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REVIEW ARTICLE **OPEN ACCESS**

Productivity Determinants of Agriculture in Different Regions of India

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ABSTRACT
Agricultural development is an essential component of total economic growth. Agriculture was the primary source of national revenue and occupation in India at the time of independence. Two significant issues confronting India today are directly related to agriculture. The first is satisfying the ever-increasing population's demand for food and other agricultural goods. The second goal is to reduce widespread poverty in rural regions. In India, three agricultural productivity indices—land productivity, labor productivity, and aggregate productivity—have been used to assess and map productivity trends. In terms of production, there are significant geographic disparities. Identification of productivity patterns and the variables behind them can aid in improving agricultural production if development efforts focus on reducing the limitations limiting output in potentially promising locations. The primary goal of this research is to investigate the short and long-term impact of various variables on agricultural productivity in India. The purpose of this research is to identify and interpret regional agricultural production patterns in India. According to the report, the government should take the initiative for non-product-specific assistance to main inputs such as organic fertilizer, power, and irrigation, as well as stimulate private investment in the agricultural sector to increase agricultural output, which would go a long way toward agricultural growth.
KEYWORDS:*Agriculture, Applications, Farmers, Farming, Independence, India, Labour, Productivity.*

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INTRODUCTION

In the practice of financial expansion of a reduced amount of developed countries such as India, farming plays an important role. Farming, in addition to providing food for a country, frees up labor, saves, and contributes to industrial market commodities and profits from foreign trade. In a country like India, there is a great deal to improve in agricultural productivity. It ensures food stability, establishes the overall economy's growth prospects, and reduces labor migration. In poor and developing countries too, the growth in agricultural productivity helps alleviate poverty. The salaries of farm workers often increase as farms become more profitable.

They generate more revenue, which will improve their well-being, for food and other items. Several studies suggest that Indian hunger and malnutrition could be eradicated and become a major global provider of food grain by achieving greater productivity than others[1].Moreover, an increase in agricultural production in an area ensures that scarce resources are more efficiently distributed. With the introduction of new techniques, more efficient farmers will benefit from a rise in their welfare, while farmers not productive enough will leave the market for other countries to succeed. In the direction of the economic situation ofIndian, agricultural productivity is thus important[2], [3].

In Southeast Asia, the aim of maintainable agricultural growth is especially significant. The social and economic growth of Southern and South-East Asian countries have long been of particular concern to agriculture, which has only led to the creation of jobs, the improvement of foodpreserving as well as poverty reduction within such 2 regionsas South East Asia as well as south Asiahas seen faster development as well as systemic shifts in recent years. South Asia and Southeast Asia had a mean GDP growth rate of 5.5- 6.3 percent per year, respectively, from 2003 to 2016.Nearly 50percent of the total of India's national revenue was produced by agriculture and related sectors. Around 72percent of the total

current employment was involved in farming. These confirm that perhaps the Indian market only at the time of Independence was primitive as well as the farming market. The share of the agricultural sector in total domestic income decreased from around 50percent of the total in 1950 to 18 percent between 2007 and 08 after 61 years of independence[4], [5]. Today, however, more than a 60percent of employees are involved in agriculture. Nevertheless, it must be observed that the development of several other companies as well as the market as a whole depends on something like an interesting detail mostly on the output of farming. Farming as well as associated activities accounted for almost 50percent of the total of India's national revenue.

Around 72percent of the total workforce is involved in agriculture. They indicate that perhaps the Indian market at the time of Its independence was indeed a reverse farming economy[6]. The agricultural contribution to the overall nation's-economy decreased too!by8 percent in the year 2007-08 which used to be up from 50 percent in 1950 after 61 years of independence. But more than 60percent of the total population is still employed in agriculture today. Nevertheless, it should be observed, the development amongst all of the different areas as well as the total economical situation is depending in a significant way on farm output[7], [8]. An estimation of allocative efficiency has established numerous variables that impact profitability in agricultural production. In the discipline of microeconomics, the idea of marginal productivity is focused on the analysis of individual businesses rather than corporations and particular commodities. This indicates that a unit change in a certain input parameter results in a change in output. Since time series data are required with each unit, the concept of allocative efficiency cannot at this stage be suited for macro spatial data based on the assessment data[9], [10].

Whilst economic studies contributed significantly to the overall crop yield issues in India, they did not shed more light on regional differences in crop yields as well as on the factors that impact such differences. Few geographical studies are restricted to parts of India, restricted by analytical constraints, and are limited mainly to the identification of trends of land productivity.India has made significant strides in agriculture since its independence. In India's post-Independence era, Indian agriculture, which grew by about 1percent per annum throughout the 50 years preceding Freedom, developed by about 2.6 percent per annum? The expansion of the region seems to have been a principal cause of growth in the 1950s and 1960s, following a decrease over the period throughout the contributions of growing areas to crop yields, which resulted in increased productivity[11], [12]. The success in eliminating its dependency on imported agricultural commodities is another significant feature of agricultural development. In addition to success in terms of efficiency and production, the Agriculture sector has contributed to the structural changes. Several initiatives initiated by the Indian government lead to all the other advancements in the Agriculture sector. Some of these measures include land reform, the opening of the Agricultural Price Commission aimed at ensuring the rewarding prices of farmers, the latest Agricultural Policy, research and extension investment programs, lending facilities, and the development of rural infrastructure.

In 1966-67, a new agricultural policy was launched to achieve personality in farming. Applying technology and science to improve returns per hectare are the basic concepts of this approach. This policy is called the Green Revolution or Modern Agricultural Strategy;This is based on expanding high-return variants that are sensitive to heavy fertilizer dosages in the selected areas with healthy rainfalls or irrigation systems and the package of providing holistic. The new policy includes the programs:

- The high return program for varieties;
- Numerous crops plan and similar policies,
- Integrated production for dryland areas;
- Steps for plant protection;
- Increasing use of fertilizers;
- The principle of modern agriculture.

Lawmakers, analysts, and economists pay close attention to both the prevailing nature of agriculture and the lesser interest pattern in farming. The key negative consequence including all sustainable agriculture policies would be that no specific governance structure for Indian agriculture is available. Since agriculture is a biological operation, the return activity is declining, since lands are essentially permanent output factors as well as demands to farms related commodities are not elastic revenue. Such features vary from other sectors of agriculture. A separate agricultural production strategy however needs to be established. This is because we did not know available for researching Indian farming characteristics. But we're far from Independence at this time and we already have long-term data on Indian farming. This study is therefore attempting to fill this void[13], [14].

The present paper assesses the success and development of Indian agriculture after independence in this regard extensively. The study analyzed sources of agricultural productivity as well as uncertainty in

Agricultural development to assess output and success in Indian agriculture as well as comparing facts and figures. The study frequently discusses the effects of decarboxylation including its crop yields using the method of output functions.

Concepts as well as Measurements regarding the Farming Productivities

Profitability in agriculture is a measure of how efficiently inputs are utilized to create a product. Productivity is considered to be maximal when a combination of inputs produces the maximum output.A farmer's relative output among farms, amongst methods of cultivation as well as between geographical areas can also be compared by measuring crop production. Comparing efficiency is conducive to modern growth and also provides support for decision-making in management and design. Because of the generalized absence of studies in nations on the impacts on agricultural efficiency [15], [16].

Almost nothing is known about just how production differs across national averages and how and when it can be increased in less developed countries.The output ratio to all inputs used in the manufacturing process is an accurate indicator of productivity. Therefore, the calculation of this proportion entails the issue of adding several final goods and services to individual indices. This is the main source of conflict in deriving productivity indexes[17]. Geographers face the additional problem of lack of data at an appropriate scale in performing spatial analyses of agricultural productivity.

For instance, in small civil units such as regions, home counties, and districts, data on certain inputs used throughout crop yields, except land and labor, is often unavailable. Thus, geographers must have utilized mean agricultural productivity or perhaps some variation of crop yields including crop region to calculate crop productivity. So far, their work is limited to analyzing minimal crop yields (land productivity). The geographers have neglected labor productivity, a more widely used measure. Regional labor efficiency differences are important from a poverty alleviation viewpoint.

Agricultural Policy: A Review

Since independence, several institutional and physical changes have been made for the general growth of international farming. The agricultural strategy implemented during this period may be generally divided into four periods:

- The 1st stages- 1947 to 1975,
- The 2nd phase- 1965 to 1980,
- The 3rd phase- 1980 to 1991,
- The 4thstages– 1991 to 92.

The initial stage in agricultural policy was the implementation of various land reforms, structural improvements, the building of significant water projects, and the strengthening of a cooperative credit institution.The productive forces have been released and the owner growers have done everything in their power to increase their yield. Increasing agricultural production in that phase, land reforms were significant. The Community Development Plan, decentralized planning, and intense areas development initiatives were also created during the British period, which had been stagnant during the British era. A pricing encouragement plan was adopted in 1964 to motivate farmers to move advantage of better technologies as well as the Agricultural Prize Committee was established to advise the government on fixing agricultural support prices. Although the Administration's institutional reforms and development programs throughout that period, India remained reliant on food for the increasing population in foreign countries.

A modern farming policy began in the mid-sixties throughout the second phase of Agricultural development. The new farming method is focused on highly productive plant varieties, multiple crops, packaging methods, modern farming practices, and water treatment systems. Self-sufficiency in the grains of food was the most important success of this policy. During the same time, farmers chose to retire, while the key concern of policymakers was any other factor relevant to agriculture such as the marketing of credit supply inputs, research, and support for technological adoption[18], [19].In the early 1980s, the third step of Indian farming began. The process of diversification started during this time, leading to a rapid rise in the nongrowable crop yields like poultry, milk, fruits, vegetables, fishery,etc. Subventions and agricultural support increased considerably over time when public sector expenditure on infrastructure growth began to decline in real-time, while farmers' investment continued to increase. Investments in agriculture were on the rise [20].

After the start of the economic reform process in 1991, the fourth phase of agricultural policy was initiated. The phase of economic reforms included deregulation, decreased intervention by the Government, and liberalization of economic activities. No direct reforms for agriculture have been undertaken, though sectors were indirectly affected via exchanges rates depreciation, foreign trade liberalizing, and industrial dis-protection.The opening up of the domestic market during this time was a further shift in agriculture, due to the new international trade agreement and the World Trade

Organization (WTO). This has brought the policymakers new challenges. In July 2000, the Indian government introduced a New Agricultural Policy. This aims to achieve effective use of resources produced at a growing rate of 4 percent every year within farming. Sustainably and equitably, it aims to achieve this aim. The government introduced a national agricultural strategy. The policy paper addresses how and when policy priorities and objectives can be accomplished in agriculture, but the corresponding phase is not addressed. It is therefore highly desirable, at both the central and the state level, to prepare action plans in quantity for the implementation of the new policy agenda within a time-bound setting[21], [22].

The land is the fundamental element in agriculture. An awareness of the pattern of land use is important to see whether the land use is at and quite away from the maximized potential of the nation. Land grading has its origins in farming stats in India. The Indian lands were widely divided in5 classes until 1950:

- Forest areas;
- Non-cultivating areas;
- Non-crop areas like existing ones follow;
- New fallow areas; and
- Net area planted.

However, it is found, that classifying didn't provide good pictures of real areaswithin various land use types needed for farming planning. As of March 1950, a reclassification was thus implemented. It now classifies land in India into nine different categories. This is as follows:

- Forest;
- Non-cultivating land;
- Land used in non-crop-growing applications;
- Farm waste;
- Various crops of trees or groves not covered by a net surface sown;
- Existing follows;
- Other follows;
- A net surface sowed.

A pattern of Farming Yields

Agriculture productivity in India is low relative to global averages, both in terms of production per unit area and employee, and has been for several decades. Perhaps the most significant agricultural productivity gain in India has happened in recent years, as the country transitioned from traditional farming to modern farming. Only a few decades ago, modern agriculture ushered in a new period of innovations in techniques and processing inputs. This change significantly enhanced the production of numerous crops per hectare, hence raising average agricultural productivity. The average yields of a variety of crops, however, remain lower than the global average and lag well below the industrialized countries of World Europe. The unequal distribution of new agriculture from one land and crop to another produces a significant shift in India's average production. Productivity has increased dramatically in some areas where modern agriculture has been implemented. In other locations, productivity has remained stable.

LITERATURE REVIEW

Many studies already attempted to determine the factors that contribute to crop yields and which factors affect performance more. Certain analyses have studied the effect on the efficiency of specific inherent advantages.

The effects of rural electrification on agricultural growth have been investigated by Barnes and Binswanger[23]. The study shows that the effect on crop yields by private sector investment in electric pumps in rural electricity is clear, according to data from 108 villages. The study indicates that investments are required for the development of infrastructure.

The sources of productivity growth have been studied by Rosegrant and Evenson and the rate for the returns to public investment in agriculture has been estimated[24]. The research utilized the Tornqvist-Theil index to calculate the assessment practices of the factor in 271 districts in India from 1956-87 for 13 countries. The study found that total-quality products have a positive effect on investment in farming, development, and business.

In the context of Palestine farming indicators, Abugamea is looking at a complex analysis using econometric techniques in time series[25]. The study used implementation procedures from Johansen - Granger to estimate long-lasting relationships between variables and used the ECM model to track short-lasting dynamics. The researchers found that perhaps the impact of capital on crop yields is substantial and also that the effect of labor on crop yields is positive. In the report, why investment had an adverse impact was not stated. The only factors were 2 variables and all the other factors were ignored.

Prabha et al. studied the pattern including its U.P. crop yields composites infrastructure index and technical variables such as fertilizer[26]. It also analyzed the effect on agricultural production of independent variables of architecture, integrated technology, and infrastructure component. The research used Cobb-Douglas equation regression analyses. The study found that in Uttar Pradesh during the green revolution, agricultural productivity improved. Infrastructure development has fluctuated sharply.

The empirical correlation involving crop production as well as some macroeconomic indicators in Nigeria is studied by Brownson et al.[27]. Agricultural GPV has been taken as that of the proportion for aggression GDP and macroeconomic indicators such as aggregate exports, external strategic factors, deflation, each capita Gross domestic product, foreign debt, inflation rates, marginal exchange rates, consumption expenditure, etc. The research employed the test scenarios protocol Engle-Granger and Johansen to analyze the long-term association of time series variables. Complete export, external reserve, inflation, and external debt are found to provide an adverse effect on agricultural output comprising in the long along with short run. However, the frequency of utilization of manufacturing capability and the nominal exchange rate has an important positive connection to crop yields

And using the car reactionary dispersed lag, Hussain and M. Ishfaq have investigated the consequences of various determinants on Pakistan's agricultural total factor productivity growth[28]. This study shows a positive effect on aggregate demand forfertilizers, human resources (education of farmers), and agriculture credit. However, there have been only a limited group of factors in this study as well as the position of agricultural research and development, and public and private investments in Pakistan are silent.

The rural development impacts on agricultural output were studied by Adepoju and Salman[29]. In this analysis, primary data were used and a statistically significant and positive effect on profitability was observed by farm size, household work, and several years spent at school. Multi-stage sampling processes were used to obtain data from one hundred and sixty subjects throughout the regions of its sample through systematic survey questions. To illustrate the impact of a physical supply on farmers' profitability, descriptive statistics, as well as the overall improving the organization framework, are being used to conduct the analysis obtained.

Obeng *et al.* analyzed the role of crop yields in Kenya of macroeconomic factors.The study found that a one-percent rise in the labor force resulted in a decrease of 0.655 percent in agricultural production, which also contributed to an increase of 0.0046 percent in agricultural production and a 1percent rise throughout the actual exchange rate led to a growth of 0.084 percent in crop output[30]. Eventually, a 1% rise in real GDP growth resulted in a 1.058% reduction in agricultural output. Nevertheless, that analysis found the positive effect of inflation as well as real exchange rates for farming as well as labor development with a per capita actual GDP on farming.

Between 1990-2011, Singh and Kaur studied facilities' influence on the development of crop yields in Punjab[31]. For research, the thesis employed an exponential rate of development and interrelation matrix. It found that, over the period, the exponential growth rates in wheat output and market arrivals were 1.35% as well as 2.79%, and agriculture sector and market arrivals were 2.60% and 3.07%. The findings show that there are positive interrelationships between the number of regulated markets, overall capacity storage, amount of financial institutions, and the number of cooperative banks to increase crop yields.

FARMING DEVELOPMENT AND ITS IMPORTANCE

In the study- theoretically, it is an interesting problem to connect governance to both the policy of redistribution, including such agrarian security. The purpose of this study was to examine the relationship between agriculture and national structures to explain and separate the position of government as well as the performance of resource security and government powers institutions. Two primary assumptions are supported by the empirical results. First, it has been shown that their security standards are higher in other more multicultural, democratic nations following monitoring the complementary environmental benefits, the economic base as well as developments as well as fiscal acquisition restrictions. Nevertheless, democracy is indeed not essential to understanding security since it is of low predictive power as well as the quantitative value of improvements to requirements is not that robust.

Amongst many 3 efficiency steps, there seems to be a lot of structural agreement. The study also shows that in some areas of India, there seems to be considerable potential for rising agriculture. In two different cases, high agricultural productivity occurs. In the Northwest, Gujarat, and South Karnataka, there is strong agriculture, a higher current level, significantly larger resources, and a reasonable population size.The situation in Tamil Nadu and the communities of western Bengal is very varied: strong

agriculture, high levels of labor supplies and different levels of input, limited possessions as well as a dense population. There is a positive body setting in each of these situations, but in the first, the environment created by the human being is more desirable than in the second. The most significant aspects of successful production rates are the considerations applicable to both classes of areas, i.e., agricultural methods as well as a greater amount of input. This inference is consistent with fact although strengthened either by findings of the correlation.

In 2 distinct cases, poor efficiency often exists.It is mostly owing to technological restrictions or insufficient moisture availability in Rajasthan, central India, and the coastal areas of Maharashtra and Karnataka. East Uttar Pradesh, Bihar, and Kerala appear to have stronger cultural constraints6. In this case, the significant population pressure on the land resulted in relatively tiny holdings and high labor levels, despite no increase in the number of inputs purchased. A high labor contribution in small holdings leads to lower yields on different inputs, particularly on work. Smallholder farmers in east Uttar Pradesh and Bihar seem to be unable to access sufficient increases in yield resources, majorly attributable to loan limitations. They're never deserving of consideration due to various limited current assets. It is therefore lower in consequence since its production is predominantly oriented towards sustainability. Those who therefore use labor-intensive equipment to create sufficient reduced feed grains.

There seems to be an urgent need for us to expand irrigation services and the procurement of fertilizers, as well as to improve financial assistance, to enable small-scale farmers to prosper from either the production capital available. Further extension of desalination plants throughout communities where they would be currently insufficient, although costly, would improve productivity.Also, small community wetlands or abandoned unused undeveloped land that contains rainfall will improve employment substantially. The reduction from some crops can be even more completely offset by significant increases in population.

- There seems to be a significant necessity for population changes from agricultural to non-agricultural operations in thickly policed eastern states. This should contribute to increased holdings as well as lower the incidence of reducing vehicular.
- In this study, the importance of population expansion indicates that agriculture would benefit from a decentralized strategy of economic renewal. This would also contribute to shifting the community from farming to non-farming. Part of the workforce in rural India, with some kind of level of restructuring, should be used profitably to support the modernized cottage industry, which produces simple but much-needed products.
- In rural India, farming salaries remain embarrassingly low and haven't risen to almost the same level as the standard of rent. Agricultural productivity increased significantly, however, revenues were not transferred to employees. Agrarian incomes in many regions are required to enhance labor productivity.

CONCLUSION

Our findings show, however, that the increase in agricultural productivity in southern and southeastern Asian States is driven dramatically by capital investment, urbanization, and advancement in cultivation. In comparison, agricultural imports and income levels were significantly negatively correlated to growth in agricultural production. Development, as well as preservation of crop yields, go hand in hand.It is therefore important to concentrate on either the land or water natural resource system that forms the basis of farming development. To support important inputs such as fertilizer, power, and irrigation the Government should undertake more expenditures on a non-product basis and also encourage private investments in the agriculture process to promote agricultural output in long term. The government must therefore focus on access to electricity by supplying more power to every rural and backwater province in the country, where farming is the primary source of livelihood, both in the long term and then in the short term also played a vital role in raising profitability. More importance also must be given to the cultivation and irrigation of groundwater. Since private investment in the agricultural sector has a long-term positive effect, the authorities should implement measures to promote private capital in the farming industry, including foreign direct investment.

This study not only reinstates main livestock performance development strategies but also compensates for a lack of earlier research focusing primarily on South and Southeast Asian territory by giving a comprehensive picture of agricultural product development and its causes in key South and Southeast Asian countries. Instead of using the non-parametric approaches like those used in prior findings, while evaluating efficiency and quality, any use of Sustainable Food and Agriculture (SFA) offers the value of accounting for and adjusting for graphical glitches including observational uncertainty, and the emergence of new results. Moreover, the results of this study may be a beneficial notion through which

lawmakers may set targeted goals and processes to ensure agriculture's continuous expansion, as well as farming and farming throughout numerous locations can the community provide and improve technological advancement, therefore encouraging farming consumer spending throughout the south and southeast Asian locations following the objectives outlined throughout the report.

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CONFLICT OF INTEREST
The authors have no conflict of interest

AUTHOR CONTRIBUTIONS
Dr. AnuNarukaand Dr. Amit Kumarconducted the research, analyzed the data, proposed the methodology, and wrote the initial draft; Dr. Heenamodified and supervised the initial draft; Dr.Ranjana, Dr. Rajeev Kumarsupervised the research and wrote the final version of the manuscript. All authors had approved the final version.

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