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RESEARCH ARTICLE

Analyzing PM-KISAN fund utilization in Southern Indian agriculture

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Abstract

This study investigates the factors influencing the spending patterns of farmers receiving financial assistance through the Pradhan Mantri Kisan Samman Nidhi (PM KISAN) program in five southern Indian states. Using a mixed-methods approach, the research collected data from 1900 PM KISAN beneficiaries across Tamil Nadu, Kerala, Andhra Pradesh, Telangana and Karnataka. The study employed factor analysis to identify key determinants of spending behaviour. Results reveal four primary factor groups: agricultural spending, repayment, social spending and household mandatory spending. The timing of fund disbursement coinciding with agricultural operations emerged as the most influential determinant, followed by farmers' interest in agriculture. Regional variations were observed, with Kerala and Tamil Nadu showing higher agricultural spending tendencies, while Andhra Pradesh and Telangana displayed stronger influences from financial pressures and social factors. The study also highlights the significant impact of socio-economic characteristics, such as farm size, education level and credit orientation, on spending decisions. These findings suggest that aligning fund disbursement with agricultural cycles enhances program efficacy. Policy recommendations include financial literacy programs and improved fund allocation strategies. The study contributes to a more nuanced understanding of the PM KISAN program's impact on rural livelihoods and agricultural productivity in southern India.

Keywords

agricultural spending; farmer behaviour; financial assistance; PM KISAN programme

Introduction

Indian agriculture has undergone a metamorphosis into agribusiness-led and hi-tech agriculture. Applying nanotechnology, path-breaking technologies in Agricultural biotechnology and the recent wave of Artificial Intelligence in precision Agriculture has changed the contours of agriculture research, education and extension. Even though agricultural research and

extension is leapfrogging into the future with a plethora of innovative farming and animal husbandry technologies, the average per capita income of farmers in India was still as low as Rs. 10218 as per the Situation Assessment Survey (SAS) of Agricultural Households 77th round which NSO conducted with states like Jharkhand (Rs. 4895) and Bihar (Rs. 7542) were plummeting in the per capita income of farmers. On the one hand, big farmers are earning more and more and the small and marginal farmers owning small lands are facing distress due to climate vulnerabilities, low productivity, lack of credit and inputs, lack of remunerative price, exploitation by intermediaries and non-availability of labour. Most of the farmers belong to the small and marginal categories, as the agricultural census of India revealed that the average land holding size decreased from 2.28 ha in 1970-71 to 1.08 ha in 2015-16 (1).

Among the multifarious problems faced by small and marginal farmers who own less than 2 ha, credit is the foremost constraint that renders them either leaving the land fallow or leaving agriculture and migrating to other places, ultimately impacting the nation's food security. Yet another essential facet is that if this critical problem of a significant Agrarian population (above 70 %) is not addressed the Indian economy, which agriculture strongly backs, will suffer a major setback. Many studies have documented that the indebtedness of farmers was due to a lack of formal credit flow to farmers and the inequality in credit flow favouring large farmers (2-4). Getting informal credit from money lenders for higher interest rates has been one of the prominent credit crises experienced by farmers irrespective of the region in India, which was captured well by earlier studies (5-8). Indian agriculture has transformed significantly in recent decades, yet challenges persist, especially for small and marginal farmers. Despite advancements in precision agriculture and biotechnology, the average per capita income of Indian farmers remains low, with stark regional disparities. The Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) program, launched in 2018, seeks to address these issues by providing Rs. 6000 annually to landowning farmers. While previous studies have highlighted the program's reach, a gap exists in understanding the determinants of fund utilization across regions. The beneficiaries steadily increased from 3.15 crores in 2019 to 10.45 crores in 2022. This Direct Benefit Scheme (DBS) has been in the news for some time and sporadic reports have been published about the program's reach. A comprehensive, multidimensional, comparative study among states has rarely been conducted.

Further, the five southern states comprising Karnataka, Andhra, Telangana, Tamil Nadu and Kerala have contributed immensely to the Agricultural GDP of the Country and possess a high degree of inter and intra variations in farmer profile. Hence, the present study has been conceptualized to assess the trend of the reach of the programme in five southern states of India, its impact on spending patterns, other social and economic domains, the determinants of spending, adoption of improved technologies before and after the introduction of the programme, constraint analysis with a merger of selected qualitative and quantitative data collection and analysis tools (9). Pradhan Mantri Kisan Samman Nidhi (PM KISAN)-beneficiaries revealed that only one-fourth of the respondents agreed that financial support provided under the scheme was adequate. However, the positive impact of the PM KISAN was documented through different studies (3, 10-14). These studies did not focus on the factors or determinants of spending the amount received from PM-KISAN. Studies on the investment of farmers across the globe paired a mixed picture. The average household expenditure was 19.42 % in rice cultivation (15). Most farmers willing to adjust their investment did not implement the adjustment in the short term (16). Technological interventions, higher yield and income and farm size influenced the investment decisions. None of the studies exclusively focused on the Direct Benefit Transfer (DBT) government schemes, such as PM-KISAN of the Government of India and how the scheme influences the spending pattern of farmers (17-21).

By comparing PM-KISAN with international schemes like Brazil's Bolsa Família, this study underscores the program's potential to alleviate liquidity constraints. This research uniquely examines spending patterns across five states- Tamil Nadu, Kerala, Andhra Pradesh, Telangana and Karnataka and provides insights into regional socio-economic variations. A perceptible research gap exists and hence, uncovering the determinants of farmers' spending patterns is of greater importance. The unravelling of the most influential factors that motivate the farmers to spend money would give useful inputs for planners of the development programmes to realize the programme's priorities. The empirical evidence of how farmers spend the amount received through PM-KISAN and the critical determinants of the spending pattern would give valuable insights for evidence-based policymaking. Against this backdrop, the present investigation has been carried out to understand and analyze the determinants of spending of farmers in five southern states of India who have continuously received PM-KISAN amounts of Rs. 6000/year since its inception.

Materials and Methods

The study was conducted across five southern Indian states, representing diverse agricultural practices and socio-economic conditions. Fig. 1 illustrates the selected regions for the study. Districts were categorized into "Best," "Moderate," and "Poor" performers based on PM-KISAN beneficiary data from the Directorate of Agriculture. A multistage proportionate random sampling method was employed to select 1900 beneficiaries. Hence, 15 districts were chosen at a rate of 3 each, including the best, moderate and poor districts from each state.

While effective for reaching dispersed beneficiaries, potential biases include over representing connected individuals. Efforts were made to mitigate this by diversifying initial referrals based on snowball sampling or chain referral method in which all the beneficiaries are identified and total respondents are completed from each referral. 380 out of 1900 PM-KISAN beneficiaries in each

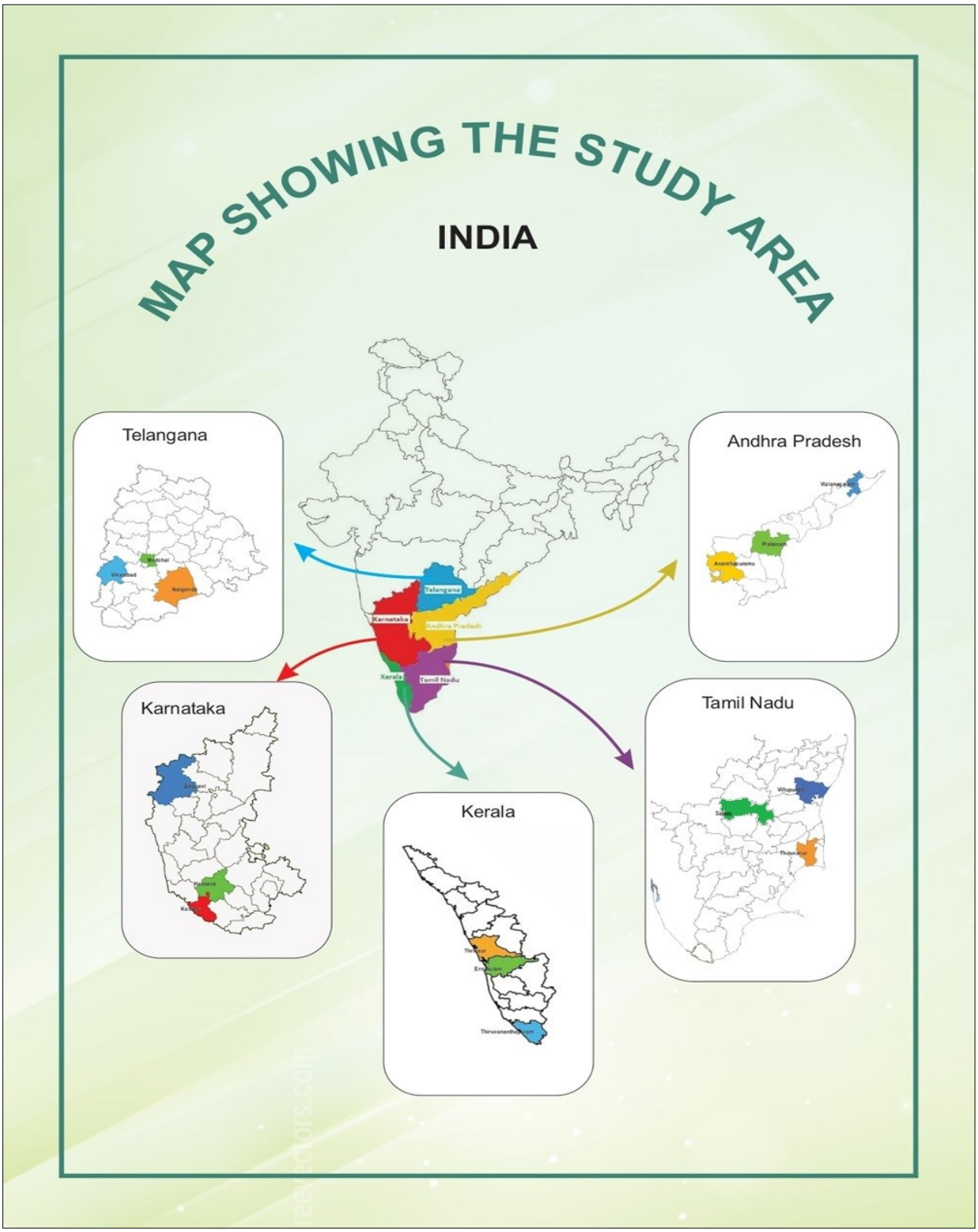

Fig. 1. Map depicting the study area.

state are selected and interviewed and respondents are distributed in each state. The data were collected using a well-organized interview schedule/questionnaire prepared with the respondents' profiles. Structured interviews and questionnaires captured demographic data, spending patterns and influencing factors. Factor analysis and the Influence Index (II) were used to analyze spending behaviour. The Kaiser-Meyer-Olkin (KMO) measure (0.82) validated data suitability and Bartlett's test confirmed its appropriateness for factor analysis.

Methodology to frame influence index

The PM-KISAN beneficiaries were asked to respond to each factor by choosing any of the options: very high, high, moderate and low. They were told to put themselves in each factor and judge their position in any of the four options given. The responses were measured so that scores of 4, 3, 2 and 1 were assigned to the responses of very high influence, high influence, moderate influence and low influence, respectively. Equation 1 was used to calculate the influence index for each factor.

$$\text{Influence Index (II)} = \frac{\begin{array}{c}(\text{No. of respondents in Very High Influence (VHI)category} \times 4) \\ +(\text{No. of respondents in High Influence (HI)category} \times 3) \\ +(\text{No. of respondents in Moderate Influence (MI)category} \times 2) \\ +(\text{No. of respondents in Low Influence (LI)category} \times 1)\end{array}}{\text{Total No. of respondents}} \times 100$$

(Eqn. 1)

The results obtained from the formula for each indicator and state are presented in the table 2 given on the ensuring pages.

Factor analysis

This study employs exploratory factor analysis to examine the data set and identify complicated interrelationships among the farmers' intentions and determinants of spending the PM-KISAN that are part of this research study. Due to the explorative nature of factor analysis, it does not differentiate between independent and dependent variables. Factor analysis clusters similar variables into the same factor to identify underlying variables and only uses the data correlation matrix. This study used factor analysis with principal components extraction to examine whether the statements represent identifiable factors related to tourist satisfaction. The principal component analysis (PCA) signifies the statistical process used to underline variation for which principal data components are calculated and bring out strong patterns in the dataset (22, 23).

Factor model with 'm' common factors

Let $X = (X_1, X_2, ...X_p)'$ is a random vector with mean vector μ and covariance matrix Σ. The factor analysis model assumes that $X = \mu + \lambda F + \varepsilon$, where $\lambda = \{\lambda_{jk}\}$ pxm denotes the matrix of factor loadings; λ_{jk} is the loading of the j^{th} variable on the kth common factor, $F= (F_1, F_2,....F_m)'$ denotes the vector of latent factor scores; F_k is the score on the k^{th} common factor and $\varepsilon = (\varepsilon1, \varepsilon2,....\varepsilon p)'$ denotes the vector of latent error terms; ε_j is the j^{th} specific factor.

Results and Discussion

The respondents' profile reveals diverse socio-economic characteristics that may impact their financial decision-making. It could be inferred from the study that the predominance of small and marginal farmers (86.2 % with 5 acres or less) in the sample is significant for PM KISAN spending patterns (Table 1). Smaller landholdings may correlate with more substantial financial constraints, potentially leading these farmers to prioritize immediate needs when spending the PM KISAN funds. Conversely, 13.8 % of larger farms might have more flexibility in allocating assistance towards long-term agricultural investments or savings. Educational Status: The varied educational levels, with a substantial proportion being illiterate (29.9 %) or having only primary education (29.8 %),

Table 1. Background characteristics of the respondents

Sr. No.	Category	Number of respondents	Percentage (%)
	I. Farm Size	(N=1900)	
1.	1-2 acres	1106	58.2 %
2.	3 - 5 acres	531	28 %
3.	Above 5 acres	263	13.8 % %
	II. Educational status	(N=1900)	
1.	Illiterate	568	29.9 %
2.	Primary school	567	29.8 %
3.	Middle school	285	15 %
4.	Higher secondary	259	13.6 %
5.	Diploma/ certificate course	112	5.9 %
6.	Graduate and above	109	5.7 %
	III. Family type	(N=1900)	
1.	Nuclear family	1384	72.8 %
2.	Joint family	516	27.2 %
	IV. Annual income	(N=1900)	
1.	Below Rs. 50000	834	43.9 %
2.	Rs. 50000 - Rs. 200000	820	43.1 %
3.	Above Rs. 200000	246	13 %
	V. Credit orientation	(N=1900)	
1.	Institutional credit	1377	72.5 %
2.	Non- Institutional credit	523	27.5 %
	VI. Social networking	(N=1900)	
1.	Member/ Office bearer in Farmers' collectives	1102	58 %
2.	Not a member of Farmers' collectives	798	42 %
	VII. Input availability	(N=1900)	
1.	Availability	1774	93.4 %
2.	Non-availability	126	6.6 %
	VIII. Access to institutions	(N=1900)	
	Nearer	1567	82.5 %
	Far	333	17.5 %
	IX. Credibility of institutions	(N=1900)	
	Highly credible	758	39.9 %
	Moderately credible	793	41.7 %
	Not credible	349	18.4 %
X. Extension programmes attended prior to release of PM-KISAN amount		(N=1900)	
	Attended	1500	79 %
	Not-attended	400	21 %

could significantly impact how PM KISAN funds are utilized. Lower education levels might correlate with reduced financial literacy, potentially influencing spending decisions towards more immediate or familiar needs. The small percentage of graduates (5.7 %) might exhibit different spending patterns, possibly allocating funds more strategically or towards innovative agricultural practices.

Family type

The prevalence of nuclear families (72.8 %) could affect PM KISAN fund allocation. Nuclear families might prioritize diverse household needs when spending the assistance. In contrast, joint families (27.2 %) could pool resources, potentially allowing for more significant agricultural investments or savings from the PM KISAN funds. Annual Income: With 87 % of respondents earning Rs. 200000 or less annually, the PM KISAN assistance likely represents a significant income supplement. Lower-income groups (43.9 % below Rs. 50000) might prioritize basic needs or debt repayment, while the moderate-income group (43.1 % between Rs. 50000-200000) could have more diverse spending patterns. The 13 % earning above Rs. 200000 might view the assistance as supplementary, potentially allocating it towards savings or non-essential agricultural improvements.

Credit orientation

The high reliance on institutional credit (72.5 %) suggests that many farmers are integrated into formal financial systems. This could influence PM KISAN spending, with some potentially using the funds to service existing loans. The 27.5 % relying on non-institutional credit might prioritize using PM KISAN funds to reduce high-interest informal debts.

Social networking

The 58 % membership in farmers' collectives could significantly influence spending decisions. These networks might facilitate information exchange about optimal uses of PM KISAN funds or even promote collective spending decisions. Non-members (42 %) might have different spending patterns based on more individualized decision-making processes. Input Availability: High input availability (93.4 %) suggests that most farmers can access necessary agricultural inputs. This could influence PM KISAN's spending towards purchasing these inputs, potentially improving agricultural productivity. The 6.6 % facing input scarcity might prioritize PM KISAN funds differently, possibly towards securing these scarce resources.

Access to institutions

With 82.5 % reporting nearby institutional access, many farmers likely have opportunities for financial advice or services, potentially influencing more informed spending of PM KISAN funds. The 17.5 % with limited access might have different spending patterns based on reduced institutional interaction. Credibility of Institutions: The mixed perception of institutional credibility (39.9 % high, 41.7 % moderate, 18.4 % not credible) could impact how receptive farmers are to institutional advice on PM KISAN fund utilization. Those viewing institutions as highly credible might align their spending more closely with official recommendations. Extension Programme Attendance: The high attendance rate (79 %) at extension programs before PM KISAN disbursements suggests that many farmers had access to agricultural knowledge and possibly financial management information. This could influence more strategic spending of PM KISAN funds among attendees, while the 21 % of non-attendees might exhibit different spending behaviours based on less formal sources of information.

Determinants of spending of PM-KISAN amount

One of the key objectives of the present study is to understand and analyze the determinants of spending on PM-KISAN amount. This objective has been set forth to unravel various factors surrounding the PM-KISAN beneficiaries that influence them to spend money on different activities. Understandably, the spending pattern of farmers is a complex phenomenon shaped by several factors like personal, psychological, family-related, officials-related and peer group-related factors.

Hence, studying the determinants of spending on PM-KISAN amounts assumes greater significance. This will help planners and policymakers to understand the critical determinants that decide farmers' spending patterns. To study this objective, 16 factors have been identified that encompass various facets of spending patterns. To understand comprehensively, an influence index was worked out for each factor, the methodology of which is given below.

Amount releasing time coincides with critical agricultural operations

The most critical determinant of expenditure made by PM-KISAN beneficiaries is the amount released with critical agricultural operations. The Ministry of Agriculture and Farmers Welfare, the government of India, is trying to release the PM- KISAN amount during the onset of the agricultural season. The three instalments of PM-KISAN amount used to be released from February, June and October to November each year to anticipate the amount to be used for the agricultural operations that farmers are supposed to take up during these months. Usually, across India, during these months, the summer, kharif and rabi seasons start; hence, the amount that used to be released during these months may be helpful for the farmers to start the season on a good note. To understand how this factor influences the farmers across southern India. The influence index was worked out for all the states and the data is presented in Table 2.

It is clear from Table 2 that the state of Kerala was ahead with an influence index of 388.95, closely followed by Tamil Nadu with II of 382.55. Andhra Pradesh (281.32) and Telangana (256.32) were far below II compared to Kerala and Tamil Nadu. Among the states, Karnataka had the least II of 248.68 for the factor of the amount of time released, which coincides with critical agricultural operations. During the survey, it was noticed that most PM-KISAN beneficiaries of Tamil Nadu and Kerala said that the peak agricultural seasons started in these states from June and October to November. Especially in the Tamil Nadu Cauvery delta region during June, the Mattur dam will be released and most of the farmers will be engaged in ploughing operations. Similarly, in Kerala, the entire state will receive rains during June through the southwest monsoon. It is also

Table 2. Influence index of spending of PM KISAN amount on agriculture

S. No.	Statements	Influence index of Tamil Nadu	Influence index of Telangana	Influence index of Andra Pradesh	Influence index of Karnataka	Influence index of Kerala
1.	Amount releasing time coincides with significant agricultural operations	380.53	256.32	281.32	248.68	388.95
2.	Interest to spend on agriculture	329.21	259.74	235.53	218.42	390.53
3.	Fellow farmers carrying out necessary agricultural operations	299.47	238.95	226.84	200.00	288.42
4.	Trigger of officials/ extension Scientists to adopt agricultural technology.	269.21	230.53	258.68	143.68	235.26
5.	Urgent requirement of money for Transportation	222.89	252.11	188.42	140.79	242.63
6.	Pressure from agri-input shops for Repaying debt	227.89	253.42	272.11	142.11	170.26
7.	Pressing household expenditure	219.47	234.47	297.89	142.37	248.95
8.	Pressure from moneylenders	184.74	217.11	246.05	137.11	151.84
9.	Cut-off date for bank loan Repayment	170.53	243.68	255.26	133.42	231.58
10.	Repayment of credit obtained from relatives/friends	171.32	239.47	233.68	127.89	178.68
11.	Social functions/festivals	179.47	207.37	203.68	133.16	183.42
12.	Treating relatives coming to home	157.89	139.74	218.42	117.63	189.47
13.	Membership in organizations / farmers group	145.79	131.58	257.89	114.47	171.84
14.	Emergency in paying education fees	206.84	130.53	244.47	122.37	176.32
15.	Emergent medical expenditure	228.42	133.68	210.00	121.32	309.21
16.	Urgent need for friends/relatives	161.32	128.42	201.05	117.63	180.79

found from Table 2 that the quantum of II was found to be highest for these factors, which indicated that farmers play a huge role in these factors. To sum up, among the factors, the amount of releasing time coinciding with important agricultural operations did receive a huge influence index among PM-KISAN beneficiaries across states with Kerala and Tamil Nadu being found to be ahead of other states' influence index (24, 25).

Interest to spend on agriculture

The following important determinant of PM-KISAN beneficiaries' incurring expenditure on agriculture is their interest in spending on agriculture. It was already highlighted in the impact of the PM-KISAN chapter and the chapter on theorizing the construct of intention to spend on agriculture, which will be discussed in subsequent pages of this report, clearly indicating that the psychology of farmers will have a bearing on spending on agriculture. Obviously, the farmers interested in taking up agriculture and improving their agricultural status may dent to invest in agriculture. Hence, the distribution of PM-KISAN beneficiaries based on the response to this factor was analyzed and presented. Among the factors identified for spending PM-KISAN next to the amount releasing time that coincides with significant agricultural operations, the magnitude of II was higher for the factor interested in spending on agriculture. Again, the influence index of this factor was higher for the states of Kerala (390.53) followed by Tamil Nadu (329.21). This was followed by the states of Telangana (259.74), Andhra Pradesh (235.53) and Karnataka (218.42) (26, 27).

Fellow farmers carrying out important agricultural operations

It is evident that their neighbouring farmers' agricultural activity will stimulate the farmers. If the neighbouring farmers or a fellow farmer in the village started ploughing his field the other farmers would be motivated to plough their fields like a chain reaction. Hence, the influence of this factor was analyzed in the states-wise distribution of PM- KISAN beneficiaries of Tamil Nadu (299.47) and Kerala (288.42), which were ahead of other states. It could be interpreted that the PM-KISAN beneficiaries in Tamil Nadu and Kerala did possess significant social capital by being a part of farmers associations, which has already been highlighted elsewhere in this report. So, this might have been why the PM-KISAN beneficiaries of these two states were ahead in this factor. The PM-KISAN beneficiaries of Telangana, Andhra Pradesh and Karnataka have fellow farmers, an important source of information that was appealed to by most farmers irrespective of the state (28, 29).

Trigger of officials/ extension scientists to adopt agricultural technology

The farmers used to be influenced by information given in training/ demonstrations organized by extension officials/ scientists. Often, this trigger will serve as a starting point for the farmers to adopt technologies. If the PM-KISAN amount released coincides with such extension programmes, the farmers may refuse to spend it on agriculture. The data reflected that Tamil Nadu (269.21) and Kerala (258.68) were found to have higher influence index when compared to other states. Though the states of Andhra Pradesh (258.68), Telangana (230.53) and Karnataka (143.68) were a bit lagging Tamil Nadu and Kerala. The farmers of these states were reported to get significantly triggered by officials and scientists. During the interview, many farmers across states believed that KVKs, ICAR institutes and the Department of Agriculture played a crucial role in adopting technologies. One farmer in Andhra Pradesh, Mr. Ganesh, told the research team that he had attended the training in Animal Husbandry in nearby KVK, which coincides with the PM-KISAN amount. He said the research team that he had purchased 'Masti Guard' a medicine for mastitis in his cow (30, 31).

Urgent requirement of money for agricultural operations

Certain agricultural activities, such as plant protection operations, are to be urgently taken up by the farmers. Hence, the farmers need money to undertake such urgent operations. If the PM-KISAN amount is released during urgent need, it will help guide over the crisis. From the table 2, it could be interpreted that Telangana (252.11) surpassed other states' influence index for this factor. This was followed by Kerala (242.63), Tamil Nadu (222.89), Andhra Pradesh (188.42) and Karnataka (140.79) where the PM-KISAN beneficiaries spend money whenever there is an urgent requirement. The agri-input usage in Telangana, Kerala and Andhra Pradesh seemed to be higher, and hence, they were influenced by this factor (32, 33).

Pressure from agri-input shops to repay debt

A common observation across India is that farmers have been indebted for agri-input shops irrespective of their state. The dependence on agri-input shops varies across states. It was noticed that once the harvest is made, the farmers pay the income to agri-input shops first as they receive debt from such agri-input shops. A significant chunk of farmers' income goes to agri-input shops and pressure from agri-input shops is inevitable. The data presented in the table 2 indicated that the two Telugu-speaking states, namely Andhra Pradesh (272.11) and Telangana (253.42), were highly influenced by the pressure from the agri-input shops to repay debt. It is a known fact that these states have been using huge agri-inputs, especially for commercial crops like cotton and chillies. Hence, they might have been influenced by this factor. The states of PM-KISAN beneficiaries, Tamil Nadu, Kerala and Andhra Pradesh, were in descending order regarding the influence index on pressure from agri-input shops for repaying debt (34, 35).

Pressing household expenditure

Household expenditure is inevitable for anyone, including farmers and they cannot avoid it. When there is pressing household expenditure, the farmers need to pay attention to it. Some farmers prefer to spend on agriculture rather than household expenditure, but this is rare. The research team is interested in how the PM-KISAN beneficiaries across states were influenced by pressing household expenditure. The data revealed that the PM-KISAN beneficiaries of Andhra Pradesh (297.89) were highly influenced by pressing household expenditure, followed by PM-KISAN beneficiaries of Kerala (248.95), Telangana (234.47) and Tamil Nadu (219.47). Though there were some variations in the influence index during the interview the PM-KISAN beneficiaries of all the states said that they have been pressed by household petty expenditure (36, 37).

Pressure from moneylenders

Non-institutional lending is scribbling the agricultural sector and these reports indicated that farmers in southern India are held in the flusher of money lenders. There is no other way for farmers to go whenever they face urgent financial needs. They must depend on money lenders. There are instances where before the produce arrives home in the field, the money lenders settle the amount and the farmers have no more money to take back home. Whenever the PM-KISAN amount is released, it is interesting to know whether it is paid to lenders. The influence index due to pressure from money lenders was high for the states of Andhra Pradesh (246.05) followed by Telangana (217.11) and Tamil Nadu (184.74), Karnataka (137.11) and Kerala (151.84) were little influenced by money lenders. It could be interpreted that the PM-KISAN beneficiaries of Andhra Pradesh and Telangana were highly influenced by pressure from money lenders. Hence, financial inclusion programmes and agricultural loans given by institutional lenders should be strengthened in these states (38, 39).

Cut-off date for bank loan repayment

Institutional credit is another essential item for which farmers must set aside some of their income. Often, the farmers could not get enough income to repay the loans. The farmers' income through agriculture and allied enterprises will be ploughed back into agriculture or domestic expenses. In such cases, there will always be a tussle between banks and farmers for repayment of loans. Hence, it is assumed that the cut-off date for bank loan repayment may be a determinant for spending PM KISAN amount. The amount is minimal. The amount may be added with available money, which will help settle bank loans. The PM KISAN amount is insufficient to settle the loan, but it will help with repayment (40, 41).

The data on how it influences the spending of PM KISAN amount was collected across states and the findings indicated, among states, Andhra Pradesh (255.26) was ahead and most of the PM KISAN beneficiaries in Andhra seemed to have been highly influenced by the cut-off date for bank loan repayment. This was closely followed by Telangana (243.68), where the PM KISAN beneficiaries were reported to be highly influenced by the repayment of bank loans. The PM KISAN beneficiaries said that if the repayment month coincided with the PM KISAN amount disbursal, the amount would probably help settle the loan. They replied that the amount may help settle only interest, which could be accrued for the loan amount.

Repayment of credit obtained from relatives/friends

Credit obtained from relatives/friends can be an essential determinant of spending PM KISAN amount. Hence, the data on this factor was collected among PM KISAN beneficiaries of five states and presented in the table 2. It could be inferred that Telangana (239.47) and Andhra Pradesh (233.68) were the two southern states where most PM KISAN beneficiaries were reported to be influenced by repayment of credit obtained from relatives/friends. The respondents believed that their respect and social prestige would be lost if they did not repay. Hence, during the Interview, most of the beneficiaries said that when the amount was released in PM-KISAN, they preferred to settle any debt they received from friends/relatives. PM KISAN beneficiaries in Tamil Nadu and Kerala responded that this factor also influenced them whenever the PM KISAN amount was released (42, 43).

Social functions/festivals

Social functions and festivals in villages consume a lot of money and there were reports, even during the pre-

independence period, that this was an essential reason for indebtedness. The farmers in villages consider spending on social functions and festivals to be family prestige and they leave no stone unturned to keep up the prestige. Hence, they spend any amount by borrowing credit from money lenders or relatives. The data was collected and tabulated to understand whether the PM KISAN beneficiaries spent the amount on social functions and festivals. From the findings, the PM KISAN beneficiaries of Telangana (207.37) and Andhra Pradesh (203.68) were reported to be influenced by the social functions and festivals than other southern states as the Influence Index (II) was higher for these states. Kerala (183.42) and Tamil Nadu (179.47) were following these states with significant Influence Index also (3, 45).

Treating relatives coming to home

Sometimes, one cannot deny or can't do anything for some of the relatives coming home. Treating relatives during community/temple functions is part of the culture in villages. The relatives may stay for two days to one week. During those days, the relatives will be treated well with sumptuous non-vegetarian meals. Though it may look trivial, it may have a bearing on the spending pattern of villagers. Hence, this factor was studied among the PM-KISAN beneficiaries. The results indicated that in Andhra Pradesh (218.42) more PM-KISAN beneficiaries were influenced by treating relatives with the money received from PM KISAN. This was followed by Kerala, Tamil Nadu and Telangana where the Influence Index was 189.47, 157.87 and 139.74 respectively (46, 47).

Membership in organizations/farmers' group

Membership or being a part of any organization warranted the farmers to spend money. Whether this has influenced them to spend PM KISAN money on it is a research question and the data collected for this factor are presented in the Table 2. It is interpreted from Table 2 that among states, Andhra Pradesh had maximum Influence Index of 257.89 which could be interpreted as the PM KISAN beneficiaries of Andhra Pradesh seemed to spend more for the farmers organizations they belonged to, followed by the state of Kerala (171.84) and Tamil Nadu (145.79) (48, 49).

Emergency in paying education fees

Paying the education fees of wards has been an essential expenditure for most farmers. It has already been indicated elsewhere in this report that one of the essential spending activities of PM KISAN beneficiaries is to pay for their children's educational activities. The data revealed that Andhra Pradesh, in this factor, also fared well with an Influence Index of 244.47 followed by Tamil Nadu (206.84) and Kerala (176.32). In South Indian states, the literacy rate is increasing and farmers are increasingly sending their wards to schools. Understandably, this might have influenced their spending from PM KISAN amount. If the release of PM KISAN amount coincides with the fee payment for their wards, most of the farmers during the interview replied that they prefer to pay education fees (50, 51).

Emergency medical expenditure

Medical expenditure has been increasing recently, not only in the urban side but also in villages. Farm holdings increasingly have patients with myriad diseases, so the medical bill has been growing drastically. The farmers need to allocate a sizable amount for medical expenditure in monthly expenditure. More likely that they may spend the PM KISAN amount for medical expenditures. Hence, the data was collected to verify whether this factor influence the PM KISAN beneficiaries to spend for medical expenditure across the southern states. The results indicated that Kerala PM KISAN beneficiaries were reported to spend PM KISAN amount for medical expenditure and the Influence Index was very high at it was 309.21, followed by PM KISAN beneficiaries of Tamil Nadu whose Influence Index was 228.42 (52, 53).

Urgent need for friends/relatives

Sometimes, friends and relatives need money during emergent situations. In such cases, farmers tend to help friends and relatives. Whether this factor influences the PM KISAN beneficiaries across states is a research question for which data was collected and presented in Table 2. The findings indicated that the PM KISAN beneficiaries of Andhra Pradesh (201.05) were reported to be highly influenced by their friends' and relatives' urgent needs and tend to give the PM KISAN amount to them whenever the situation warrants. This was followed by Kerala and Tamil Nadu, whose Influence Index was 180.79 and 161.32, respectively. When the PM KISAN beneficiaries were asked about this, they said that when the PM KISAN amount is released, if a relative needs money, they used to give it. Often, they are told they cannot evade from such circumstances (44, 10).

To sum up, the Influence Index was higher for the factors, namely the amount of releasing time that coincides with essential agricultural operations, interest to spend on Agriculture and Fellow farmers carrying out critical agricultural operations across all five states. Credit and lending factors, namely Pressure from Agri input shops for repaying debt, pressure from money lenders and Cut-off date for bank loan repayment, were also found to influence the spending of PM KISAN amount by beneficiaries with a significant Influence Index. Kerala and Andhra dominated agricultural-related factors, whereas Andhra and Telangana topped the Influence Index in terms of financial factors.

Factoring of determinants influencing the spending of PM KISAN amount

Many factors determine how the money received through PM the beneficiaries could spend KISAN. There may be a group of factors that determine spending. Analyzing these factors will give a better idea of the spending pattern of farmers and the importance they are placing for every factor. These factors may be associated with the urgency of issue, crop stand, demand for money for medication, demand for money for education, due for repayment of loan, an emergency due to social issues, influence of Extension system etc. To find out the pattern of grouping among these factors and to identity the underlying relationship between them, factor analysis was run with the help of SPSS version 23.00 and the results are presented below.

As a first step, the suitability of the data for factor analysis was checked. The Bartlett's sphericity test gave a significant chi-square value, indicating that the data was amenable for factor analysis. Hence it was decided to proceed further. Table 3 provided below gave an account of number of factors extracted using principal component analysis with varimax rotation. It also gives the total variance explained by the factors put together and the amount of variance explained by each factor. Closer observation of the Table 4 revealed that 51.48 per cent of the variation in the consumption of greens was explained cumulatively by the extracted four factors. The first factor accounts for 18.74 percent variation in spending using PM KISAN amount, followed by 12.77 percent, 10.44 percent and 9.54 percent variation, which are explained by the second, third and fourth factors. The subsequent Table 4 showed that factors and the magnitude of factor loadings were loaded into four components.

The percent variation in each of the factors implies the importance given by the beneficiaries for spending on those aspects. Hence, the magnitude of the variance is essential, followed by the grouping of factors. Through repeated iterations, the PCA identify those factors that are closer to each other. In other words, the grouping of variables indicates the mental process of the beneficiaries to locate the factors closer or farther from each other. The interest is whether agriculture-related spending, family spending and social spending are grouped together, which will indirectly tell the cognitive distance of each factor.

Factor I

The highest factor loading in component I was for "Amount releasing time coincides with important Agricultural Operation", with a loading of 0.735. It was discussed elsewhere in this report that agricultural operations during the release of PM KISAN amounts are an essential factor in determining the spending patterns of PM KISAN beneficiaries. The purchase of seeds, fertilizers, plant protection chemicals, or urgent payment for labour coincides with the release of the instalment of money, making the beneficiaries prioritize spending on these items. The second highest loading under this component is for interest to spend on agriculture, with a factor loading of 0.715. Attitude or interest spent on Agriculture is a prerequisite for spending on any of the activities in Agriculture. Fellow farmers carrying out significant agricultural operations (0.704) and triggering Extension officials/Scientists to adopt innovative agricultural technologies (0.617) are the other factors loaded into this component.

Farmers have always been influenced by agricultural activities undertaken by neighbouring farmers/relatives. The farmers follow the same procedure if the neighbouring farmer applies fertilizer or plant protection chemicals. This may be due to fear or to show the neighbours that they are

Table 3. Rotated component matrix and factor loadings

Component	Initial eigenvalues			Extraction sum of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	2.999	18.743	18.743	2.999	18.743	18.743	2.780	17.373	17.373
2	2.043	12.767	31.510	2.043	12.767	31.510	1.866	11.662	29.035
3	1.670	10.436	41.946	1.670	10.436	41.946	1.805	11.282	40.317
4	1.526	9.536	51.482	1.526	9.536	51.482	1.786	11.165	51.482
5	1.368	8.547	60.030						
6	1.075	6.717	66.747						
7	0.962	6.011	72.758						
8	0.952	5.951	78.710						
9	0.757	4.730	83.439						
10	0.580	3.627	87.066						
11	0.517	3.229	90.294						
12	0.467	2.917	93.211						
13	0.339	2.119	95.330						
14	0.318	1.984	97.315						
15	0.270	1.690	99.005						
16	0.159	0.995	100.00						

Table 4. Factors influencing spending of PM KISAN amount

S.No	Factors influencing spending of PM KISAN Amount	Component			
		1	2	3	4
1	Amount releasing time coincides with necessary agricultural operation	0.735			
2	Interest in spending on agriculture	0.715			
3	Fellow farmers carrying out necessary agricultural operations	0.704			
4	Trigger of Extension officials/ Scientists to adopt agricultural technology	0.617			
5	Urgent requirement of money for transportation				
6	Pressure from agri-input shops to repay debt				
7	Pressing household expenditure		0.663		
8	Pressure from moneylenders		0.649		
9	Cut-off date for bank loan repayment		0.587		
10	Repayment of credit obtained from relatives/friends		0.550		
11	Social functions/ Festivals			0.846	
12	Treating relatives coming to home			0.554	
13	Membership in organizations /Farmers' group			0.531	
14	Emergency in paying Education fees				0.822
15	Emergent Medical expenditure				0.526
16	Urgent need for friends/relatives				

also serious about crop cultivation. Similarly, suppose an Extension official or scientist recommend a particular technology that coincides with the availability of money in the hand given through PM KISAN. In that case, there is every likelihood that a farmer will try that technology. Since all these factors are related to Agricultural spending, this may be termed "Agricultural spending factor".

Factor II

The second component has four factors with the highest loadings. The prime factor with the highest loading in component II is pressing household expenditure (0.663) followed by pressure from money lenders (0.649), Cut-off date for bank loan repayment (0.587) and repayment of credit obtained from friends/relatives (0.550). These are all pressures experienced by most farmers, irrespective of the states they belong to. Farmers should get credit from money lenders, banks, relatives and friends to carry out significant, timely crop husbandry operations. They may lose the entire crop if they fail to do these activities. Hence, grouping these variables is highly appropriate and these factors may be named the "Repayment Factor".

Factor III

In the third component, three factors had the highest factor loadings. They were social functions/festivals (0.846), treating relatives coming to home (0.554) and membership in organizations or farmers groups (0.531). Any farmer or beneficiary of PM KISAN is a part of rural society and must comply with social values and norms. The individual may be highly knowledgeable or prosperous but has lived within the culture of the rural society where they were raised. A closer look at the factoring of the factors in this component revealed that spending money has an intricate relationship with societal requirements. Attending temple festivals, marriages and rituals in society is mandatory for the beneficiaries. Hence, they will look for societal spending whenever they receive money through PM KISAN after agriculture. In some still culture-bound societies, whether the money is available to a farmer, they must pay a hefty gift to relatives' marriage. Otherwise, they will not be accepted in the society.

The relatives coming to home and treating them appropriately is another crucial societal compulsion. Especially during temple festivals or any function, the coming of relatives is always accompanied by spending money to treat them. Hence, the beneficiaries, in many instances, were told that they had to get money from moneylenders to tide over the financial crisis. Further, membership in organizations or farmers' groups has become a necessity now and again, a social obligation for beneficiaries. The grouping of the three factors is well knit together, which may be termed the "Social spending factor".

Factor IV

Component four has two determinants with high loadings. One is emergency to spend for education fees with a factor loading of 0.822 and emergent medical expenditure with a factor loading of 0.526. The factor loading for educational spending was very high, implying that farmers placed lot of importance on spending for their children's education. This is common in almost all states. Spending on medication is quite understandable; whenever a medical emergency is there, whatever amount available in their hand will be used only for medical purposes. If the PM-KISAN amount release and medical emergency have coincided, the beneficiaries will prioritize the spending on medical issues only. Since these factors are related to household expenditure, this may be termed the "Household mandatory Spending Factor" (Fig. 2).

Comparison with similar programs

Programs like Bolsa Família prioritize household stability, like PM-KISAN's focus on immediate needs. However, PM-KISAN's alignment with agricultural cycles is a unique advantage.

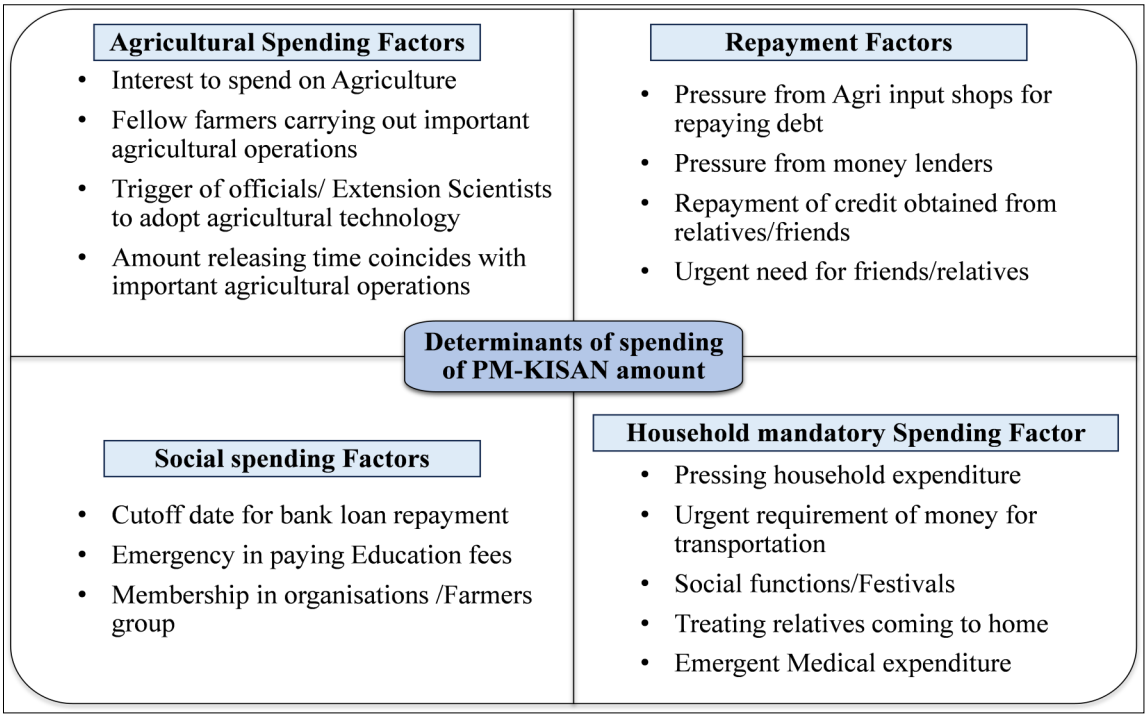

Fig. 2. Determinants of spending of PM-KISAN amount.

Conclusion

This study provides valuable insights into the factors influencing how farmers spend financial assistance received through the PM-KISAN program in five southern Indian states. The research identified four key factor groups that shape spending patterns: Agricultural Spending, Repayment, Social Spending and Household Mandatory Spending. The timing of fund disbursement coinciding with agricultural operations emerged as the most influential determinant, followed by farmers interest in agriculture. This suggests that the program is largely achieving its goal of supporting agricultural activities. However, the study also revealed significant pressures on farmers to use funds for debt repayment, social obligations and urgent household needs like education and healthcare. Regional variations were observed, with states like Kerala and Tamil Nadu showing higher agricultural spending tendencies, while Andhra Pradesh and Telangana displayed stronger influences from financial pressures and social factors. These findings highlight the complex interplay of economic, social and cultural factors that shape farmers' financial decisions. The study underscores the importance of considering these diverse influences when designing and implementing agricultural support programs. Policymakers should aim to align fund Timing Disbursements that should synchronize with key agricultural cycles and Financial Literacy Programs by educating the farmers on strategic fund utilization and Complementary Advisory Services by enhance the impact of funds through extension programs and that will improve program's impact on agricultural productivity and rural livelihoods.

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Authors' contributions

MK and MR conceptualized the research, writing and methodology. DPP, PV, MJ, SS, BS and RR edited the manuscript. All the authors read and approved the final version of the manuscript.

Compliance with ethical standards

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Declaration of generative AI and AI-assisted technologies in the writing process

I have used only the Chatgpt AI tool to paraphrase a few sentences.

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