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Impact Of Technological Change In Agriculture On Agricultural Development

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Abstract

The main objective of this research study is to find out the impact of technological change in agriculture on agricultural development. The use of agricultural technologies determines how the increase in agricultural output impacts on poverty levels and development of the society. The introduction of new technologies and scientific methods (advancements) has made a monumental impact on the farming sector in recent decades. Its welcomed induction has not only made farming more sustainable and profitable, it has also dramatically reduced the manual workload placed on many farmers. Primary data is collected from farmers of Gwalior district to evaluate the impact of technological change in agriculture on agricultural development. Result shows there is positive and significant impact of technological change in agriculture on agricultural development.

Keywords: Technology, Agricultural Development, Farmers, Agriculture, Productivity.

Introduction

Advances in technology within agriculture have made a tremendous contribution to the lives of every human being in the world today, both economically and socially. It is not just an industry it is the foundation of our civilization. Agriculture provides us with the basic essentials for living, the food we eat, the clothes we wear, the materials inside of our homes and it also provides many people with incomes. Without agriculture we would have none of these, matter of fact we wouldn't be able to survive.

The introduction of new technologies and scientific methods (advancements) has made a monumental impact on the farming sector in recent decades. Its welcomed induction has not only made farming more sustainable and profitable, it has also dramatically reduced the manual workload placed on many farmers. An example of

this would be that today more complex high tech machinery does most of the typical jobs that need to be carried out by farmers. Nowadays a farmer can bale silage or hay in a fraction of the time that would have taken less than 40 years ago, not alone this but the impact of technology in agriculture is evident throughout the world.

Review of Literature

Evenson (1986), using time series data (1948 – 84) of Philippine agriculture, suggested that technological variables (modern varieties, research and extension programs) showed strong factor bias in favor of fertilizer and tractor use. Research expenditure showed a bias against labor use while extension and modern varieties use labor. Regional and national research showed the highest impact and provided highest rate of return to investment. Roads (infrastructure variable) had a substantial impact on use of input and output. Land reform also had positive impact on productivity.

Vernon W. Ruttan (1988) conducted a study on technical change and agriculture development. Study concluded that the lag in shifting from a natural resource-based to a science-based system of agriculture continues to be a source of national differences in land and labor productivity. Lags in the development and application of knowledge are also important sources of regional productivity differences within countries. In countries such as Mexico and Pakistan, differential rates of technical change have been an important source of the widening disparities in the rate of growth of total agricultural output, in labor and land productivity, and in incomes and wage rates among regions. Productivity differences in agriculture are increasingly a function of investments in scientific and industrial capacity and in the education of rural people rather than of natural resource endowments.

G.F. Sassenrath (2008) conducted a study on Technology, complexity and change in agricultural production systems. Technological advances have contributed to impressive yield gains and have greatly altered US agriculture. Selective breeding and directed molecular techniques address biological shortcomings of plants and animals and overcome environmental limitations. Improvements in mechanization, particularly of power sources and harvest equipment, reduce labor requirements and increase productivity and worker safety. Conservation systems, often designed to overcome problems introduced from other technologies, reduce negative impacts on soil and water and improve the environmental sustainability of production systems.

The literature reveals that adoption of improved technologies is the key to increase agricultural productivity and farmers' income (Matushcke *et al.* 2007; Subramanian and Qaim 2009; Duflo *et al.* 2011; Mason and Smale 2013; Kumar *et al.* 2020). Despite a very strong impact on the well-being of farmers, the adoption of improved technologies is low, especially in the context of developing regions and countries. Factors include awareness and knowledge about technology, access to credit and relevant inputs, risk implications and marginal returns (Feder *et al.* 1985; Besley and Case 1993; Morris *et al.* 2007; Barrett *et al.* 2010; Duflo *et al.* 2011; Kumar *et al.* 2017; Varshney *et al.* 2019). Factors include policy support, investment in agricultural

research and extension system, availability of infrastructure, and institutional arrangements for the delivery and benefit sharing of technologies.

Radhika Kapur (2018) in his study on usage of technology in the agricultural sector concluded that to feed the increasing population, it is essential to introduce modern and innovative techniques in the agricultural sector. New technologies are required to encourage the yield frontiers to an advanced stage, make use of the inputs resourcefully and diversify to a more sustainable and higher value cropping patterns. There are still deficits in the usage of technology. Yields per hectare of food grains, fruits and vegetables within the country are far the below global averages. Even India’s most productive states are behind the global average. Similarly, the productivity of pulses and oilseeds can be increased, through giving consideration to the seeds, soil health, pest management, crop life-saving irrigation methods and post-harvest technology.

Objectives of the study

1. To find out the impact of technological change in agriculture on agricultural development.
2. To identify the problems in technology adoption in agriculture.

Research Methodology

The population of this descriptive research study is farmers who use technologies in their agricultural practices. The study's respondents are found using the convenience sampling approach. The respondents' questionnaires are used to gather primary data, and the study's sample size is 120. Regression analysis is used to assess the influence of technology advancements in agriculture on the agriculture development, while reliability tests are used to gauge the consistency of the data.

Hypothesis of the study

H1. There is positive and significant impact of technological change in agriculture on agricultural development.

Data Analysis

Table No. 1 Reliability Statistics

Cronbach's Alpha	No of Items
.861	18

Using Cronbach's alpha, the reliability of the questionnaire was assessed using SPSS software. The reliability was found .861, which was more than the allowable limit and suggests the data is trustworthy for research.

H1: There is positive and significant impact of technological change in agriculture on agricultural development.

Table No. 2 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.640	.410	.409	1.95278	2.200

- a. Predictors: (Constant), Technological change
- b. Dependent Variable: Agricultural development

Table No. 3 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	75.040	1	75.040	9.191	.003
	Residual	3902.458	478	8.164		
	Total	3977.498	479			

- a. Dependent Variable: Agricultural development
- b. Predictors: (Constant), Technological change

Table No. 4 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.073	.729		19.300	.000
	Technological change	.299	.099	.137	3.032	.003

- a. Dependent Variable: Agricultural development

The equation for regression analysis from table can summarized as below

$$Y = a + b x + \text{error}$$

$$\text{Agricultural Development} = 14.073 + .299 (\text{Technological change})$$

The result of regression analysis shows that the F value is 9.191, which was sig. at 0% level indicating good model fit and value of t is 19.300, which are also significant at 0% level. R square value is .410, which indicates 41.0 % of variance in Agricultural development is explained by Technological change. Thus, our

hypothesis is accepted. This indicates that there is positive and significant impact of technological change in agriculture on agricultural development.

Conclusion

The study concluded with the fact that there is significant impact of technological change in agriculture on agricultural development. The introduction of technology in agriculture has led to a massive increase in food productivity as well as removing any concerns relating to a scarcity of food in the future. Advancements in technology such as crop sensors, irrigation systems and fertilizers have all helped crop yields meet their maximum potential, and variable rate technologies have also ensured that fields obtain the required amount of input that will as a result lead to huge increases in production. It has been well documented in recent years that food production will need to rise by up to 70% in many parts of the world within the year 2050 due to predicted increases in world population.

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