ISSN 1819-1894

Asian Journal of Agricultural Research

http://knowledgiascientific.com

Knowledgia SCIENTIFIC
A Place to Publish Outstanding Research

OPEN ACCESS Asian Journal of Agricultural Research

ISSN 1819-1894
DOI: 10.3923/ajar.2026.1.9

Review Article
Productivity Enhancement in Indian Agriculture: A Diagnostic Approach

Ram Krishna Mandal

Department of Economics, Cooch Behar Panchanan Barma University, Cooch Behar, West Bengal, India

Abstract

The efficiency with which resources, labor and land are used to create agricultural outputs is known as agricultural productivity. In essence, it is a measurement of the amount of output generated for a specific quantity of input. The aim of the study is to explore the challenges and their remedy for agricultural productivity. Different published and unpublished research articles, papers, books, government reports, etc., on agricultural diversification have been consulted. Even though India has an agrarian economy and agriculture plays a major role in both GDP and jobs, the country's agricultural productivity is still a major problem. Since more than half of India's workforce works in agriculture, low productivity has an impact on food security, national economic growth and rural life. India's low agricultural production can be attributed to a number of complicated variables that interact in different ways. Even though over half of India's population makes their living from agriculture, the nation's agricultural output has remained relatively stagnant in recent years. Strategies to address these problems and increase agricultural output are crucial given the difficulties posed by a lack of arable land, climate change, fragmented land holdings, antiquated farming methods, etc. India's agricultural productivity has to be increased by a multifaceted strategy that tackles issues linked to technology, finances, the environment and policy. India can greatly increase agricultural productivity through implementing contemporary technologies, expanding financing availability, making infrastructural investments and encouraging sustainable farming methods.

Key words: Agricultural diversification, agrarian economy, workforce, arable land, climate change

Citation: Mandal, R.K., 2026. Productivity enhancement in Indian agriculture: A diagnostic approach. Asian J. Agric. Res., 20: 1-9.

Corresponding Author: Ram Krishna Mandal, Department of Economics, Cooch Behar Panchanan Barma University, Cooch Behar, West Bengal, India

Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

To enhance agricultural productivity in India, it is important to first focus on what the challenges are along with possible solutions to the challenges. Agricultural productivity is defined by the effectiveness of how resources, labor and land are combined to generate agricultural outputs, or, put simply, it is the amount of output produced with a given amount of input. Agricultural productivity has served as a useful tool to delineate the geographical patterns or distributions of agriculture. A number of academics have sought to quantify and characterize the spatial patterns of agricultural outputs. This research strives to create an alternative metric of agricultural residential productivity. The "Average Productivity Index" (API) enables one to study spatial patterns of productivity at either the state or national level. The two components of the API are the average yield and the harvested area of the state or national average. According to the OECD, "A volume measure of output divided by a volume measure of input use is a common definition of productivity". At its most basic level, productivity captures the amount of output produced by a given target group (nation, industry, sector, farm, or nearly any target group) that can be developed from given inputs and resource combinations. Productivity can be measured at the single unit (farm, commodity), or collectively on any geographic scale. The final decision in measuring productivity should depend on the investigative goal. If the purpose is to compare agricultural productivity, micro-based measures are needed, for instance[1].

Macro measures are necessary if a national agriculture policy is to be evaluated at a national level and this is also in parallel with not only the national economy but in the sector itself. While the intended purpose may differ, the challenges in measurement related to identifying the various indicators remain the same. There may also be different information required for measuring different indicators, however, in the case of measuring indicators like productivity at the output and input levels, both of which should have some monetary value related to them, are likely to require a little more. For instance, measuring the productivity for the farm level of one commodity and input (e.g., the labor productivity of maize farm households) may require only basic output numbers and input information, however, when aggregate measures are created, they require inputs and outputs be valued[2,3].

As an nation of the agricultural activity, agriculture is essential to improve food security for the many, but is also has great significance for the function and advancement of other non-agrarian sectors of the economy as the resources agriculture has to provide raw materials and products in exchange value[4]. The agricultural improvement and developments of a country or region depend largely on enabling the cultivation and production of multiple crops of the agricultural economy[5]. India's agricultural achievements and necessity have gained recognition on a global scale. Indian agriculture illustrates the different revolutions in staple food, livestock and fisheries that have transformed the country from a food-scarce country to a food-surplus and exporting nation[6].

The findings of the study will help policymakers, agricultural planners and extension workers to understand the problems faced by marginal, small and medium farmers and its solutions of agricultural modernization in India and thereby they will take actions.

The aim of the study is to look into and consider the challenges and their remedies of agricultural productivity.

MATERIALS AND METHODS

Methodology: This study adopts a qualitative and analytic design, using qualitative secondary data sources, to explain the barriers to agricultural productivity in India and to propose solutions. Due to the dynamic and multi-faceted nature of agricultural productivity, the methodology is structured to not only document the range of structural issues, but also to gain an understanding of the depth of the various and sometimes overlapping themes that arise within existing literature.

Design: The study has an exploratory-descriptive design. It is exploratory in nature because it explores different areas of barriers such as technological gaps, infrastructure bottlenecks, financial exclusion, soil quality degradation and climate vulnerabilities. It is descriptive in the sense that it attempts to provide evidence and consolidated information to systematically understand the barriers and potential solutions. This dual focus makes the research appropriate for policy considerations and academic reflection.

Data sources: The study is exclusively based on secondary data. To develop an all-encompassing perspective, a diverse array of data sources was reviewed, including.

Academic literature: Books, peer-reviewed journals, research papers focused on agricultural economics, productivity statistics and research, rural development and environmental sustainability.

Policy documents: Government of India reports, statistical handbooks, white papers published by the Government of India, the FAO, the OECD and other agencies.

Empirical evidence: Past field studies, evaluations and case studies on agricultural circumstances, soil quality, irrigation and adoption of coding.

Unpublished materials: Doctoral dissertations, working papers and institutional reports that can give micro-level understandings.

Data collection and review strategy: Relevant literature was identified, screened and reviewed systematically. The databases JSTOR, Science Direct, Springer Link and Google Scholar were searched systematically using the search terms: agricultural productivity in India; agrarian economy; soil health; climate change and agriculture; and, sustainable farming practices. After the initial screening for relevance and trustworthiness, the reviewed studies were analyzed for the present data about the key productivity factors. The data was thematically organized for analytical conversation.

Analytical framework: The study employed thematic content analysis that grouped the literature insights into broad themes: Technological adoption, financial/credit access, infrastructure constraints, environmental constraints and policy failures. Comparative analyses were also employed to compare India's experience with that of other developing nations (notably irrigation efficiency, climate-resilient farming and institutional reform). When quantitative references were available they were included to support the qualitative claims to add a degree of balance to the analytical approach.

Measurement parameters: In general, farming systems in developing countries tend to be somewhat heterogeneous. Farmers often mix subsistence production with cash crops and other forms of production. Productivity is only recorded to an adequate measure when all production generated on the farm is counted, which includes secondary crops, by-products and food surplus not consumed. Measurement of production can be more complicated in developing countries, since the practice of mixed cropping is common and abused. Mixed cropping is when more than one crop is grown simultaneously in the same unit of land. The greatest barrier to measuring productivity in developing countries is undercounting production and yield, simply for not counting secondary crops and by-products[7]. This concern is especially relevant to Sub-Saharan Africa. A classic example[8] suggested that for Niger returns to labor (which they operationalized as labor productivity in monetary terms) only counted the main crop, 20% lower than returns when productivity from the main and secondary crops are included into the overall measure. Another example of trouble accounting farm production, relates to horticulture products on-farm. Count will vary, due to crops generally occupying less area than grains or cash crops. Most likely this is a consideration when producers start dabbling into a variety of new products such as fruit and vegetable products.

Because of high potential value and relative importance, horticultural goods need to be included in farm output calculations[7]. Another cause of output being undervalued is the lack of consideration for crops that are inputs to other production processes. An output will need to be accounted for as an output for the crop enterprise when it is used as an input in another enterprise (for example, hay for feed), or agricultural output measurement will be inaccurate, along with micro productivity and profitability measures[9].

RESULTS AND DISCUSSION

Challenges faced by the Indian farmers for the causes of low agricultural productivity in India: While India is an agrarian economy and agriculture is a major contributor to GDP and employment, agricultural productivity remains a serious issue in India, as over 50% of the workforce is in agriculture, which has implications for food security, national economic growth and rural livelihoods. Many complicated factors interact in various ways to create India's low agricultural productivity and some of the main causes of low agricultural productivity in India are shown in Fig. 1 and thereby explained.

Minimal incorporation of new technology: Use of new technology throughout the agricultural sector has been slow in several regions, including rainfed areas, even though the Green Revolution bolstered food production (but little productivity improvements as compared to that witnessed in the G.R.) in India.

Smallholder agriculture: A large part of agriculture in India is categorized as smallholder or family farm operations. Productivity improvements are limited in bookkeeping part plausibly because those farms are smaller and because smallholder farmers do not have access to modern technology (i.e., irrigation systems, mechanization and high yielding cultivars)[10]. Absence of technology: High cost of technology, lack of infrastructure and poor extension services have prevented the wide use of drones, satellite imagery, or more advanced agricultural practices.

Limited access to finance and credit: Limitations on secured loans: India's smallholder farmers endure problems associated with acquiring loans, high interest rates and poor collateral, in

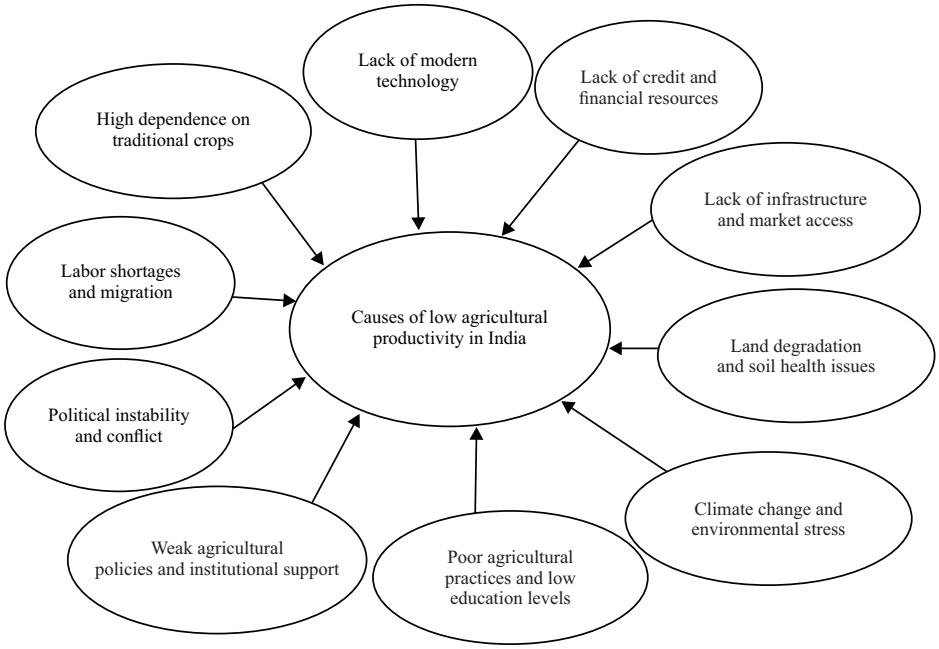

Fig. 1: Different challenges for agricultural productivity

particular rural banking systems with limited infrastructure. This exclusion from formal finance limits smallholder farmers spending on modern financial inputs (i.e., machinery, fertilizers and pesticides)[11].

Dependence on informal lenders: Many farmers must depend on informal forms of credit, typically money lenders, who charge high interest rates. The reliance on informal lenders places a cycle of debt on farmers and limits investment in agricultural production[12]. Loan waivers and erratic policies: Some state governments offer loan waivers, but they do not ensure sustainable growth of the farming operation. They do not address the structural constraints to obtaining funding for farmers.

INADEQUATE ACCESS TO MARKETS AND INFRASTRUCTURE

Poor rural infrastructure: Rural areas of India often endure poor infrastructure such as inadequate road networks, erratic power supply and poorly maintained storage facilities. These issues promote post-harvest loss and make it difficult for farmers to move their products to market[13].

Poorly constructed cold storage facilities: The absence of cold storage facilities for perishable goods (such as fruits, vegetables and dairy products) produces considerable waste and diminishes the end profitability of agricultural output.

Market inefficiencies: Price instability and lack of market access for farmers are also facilitated through the intermediaries that are part of the agricultural supply chain. The absence of effective and transparent mechanisms for markets reduces production incentives by both diminishing farmers' bargaining power and lowering farmers' overall wage value.

DETERIORATION OF LAND AND SOIL HEALTH

Soil erosion and nutrient depletion: Unsustainable agricultural practices (such as monoculture, over-application of synthetic fertilizers and limited crop rotation) have led to serious erosion of soil and depletion of key nutrients in the soil under India's agricultural practices[12].

Reduced arable land: The rising and unending demand for land is driven with considerable urgency because of sustained urbanization and population growth that has ultimately resulted in the fragmentation of agricultural holdings and complex agricultural productivity systems. Over time, the average land holding in India has been diminished and this has ultimately reduced the possibilities of positively influencing large and efficient agricultural production systems for significant quantities of food that will be necessary to assure food security[11].

Over-reliance on chemical fertilizers: The excessive use of chemical fertilizers has created shifts in soil nutrients, lowered organic matter levels and continuously reduced soil fertility, resulting in negative implications for agricultural productivity.

CLIMATE CHANGE AND ENVIRONMENTAL STRESS

The vulnerability of Indian agriculture to the negative impacts of climate change is particularly alarming, as the nation's agricultural sector is largely rain-fed. This means that any changes in rainfall distribution, increased temperatures and extreme weather events such as droughts and floods have shattered traditional agricultural practices and thus, created volatile crop yields[3]. One of the major and urgent issues currently confronting the Indian agricultural system is the critically serious issue of water scarcity. This is most apparent in a number of states but especially alarming in states like Punjab, Maharashtra and Rajasthan. In these areas, the worrisome rates of groundwater depletion have reached dangerously alarming levels and are a major and considerable roadblock to sustainable agricultural management for sustainability and productivity over the long term. The ongoing reliance on irrigation systems along with a lack of water resource manageability, has created tremendous pressure on existing water systems[13].

Moreover, India has been subjected to extreme weather conditions rising in frequency and intensity such as erratic cyclones, brutal heat waves and prolonged drought, all of which cumulatively compromise the guarantees of agricultural productivity. In vulnerable communities, food security and economic viability are impeded by large yield losses arising from the unpredictability and erratic nature of climate, especially in rain-fed agricultural areas and marginal cropping areas already primed for those stresses.

POOR AGRICULTURAL PRACTICES AND POOR EDUCATION

A large proportion of the agricultural population in India is at risk of lacking fundamental technical knowledge and risk, through inadequate training and education, inefficiencies across the range of agricultural production activities. This is usually evident in the application of agricultural inputs in excessive and incorrect volumes; a disappointingly low adoption of best farming practices; and unsustainable land use practices[11], all of which lead to productivity losses.

Moreover, the educational levels of farmers, especially those in rural areas, are very low, which adds to the problems and troubles in an already troubled agriculture system. Many of these farmers are still largely ignorant of any new crop management knowledge, improving soil health knowledge, or water conservation knowledge, which will put another obstacle in the path of achieving overall productivity and sustainability in farming. In addition, the agricultural cohort, located in rural India, is hesitant to change pre-disposed to traditional agriculture because of its historical imprinting and more stability supporting evolving agriculture practices that are changing with the situation evolving with the environmental condition. The cultural context that can support evolving agriculture related to current situation and environment is made more mediocre by the cultural context surrounding skepticism and the distrust expressed within the traditional practice of agriculture, which often reinforces the aversion to new farm practices that may lead to agricultural transition.

LACK OF INSTITUTIONAL SUPPORT AND WEAK AGRICULTURAL POLICY

While they have developed and implemented many farm policies that are creating increased productivity by implementing policies such minimum support prices (MSP) and fertilizer subsidies, many policies do not resolve the generational activity of low agricultural productivity, because they focus almost exclusively on immediate short-term production outcomes without adding the long-term implications of developing agricultural sustainability. Policies, particularly in agriculture, must be holistic and sustainable, in order for the poly to generate sustainable farm level practices[12].

India has made significant progress in agricultural research and development, however, the means, mechanisms and processes for sharing the results of that research and the technological innovations based on research findings with the farming community continue to be inadequate and inefficient in expediting the benefits that could come from better communicating and using research in practice. Public research and development investment is not enough to ensure it is keeping up with the rapidly changing nature of the challenges farmers face with climate change and land resource depletion[13]. Coupled with this, the lack of appropriate and effective extension services severely limits farmers' ability to receive timely and useful information and expertise on modern agricultural practices or relevant government-sponsored initiatives aimed at supporting agricultural development. The lack of support systems eventually leads to declining farmer capacity to adapt and increase agricultural productivity in their farm operations, perpetuating inefficiency and stagnant agricultural productivity development, negatively affecting farmers and the agricultural economy.

POLITICAL UNREST AND CONFLICT

Political unrest in some parts of India, along with inadequate or often fragmented governance, has significantly deferred agricultural development in the area of conflict or civil strife. The Food and Agriculture Organisation[7] recognizes the effects of political instability on food production and food security. Agricultural processes in an unstable environment are severely affected by the forced displacement of farm communities from their homes, physical destruction of infrastructure and general unrest that significantly changes the agricultural landscape.

In addition, the inconsistent application of agricultural policies in states and regular political leadership transitions contribute to an unpredictability that deters long-term agricultural investments (these long-term investments require long-term commitments, which can contribute to agricultural productivity and sustainability). Aside from deterrent public investments - as interests become risk-averse - this ongoing agriculture policy instability severely reduces the private sector experience interest in the agricultural industry, which limits growth and development potential to occur in less uncertain settings.

LABOR SHORTAGES AND MIGRATION

The phenomenon of rural to urban migration in and of itself constitutes a significant challenge to agriculture productivity (as many of the younger males and females migrate to urban centers in search of better and more lucrative job opportunities) and creates a way greater and adverse labor shortage in the agricultural industry in rural settings.

The demographic alteration has exacerbated the preexisting difficulties associated with low productivity, which has been thoroughly studied and documented in academia[11] and establishing a clear, yet not necessarily simple association/relationship between shifting demographics, or demographic shifts and agricultural productivity. The increasing prevalence of old farmers, furthermore, adds a nuance to the demographics of the farming sector and contributes, exacerbating a complication of labor issues with fieldwork. We risk that the lack of skilled labor will undermine the adoption of innovations in farming practices necessary to increase yields and sustainability. The future of farming in the region is threatened as fewer young people move into agriculture.

RELIANCE ON CONVENTIONAL CROPS

Many Indian farmers still practice monoculture cropping systems that are widely used. These farmers have traditionally depended on staples like wheat and rice; however, relative to a more diversified cropping system, their yields of conventional staples are low and minimally useful for the overall productivity and efficiency of agriculture. By continuing to rely upon staple crops, traditional farmers are not wisely addressing climate variations that impact their fields and changing market conditions and likewise agricultural outcomes ultimately become inefficient use of land and limitations to productivity, as accurately noted[11].

Moreover, farmers' persistent lack of diversification of crops and their continued dependence on government procurement policies on staple crops like wheat and rice continue to constrain the overall productive capacity of agricultural systems in India. Therefore, it must be considered to reexamine agricultural systems to increase resilience and sustainability, because this limited diversification discourages innovation and reactivity and subjects farmers to greater levels of market risks and environmental vulnerabilities. The ability of agricultural systems to remain viable, applies to both the agricultural systems themselves and the farmers feeling the long term viability of their livelihood.

SOLUTION PATHWAYS IN ENHANCING PRODUCTIVITY OF INDIAN AGRICULTURE

Although more than fifty percent of India's total labor force remains as agriculturalists, productivity of agricultural systems in the country has become stagnant over the last several years. Solutions to these challenges and methods to enhance agricultural productivity are important to consider, given the challenges of diversity in arable land, climate change, small holders with fragmented land and technologies from before the green revolution. Below are some of the key potential pathways to enhance agricultural productivity in India, with evidence from best practice and research shown in Fig. 2.

Utilization of modern technology: Agricultural Precision: The use of modern technologies, such as drones, satellite images and various sensor technologies, is important to precision agriculture because these technologies are very valuable for optimizing introductions, such as water, fertilizer and pesticides that ultimately increase crop yield. Furthermore,

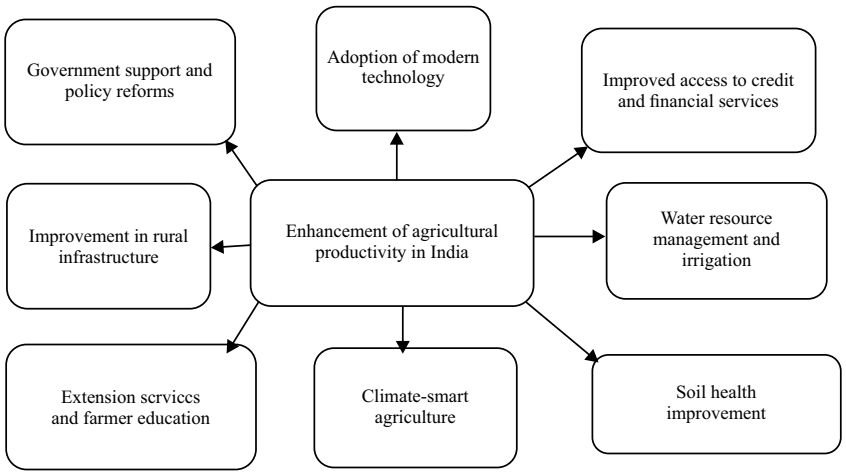

Fig. 2: Solution pathways in enhancing productivity

precision farming allows producers to observe what is going on with their crops, in real time and identify areas that may be performing poorly or not performing at all, to take targeted and properly supported action[11].

Development of improved seed varieties: The commitment of resources towards research and development activities for the development of seed varieties with high yield potential, climatic stress (drought) resistance and pest resistance should remain a focal point of agricultural activity. Evidence of this trend is provided by historical experience with an early challenge, the Green Revolution, which saw the widespread adoption of high-yielding varieties of rice and wheat, greatly improving agricultural productivity. It is possible that similar creativity was also once applied to a wider range of crops in later development cycles of modern agricultural practices[10].

Enhancing production through mechanization: The use of new or better farm machines and equipment, e.g., tractor, harvester, planter, could potentially enhance labour efficiencies and consequently reduce the time spent on traditional manual labour practices. Mechanisation is an approach that could significantly reduce production costs, if it works as is expected, it could develop production efficiency towards improving productivity of agricultural products or services, especially in those geo-spatial regions that struggle with labour shortages or availability of workers[13].

Increased access to credit and financial services: Financial inclusion for farmers: Several Indian farmers face constraints in farm production because of a lack of access to reasonably priced credit. Improved access to credit and insurance may also help smallholder farmers, who normally have limited resources, make vital investments in upgraded agricultural inputs, such as seed, fertilizer and necessary machinery, to enhance agricultural productivity[12].

Farmer-producer organizations (FPOs): Strengthening and promoting Farmer-Producer Organizations (FPOs) can be an effective means by which farmers can pool their resources, thereby reducing input costs and gaining access to critical credit. FPOs can also enhance farmers' negotiating power, which will help them to gain better prices for their product and subsequently enhance productivity-enhancing investments[9].

Subsidies and waivers of loans: While agricultural subsidies could help farmers in times of distress, such as during the recent COVID crisis, these subsidies need to be shifted toward subsidizing practices that enhance productivity, such as micro-irrigation, organic farming and sustainable resource management; this would be much better for agricultural practices in terms of sustainable, long-term practices than subsidies for low prices.

Water resource management and irrigation: Efficient water use for irrigation: A large share of agricultural production in India is highly variable due to reliance on the monsoon rains that may not be reliable from season to season. Given this, it is important to help farmers transition to using efficient water-saving irrigation technologies such as drip irrigation or sprinkler systems, which research has shown will optimize the use of water by minimizing loss, while still allowing for crops to be watered thoroughly during dry periods in water-short areas[4].

Rainwater harvesting practices: Development of rainwater harvesting practices is another important intervention that can support farmers in capturing and storing rainwater for irrigation during dry periods in the season. The potential benefits of rainwater harvesting are that it is seen as a means to relieve pressure on groundwater that is being overdrawn in some parts of the country, while also providing a more sustainable and certain source of irrigation water[11].

Conjunctive use of water: Min its water management approaches have been in integrating surface water management with groundwater, which holds another potential way to raise overall water levels in agricultural areas and increase available water in areas that do not have adequate irrigation or that have better irrigation systems and are under stress for more water.

Improving soil health: Sustainable land management: Sustainable farming approaches, like crop rotation, agro-forestry and organic farming. These sustainable farming practices will help to improve soil health and reduce soil erosion. Additionally, by helping to sustain land health, these practices also help to sustain productivity.

Increase in the use of organic fertilizers: In numerous regions of India, the excessive application of chemical fertilizers has resulted in a decrease in the quality of the soil. The benefits of composting and switching to organic fertilizers are an improvement in soil structure, an increase in water retention and an increase in soil health all leading to higher crop yields[9]. Nutrient management and soil testing: Providing farmers with soil testing devices and advice on managing nutrients can help get optimal use of fertilizers and improve soil fertility. These approaches would promote sustainable land use and help decrease excessive dependence upon chemical fertilizers.

Climate-informed agriculture climate-resilient crops: In light of the increasing unpredictability of weather patterns attributed to climate change, an important part of India's agricultural future will be to formulate and promote crop varieties that exhibit resistance to drought, heat and flooding[12]. Early warning systems and weather forecasting: One way that farmers can plan their planting and harvesting cycles and mitigate losses for negative weather conditions as well as prepare proactively for disasters such as floods or drought is through the implementation of, or recommendation of improved weather forecasting systems and early warning systems.

Agro-climatic zoning: By introducing climate-resilient farming strategies specific to regions based on agro-climatic zones, farmers can be assured that they are following climate-resilient best practices for the area in which they may be working. This would increase productivity while also alleviating risk from climate change[13].

Extension services and knowledge transfer in farmer education: Enhancing farmers' technical skills and knowledge requires improving agricultural extension services. Extension agents play a key role in educating farmers on how to best manage their resources, control pests and utilize sound agricultural practices[11].

Training and capacity building: Interventions that provide farmers with education about post-harvest management, financial literacy and new farming practices could significantly increase agricultural productivity. These extension programs need to be resourced better and provided resources to reach remote rural communities.

Use of ICT: Information and communication technology (ICT) is a suitable area to utilize in rural India to provide education and information sharing to help address knowledge gaps. For example, farmers may be able to have real-time updates on the weather, market prices and crop management methods from mobile applications and online platforms[13].

Improvement of rural infrastructure: Improved roads and transport: Investment in rural infrastructure, including roads, transport and cold storage, can mitigate postharvest losses and ensure agricultural products get to market in good condition[9]. In addition, adequate infrastructure can help to reduce transport costs and improve access of farmers to urban markets.

Processing and storage infrastructure: Reducing waste and improving farmers' margins can be assisted through the development of effective processing and storage infrastructure, particularly for perishable goods. Agro-processing industries in rural areas will provide rural employment opportunities, improve farmer incomes and add value to agricultural products.

Policy revisions and government support modifications to the minimum support price (MSP): The MSP policies provide a safety net for farmers, but need more adjustments to accurately reflect market realities and promote a spectrum

Smallholder farmers could benefit and agricultural production overall would benefit through diversifying crop procurement policies.

Agricultural policies should be long-term, consistent and promote sustainable, increased productivity and help protect farmers from external shocks. That is, consistent policies which give farmers continued incentives for improvement, educational activities, research and adoption of technology.

CONCLUSION

Increasing agricultural productivity in India calls for a multi-faceted approach that tackles issues associated with technology, finance, the environment and policy. By employing modern technologies, expanding financial access, investing in improved infrastructures and incentivizing sustainable agricultural practices, India can substantially increase agricultural productivity overall. In order to safeguard food security and the economy of the nation, the ability to incentivize agricultural growth must be carefully orchestrated across multiple levels and areas such that the government, farmers, researchers and industry can work facing or build this agriculturally supportive environment.

The chronically low levels of agricultural productivity in India stem from diverse interrelated issues that are constantly present in the hierarchy of factors surrounding this critical issue (technological constraint, financing constraint, infrastructure deficit and climate change effects and inefficient policy) and as India looks to address these unique issues, it cannot simply look to one intervention as a solution. Instead, a more integrated, holistic approach is required. Such an approach should include improving access to modern agricultural innovation, enhancing farmers' financial inclusion, making sizeable investments in rural infrastructure, creating sustainable land use practices and enhancing education and extension services that reflect the needs of farming communities. By addressing these interrelated issues, India can systematically improve agricultural productivity and therefore enhance food security and subsequently the income levels of rural populations and create a stronger, more prosperous agricultural sector.

SIGNIFICANCE STATEMENT

India's agricultural productivity remains critically low despite its large agrarian workforce, affecting national food security, rural livelihoods and economic growth. Addressing this challenge requires integrated solutions that overcome technological gaps, limited financing, infrastructure deficits, fragmented land holdings and climate stress. This study highlights the need for modern farming technologies, improved financial access, sustainable practices and supportive policy frameworks. Strengthening collaboration between government, farmers, researchers and industry can enhance productivity, elevate rural incomes and build a resilient agricultural sector in India.

REFERENCES

1. Ampa, T. and R.K. Mandal, 2025. Agricultural productivity and its trends in India: An empirical study. Agric. Arch. Int. J., 4: 50-55.
2. Ampa, T. and R.K. Mandal, 2025. Structures and problems for measuring agricultural productivity: An analytical study. Int. J. Hortic. Agric. Food Sci., 9: 17-25.
3. Fan, S., P. Hazell and S. Thorat, 2000. Government spending, growth and poverty in rural India. Am. J. Agric. Econ., 82: 1038-1051.
4. Coxhead, I., V.H. Linh and L.D. Tam, 2012. Global market shocks and poverty in Vietnam: The case of rice. Agric. Econ., 43: 575-592.
5. Dharmasiri, L.M., 2011. Measuring agricultural productivity using the average productivity index (API). Sri Lanka J. Adv. Social Stud., 1: 25-44.
6. Evenson, R.E. and D. Gollin, 2003. Assessing the impact of the green revolution, 1960 to 2000. Science, 300: 758-762.
7. FAO, 2017. The State of Food and Agriculture 2017: Leveraging Food Systems for Inclusive Rural Transformation. Food and Agriculture Organization, Rome, Italy, ISBN: 978-92-5-109873-8, Pages: 181.
8. FAO, 2017. Productivity and Efficiency Measurement in Agriculture: Literature Review and Gaps Analysis. 1st Edn., FAO, Rome, Italy, Pages: 77.
9. Diao, X., P. Hazell and J. Thurlow, 2010. The role of agriculture in African development. World Dev., 38: 1375-1383.
10. Sheahan, M. and C.B. Barrett, 2017. Ten striking facts about agricultural input use in Sub-Saharan Africa. Food Policy, 67: 12-25.
11. Lobell, D.B., W. Schlenker and J. Costa-Roberts, 2011. Climate trends and global crop production since 1980. Science, 333: 616-620.
12. Mandal, R.K., 2024. Aatmanirbhar Bharat in agricultural sector: A contemplative study. Res. Rev. J. Agric. Sci. Technol., 13: 41-48.
13. Owens, T., 2004. External support during the transition phase: Roles for humanitarian aid and development assistance from a village perspective. World Dev., 32: 1711-1733.