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Research Article

THE BENEFITS OF EDUCATION AND FARMERS' TRAININGS REGARDING AGRICULTURAL PRODUCTION IN PAKISTAN

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Abstract

Since Pakistan is an agrarian nation, over 70% of its workforce is employed in agriculture. Due to significantly lower agricultural productivity than previously, those who reside in or rely on the agricultural industry for their livelihoods are facing very serious issues. Due to their lack of education, Pakistani farmers face numerous difficulties in the agricultural sector. One of the main causes of Pakistan's poor agricultural production and growth rate is a lack of awareness of the problem. People in Pakistan are adopting outdated methods for agricultural production because they lack adequate knowledge of farming systems. The expansion of agricultural productivity is fueled by education. In addition to reporting on the development and current state of agricultural education in Pakistan, this study aims to forecast the future. A sizable section of Pakistan's population works in agriculture, which is regarded as the foundation of the country's economy. The goal of this study was to determine how education affects Pakistan's agricultural output. Since agriculture is the main engine of the nation's economy, agricultural education is an important component. There is a dearth of published research on the difficulties and effects of agricultural education in Pakistan.The purpose of this study was to close the gap in the literature and encourage more research. According to the estimation results of this study, agricultural production is positively impacted by education. Therefore, it is advised that effective steps be taken to raise educational standards, particularly in Pakistan's agricultural sector.

Keywords: Agriculture, Education, Impact, Agricultural-Production, Pakistan.

INTRODUCTION

As the world's population continues to increase, agricultural output must increase by 60% over the next 40 years to meet the demands of shifting dietary patterns and the rise in the number of people with the means to purchase higher-value foods (Popp *et al.,* 2014). The agricultural and food industries in a number of nations need to shift their practices and put more emphasis on quality as well as quantity. At the start of the 1990s, the Hungarian agricultural system encountered these difficulties (Toth & Ferto, 2017). Unfortunately, hunger and malnutrition are still major issues for both the populace and the agricultural sector in a number of nations or regions that are suffering from them due to political unrest, soil erosion, climate change, a lack of technical agricultural education, advanced agricultural systems, or other causes (WHO, 2018). In developing nations, agriculture is the primary tool for poverty alleviation and increased food security (Afari, 2001). There are two types of agriculture in the world. The first one is the inefficient, low-productivity agriculture of emerging nations, which is mainly for sustenance, and the other is highly efficient agriculture of industrialized nations, which has great capabilities for production and high output for workers (Egenti, 2020). Since the middle of the 18th century, advances in biology and technology have led to a consistent increase in agricultural output worldwide (Eric *et al.,* 2014). The foundation of Pakistan's economy is agriculture. The growth of agriculture and the nation at large depend on increasing food crop yield (Perveen & Shahbaz, 2024).

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The agricultural sector's output must be increased to the highest possible level in order to fulfil the demands of the expanding population (Shah *et al.,* 2010). Several agricultural colleges, faculties, and universities were founded for this reason in order to provide skilled labour for improved farm productivity through the use of the newest technology and research discoveries (Amjad *et al.,* 2023). Many public universities and colleges currently offer graduate and postgraduate agricultural science courses, enhancing the ability of rural men to pursue careers in agriculture (Moroda *et al.,* 2018). Despite the structural shift towards industrialization, the agriculture sector appears to remain the foundation of the Pakistani economy. With a contribution of 21.8% to GDP, it has employed 44.7% of all employed workers (Rehman, 2023) (GOP, 2008-09). For the majority of people living in rural areas, it is their primary occupation (Khurshid *et al.,* 2024). Changes in agriculture output have a big effect on Pakistan's economy's employment and balance of payments. Except for a few years, Pakistan's agricultural growth has been sustainable (Ali & Safdar, 2022). With 30% of the region's population, Pakistan is the most populous nation in the Eastern Mediterranean (WHO, 2018). Approximately 68% of the population lives in rural areas, and this number is growing by 2.6% annually (Safdar, 2024). The foundation of the nation's economy is agriculture. It has been identified as the primary source of income for 66% of the nation's population. It employs 43.4% of the labor force and contributes 20.9 percent of the GDP (Afzal, 2023). These days, climate change poses a serious threat to Pakistan. The effects of climate change pose a serious threat to agricultural crops and livelihoods. Due to its detrimental effects on food security and human health, climate

change disproportionately affects the poorest populations (Habib *et al.,* 2022; Huq *et al.,* 2004). One significant area of the Pakistani economy is agriculture. About 70% of Pakistan's population lives in rural areas, where the majority of people rely on agricultural production (Zahra *et al.,* 2017; Anowar, 2010). One efficient way to combat poverty and promote sustainable development is to invest in human capital (Abraham & Mallatt, 2022). Programs for agricultural education, extension, and training make sure that farmers who need it most receive information on new plant varieties, technology, and cultural practices, which promotes a nation's sustainable development (Kamal *et al.,* 2022). A nation's socioeconomic and technical progress are topics covered in agricultural extension education (Nugroho *et al.,* 2021). As industrialization progresses and farmers' economic circumstances improve, the quality of agricultural inputs, their management practices, farm products, and value-adding techniques will all continue to evolve. In light of this, the agricultural extension curriculum must occasionally be adjusted to meet the evolving demands of the agricultural industry (Liu & Wang, 2022). Since education is crucial to a country's economic and human growth, its significance in all facets of human endeavor cannot be disputed. Numerous studies conducted worldwide have demonstrated that education is the most effective means of reducing poverty in the agriculture sector as well (Li & Wu, 2022). This is due to the fact that the likelihood of falling into poverty decreases as education levels rise. Globally speaking, a country's ability to advance depends on how well-educated its citizens are. Numerous research have determined that education is the fundamental component of all societies. The best investment a nation can make to create a prosperous, just, and healthy society is in education (Abbas *et al.,* 2024). Additionally, education has a big impact on farmers' hourly wages, and education policy can have a big impact on reducing poverty (Ninh, 2021). The average or highest level of education in a home increases its income (Bai *et al.,* 2021). Due to a lack of investment in education, small farmers in developing nations are unable to adapt to the changing global landscape. Farmers who participate in Farmers Field Schools may experience both short-term and long-term advantages. The significance of education in agricultural development has been generally acknowledged since Lundahl's (2021) groundbreaking work. According to Birol et al. (2024), education improves farmers' farming ability and productivity. It allows them to adhere to written guidelines for the application of appropriate and suggested chemical and other input dosages (Uzaifa, 2024; Kafando, 2023), Salam et al. (2023), Jacquet *et al.,* (2022), Dharamshet al, (2023), Duraisamy (1992), Ram (1980), Singh (1974), and Young & Deng (1999) are just a few of the studies that have demonstrated that education has a substantial influence in increasing agricultural output (Bhoi *et al.,* 2021).

Significance of the study

Pakistan's economy is centered on agriculture, and a number of issues negatively impact the sector's output. In analyzing how education affects agricultural productivity, this work is crucial. It also provides information for future research approaches that look into similar issues in the study. This study's primary goal is to determine how education contributes to Pakistan's agricultural output. The Muzaffargarh district of Punjab, Pakistan, is the site of this study because it produces important agricultural products like wheat, cotton, sugarcane, and others. This study is crucial for determining the issues facing the agriculture industry.

Research aim and Question

Our primary focus in this research was whether or not new technology and advancements in the agricultural industry mattered. The study's goal was to determine how education and training can help to Pakistan's agricultural production.

Overall objective of the Study

The study's main objective was to ascertain how education may be utilized to increase Pakistan's agricultural output while also investigating the effects of education on the country's agricultural industry.

Scope of the study

This study was conducted in Punjab, Pakistan's Muzaffargarh. The primary goal of the study was to determine the variables influencing agricultural productivity in the chosen region of Pakistan. In Pakistan, agriculture serves as the foundation for all individuals. The implications and ramifications of agricultural productivity are only attempted to be covered by the researcher in the case of Muzaffargarh, Punjab, Pakistan, where the necessary data is accessible. Finding the elements that can be crucial in optimizing agricultural output was the primary concern of the researchers; for this particular study, our goal was to concentrate on the significance of education in Pakistani agriculture.

Limitation of the study

Numerous prerequisites must be met in order to investigate a problem and identify potential solutions. Additionally, conducting certain types of study requires the use of sufficient and trustworthy data and information. However, while doing this investigation, the researcher ran into a lot of problems. The most frequent ones were respondents' refusal to supply sufficient information, a lack of verified secondary sources of data, and a lack of time for academic running.

THEORETICAL FRAMEWORK

The Human Capital Theory

In part, human growth is about individuals and groups bettering their own lives and taking charge of their own fates. According to Afari, (2001), education is widely utilized as a tool for social transformation. The foundation of this concept can be found in Theodore Schultz's methodical articulation of the human capital theory of development in the 1960s. According to Schultz, knowledge and population quality are the main factors influencing humanity's future well-being. Human capital theory, as stated by Theodore W. Schultz, is the idea that people acquire knowledge and skills as capital through vocational and technical education. Such capital produces revenue and is the result of carefully thought-out investments (Schultz, 1972). According to human capital theory, investing in people benefits both the individual and society as a whole financially (Nafukho *et al.,* 2004). The foundation of human capital theory is the idea that formal education is extremely important even essential for increasing a population's potential for output. In summary, human capital

theorists contend that a population with higher levels of education is more productive (Olaniyan & Okemakinde, 2008). The focus of human capital theory is on how education boosts employees' efficiency and productivity. The presumptive economic return of education investment at the individual and societal levels served as the foundation for the attraction of the human capital theory. According to the theory, a country's human resources rather than its capital or material resources are what ultimately define the nature and rate of its economic and social development. The foundation of human capital theory is the idea that formal education is extremely important, if not essential, for increasing a population's capacity for output (Adedoyin, 2005). To put it briefly, the theory's proponents contend that a population with higher levels of education is also more productive. Since it is generally acknowledged that education produces better citizens and raises the general standard of living in a society, the emphasis on education as a capital good is related to the idea of human capital, which highlights the importance of skill development in production activities (Hussain & Byerlee, 1995). The most common explanation for the economic worth of education is found in human capital theory. Three considerations support the rationality of investing in human capital, according to Babalola (2003):

- The right portions of the information that previous generations have previously gathered must be passed on to the younger generation.
- It is important to teach the next generation how to apply existing knowledge to create new products, new production techniques, and social services.
- Individuals must be inspired to use innovative approaches to create completely new concepts, goods, procedures, and techniques.

MATERIALS AND METHODS

Research technique is a crucial part of every study or research effort since it gives the investigation direction. It is a thorough plan for conducting research that starts with the objectives and focal points of a study (Weber, 2017). The methodical procedures a researcher follows from the time they identify a problem until they arrive at a conclusion are referred to as methodology (Kumar, 2018). For this mix method study, a questionnaire was developed to meet the objective of our study, reading articles and conducting unstructured interviews and observations were also the main methods of data collection. The study concentrated on how education can affects Pakistan's agricultural output or development. Farmers in Pakistan's rural areas were questioned for this purpose. To get better outcomes, the farmers engaged in a thorough dialogue regarding education and its contribution to Pakistani agricultural production.

RESULTS AND DISCUSSION

In results section, this study looked at how education affects agricultural output. The analysis of this study indicates that education significantly affects agricultural production, meaning that the more education offered in a certain location, the higher Pakistan's agricultural output will be (Shah *et al.,* 2009). The study's conclusions demonstrate that in order to support and achieve the goal of rural development, the government should build more schools in rural regions. This would increase agricultural output, which will ultimately lead to rural development (Tilak, 1993), (Reimers & Klasen, 2013).

Table 1. Socioeconomic characteristics

Variables	N	Minimum	Maximum	Mean	Standard deviation
Age of respondent	50	28.00	58.00	46.60	7.92
Professional Experience in Agriculture	50	5.00	33.00	19.46	6.98

Source: Survey, 2025

Table 01 Indicates the basic information of the respondents in the selected Area and it shows that they were highly matured in their fields and results. One of the most significant economic sectors in developing nations is agriculture. Because so many people live in rural areas, it is also important from a sociological perspective. Rural people's right under the economic reform must be upheld, and their lives and position must be improved. Rural people do have a range of duties in the global agricultural systems (Swanson *et al.,* 1989).
Pakistan's educational standards are incredibly low. Few people have graduated or obtained a master's degree, and most people in many places have less than 10 years of education (Khalid & Khan, 2006). They must, however, be completely conscious of the issues they encounter. They know their problems and how to solve them.

Table 02 explains overall perception of farmers regarding advancement in Agricultural sector, educational reform in Agriculture of Pakistan, and their opinion that either education can change their agricultural lives or not and the results clearly defines their positive attitude towards this objective. More than any other medium, electronic media and communication tools have a significant influence on educational settings (Kumar *et al.,* 2003). Numerous academics and social scientists have conducted studies and confirmed that farmers and other stakeholders have a better comprehension of the adoption of pertinent knowledge (Gamon *et al.,* 1992; Faiola *et al.,* 2014). Their study's findings show that extension educators use a variety of instruments and media to inform the farming community about new technologies. The use of contemporary communication techniques significantly raises farmers' awareness levels.

Table 2. Farmers Perception regarding Agricultural Education/Awareness

Are you in favor of giving educational training to farmers?			Do you think that agricultural trainings are beneficial for agricultural production in PAK?	
	Frequency	Percent	Frequency	Percent
Strongly disagree (SD	00	00.00	03	06.00
Disagree (D)	04	08.00	04	08.00
Neither agree nor disagree (N)	05	10.00	07	21.00
Agree (A)	13	26.00	21	15.00
Strongly agree (SA)	28	56.00	15	30.00
Total	50	100.0	50	100.00

Source: Survey, 2025

It seems that the main factor contributing to TV's appeal is its ease of audience access. People's primary goal is to learn in the easiest method possible, which is why educational television shows offer this option (Chhachhar *et al.,* 2012). By raising labor quality, enhancing the ability to adapt to disequilibrium, and influencing the likelihood of successfully implementing innovations, education may directly increase farm output. In a technological or economic context that is changing quickly, education is considered to be the most crucial factor for agricultural productivity (Shultz & Philon, 1973). Despite Pakistan's agro-based economy, only 21.17 million of its 79.61 million hectares are under cultivation (Baig *et al.,* 2009).

Table 3. Your Agricultural Production after using Advance Techniques in Agriculture

	Frequency	Percentage
Better	32	64.00
Same	17	34.00
Worse	01	02.00
Total	50	100.00

Source: Survey, 2025

Table 03 indicates the results of trainings attended by farmer and it shows that training have positive impact on agriculture sector. Giving trainings to farmers for getting better results in agriculture sector is a positive sign. The majority of people in Pakistan are either directly or indirectly dependent on the agricultural industry, according to the country's Economic Survey. Sources of income generated by the farming sector. Agriculture and agro-based industries are the backbone of the Pakistani economy (Ozcatalbas & Akcaoz, 2010). People in rural areas are more likely to work in agriculture. Both men and women in rural areas make substantial contributions to the agricultural sector, which includes crop, animal, and cottage industries (Butt & Sultanl, 2010). Since education is crucial to a country's economic and human growth, its significance in all facets of human endeavor cannot be disputed (McGrath, 2010). Since numerous studies have demonstrated a positive and significant correlation between education and poverty reduction, it is also recognized that education is the most effective tool in the fight against poverty (Omoniyi, 2013). It has been noted that environmental, social, economic, and cultural development processes are not covered in the nation's agricultural extension education curriculum (Jolliffe *et al.,* 2022). A country's goals, requirements, and aspirations are reflected in a subject's curriculum (Shah *et al.,* 2010). It is possible to gauge a country's level of intellectual development and advancement by examining its curriculum. New knowledge and ideas are spreading, and the globe has become a global village (Shah *et al.,* 2009).

Conclusion

The primary goal of the study, which was conducted in Pakistan, was to determine how education contributed to the country's agricultural prosperity. According to the vicious loop theory, the results show that the economies of poor countries consistently lag behind those of rich countries. In these nations, things are getting worse and worse. Pakistan has a similar situation. Farmers are highly motivated to do work, but they lack the newest technologies, and irrigation systems are not as advanced to swiftly boost the nation's output. Numerous initiatives have been started in the nation to increase agricultural output, but none of them have been successful in reaching their goals. This is solely because the agricultural industry lacks updated technology and accurate information. Additionally, recent research has shown a strong and favorable correlation between agricultural productivity and education (Kabiru, 2020). Education has a variety of effects on agricultural productivity, first by encouraging farmers to adopt new technologies and then by enhancing their capacity to use the introduced technologies efficiently to increase output from available resources (Reimers & Klasen, 2013). According to Kabiru & Arshad (2019), education is also anticipated to boost agricultural productivity by improving the productive capacities of all producers through exposure to a more dynamic and systematic production system and by improving their capacity to select the ideal ratios of inputs and outputs.

According to Temu and Msuya (2004), television is seen as the most crucial medium for delivering information to the rural community residing in isolated regions of developing nations. The current study set out to examine how more exposure to the media improved the presentational abilities of research scientists.

The impact of human capital on agricultural productivity in Cameroon was also studied by Djomo&Sikod (2012), who concentrated on the relationship between agricultural productivity and educational attainment. According to the analysis's findings, agricultural output rises with each extra year of education and experience (Evenson, 1988). Furthermore, the study discovered that the degree of inefficiency is decreased by one more year of experience and one more year of schooling. Additionally, the study discovered that farmers' incomes improve with each extra year of education and experience (Kabiru & Arshad, 2019). Similarly, Ndour, (2017) investigated that how agricultural productivity impacted by human capital. The study found a strong correlation between technical efficiency and human capital. Similarly, Fielke & Bardsley (2014) investigated the significance of farmer education in connection to Australian agricultural productivity. According to the study, education generally encourages more critical thinking about the social and environmental effects of particular agricultural firms' actions. Therefore, it is crucial that we introduce the most recent advancements in agricultural extension into our curriculum in order to update it (Ahmad *et al.,* 2013). Therefore, it was crucial to record the curriculum, teaching, and learning methods used at the nation's agricultural colleges, assess their current state, offer guidance for the ongoing growth of agriculture extension programs, and create a resource for agriculture extension staff ((Yang *et al.,* 2022). The study in question was designed with the following goals in order to solve the aforementioned difficulties (Ashraf *et al.,* 2019).

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