

Sustaining Performance of Wheat–Rice Farms in Pakistan

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The unceasingly augmenting emission of greenhouse gases (GHG) has contributed substantially to the degradation of the key environmental parameters and the deterioration of performance of the agricultural sector globally. The food insecurity problem has been aggravated consequently. Due to a variety of economic and social issues, many farmers in developing economies use low-efficient and environmentally unfriendly agricultural practices. Adopting innovative technologies and practices linked with sustainable farming remains a complex issue across the developing world. In particular, financial exclusion and low financial literacy are commonly cited as the critical obstacles to achieving sustainable development.

financial institutions

credit

extension services

financial inclusion

sustainable agriculture

financial literacy

1. Introduction

The world population is growing at an alarming rate, while the dissipating effects of climate change are becoming more apparent ^[1]. This has significantly strained agricultural production, as many of the contemporary farming practices remain environmentally unfriendly and unsustainable, especially across developing and less developed countries ^[2]. Intensive farming aggravates the degradation of agricultural lands, depletes other environmental resources, and thus suppresses the productivity of the agricultural sector and endangers the global food security ^[3]. Those effects of unsustainable farming practices consequently threaten the social and economic wellbeing of people worldwide ^[4]. Soil fertility has declined globally over time. As the progressing climate change is transforming the longstanding agricultural production patterns, farmers are looking for more efficient practices that could allow them to sustain or even increase yields and reduce the environmental footprint of agricultural production at the same time. Several studies ^{[5][6]} recognize sustainable agriculture practices among the primary tools for improving the performance of the agricultural sector globally while also protecting the environment and generating income for farmers.

Similar to most of the developing countries, Pakistan has a dual economic structure with a mix of urban and rural economies ^[7]. The gap between the two is most notable in the disparity in the quality of infrastructure and services ^[8]. Those living in more populated and developed urban areas usually have access to better roads, running water, and educational institutions, while rural dwellers often lack opportunities of similar quality ^{[9][10]}. This disbalance is

especially apparent when incomes and consumption levels are compared between the two groups [11][12]. According to Zulfiqar and Thapa [13], the average rural household earns significantly less than the average urban one. In addition, rural households are more likely to consume less than their urban counterparts. This discrepancy highlights the need for more development and investment in rural areas of Pakistan. Otherwise, the country will continue suffering a divide between its urban and rural populations [14]. Pakistan's agricultural productivity has extensively relied on unsustainable and harmful practices, such as extensive use of inorganic fertilizers and pesticides, which have led to greenhouse gas (GHG) emissions [15][16][17]. The above tendency is particularly evident in the wheat and rice sectors, the two locomotives of Pakistan's agriculture [18][19][20]. The contribution of the agricultural sector to the country's GHG emissions has peaked at 44% (compared to the 24% contribution of the agricultural sector to the GDP) [21]. Meanwhile, the consideration given to the development of sustainable farming practices remains low. Therefore, there is an evident need for developing the solutions to address the rising demand for food and agricultural products while reducing GHG emissions [22].

Many scholars, including Ali et al. [4], Eton et al. [5], Ardic et al. [23], Lopez and Winkler [24], Wafula [25], Aro-Gordon [26], and Bongomin et al. [27], among others, have suggested that financial literacy and inclusion are consequential for sustainable business performance. However, the direct association between financial literacy, inclusion, and sustainable farming performance has remained under-investigated. Moreover, previous studies have also failed to incorporate the role of trust in extension services as a moderator between financial inclusion, literacy, and sustainable farming performance. Agricultural extension has been widely considered as a vehicle for encouraging the productivity and performance of farmers [28]. According to Feder et al. [29], the involvement in the extension practices allows farmers to reduce productivity differentials by increasing their knowledge and expertise and accelerating the technology transfer. Danso-Abbeam et al. [30] and Ogundari [31] reported positive economic gains across agricultural sectors from farmers' participation in the extension services programs. Economic, institutional, and farm-specific variables were estimated to significantly affect the farms' income. Until recently, extension has been financed mainly by the public sector [32]. However, due to a steady decrease in the farm population, substantial cuts have occurred in the public financing of agricultural extension services [28][33]. This process is particularly evident across developing countries, where the shift to self-supported extension services has highlighted the critical importance of access to credit [5][6], as well as the radical improvement of the financial literacy and financial inclusion among farmers as factors of rural poverty alleviation [34]. Still, there has remained an evident gap in the literature, which fails to relate financial access and literacy to sustainable agricultural performance development, particularly in the spheres of adaptation to climate change challenges [35], land quality issues [36], and the intensification of agricultural production and machinery [37]. The role played by financial actors in improving the financial inclusion of the rural population and businesses is essential for the economic and social development of Pakistan.

2. Financial Literacy and Sustainable Farm Performance

Financial literacy is an individual's ability to understand the concepts and tools associated with money and money management [23][25]. These tools often include the management of personal finances, investments, loans,

budgeting, and capital management. The knowledge of managing finances significantly impacts the performance of businesses [38][39]. Bongomin et al. [27] examined the role of networks in moderating the relationship between financial literacy and financial inclusion among poor households in rural Uganda. The study found that personal and professional networks play a significant role in financial literacy and inclusion. Other studies have also suggested a growing need for people to become financially literate [23][38][39][40]. Increasing consumer debt, bankruptcy, and low savings have highlighted business people's lack of financial literacy. Empowering poor households with financial knowledge and skills could help them make informed financial decisions and strategic choices in a drive to scale up the scope of financial inclusion [27]. As suggested by Babajide et al. [38] and Usama and Yusoff [39], financial literacy among the poor can help improve their financial decision-making abilities by increasing their awareness of financial issues and choices and giving them the basic skills they need to navigate the financial world. Furthermore, Ali et al. [4] found that financial literacy can help reduce information asymmetry in the market by informing customers about different financial products and services they may not be aware of. This, in turn, can help encourage them to avoid non-standard financial services, which may not be in their best interests.

Usama and Yusoff [39] demonstrated that financial literacy could significantly improve the economic performance of businesses. A resource-based theory suggests that a company's resources can give it a competitive advantage if they are rare, difficult to imitate, and essential to the customer's experience. While financial literacy and sustainable farm performance have not been linked in recent literature, the concept of sustainable agriculture suggests that increased literacy of farmers would improve the performance of the farms. According to Gao et al. [41] and Sikandar et al. [42], sustainable agriculture is about more than just sustaining farmers, resources, and communities. It is about promoting farming practices and methods that are profitable, environmentally sound, and good for communities. Sustainable agriculture is a vital component of modern agriculture and complements traditional methods and techniques [6][43]. It can be defined as farming practices that are sustainable and that allow people to meet their current needs in terms of food, clothes, utilities, and other agriculture-related products without compromising the ability of future generations to meet their needs. Overall, achieving sustainable development in the agricultural complex is based on understanding the long-term sustainability of ecosystems [42][43]. Thus, the ability of farmers to make financially sound decisions would allow them to invest in sustainable practices, equipment, and technology and lead to improved farming performance.

3. Financial Inclusion and Sustainable Farm Performance

Financial inclusion is a term used to describe the provision of affordable, timely, and appropriately regulated access to financial services and products to all categories of people to improve and promote the population's wellbeing. The usage, adequacy, convenience, product knowledge, affordability, and accessibility of financial services are some of the factors that affect financial inclusion. Financial inclusion emerged as a significant player in delivering financial services to the community and the disadvantaged poor at affordable terms and conditions. Financial inclusion has several benefits, including access to credit, improved opportunities for savings, and improved financial literacy [26][44]. Financial inclusion also aids in poverty reduction and inequality and promotes economic growth [45]. Financial inclusion leads to the provision of increased access to financial services for individuals and

communities that have been ignored in the past, leading to the creation of opportunities for poverty reduction. Providing access to formal banking services for communities such as farmers can allow them to save, invest, and have access to credit options, which improve their financial and economic situations and promote overall economic growth. The government and financial sectors need to create an enabling environment, which supports the capacity of financial service providers. This can be achieved by designing affordable products and services that identify and address market demands, which support financial inclusion [46]. For example, agricultural technology is improving in Pakistan, and innovative Fintech applications and services enable innovation and access to financial tools within the agricultural sector [3][13]. Lopez and Winkler [24] argued that financial inclusion could become difficult to sustain because formal financial institutions have difficulty staying afloat due to an unfavorable business environment and increasing transaction costs.

Moreover, De Ollouqui et al. [47] suggested that most people who face financial exclusion are located in rural areas—these typically include low-income groups with lower levels of financial literacy. Several risks are associated with rural environments, such as lower rates of formal property ownership. This may reduce the range of collateral security options and affect the quality and coverage of the available infrastructure [24][48].

As demonstrated by Sikandar et al. [49], agricultural financing differs from other forms of financing, so it is important to understand this distinction. This knowledge is essential for borrowers looking to repay loans. The agricultural sector presents financial institutions with unique risks and challenges, which must be considered when providing access to financial services. These risks include lower yield, illness, injuries and accidents, and other product life-cycle risks. Timely and sustainable access to credit is essential for agricultural development. Still, financial institutions must be aware of the unique risks associated with the sector to provide adequate services. Moreover, access to credit is a significant feature of financial inclusion and plays a significant role in the development of sustainable agriculture. Gashu et al. [50] and Anshari et al. [51], among others, suggested that improved financial inclusion will improve agricultural performance and aid farming households in developing sustainable agricultural processes.

4. Moderation of Trust in Extension

Credibility is critical regarding whether people will trust new technology and decide to adopt or purchase it. In countries where agricultural extension services are developed, these agencies play a crucial role in providing farmers with the information they need to change their farming practices [52]. Because state-run agencies are considered credible information sources, farmers are more likely to trust and adopt the new technology [53][54]. Credit is critical for sustainable agriculture, and a functional financial system is key to achieving universal financial inclusion—a feature in the SDGs [3][43]. Thus, access to credit and inclusion by financial actors is essential for developing sustainable agriculture practices. According to Babajide et al. [38], Aracil et al. [55], and Akram et al. [56], agricultural production has been in decline due to several different factors, such as the pandemic, falling prices of the raw material, inadequate infrastructure, inefficient marketing, and lack of technology, which leads to stagnant growth and development of the sector and also impedes the progress toward sustainability. Yusuf et al. [48] suggested that the access to financial service providers and bank branches has been a problem for smallholder

farmers and agriculturalists living in rural areas where banking services, financial assistance, and support from third party organizations are not readily available. Smallholder farmers have often stuck to subsistence agriculture because it is less risky and, therefore, not as profitable, meaning they miss out on the potential benefits of commercializing their agricultural efforts [57][58]. In light of the reviewed literature, agricultural extension services are helpful in spreading financial and non-financial knowledge to farmers and facilitating knowledge transfer, accelerating the acceptance of new strategies, such as sustainable farming, making them better managers. Therefore, it can be predicted that the farmers' trust in the agricultural extension services can help in improving financial decision making and raise the percentage of adoption of better practices. The increased literacy and inclusion in financial services can lead to increased use of sustainable practices, which is furthered by having trust in extension services offered by financial and other state-run institutions.

5. Theoretical Framework and Model Development

The idea that institutions are essential for sustainable economic development has been proposed by Acemoglu et al. [59] and Rodrik et al. [60]. Institutions are identified as actors who govern market participation and dictate the human environment that influences it. They play a fundamental role in stimulating sustainable growth, reducing poverty, and improving the performance of agricultural and non-agricultural units [55]. Asadullah and Savoia [61] determined that institutional reforms are a primary cause of social advancement and poverty reduction. The institutional theory explains the financial institutions' role in providing the knowledge of their services. The theory of financial markets as frictionless was disapproved by Ford et al. [40], who argued that a world in which organizations, networks, norms, and rules construct the parameters of the partnership between service providers and consumers was more accurate. The theory emphasizes the financial institutions' role in providing the knowledge to improve behavior among consumers of financial services. Having financial knowledge is critical for making sound financial choices. According to findings by Wafula [25] and Bongomin et al. [27], a lack of financial knowledge is a barrier not only to food security but also to accessing financial services and products essential for economic growth and development in the country. Aracil et al. [55] argue that financial education should be part of the curriculum at the primary level, so that the rural community can acquire basic financial education, which can be employed in everyday practice. For the inclusion of the sustainability directive and ideology, financial literacy and inclusion are essential factors, which need to be addressed by the relevant institutions [6][38][62]. Thus, the rationale drawn from the theory is that financial actors and institutions should endorse equality and focus on the inclusion of various community members for growth and sustainability. The SDGs have appropriated sustainable agricultural development and financial inclusivity as imperial metrics. Therefore, the institutional actors should focus on implementing these goals for a harmonic, developed, and sustainable community. The increased presence of financial actors in the agricultural community would foster the farmers' trust in extension services and financial actors [51][63]. It would also lead to informed actions by the farmers, increase the inclusion and literacy rates, and therefore increase the adoption of sustainable practices. Thus, the institutional theory posits that financial and non-financial actors should perform their institutional role and make efforts to include farmers and the agricultural community, improve their financial literacy, and help them attain extension services, so that agricultural activities and output can become sustainable.

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