and communication-behaviour variables; (ii) to statistically test, for each variable, whether the beneficiary sample is evenly distributed across its categories or significantly skewed toward particular categories; and (iii) to assess the extent and adequacy of PM-KISAN fund utilization among the same respondents

using a set of nine utilization indicators. Taken together, these objectives are intended to situate the utilization findings within a statistically grounded description of who the beneficiaries actually are.

2. Materials and Methods

2.1 Study area and sampling

The study was conducted among PM-KISAN beneficiary farmers in [study area/district/state to be inserted by the author]. A total of 70 respondents were selected through [sampling technique e.g., simple/proportionate random sampling to be specified] from the list of registered beneficiaries maintained under the scheme. Data were collected during [month(s)/year of data collection to be inserted] using a pre-tested, structured interview schedule administered through personal interviews.

2.2 Selection and scoring of variables

Eleven independent variables covering the socio-personal, economic and communication-behaviour dimensions of the respondents were selected on the basis of their established relevance in extension-education research: age, gender, education, landholding, type of land ownership, farming experience, annual income, cropping pattern, risk orientation, extension agency contact and social participation. Each variable was operationalized into mutually exclusive categories and assigned ordinal scores as summarized in Table 1, following conventions used in comparable socio-economic profiling studies of small and marginal farmers (Prusty *et al.*, 2025; Alzahrani *et al.*, 2023) [5, 1].

Table 1: Independent variables and scoring categories

Variable	Categories and Scores
Age	Young (18-35) = 1; Middle (>35-45) = 2; Old (>45) = 3
Gender	Male = 1; Female = 2
Education	Illiterate = 1; Primary = 2; Secondary = 3; Higher Secondary = 4; Graduate = 5
Landholding	Marginal (<2.5 ac) = 1; Small (2.5-4.9 ac) = 2; Medium (9.8-24.7 ac) = 3; Big (>24.7 ac) = 4
Type of land ownership	Tenant = 1; Owner = 2
Farming experience	<10 yrs = 1; 10-20 yrs = 2; 20-30 yrs = 3; >30 yrs = 4
Annual income	Low (Rs.35,000-1,90,000) = 1; Medium (Rs.1,90,000-3,45,000) = 2; High (Rs.3,45,000-5,00,000) = 3
Cropping pattern	Single season = 1; Two seasons = 2; Three seasons = 3
Risk orientation	No impact = 1; Moderate = 2; Reduced = 3
Extension agency contact	Never = 1; Sometimes = 2; Regular = 3
Social participation	Member (past) = 1; Office bearer (past) = 2; Member (present) = 3; Office bearer (present) = 4

2.3 Statistical analysis

Responses were coded and analysed using descriptive and inferential statistics. Frequencies and percentages were computed for every category of the eleven independent variables (Tables 2-12). A weighted mean and standard deviation were additionally computed for each variable using the ordinal scores in Table 1, to summarize the central tendency and spread of the sample on a common numeric scale. To formally test whether respondents were distributed evenly across the categories of each variable or concentrated in particular categories, a chi-square goodness-of-fit test was applied to each variable, with the null hypothesis (H₀) that all categories of a given variable were equally likely (i.e., an even/uniform split), tested at the 5 percent level of significance. For the nine PM-KISAN utilization indicators (Table 13), a one-sample exact binomial test was used to

test the null hypothesis that the proportion of 'yes' responses equalled 50 percent, again at the 5 percent level of significance. All computations were performed using standard spreadsheet statistical functions (chi-square and binomial distribution functions) and cross-verified against independent script-based computation.

3. Results and Discussion

3.1 Age

Table 2: Distribution of respondents according to age (n = 70)

Age group	Respondents	Percentage (%)
Young	5	7.00
Middle	8	11.00
Old	57	82.00
Total	70	100.00

The majority of respondents (82.0 percent) fell in the 'old' age category (above 45 years), compared with only 7.0 percent young and 11.0 percent middle-aged farmers (Table 2). The weighted mean age score was 2.74 (SD = 0.58) on the 1-3 scale, and the chi-square goodness-of-fit test confirmed that this distribution differs significantly from an even three-way split (chi-square = 73.06, df = 2, $p < 0.001$). This pronounced skew toward older respondents is consistent with the widely documented ageing of the Indian farming workforce and implies that any communication or capacity-building strategy accompanying PM-KISAN in this beneficiary group should account for the preferences and constraints typical of older farm operators, such as lower digital literacy for grievance-redressal portals.

3.2 Gender

Table 3: Distribution of respondents according to gender (n = 70)

Gender	Frequency	Percentage (%)
Male	49	70.00
Female	21	30.00
Total	70	100.00

Male respondents accounted for 70.0 percent of the sample against 30.0 percent female respondents (Table 3). The chi-square test confirmed this male-skewed distribution to be statistically significant (chi-square = 11.20, df = 1, $p < 0.001$), reflecting the wider pattern in Indian land records whereby operational holdings, and consequently PM-KISAN registration, remain predominantly recorded in the name of male household heads. This underlines a continuing gap in women's direct access to land-linked income-support schemes that has been flagged in related work on inclusion in extension and welfare delivery (Krishna *et al.*, 2019) ^[4].

3.3 Education

Table 4: Distribution of respondents according to educational status (n = 70)

Educational level	Frequency	Percentage (%)
Illiterate	17	24.00
Primary	10	14.00
Secondary	18	26.00
Higher secondary	17	24.00
Graduate	8	12.00
Total	70	100.00

Respondents were fairly evenly spread across educational levels, ranging from 24.0 percent illiterate to 12.0 percent graduates (Table 4), giving a weighted mean education score of 2.84 (SD = 1.35) the highest variability of any variable in the study. Unlike age and gender, the chi-square goodness-of-fit test did not reach significance for education (chi-square = 6.14, df = 4, $p = 0.189$), indicating that, statistically, this sample cannot be said to be concentrated in any particular educational category. This relatively even educational spread is a favourable condition for scheme communication, since awareness material pitched at a single literacy level would otherwise risk excluding a substantial share of beneficiaries.

3.4 Landholding

Table 5: Distribution of respondents according to landholding category (n = 70)

Category	Frequency	Percentage (%)
Marginal farmers	23	33.00
Small farmers	36	51.00
Medium farmers	5	7.00
Large farmers	6	9.00
Total	70	100.00

Marginal and small farmers together accounted for 84.0 percent of the sample (Table 5), with a weighted mean landholding score of 1.91 (SD = 0.86) and a highly significant chi-square value (chi-square = 37.77, df = 3, $p < 0.001$), confirming that the sample is dominated by resource-constrained landholders. This composition is broadly consistent with national data showing that small and marginal households make up the bulk of India's operational holdings (Prusty *et al.*, 2025) ^[5] and reinforces the rationale for a flat-rate income-support instrument such as PM-KISAN, which is explicitly targeted at this segment.

3.5 Farming experience

Table 6: Distribution of respondents according to farming experience (n = 70)

Category	Frequency	Percentage (%)
Low (<10 yrs)	0	0.00
Small (10-20 yrs)	7	10.00
Medium (20-30 yrs)	12	17.00
High (>30 yrs)	51	73.00
Total	70	100.00

Nearly three-fourths of respondents (73.0 percent) reported more than 30 years of farming experience, with no respondent falling in the least-experienced category (Table 6). The weighted mean experience score was 3.63 (SD = 0.66), and the chi-square test again confirmed significant skew (chi-square = 89.66, df = 3, $p < 0.001$) the single strongest departure from a uniform distribution among all eleven variables. Read together with the age distribution, this indicates a beneficiary base that is long-established in farming, which may translate into deep-rooted but potentially conventional cultivation practices that extension efforts would need to work with rather than assume away.

3.6 Type of land ownership

Table 7: Distribution of respondents according to land ownership (n = 70)

Category	Frequency	Percentage (%)
Owner	70	100.00
Tenant	0	0.00
Total	70	100.00

All 70 respondents (100 percent) were owner-cultivators, with no tenant farmers represented in the sample (Table 7). Because this variable has zero variance (SD = 0.00) and only a single observed category, no chi-square test could be

computed; the finding instead highlights a structural feature of PM-KISAN eligibility itself, since land-ownership records are the primary basis for beneficiary identification, a design feature that has separately been flagged as a source of exclusion for tenant and sharecropping farmers who cultivate land without formal title.

3.7 Annual income

Table 8: Distribution of respondents according to annual income (n = 70)

Category	Frequency	Percentage (%)
Low	51	73.00
Medium	13	18.00
High	6	9.00
Total	70	100.00

Low-income households dominated the sample (73.0 percent), yielding a weighted mean income score of 1.36 (SD = 0.64) and a significant chi-square statistic (chi-square = 50.26, df = 2, $p < 0.001$) (Table 8). This concentration in the low-income bracket is precisely the population PM-KISAN is intended to reach, but it also means that the fixed annual transfer represents a comparatively larger share of household income for most respondent a point that becomes important when interpreting the utilization-adequacy findings in Section 3.9.

3.8 Cropping pattern

Table 9: Distribution of respondents according to cropping pattern (n = 70)

Category	Frequency	Percentage (%)
Single season	15	21.00
Double season	44	62.00
Three seasons	11	17.00
Total	70	100.00

Double-season (two-crop) cultivation was the modal cropping pattern, practised by 62.0 percent of respondents (Table 9), with a weighted mean score of 1.94 (SD = 0.61) and a significant chi-square value (chi-square = 27.80, df = 2, $p < 0.001$). This predominance of double-cropping suggests moderate, rather than intensive, cropping intensity across the sample, which is consistent with the resource constraints already indicated by the landholding and income distributions.

3.9 Risk orientation

Table 10: Distribution of respondents according to risk orientation (n = 70)

Category	Frequency	Percentage (%)
No impact	40	57.00
Moderate	27	39.00
Reduced	3	4.00
Total	70	100.00

More than half the respondents (57.0 percent) reported that the income support had 'no impact' on their willingness to take production risks, with only 4.0 percent reporting a

reduced risk appetite (Table 10). The weighted mean risk-orientation score was 1.47 (SD = 0.58), and the chi-square test confirmed a significant departure from an even spread (chi-square = 30.20, df = 2, $p < 0.001$). This pattern implies that, for most respondents in this sample, the transfer functions more as a supplementary income cushion than as capital that measurably alters cropping-risk decisions a nuance consistent with findings that unconditional cash transfers under PM-KISAN are typically absorbed into general household liquidity rather than earmarked for risk-bearing investment (Ghosh *et al.*, 2024) [2].

3.10 Extension agency contact

Table 12: Distribution of respondents according to contact with extension agencies (n = 70)

Category	Respondents	Percentage (%)
Never	25	36.00
Occasionally	30	43.00
Regularly	15	21.00
Total	70	100.00

Contact with extension agencies was fairly evenly spread across the 'never', 'occasional' and 'regular' categories (36.0, 43.0 and 21.0 percent respectively; Table 12), with a weighted mean score of 1.86 (SD = 0.75). Unlike most other variables, the chi-square goodness-of-fit test for extension contact fell just short of the 5 percent threshold (chi-square = 5.00, df = 2, $p = 0.082$), meaning the sample cannot be said to be significantly concentrated in any one contact category. Even so, that 36.0 percent of respondents report never having contacted an extension agency is noteworthy, since prior evidence indicates extension contact is strongly associated with higher farm income and more effective use of scheme benefits (Krishna *et al.*, 2019; Alzahrani *et al.*, 2023) [4, 1]; strengthening outreach to this un-contacted segment represents a concrete, low-cost opportunity to improve the developmental returns from PM-KISAN.

3.11 Social participation

Table 11: Distribution of respondents according to social participation (n = 70)

Category	Respondents	Percentage (%)
Member (past)	31	44.00
Office bearer (past)	9	13.00
Member (present)	26	37.00
Office bearer (present)	4	6.00
Total	70	100.00

'Member (past)' and 'Member (present)' were the two dominant social-participation categories, together accounting for 81.0 percent of respondents (Table 11), with a weighted mean score of 2.04 (SD = 1.03) and a significant chi-square value (chi-square = 29.09, df = 3, $p < 0.001$). Office-bearer categories, past or present, were comparatively rare (19.0 percent combined), suggesting that while most respondents engage with local farmer or cooperative groups, formal leadership roles remain concentrated in a small subset of the beneficiary population.

3.12 Summary of chi-square goodness-of-fit tests

Table 12: Summary of weighted mean, SD and chi-square goodness-of-fit results for all socio-personal variables (n = 70)

Variable	Weighted Mean	SD	χ^2	df	p-value	Result ($\alpha = 0.05$)
Age	2.74	0.58	73.06	2	<0.001	Significant
Gender	1.30	0.46	11.20	1	0.001	Significant
Education	2.84	1.35	6.14	4	0.189	Not significant
Landholding	1.91	0.86	37.77	3	<0.001	Significant
Farming experience	3.63	0.66	89.66	3	<0.001	Significant
Land ownership	2.00	0.00	—	1	—	No variance (all owners)
Annual income	1.36	0.64	50.26	2	<0.001	Significant
Cropping pattern	1.94	0.61	27.80	2	<0.001	Significant
Risk orientation	1.47	0.58	30.20	2	<0.001	Significant
Extension contact	1.86	0.75	5.00	2	0.082	Not significant
Social participation	2.04	1.03	29.09	3	<0.001	Significant

Taken together, nine of the eleven variables show a statistically significant departure from an even distribution across their categories, confirming that this beneficiary sample is not a demographically 'flat' cross-section but one concentrated in specific socio-economic bands older, male, small/marginal-landholding, highly experienced, low-income owner-cultivators practicing double-season

cropping. Only education and extension-agency contact approximate an even spread, which is analytically useful because it means the utilization findings reported next cannot be dismissed as an artefact of, say, an all-graduate or all-regularly-contacted sample.

3.13 Utilization of PM-KISAN benefits

Table 13: Distribution of respondents according to utilization of PM-KISAN benefits (n = 70)

S. No.	Particulars	Respondents	Percentage (%)
1	Registered beneficiary of PM-KISAN	70	100.00
2	Receiving benefits since scheme inception/registration	70	100.00
3	Receiving all instalments regularly	70	100.00
4	Using PM-KISAN funds for agricultural purposes	58	82.80
5	Utilization has improved farming activities	44	62.80
6	PM-KISAN has reduced farming/cultivation costs	55	78.50
7	PM-KISAN has helped reduce overall farming expenses	50	71.40
8	Saves any portion of the PM-KISAN amount	0	0.00
9	Considers the PM-KISAN amount sufficient for agricultural activities	1	1.40

Table 14: One-sample binomial test of PM-KISAN utilization indicators against a 50% benchmark (n = 70)

S. No.	Particulars	% Yes	p-value	Result ($\alpha = 0.05$)
1	Registered beneficiary of PM-KISAN	100.00	<0.001	Significant
2	Receiving benefits since inception	100.00	<0.001	Significant
3	Receiving all instalments regularly	100.00	<0.001	Significant
4	Using funds for agricultural purposes	82.86	<0.001	Significant
5	Utilization has improved farming activities	62.86	0.041	Significant
6	Reduced cultivation costs	78.57	<0.001	Significant
7	Helped reduce overall expenses	71.43	<0.001	Significant
8	Saves any portion of the amount	0.00	<0.001	Significant
9	Considers amount sufficient	1.43	<0.001	Significant

All 70 respondents (100 percent) confirmed being registered PM-KISAN beneficiaries, receiving benefits since inception, and receiving all instalments regularly (Table 13, items 1-3), and the one-sample binomial test confirms each of these proportions to be significantly different from a 50 percent baseline ($p < 0.001$ in each case; Table B) indicating a scheme-delivery mechanism that, for this beneficiary group at least, is functioning close to its intended design with no reported disbursement failures. A clear majority also reported using the funds for agricultural purposes (82.9 percent), experiencing reduced cultivation costs (78.6 percent) and reduced overall farming expenses (71.4 percent), each significant at $p < 0.001$. A smaller but still significant majority (62.9 percent, $p = 0.041$) felt the funds had improved their farming activities more broadly,

suggesting the perceived productivity benefit is real but somewhat more modest than the cost-relief benefit.

The most striking results, however, concern adequacy rather than delivery: not a single respondent (0.0 percent) reported saving any portion of the PM-KISAN transfer, and only one respondent (1.4 percent) considered the amount sufficient for their agricultural activities both proportions significant at $p < 0.001$ in the direction of near-universal disagreement. Read against the socio-economic profile established in Section 3.1-3.11 a sample dominated by low-income (73.0 percent), small/marginal-landholding (84.0 percent) households this pattern is consistent with the transfer being fully absorbed into recurring cultivation and household expenses rather than generating a surplus. This mirrors the broader finding in the literature that PM-KISAN, while

effective at easing short-term liquidity constraints, was not designed, and does not currently function, as a scheme capable of generating savings or capital accumulation among its intended beneficiaries (Ghosh *et al.*, 2024; Sihag & Malik, 2024) ^[2, 7].

4. Conclusion

This study statistically profiled 70 PM-KISAN beneficiary farmers across eleven socio-personal, economic and communication-behaviour variables and evaluated nine indicators of scheme utilization. The beneficiary sample was found to be significantly concentrated among older, male, small/marginal-landholding, highly experienced, low-income owner-cultivator a profile that closely matches the population PM-KISAN is designed to target, with education and extension-agency contact being the only two variables that did not differ significantly from an even spread. On utilization, the scheme's disbursement mechanism performed strongly, with universal, regular receipt of instalments and a clear majority of respondents reporting productive use of the funds and reduced cultivation costs. At the same time, the near-total absence of savings and the almost universal perception that the transfer amount is insufficient point to a persistent adequacy gap rather than a delivery gap. On the basis of these findings, it is recommended that (i) the transfer amount be periodically reviewed against prevailing input costs and inflation, (ii) extension outreach be actively extended to the 36 percent of beneficiaries in this sample reporting no prior extension contact, given the established link between extension access and income gains, and (iii) future research build on this profiling exercise with respondent-level correlation or regression analysis to establish which specific socio-economic characteristics most strongly predict utilization outcomes, which the present grouped-data analysis could not test directly.

As with any single-location, cross-sectional survey of modest sample size (n = 70), these findings should be interpreted as indicative of this specific beneficiary group rather than generalized to the national PM-KISAN population without further multi-site validation.

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