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Government Expenditure in Agriculture in relation to Institutional Credit and Livelihood Security in Indian Context

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Abstract

Agriculture refers to the science, art or practice of cultivating the soil and growing crops. Government spending and institutional credit are the most important factors that engender agricultural innovation and rural income security for over 50% of India's population who derive their livelihood directly from farming. This paper assesses the role of agricultural expenditure by the government, access to formal credit and its role in supporting livelihood in agricultural regions. Government consumption includes outlays on infrastructure, subsidies, and financial programs to enhance gains realized from agricultural production. Institutional credit on the other hand, comprises the formal sources of funds including bank credit, cooperative credit and microfinance made available to farmers for purchase of necessary inputs and as hedge to output risk. This study, therefore, adopts a secondary data research strategy supplemented by case studies to establish the impact of these financial tools on the stability and income of farming households. These findings thus reveal the major challenges facing extension of government policies and of credit schemes, with a large number of such S&MF remaining outside the coverage. The study also highlights the influential parameters like spatial distribution, financial literacy and institutional mechanisms that intervene with the relationship between government spending, credit availability and sustenance. The study also finds a strong correlation between government expenditure, income and farmer suicides, where ceteris paribus, 8.788 unit decrease in government spending leads to one unit increase in farmer suicides and ceteris paribus, 9.517 unit increase in government spending leads to one unit increase in income. Therefore, with these findings the paper provides policy implications on resource management in delivering credit and rural employment for betterment of the people and sustainability of agriculture in the overall context of India.

Keywords: Agricultural & Institutional credit, Farmer Suicides, Livelihood Security, Rural Development, Poverty Reduction, Government Expenditure.

Introduction

India's agriculture plays a vital role in supporting the nation's economy through providing employment to over one-half of the total population and contributing about 18% to the country's GDP (Arun, 2017). However, Chelshi (2023) notes that the sector remains very vulnerable facing challenges such as low productivity, income risk and climate change affecting the livelihood of millions of farmers. To solve this, government outlay and institutional credit have proven to be effective sources of underwriting improved food production in agriculture, promoting farmers' incomes, and ensuring steady incomes in rural India (Binswanger, 1995).

This expenditure represents the government's spending in infrastructure, subsidies and in welfare schemes which are all pro- agriculture and all designed to enhance productivity efficiency in agriculture. However, the disbursal of these funds has occurred selectively, and predominant emphasis has been paid to mere subsidies and not to developmental capital expending, especially on infrastructure and specifically on technologies (Fan et al., 2008). Official credit as bank credit, cooperative credit, credit unions, micro-credit which help farmers to source the financial resources felt for obtaining inputs, investing in modern technology, managing risks attached to farming enhances credit delivery (Binswanger, 1995). Kumar et al. (2017) noted government spending on agriculture and institutional credit are complementary and play crucial roles that positively influence household capabilities, which refers to the capacity of rural farming households to earn stable income, freely access basic resources such as food, education and health facilities.

Expenditure and credit profile data from government sources and policy documents, as well as case studies, are used to examine the effects of government expenditure and credit facilities on income and performance of farmers. These results indicate that government expenditure and institutional credit have played a role in improving agriculture growth though the findings suggest that resource endowment and distribution is

skewed (Shivaswamy et al., 2020). Creditworthiness is low among Small and Marginal Farmers so they cannot get access to formal credit (Kumar & Kaur, 2017). They are locked out in the financial system and public investment seen mostly having short-term oriented subsidies rather than long-term oriented infrastructure. There are also differences in the level of coordination about states such as Punjab & Haryana, where government expenditure and credit levels are better coordinated than in States such as Odisha & Bihar (NSO, 2023).

Based on these observations, the study suggests an increased spending on developing rural infrastructure and technology, promotion of institutional credit through interest subvention and financial literacy (Binswanger, 1995). Owing to a direct relation between public expenditure and poverty, by targeting the major beneficiaries of agriculture, i.e., the smallholder farmers, combined with the efficiency of institutional credit systems the government can foster increased productivity and food security necessary for the survival of a vast majority of the Indian rural population.

Review of Literature

Government expenditure on agriculture and institutional credit is considered the most significant determinant of agricultural yields, rural economy, and poverty reduction in developing countries like India. Many studies have shown a positive relationship between public expenditure, credit, and income stability for the rural population engaged in agriculture (Latief et al., 2023). Public investment is needed in rural infrastructure, research, and extension services to increase productivity. The fertilizer and irrigation subsidy programs have increased production but are now facing the threat of this lack of long-term investment in critical infrastructure. As per Gulati and Sharma, the spending of subsidies should be invested in irrigation and infrastructure that will yield more productivity. Institutional credit in agriculture is of great importance since formal credit opens avenues to access advanced methods and productive resources (Shivaswamy et al., 2020). However, the Kisan Credit Card has not been effective for many smallholder farmers primarily due to barriers such as collateral requirements and low credit literacy (Kurup et al., 2021). Funding from banks and cooperative societies significantly affects farm mechanization, crop diversification, and productivity, according to (Bowman et al., 2013). Regions like Punjab and Haryana very vividly manifest the relationship between agricultural productivity and livelihood security-ability to buy food, income, and other necessary services-because higher agricultural productivity would correspond to better livelihood indices as cited by Vatta et al. (2022). In addition, areas exhibiting better rural infrastructure and institutional credit showcase higher livelihood security and a diversification into activities not merely confined to agriculture (Ellis, 1998). Despite all these initiatives, suicide among farmers became an issue of immense import in the Indian agricultural scene (Dominic Merriott et al., 2016). Debt, crop failures, and lack of credit have been major contributors to this tragic phenomenon. This clearly calls for definite interventions needed both psychologically and economically to work upon stress factors. Scholarly research has emphasized government spending and credit accessibility towards rural development. The biggest goal is to come up with policies that coordinate investment in infrastructure with the availability of credit to increase productivity and lower income vulnerability. Latief et al. (2023) reports that only those states that integrate government expenditure with credit facilities and programs of farmer welfare can maintain sustainable agriculture growth and livelihoods in the rural areas. Over-investment in input subsidy programs and inefficient allocation of funds towards agricultural reforms hampers sustainable development. Sandhu et al. (2020) stated that high collateral requirements and less availability of banks for small farmers have compelled many to adopt informal credit sources. The challenge to be addressed by enhancing public investment in infrastructure, improving credit access, and supportive systems to the poor vulnerable farming communities concerning agricultural productivity can reduce farmer suicides in India.

Methodology

This research paper relies on secondary data collected from different authenticated sources such as government publications, reports from financial institutions, academic journals and databases related to agriculture, institutional credit and livelihood security in India. The study looks at how government spending on the agricultural sector and access to institutional credit influences livelihoods in rural areas.

The data used in this research was gathered from the following key sources:

- Reports from the Reserve Bank of India (RBI) detailing trends in agricultural credit disbursement and policies.
- Data from the Ministry of Agriculture, Government of India, covering budget allocations and actual government expenditure on agricultural schemes and subsidies.
- Statistical reports from the National Sample Survey Office (NSSO) and other governmental surveys, which provide insights into rural employment, income levels, and access to credit.
- Research papers and articles focus on institutional credit in agriculture and its link to economic development and livelihood security.
- Time series data concerning government expenditure in agriculture as well as institutional credit will be collected from the above-mentioned sources for a specified period. The following key variables have been identified for analysis:
- Government expenditure on agriculture: This refers to purchase of inputs for agricultural subsidies, funding of developmental projects, physical infrastructure and financial support to producers.
- Institutional credit: Meaning the extent to which people can access credit facilities from recognized financial institutions like banks, cooperatives, micro financing organizations etc.
- Livelihood security indicators: Measures such as income levels, unemployment rates and poverty rates in the rural sector have been utilised to reflect upon the effectiveness of agricultural policies.

- Farmer Suicides: Refers to the rate at which farmers commit suicide in India and the impact government expenditure has on it.

A longitudinal distribution of these variables will be done through descriptive statistics, and then a linear regression analysis model will be used to establish the impact of government expenditure and institutional credit on livelihoods. The regression model is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu_1$$

Where

Y = Government Expenditure on Agriculture
X_1 = Farmer Suicides
X_2 = Rural Unemployment Rate
X_3 = Average Monthly Income
α = Intercept
β_1, β_2, β_3 = Coefficients of the respective variables
μ_1 = Error term

The study mainly relies on secondary data collected from Indian sources thereby restricting the period under analysis even though it covers a long duration, from the year 2000-2022; however, all the variables did not yield consistent data. However, the current study fails to include first-hand data sources including field surveys or interviews that would provide understanding of the farmers' actual experience in received institutional credit facilities.

However, these considerations do not detract from the research objective of offering insights into how the expenditures by the government on agriculture and institutional credit improve the livelihood in rural India. The findings would therefore be of interest to policy makers, banking and micro-finance institutions as well as other researchers in agricultural development and rural finance.

Results and Analysis

Government Expenditure on Agriculture

Trends and Patterns of Government Expenditure to Fund Agriculture

The government expenditure on agriculture in the past decades has portrayed different trends of fluctuation. In the past decades, the expenditure has risen because of the increasing demands for food security and rural development (Ministry of Agriculture & Farmers' Welfare, 2022). The Union Budget 2022-23 of the government for agriculture has allocated ₹1.32 trillion with a majority focus on irrigation, crop insurance, and MSP. The allocations towards subventions exceeded that towards infrastructure that has influenced the long-term sustainability of agricultural growth (Wu Chun-long et al., 2010).

Schemes and Policies (e.g. PM-Kisan, Agricultural Infrastructure Fund)

In the last few years, several key schemes have been unveiled to strengthen the support of agriculture. At the same time, the PM-Kisan Samman Nidhi would provide direct income support to farmers so that they also enjoy a steady inflow of cash, mainly for small and marginal farmers. At the same time, AIF focuses on making post-harvest infrastructures like warehouses and cold chains to have minimal wastage and increase the income of farmers (Government of India, Ministry of Finance, 2023). These policies are regarded as a new addition to the wealth empowerment of the farmers accompanied by infrastructure development that will strengthen in the long term.

Impact of Subsidy, Public Expenditure, and Fiscal Policies

Inputs or subsidy fertilizers, electricity, and irrigation account for the lion's share of government spending (Harshal Anil Salunkhe et al., 2012). These have been the productivity augmentation factors; however, the tendency towards inefficient use of resources persists. Subsidies' availability often diverts funds from investments in more productive technology and infrastructure (Praduman Kumar et al., 2014). Investment in rural infrastructures, like roads and irrigation systems, are effective and more efficient in generating agricultural productivity and farm incomes when matched with fiscal policies that alleviate rural poverty (Ghosh et al., 2017).

Institutional Credit in Agriculture

Role of Institutional Credit (Banks, Cooperatives, Microfinance)

Institutional credit gives the farmers the much-needed financial muscle to invest in inputs, technology, and infrastructure, and indeed, agricultural development is very dependent on such credit (NABARD, 2023). Indeed, agricultural credit formed a considerable proportion of the credit from banks, while commercial banks, cooperative societies, and regional rural banks formed the important institutionalized players (Reserve Bank of India, 2021). Microfinance institutions, too play an important role in accessing credit for the small holders and tenant farmers generally kept away from formal banking systems (Parul Maurya et al., 2019).

Credit Schemes: Kisan Credit Card, NABARD Initiatives

Kisan Credit Card is one of the most popular credit schemes that generate easy and on time credit for farmers. By simplifying the process of credit distribution and allowing flexibility in repayment conditions, KCCs have helped farmers gain easier access to institutional credit. Furthermore, most schemes launched by NABARD, such as RIDF, are long-term loans for rural infrastructure development, including irrigation and rural roads, which provide an indirect benefit to the agricultural sector (NABARD, 2023).

Discussion on How Credit Impacts Productivity and Income of Farmers

The availability of institutional credit directly affects the productivity and income levels of farmers. Studies reveal that areas with greater formal credit access have higher crop yields and more mechanized farms (Yadav et al., 2022). Additionally, the availability of low-cost credit allows farmers to adopt modern technologies that enhance productivity (Binswanger et al., 1995). However, small and marginal farmers, who generally lack adequate collateral, find it difficult to access formal credit, which restricts their investment in productivity-enhancing resources (Reserve Bank of India, 2021).

Livelihood Security and Agriculture

Definition of Livelihood Security in the Indian Rural Scenario

Livelihood security in the rural regions of India is highly dependent on agriculture as 58% of the population is engaged in farming-based sources of income (FAO, 2021). Livelihood security encompasses not just income but also access to food, education, and health facilities. Consequently, the probability of its sustenance in a household is a result of both agricultural productivity and available non-agricultural sources, such as credit, land, and technology (Acharya et al., 2006).

Contribution of Agricultural Productivity to Livelihood Security

Agricultural productivity directly affects the livelihood security of farm households as productivity affects the level of income of such households directly (World Bank, 2020). Higher productivity not only involves positive effects in the form of surplus production that can be marketed or sold in the market but is also said to enhance the food security of the households (OECD, 2021). Livelihood security is much stronger in states like Punjab and Haryana, in which high levels of productivity are attendant on better access to irrigation and credit than in rain-fed states like Odisha and Jharkhand (NSO, 2023).

Diversification, Off-Farm Employment, and Risk Management

Diversification of incomes through off-farm jobs is increasingly vital for livelihood protection, especially in climate change-sensitive regions with uncertain agricultural output (Yating Chuang et al., 2019). Off-farm employment opportunities such as rural industries and services thus provide a safety net for the household when farm incomes are inadequate (Kirit Patel et al., 2015). In addition to this, risk management practices like crop insurance schemes have been introduced to protect farmers against income shocks due to crop failure (Ministry of Agriculture & Farmers' Welfare, 2022).

Interlinkage: Government Expenditure, Credit, and Livelihood Security

How Government Expenditure Supports Institutional Credit

Government expenditure has played a crucial role in supporting institutional credit through interest subvention schemes and capital infusion into rural banks (Sehgal, 2023). By subsidizing interest rates, the government has made credit more affordable for farmers, which has led to increased uptake of loans for productive investments (Bhanot et al., 2021). Additionally, investments in rural infrastructure, particularly in irrigation and electricity, have created a more conducive environment for the effective use of credit (Kaur & Kaur, 2023).

Impact of Coordinated Efforts Between Expenditure, Credit, and Farmer Welfare

Coordinated efforts between government expenditure and farmer welfare schemes such as the ones for credit access have shown positive outcomes in improving agricultural productivity, output and income (Bahal, 2019). For example, the combination of direct income support through PM-Kisan, affordable credit through KCC, and public investments in irrigation infrastructure has created a comprehensive support system for farmers (Nerella, 2016; Varshney et al., 2020). In Punjab and Haryana, these coordinated efforts have resulted in sustained high levels of productivity and income for farming households (NSO, 2023).

Case Studies or Examples from Specific Regions or States

Punjab and Haryana as listed earlier are well-known examples where coordinated government efforts have significantly boosted agricultural resources and rural earnings (NSO, 2023). The Green Revolution in these states was supported by substantial public investments in irrigation and institutional credit, which enabled farmers to adopt high-yielding varieties of wheat and rice (Sidhu, 1974). In contrast, Odisha and Bihar, where such coordinated efforts have been less effective, continue to face challenges in achieving food and livelihood security (NSO, 2023).

Farmer Suicides

Role of Government Expenditure in Addressing Financial Distress

Government expenditure is crucial in creating financial stability for farmers, primarily through interest subvention schemes and direct income support like PM-Kisan, however, limited investments in rural infrastructure and technology have hindered sustainable growth in many regions, leading to financial insecurity among smallholder farmers and without robust support systems in place, these farmers are more susceptible to income volatility, which has been a contributing factor to farmer suicides as stated by Chaithanya et al. (2024).

Impact of Limited Access to Formal Credit on Farmer Suicides
Access to formal credit is essential for farmers to make productive investments and mitigate risks, but many small and marginal farmers struggle to secure loans due to collateral requirements and complex banking processes (Chaithanya et al., 2024). This lack of access forces farmers into informal credit arrangements with high-interest rates, which contribute to rising debt burdens. Studies show a direct correlation between regions with lower access to formal credit and higher incidences of farmer suicides, highlighting the urgent need to expand credit outreach through schemes like KCC (Rao, 2022).

Livelihood Security as a Buffer Against Economic Distress
Livelihood security encompasses stable incomes, access to essential services, and resilience against economic shocks (Marschke, 2006). As noted, earlier states like Punjab and Haryana have better-coordinated efforts between government spending, credit access, and rural infrastructure development which strengthened livelihood security and reduced financial distress among farmers. In contrast, states with poor infrastructure and limited credit outreach, like Maharashtra and Andhra Pradesh, report higher suicide rates among farmers, indicating a lack of adequate support systems (Mishra, 2006).

Challenges and Issues

Inefficiencies in Expenditure Allocation

One of the primary issues in government expenditure on agriculture is the inefficient allocation of resources. A significant portion of the budget is spent on subsidies for fertilizers, electricity, and irrigation, which disproportionately benefit large farmers while smaller farmers struggle to access these benefits, additionally, there are often delays in the disbursement of funds for critical schemes, which hampers the timely implementation of programs (Joshi, 2015).

Accessibility Issues in Institutional Credit

Although institutional credit has expanded, many farmers, particularly smallholders, continue to rely on informal credit sources due to the difficulties in accessing formal credit such as the collateral-based nature of most formal loans exclude tenant farmers and those without clear land titles, limiting their ability to invest in agricultural inputs (NABARD, 2021). While the KCC scheme has expanded access to credit, its penetration in regions with poor banking infrastructure remains limited as noted by NABARD (2021).

Impact of Climate Change and Market Instability on Livelihood Security

Climate change is emerging as a significant threat to agricultural productivity and livelihood security. Increased frequency of extreme weather events, such as droughts and floods, has led to crop losses and reduced incomes for farmers, especially smallholders reliant on rain-fed agriculture (Malhi, 2021). Moreover, market instability, particularly fluctuating commodity prices, has further exacerbated the vulnerability of farming households, undermining livelihood security as noted by Chand et al (2009), while the government has introduced risk management schemes, such as crop insurance, their coverage and effectiveness remain inadequate.

Table 1: Growth of Govt. Expenditure, farmer suicide, rural unemployment and rural income

Year	Govt. Expenditure (₹ Crore)	Farmer Suicides	Rural Unemployment	Income (₹)
2000	10,124	16,603	7.5	2,333
2001	9,564	16,415	7.3	2,500
2002	11,715	17,971	7.0	2,583
2003	12,734	17,164	6.8	2,667
2004	18,000	18,241	6.9	2,917
2005	19,827	17,131	6.7	3,083
2006	21,792	17,060	6.5	3,250
2007	25,011	16,632	6.3	3,417
2008	30,000	16,196	6.2	3,583
2009	35,849	17,368	7.0	3,833
2010	37,789	15,964	6.5	4,000
2011	40,000	14,207	7.5	4,250
2012	53,243	13,754	6.9	4,583
2013	76,000	11,772	6.8	4,833
2014	93,000	12,360	6.2	5,000
2015	1,13,000	12,602	5.8	5,833
2016	1,28,000	11,370	5.5	6,667
2017	1,41,000	0,655	5.4	7,500
2018	1,50,000	10,349	5.6	8,333
2019	1,09,261	10,281	5.5	8,750
2020	1,24,060	10,677	10.0	9,583
2021	1,26,203	10,881	9.5	10,000
2022	1,18,256	11,290	8.0	10,417

Source: https://www.mospi.gov.in/sites/default/files/publication_reports/nss_rep_576_0.pdf & various NCRB Annual Reports

This dataset in table 1 encompasses four key areas and their trends from 2000 to 2022: government expenditure in crore ₹, farmer suicides, rural unemployment in %, and rural income in ₹. It vividly displays many insights about the interrelationship of government spending with farmer well-being, rural employment, and growth in income for two decades. Government spending has increased over time but has especially accelerated since the late 2000s. It stood at ₹10,124 crore in 2000. The expenditure reached ₹1,18,256 crore in 2022. This steady growth trend is suggestive of high priority to rural development and agriculture over the years but with a few fluctuations between the last couple of years, especially between 2019 and 2022. There was an almost sharp increase between 2008 and 2012, which must be credited to policy

changes and implementation of programs on rural development and farmer welfare in this period. Although in the last year, beginning in 2019, numbers seem to slightly decline from previous years, possibly influenced by budget reallocations and economic factors, the year the suicides peaked at 18,241 was in 2004. The counts eventually started to go down thereafter, reaching about 10,349 in 2018. This is expected, as the support structures are better, and expenditure by the government is improving, trying to mitigate this agricultural crisis. However, the trend tends to stabilize around 10,000 after 2018 with a small rise by 2022 at 11,290. This might be a persistence of deeper underlying issues with rural agriculture and welfare still not fully addressed. Unemployment changed with time. Initially, unemployment started decreasing from 7.5 percent in the year 2000 down to around 5.4 percent in 2017. In 2020 and 2021, however, it rises steeply, peaking at 10 percent in 2020, which was probably the impact of the Covid - 19 pandemic on rural jobs. Unemployment in 2022 declined to 8 percent, suggesting some degree of recovery, but at these levels, it was higher than the pre-pandemic level. Income data clearly records a steady increase, going from ₹2,333 for the year 2000 to ₹10,417 by 2022. This rise in income might be in line with rises in government expenditure, while the increase is consistent over time and likely improves market access, rural infrastructure and agricultural productivity. This doesn't mean that continuous progress has been made throughout: the rate of change after 2010 would hint at the impact of intensified government interventions and potentially through diversification in income in rural areas beyond traditional dependence on agriculture. There appears to be a positive impact of increased government expenditure on both rural incomes and farmer suicide reduction over time. However, despite higher spending, rural challenges persist as evidenced by the recent increase in unemployment and suicides. The pandemic years (2020–2021) were impactful for unemployment, and possibly impacted the sustainability of growth in rural incomes even as the government spent more during these years. Though, there is progress in rural incomes and the reduction of farmer suicides; data remains with continuing problems toward a full stabilization of the rural economy, especially regarding steady

Table 2: Model Summary of R2 and standard error

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.971[a]	.943	.933	12913.84257
a. Predictors: (Constant), Farmer Suicide, Rural Unemployment, Farmer Income				

Table 2 shows the value of R here is 0.971, which indicates a very strong positive correlation between the predictors (Farmer Suicides, Rural Unemployment, and Income) and the dependent variable (possibly Government Expenditure, though the target variable isn't explicitly stated here). This high R value suggests that the combination of the predictors has a strong linear relationship with the dependent variable. The value of R Square is 0.943, indicating that 94.3% variance in the dependent variable could be explained by the predictors or the regressors, namely: Farmer Suicides, Rural Unemployment, and Income. It's obvious with such a high R-squared value that the model fits the data very well, and as a group, these three predictors have an exceptionally strong explanatory power for the dependent variable. Likewise, The Adjusted R Square is 0.933. Adjusted R-squared considers the number of predictors in the model. That is why, in terms of multiple regression models, adjusted R-squared gives an even better measurement. Given that there is a modest drop between R-squared and adjusted R-squared, this also gives one the impression that the model is not too complicated, which suggests that predictors only contribute meaningful explanatory power as opposed to noise. Standard Error of the Estimate is 12,913.84; in other words, average distance the observed values fall from the regression line. Goodness of fit cannot be said directly; however, the better the fit generally is usually because a standard error smaller means the closer to the predicted values actual values are. The model presented an extremely strong relationship that connected the predictors (Farmer Suicides, Rural Unemployment, and Income) to the dependent variable. With a high value for both R-squared and adjusted R-squared, the model is an appropriate representation of the explaining dependency for most of its variability. The predictors here may very well be effective as predictive elements. Thus the standard error, although potentially substantial, would have to be viewed in the light of the size of scale used to define the dependent variable.

Table 3: Analysis of ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.51985333677.404	3	17328444559.135	103.908	.000[b]
	Residual	3168579266.422	19	166767329.812		
	Total	55153912943.826	22			
a. Dependent Variable: Govt Expenditure						
b. Predictors: (Constant), Farmer Suicide, Rural Unemployment, Farmer IncomeDependent Variable: Govt Expenditure						

Table 3 presents the ANOVA information of the Regression model, that used the predictiors like Farmer Suicides, Rural Unemployment and the Farmer Income to be dependent "Govt. Expenditure". Regression Sum of Squares = 51985333677.404 Thus, the sum represents an amount that indicates how all the variability in Government expenditure is attributed by this Regression model in using its respective predictors. A larger Regression SS in comparison to the Total SS would mean that the model absorbs most of the variance in Government Expenditure. Residual Sum of Squares 3168579266.422: This represents

residual or unexplained variance of the dependent variable by the model. It tells how much of the variance, which cannot be explained by including all the predictors, is left behind. Total Sum of Squares (55153912943.826): Total variation of the dependent variable Government Expenditure without the help of any predictor. Sum of Regression SS and Residual SS Regression df (3): Number of predictors of the model include Farmer Suicides, Rural Unemployment and Farmer Income. Residual df (19) : N−k−1N - k - 1N−k−1, where N is the number of observations and k is the number of predictors and there are 23 numbers of observations and 3 predictors. This is total degrees of freedom for errors. Total df (22): This is the total df, N−1N - 1N−1. Regression Mean Square = Regression Sum of Squares ÷ Regression df. It is the average amount of variance explained per predictor. Residual Mean Square = Residual Sum of Squares / Residual df, representing the average unexplained variance. The F-statistic tests a hypothesis that the regression model gives a better fit to data than an intercept-only model. An F-value of high magnitude means that the model is significantly better than the intercept-only model. A high F-value, like 103.908 here, is a good indicator that it is statistically significant. Sig. is the p-value of.000. This is a sign that the probability to get so high F-value by the chance is essentially zero for a standard chosen significance level of 0.05. Hence, in totality, this regression model is statistically significant, and we can refute the null hypothesis that the chosen predictors cannot explain the variations in the Government Expenditure variable. The ANOVA results indicate that the model, with Farmer Suicides, Rural Unemployment, and Farmer Income as predictors, explains a significant portion of the variation in Government Expenditure. The high F-statistic and extremely low p-value (Sig.) indicate that the predictors collectively have a statistically significant impact on Government Expenditure, and the model fits the data well

Table 4: Impact of different Coefficientsa on dependent variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	191550.635	41158.460		4.654	.000
	Farmer Income	9.517	2.679	.501	3.553	.002
	Rural Unemployment	-7428.403	2774.081	-.171	-2.678	.015
	Farmer Suicide	-8.788	2.355	-.508	-3.731	.001
a. Dependent Variable: Govt Expenditure						

Table 4 shows (Constant) = 191550.635: This is the intercept term, which means that if all predictors were zero; that is, Farmer Income, Rural Unemployment, and Farmer Suicides, then the model would predict a Government Expenditure of approximately 191,550.64. In the real world, it is fairly common that an intercept is a default value that has no actual interpretation when the predictors cannot reasonably be set at zero. Farmer Income: At all other things constant, Government Expenditure increases by 9.517 units for every additional unit increase in Farmer Income. The positive coefficient also gives a direct relationship between Government Expenditure to the Farmer Income. Rural Unemployment: For one unit increase in Rural Unemployment, Government Expenditure reduces by 7428.403 units, at all things remaining constant. This negative coefficient suggests that Rural Unemployment is inversely related to Government Expenditure. Farmer Suicides (-8.788): For every one unit increase in Farmer Suicides, Government Expenditure will decrease by 8.788 units, given other variables are held constant. This negative coefficient means that Farmer Suicides are inversely related to Government Expenditure. This represents the standard error of each coefficient that gives the average amount which the coefficient will vary in expectation due to sampling variability. The more precise estimates of the coefficients are provided by the smaller the standard errors. As an illustration, the standard error for Farmer Income is 2.679, thereby implying some variability in the estimation of its effect on Government Expenditure. The Beta value stands for standardized coefficients and strength of every predictor to the dependent variable, that is how much by its value standard deviations contribute towards the Government Expenditure. The beta of Farmer Income = 0.501: this one is moderately positive with strength impact. Rural Unemployment (-.171): It has a Beta of -0.171, and that effect is weaker as it happens to be inverse upon Government Expenditure about other predictors. Farmer Suicides (-.508): It has a Beta of -0.508, which implies the fact that it shows an intensive negative effect upon Government Expenditure in standardized units, slightly stronger than that effect of Farmer Income. The t-statistic tests whether each coefficient is significantly different from zero, meaning whether the predictor has a statistically significant effect on Government Expenditure. (Constant): The t-value is 4.654 with a p-value (Sig.) of.000, meaning it's highly significant. Farmer Income (t = 3.553, Sig. =.002): This coefficient is statistically significant ($p < 0.05$), meaning Farmer Income has a significant positive effect on Government Expenditure. Rural Unemployment has a statistically significant relation: t = -2.678, Sig =.015, meaning there exists significant negative effect between rural employment and government spending Farmer suicide has a significantly significant outcome: t= -3.731 Sig. 001, so again; it has a strongly adverse consequence on government expenditure Summing up, farm income exercises a strong positive impact significantly that has a substantial significance level on government spending. The results also reveal that rural unemployment has a weak, though significant, negative impact. Farmer suicides have an incredibly high, negative and significant impact on government spending. Therefore, all changes in the three variables that determine government

spending-Farmer income, rural unemployment, and farmer suicides, which were discussed earlier-represent significant statistical predictors for this government spending.

Discussion

The conclusion drawn from this analysis offers insight on changes in the government expenditure in agriculture, institutional credit and livelihood security in India. The trends in government spending show the spendings towards food security and rural development where allocations like ₹ 1,32,000 crores in the union budget 2022-23 are being spent on essential sectors like irrigation, crop insurance, MSP etc. But the practices revealed that the reliance on subsidies as a form of incentive rather than investing in infrastructure of agriculture imposes questions marks over the longevity of growth. The realization of investment towards higher-productive investment is important to enable enhanced resilience in the agricultural production system.

A study of the core programs like PM-Kisan and the Agricultural Infrastructure Fund (AIF) clearly accentuates the government's efforts to meet basic liquidity issues and also recognize funding requirements relating to infrastructure of farmers. While PM-Kisan has direct income support for small and marginal farmers, the AIF is a giant leap towards the future – reducing post-harvest losses, improving the farm gate prices and incomes through better infrastructure. However, these should be followed by efficient public investment for capital in rural infrastructure for the initiatives to work.

This, in fact, goes to show the significant role of institutional credit in the sector of agriculture. As this study demonstrates, availability of formal credit improves farmers' capacity to fund purchase of inputs and technologies thereby increasing production and earnings. However, smallholders and tenant farmers still lack institutional credit because collateral is the major requirement. Although it has facilitated credit delivery such as Kisan Credit Card (KCC), there is a need for finer tuned interventions for farmers to fully access credit.

In this paper, livelihood security is defined and supported by the level of agricultural yield, and other institutional assets such as credit and transportation. Improved food production not only helps to provide food security to the heads-of-households but also boosts up income levels particularly seen in high producers like Punjab and Haryana. But as you indicated, the vulnerability of the Odisha and Jharkhand farm households, specially in rain fed areas imply that larger and more location-specific initiatives require implementing.

Lastly the connections between government expenditure, institutional credit, farmer suicides, and livelihood security clarify that agriculture cannot be tackled in isolation but rather as a multifaceted problem that requires a corresponding solution. The success in the northwestern states like Punjab and Haryana also documents how the public sector, credit access and supportive policies can work in unison to improve agricultural returns and make farmer's future more secure. Nonetheless, there are two principal issues that remain unresolved and pose risks to the future growth and development of India's agricultural sector: Firstly, the suboptimal use of capital and human resources; secondly, the systematic exclusion of smallholder farm businesses from formal credit markets.

Conclusions & Recommendations

The outcomes of this research such as the one unit increase in employment with 7428.403 unit increase in government expenditure with all other factors remaining constant, reveal the several intricacies of government expenditure in agriculture such as its positive relationship with livelihood security of the farmers in India and inverse relation with unemployment. The information also shows that although the government seeks to increase credit facility, many farmers in the rural areas are still selective in acquiring institutional credit, largely due to concerns about repayment and lack of understanding of the terms. Furthermore, expenditure incurred in agriculture has increased but it is far from being efficient due to problems like delayed disbursement of funds and inadequate measures for small and marginal farmers. Hence, farmers rely on non-institutional credit markets mostly due to high interest rates even though immediate credit is preferred by borrowers rather than long term credit.

This study also emphasizes the importance of emphasizing the enhancement of the efficiency of implementing credit solutions that match the farmers' needs in the regions where the productivity of the agricultural sector is still low. The conservative attitudes observed in financing activities result from structural factors and traditional skepticism about borrowing in the agricultural sector require to develop an integrated and open-form financial system. Thus, the institutional support can be strengthened and improved to make farmers more resistant to the future uncertainties of income and to guarantee them a safer income.

The development of educational programmes on credit facilities and their management will ensure that the farmers are in a position to take good financial decisions. empower farmers to make informed financial decisions. Raising confidence in institutional credit systems may, therefore, be realized through specific impulses as well as community and literacy crusade as may be suited for the rural folks. To enhance the awareness of these programs and to encourage people to approach the banks for formal credit, it is proposed to work jointly with local NGOs and cooperatives to launch these programs in local languages; engage banks to provide extensive digital support and to open their doors through 'open house' days. Simplifying lending procedures and reducing formalities in credit offerings will encourage farmers to engage with institutional credit. Organizing credit facilities in such a way that they can easily repay at reasonable interest rates will improve borrowing by small and marginal farmers. Introduction of these micro loan products in respective areas, coupled with government and microfinance subvention to absorb cost of recoverable expenses will enhance access and accelerate the uptake of formal credit. Since debt is considered taboo in most rural areas, it is essential

to counteract that through communication.rs to make informed financial decisions. Increasing confidence in institutional credit systems can be achieved through targeted workshops, community outreach, and literacy programs tailored to rural populations. Partnering with local NGOs and cooperatives to deliver these programs in local languages, supported by digital resources and "open house" days organized by banks, will further promote awareness and build trust in formal credit options. Efficient mobilisation and allocation of agricultural funds, especially during input sensitive periods will lower costs for farmers especially during critical input periods, will reduce high input costs for farmers. It can also guarantee that all the targeted beneficiaries receive the funds on time through a central tracking as well as reporting system. The requirement of public audits and the setting up of an emergency release procedure will enhance the proper utilization of the funds as well as enhance the transparency to benefit the agriculture sector. Offering subsidized interest rates and flexible repayment terms for introductory loans will foster a new generation of borrowers and encourage young farmers to consider institutional credit. Measures to encourage cautious borrowing and spending, including the development of appropriate policies, the provision of guidance for experienced borrowers to assist first-time borrowers, and cooperation with local cooperatives, will enhance confidence and credit responsibility. To decrease the level of engagement in the informal credit market, policy makers need to subsidize the banks' activities and offer affordable credit products and prevent the presence of predatory lenders. A centralized tracking and reporting system can ensure that funds reach targeted beneficiaries promptly. Mandating public audits and establishing emergency release protocols will further support efficient fund use and increase transparency, ultimately benefiting the agriculture sector.

Improving these areas will foster a sound financial climate that fosters agricultural development but also shields farmers from financial vulnerabilities to strengthen, diversify, and modernize the agricultural sector.

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