Role of Agriculture Sector in Economic Prosperity of an Islamic State: A Pakistani Perspective

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Abstract

Agriculture has been the backbone of Pakistan's economy historically and has contributed significantly in terms of GDP, employment and foreign exchange earnings. Agriculture remains a basic livelihood for most of the rural population of Pakistan, despite rapid industrialization and the growing importance of the services sector. The present study is an effort to investigate the multidimensional role of the agricultural sector for economic prosperity in the context of an Islamic state with special reference to the socioeconomic setting of Pakistan. The findings indicate that the agricultural sector of Pakistan, despite its strategic importance, is encountering several issues such as structural inefficiencies, poor infrastructure, water scarcity, and lack of access to modern technology and credit facilities. The study recommends that policy makers should emphasise agricultural reform by incorporating Islamic principles of resource sharing and cooperative farming into national policy. Investment in irrigation systems, rural education and microfinance institutions based on interest-free Islamic banking models is highly recommended. Also, there should be land reform policies for equitable distribution of land among smallholder farmers.

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Strengthening the agriculture-industry linkage and enhancing the export competitiveness of agricultural commodities are equally important for long-term economic prosperity in line with Islamic values of sustainability and social welfare.
Keywords: Agriculture, Economic Development, Pakistan, Islamic State, Rural Development, Descriptive Research

1. Introduction

Agriculture is the backbone of economy of Pakistan and its importance cannot be over emphasised. This sector is not only an economic pillar, but also a social lifeline, as a vast section of the country's population is directly dependent on it for their livelihood. Pakistan has the natural advantage of having large areas of fertile agricultural land and a variety of seasonal conditions, which provide a strong base for agricultural productivity (Khan et al., 2022). The sector also provides critical raw materials to several industries and plays a significant role in reducing poverty, which are both key objectives for any developing economy striving for sustainable growth.

In general, the agriculture structure in Pakistan can be classified into crop and non-crop sectors with different financing needs and cash flow patterns. The agricultural credit is being provided by conventional and Islamic financial institutions in both categories (Agricultural Credit Department IBD SBP, 2008). Generally, the credit facilities have two aspects. One is production financing which helps farmers purchase seeds, fertilisers, pesticides, labour and other inputs. The other is development financing which helps with the purchase of machinery and long-term farm investments. Farmers use short-term credit for their operational needs on a daily basis; medium and long-term facilities are used to meet larger capital needs (Moh'd et al., 2017; Saiti et al., 2018).

While there are provisions in place to assist farmers, the real-life situation for farmers is very different from how policies would suggest. Most farmers in rural Punjab, Pakistan, live below the poverty line and continue to struggle with a poor economic situation. This makes it difficult for farmers to take advantage of any of their own farming operations (Saqib et al., 2017; Moh'd et al., 2017).

Formal credit is more organized than informal lending, yet it is not available to a large number of farmers. Only 2 million of the 6.6 million farmers have access to formal agricultural financing, and only 5% of all crop loans are made via formal channels, while nearly 70% rely on informal lending markets (Shabir et al., 2020; Chandio et al., 2018). This is concerning since many farms require intermediaries to purchase their crops,

which often leads to exploitation of farmers' need for credit because they can take advantage of their position as an intermediary.

Another contributor to this problem is slow adoption of agricultural technologies. A few farmers have been progressive in adopting mechanization, new seeds, and other inputs; however, there are many more farmers who have not been able to adopt the modern methods of farming identified above (Mahmood & Arshed, 2022). Therefore, there is not a high degree of innovation in agriculture in Pakistan, resulting in much lower agricultural yields when compared to other sectors, at a time when the need for credit is increasing significantly.

There are some positive signs of innovation, with an increase in tunnel farming for off-season vegetables giving farmers the chance to sell at premium prices and provide food throughout the year. However, this method has higher initial set-up costs and requires structured finance support as well as adequate training (Ali et al., 2017). Despite the potential for Islamic Banking Institutions (IBIs) to provide the farming community with interest-free financing products based on Sharia principles, they are largely absent from agricultural finance, and their products are typically only seen on institutional websites with little delivery to farmers on the ground (Khan et al., 2022). Addressing these gaps through targeted policy intervention and financial outreach is now a critical and unmet need.

The study used both primary and secondary data sources to create a descriptive study methodology. Secondary data used in this research was collected from reports of the Pakistan Bureau of Statistics, the State Bank of Pakistan, Ministry of National Food Security and peer-reviewed academic literature. The agricultural trends, their corresponding policy frameworks and to what extent they are in accordance with Islamic economic principles such as zakat, equitable distribution of resources and prohibition of exploitative practices have been systematically analyzed using a descriptive approach. A qualitative content analysis was applied to interpret related injunctions of the Qur'an and Hadith concerning agricultural production and economic justice. The novelty of the research is that previous studies were conducted within a specific time frame, while the current updated picture of Agri sectors and their economic contribution is lacking. The research aims to identify recent challenges in Pakistan's agricultural sector and explore potential solutions.

2. Literature Review

2.1 Role of Agriculture Sector in Economic Prosperity: A Pakistani Perspective

Agricultural economic prosperity is a significant element in the continued growth of Pakistan. As the source of feeding, providing foreign currency and absorbing millions of workers into the workforce, agriculture plays an integral part in the development of Pakistan's economy. Like many countries, but particularly those of developing Islamic nations such as Pakistan, agriculture must continue to be the basis of economic growth because of its economic, social and moral importance. Domestic agricultural production has a greater potential to impact an economy than any other sector through its ability to provide food for a nation; thus improving the economy, reducing poverty, stabilizing food prices and providing optimal utilization of the workforce (Utama et al. 2019).

Pakistan is in a very advantageous position as far as natural resource endowments go. The Pakistani landscape for agriculture is rich and has an excellent variety of climate, as well as one of the largest systems of canal irrigation found in the world. Despite these advantages, the agricultural sector continues to face many structural inefficiencies, a lack of adequate financing, out-of-date technologies, and inequitable land tenure. For this reason, it is important to consider the multidimensional role agriculture plays within the overall economics of Pakistan, including understanding impediments preventing agricultural development, in order to create meaningful policies and interventions that satisfy the economic and Islamic principles of justice and equity.

This paper will provide a discussion of the role of agriculture in promoting Pakistan's economic prosperity through various avenues, including the contribution to GDP and jobs, types of financing available (formal and informal), the role of the middleman in rural credit markets, the major obstacles to agricultural growth, and the broader context in which the government and financial institutions are working to overcome these obstacles.

2.1.1 Agriculture and Its Broader Definition in Modern Context

Agriculture has evolved from merely producing food crops for sale to encapsulating large numbers of individuals involved with various types of animal and undeveloped industrial production activities. Today's understanding includes traditional growing methods (such as wheat and corn), but also includes many forms of production that may not have traditionally been thought of as agriculture, including all the above-mentioned types of production activities (Rahma, 2020; Mariwah, 2012). Thus, agriculture has become an integrated value chain between the planting of a grain seed, the harvesting of that grain and all the other steps in between until the product reaches the end user or consumer.

The fact that agriculture encompasses all of the above emphasizes that agriculture is no longer thought of as just a peripheral or traditional economic market sector; instead, it now plays a central role in underpinning the economy of many countries around the world, such as Pakistan. Therefore, the level of economic activity generated by agriculture is substantial, given that, in addition to being the foundation of a country's economy, the farming portion of the agricultural sector also supports many of the other elements needed to sustain a community (Rahma, 2020; Mariwah, 2012). This is due in large part to recent collaboration between various levels of government, businesses and academic institutions in working together to develop new ways of producing food to meet current societal needs (Saqib et al., 2017). In short, the evolution of agriculture for producing food has been a reflection of both its depth of significance in our lives, and its importance in transforming itself in order to meet 21st Century global challenges.

2.1.2 Agriculture's Contribution to Pakistan's Economy

Agriculture is fundamental for Pakistan and its economy according to the Pakistan Economic Survey (2021-2022). Within the agriculture industry, there was major Economic Growth (4.40%) during the period of 2021 to 2022 and the Agricultural industry employs about 37.40% of the total labor force and provides 22.70% of the total GDP, which proves how important this industry is to the overall economic structure of the country. The Crop Sector alone generates 6.870% of GDP and 35.810% of the total value of agriculture's contribution overall. The Agricultural Sector produced 2.470% Economic Growth and has driven the major crop growth by 4.650%. The reason for the overall production increases was the availability of Agricultural Inputs such as; water, subsidized fertilizers, certified seeds and pesticides, Agricultural Credit; coupled with high yields and favorable prices of crops, as well as government policies and Improving access to certified seeds, pesticides, and agricultural loans (Pakistan Economic Survey, 2021-2022)

The agricultural sector plays an important part in Pakistan's exports, producing around 65.5% of all exports (excluding leather); it is one of the major contributors to this economy after GDP/employment level effects (Abdullah et al., 2015; Mahmood & Arshed, 2022). Pakistan exports a diverse range of products globally including cotton, wheat, citrus fruits, mangoes, sugar, and dates; it is also ranked in the top 10 globally for cotton, wheat and citrus fruits, while also being ranked as the 13th largest rice producer in the world (Mahmood & Arshed, 2022). This provides an insight into the export capabilities and foreign currency earning potential for Pakistan.

The river/canal irrigation system has generally been highly beneficial to agriculture which has provided agricultural producers a competitive advantage (Abdullah et al., 2015) throughout history; the water infrastructure providing a basis for large-scale production of currently unproductive lands. Despite this competitive advantage there is still an inability to fully realise the agricultural sectors true potential which has been impacted by a myriad of factors resulting in a negative impact on creating jobs and the agricultural sector's ability to assist with poverty alleviation (Mahmood & Arshed, 2022).

2.1.3 Land Holdings and Farm Structure in Pakistan

Understanding the structure of land ownership and the distribution of farm sizes is necessary to comprehend the problems facing the agricultural sector of Pakistan. The Agricultural Census Organization (Government of Pakistan, 2012) estimates there are over 8 million farms in Pakistan covering approximately 53 million acres. In Pakistan, the majority of these are small landholdings, with approximately 64 percent—about 5.35 million farms—having less than 5 acres; this represents about 19 percent of the total amount of farmland. However, there are only about 0.30 million farms larger than 25 acres - 4 percent of all farms - but these account for approximately 35 percent of the total farmland.

The average farm size in Pakistan is 6.4 acres, but each farm's arable land is only 5.2 acres. Most family farms in Punjab, which is responsible for a lot of agricultural activity in Pakistan, are also between 5-10 acres in size; approximately 84% of family farm laborers are working on farms of this size. There are almost 24 million acres of owner operated farms in Punjab and almost 44 million acres of total farmable soil, while the total area for tenant operated land is almost 8 million acres out of 10.4 million acres of total farmable land. Of the tenant operated farmable land, 71% is operated through sharecropping and 26% is operated through leasing (Agricultural Census Organization GoP SD, 2012).

Having this many farms within a small area makes it difficult for these farmers to be productive, and results in limited access to financing for these farmers. As a result of their small size, these farms do not generate enough revenue for farmers to invest in improving their operation or purchase inputs, which has contributed to a lack of fertilizer being used. According to available records, approximately 40% of farmers in Punjab utilize fertilizer, while approximately 60% of farmers in Sindh utilize fertilizer; therefore, this indicates that there is a large opportunity to increase production through increasing fertilizer usage. In addition, most of the farmers in Punjab have very small

farms, making it difficult for banks to profitably extend credit to these farmers because bank's transaction costs related to providing loans would exceed the small amounts that multiple small farms require.

2.1.4 Agriculture in Punjab: The Provincial Heartland

Punjab makes up a unique part of the agricultural landscape of Pakistan because it has the highest population and accounts for most farming in Pakistan. Punjab has a lot of tropical climates, large irrigation projects and fertile land. Thus, agriculture has the strongest rural economy and employment in Punjab (Manzoor et al. 2018). As per the provincial report from the 2020 Mouza Census (PBS, Agriculture Census Wing of the Government of Pakistan, 2020), there are 26,462 Mouzas located in 41 districts of Punjab while there is a total of 49,463 Mouzas throughout the country. The most interesting thing about Punjab is that 99% of the Mouzas produce wheat; therefore, wheat is the dominant crop grown in the province. Punjab also has more wheat and cotton grown than any other province with wheat covering 66% of land and cotton covering 72% of total land cultivated in the province.

For irrigation, the province primarily uses tubewells; 78% of Mouzas use tubewells as their main source of irrigation. Developmental irrigation techniques such as drip or sprinkler are only in use in 1.43% and 0.38% of Mouzas, respectively, indicating potential for considerable technological development. In terms of credit access, 16,989 Mouzas in Punjab report ZTBL (Zarai Taraqiati Bank Limited) as their primary source of credit, whereas 8,832 Mouzas access credit from commercial banks, including Islamic banks (PBS, Agriculture Census Wing, 2020).

Women play a vital role in agriculture in Punjab. While male and female farmers work together pre- and post-harvest, there are very few opportunities for rural women farmers to make decisions because of cultural restrictions, despite the importance of their operational roles (Ishaq & Memon, 2016). The revenue derived from livestock production managed primarily by women tends to be more predictable than the revenue generated from crops and is therefore a reliable source for women to provide for essential household needs in rural communities (Muhammad & Mehmood, 2020).

2.1.5 Agricultural Financial Needs and Credit Classification

The agricultural financing requirements of farmers and other growers in Pakistan vary widely; are impacted by seasonality; and are often time sensitive. Agriculture can be divided into two major groups (crops and non-crops), and each will have different lending and cash-flow needs. With reference to the crop sector, the primary crop-

growing seasons in Pakistan are Kharif (March to August) and Rabi (September to February). Farmers will plant the Kharif crops of cotton, rice, sugarcane, corn, jowar and bajra and Rabi Wheat, Barley, Chickpeas, and Canola (Agricultural Credit Department IBD SBP, 2008).

Farmers can utilize two forms of credit from their banks: production finance – which finances purchases of inputs such as seeds, fertilizer, pesticides, labour, water and electricity - and development finance – which helps with the purchase of tractors, equipment etc., including development of land and improvement of soils (Agricultural Credit Department IBD SBP, 2008). Production financing is critical for covering the cost of day-to-day agricultural expenses through working capital. Working capital is typically provided on a short-term basis with repayment made at a time that corresponds with the agricultural cycle, i.e., when the farmer sells his harvested crops; this is referred to as harvest time. On the other hand, medium and long-term financing is used to develop the land through soil enhancement and purchased farm machineries (Hassan et al., 2012).

In the last three decades, agricultural credit demand has increased dramatically due to the restructuring of the agricultural industry; greater use and availability of pesticides, chemical fertilizers, mechanical equipment, and improved quality seeds (Mahmood & Arshed, 2022). At the same time as this increased demand for agricultural financing exists, agricultural crops are producing lower levels of income than many other sectors of the economy, contributing to the financing gap that is continuing to widen. In spite of this increasing demand for formal agricultural credit; the percentage of farmers who can access these formal sources of credit is extremely small. The disbursal of agricultural credit grew by 14.8% to Rs. 2.16 trillion from July 2025 to March 2026. Outstanding loans increased by 22.6% to Rs. 1.17 trillion, but the number of borrowers slightly declined to 2.96 million from 2.97 million, reflecting stagnation despite rising loan amounts. (Tribune, July 13,2026)

2.1.6 Formal and Informal Sources of Agricultural Finance

Agricultural finance in Pakistan is characterized by both formal and informal sources with distinct benefits, drawbacks, and clientele. Formal sources consist of traditional banks, Islamic banks, dedicated agricultural banks, microfinance, and non-governmental organizations (NGOs). Family, friends, neighbours, local money lenders, village shops, dealers, and commission brokers make up informal sources of credit (Bashir & Azeem, 2008; Malik & Nazli, 1999; Saqib et al., 2017; Moh'd et al., 2017).

Despite having access to formal credit sources, most Pakistani farmers rely on informal sources. Currently, informal financing (credit) comprises 72% of the total amount of agricultural loans disbursed in Pakistan while the formal lending market provides less than 5% of the total credit required by private sector farmers for crop production (Rasheed & Mudassar, 2010). The predominance of informal financing is not in the slightest bit coincidental; it is the farmers' rational response to their circumstances.

The primary factors identified by researchers as contributing to the desire of agricultural producers to utilize informal financing sources (Guirkinger, 2005) include: low interest rates; easy application process; low transaction cost; flexible repayment terms; and no requirement for collateral, security, or documentation (Guirkinger, 2005). According to Guirkinger (2005), informal lenders also have extensive knowledge about the needs of farmers in their area and are aware of the unique financial situations of each borrower in their community which enables informal lenders to make fast and informed decisions that formal lenders do not have the ability to do.

Additionally, the studies completed by Schaefer and Von (1986) and Saqib et al. (2017) regarding the impact of tradition, familiarity, and flexibility on farmer's preferences for informal lending, indicate that many farmers in rural areas prefer to borrow from family or friends as the primary reason for this preference is due to the high levels of social trust that exist in most rural communities. The high trust among rural communities' results in an overall repayment rate for informal loans being approximately 97%, indicating that when informal credit is part of a strong social network, it is both a reliable source of credit and useful source of capital for agricultural producers.

On the other hand, there are many barriers that make it difficult to access formal credit. To access formal financing, farmers need to prepare good business plans and provide collateral (Cabannes, 2012; Moh'd et al., 2017; Sadler et al., 2016). For farmers in developing countries where literacy rates are low, this creates significant barriers to accessing formal credit. Financial institutions will respond to these problems by increasing regulatory requirements, implementing mandatory lending quotas, raising interest rates, and imposing strong penalties for defaults (Cabannes, 2012; Sadler et al., 2016). Because of this, small farmers, who often are viewed as not having sufficient socioeconomic status to qualify for a bank loan, are unable to access formal credit (Moh'd et al., 2017; Muneeza et al., 2011; Saiti et al., 2018).

In addition to socioeconomic factors, religious beliefs also impact how agriculturalists prefer to borrow. According to research completed by Mohaid and Maharjan (2020), religious beliefs increase the likelihood that farmers will not use formal credit; however, they are unlikely to deter farmers from accessing informal credits. According to the

results of Bangash's (2020) survey of agriculturalists, 58 percent of the respondents avoided borrowing from commercial banks because of their beliefs/issues related to lending based on interest, and 72 percent of the respondents felt that they could not access commercial lenders due to collateral requirements. Therefore, providing Shariah-compliant financing alternatives is important in a predominantly Muslim agricultural community.

2.1.7 The Role of the Middleman (Arthi) in Punjab's Agricultural Economy

According to research conducted by Haq et al. (2013), the arthi, or commission agent, is possibly the most important figure in Punjab's agricultural finance landscape as they operate as lenders, buyers, and market intermediaries. Arthis act as the most common informal source of finance for agriculture in Punjab, meeting the needs of a market sector deemed too high-risk and economically uncreditworthy by formal banking institutions.

There are two principal forms of an arthi system set up to assist farmers: pukka arthi and kacha arthi. The pukka arthi will purchase harvests from farmers, where farmers retain ownership until an agreement is reached. Meanwhile, the kacha arthi only acts in a middleman capacity, by introducing the farmer to the pukka arthi and earning a commission from the farmers without gaining ownership of the crops. Since there are many more kacha arthis than pukka arthis, and since kacha arthis have a greater geographical reach, the vast majority of informal lending activity between farmers will flow through kacha arthis along the agricultural supply chain.

An arthi provides two essential services to farmers: it loans materials at the time of planting a particular crop, and it serves as an agent for selling farmers' harvests in the marketplace. In return, farmers agree to sell their harvest exclusively through the arthi, thus giving it control over their cash flows (Amjad and Hasnu, 2007; Oneybinama and Oneybinama, 2010). Therefore, the unregulated arthi relationship creates an interlocked system of credit and marketing; although their potential for being exploitative has been well-documented, they also provide farmers with the means to finance their crops and access the marketplace.

The financial aspects of the arthi model explain why it has survived even as banks have developed. Unlike banks, which require collateral such as property deeds, the arthi will lend to a farmer based solely on its personal knowledge of the farmer's creditworthiness (Bashir & Iqbal, 2021; Jehangir, 1999). Thus, the trust-based nature of the arthi is far more accessible than anything that a formal institution would provide to a farmer.

The system of arthi proves to be a profitable venture. The operational costs associated with providing credit amount to less than 2.5% of total credit extended; the level of nominal write-offs (that is, losses) is minimal due to effective risk management techniques employed by the institution; and effective interest rates are calculable as 62%-80% (Bashir & Iqbal, 2021; Sharma & Chamala, 2003; Madestam, 2010). Beyond collecting interest revenue, the arthi earns commission on the sale of agricultural products by borrowers (typically ranging from 2%-4% of the total sale price, depending upon both crops and agreements made).

In addition to earning interest revenue, the arthi commonly receives commissions based on the sale of agricultural products from borrowers (typically ranging between 2%-4% of the sale price based upon the crop and/or agreement terms). A unique aspect of the arthi and farmer relationship is found within farmers' perception. A significant percentage of farmers, when asked if they are paying interest on the credit received from the arthi, would reply that they are not doing so because of how the arthi has framed their interest charges as being Islamicly based (Bashir & Iqbal, 2021). Fees and/or charges at the arthi are often derived from a product-based transaction rather than a pure cash loan (as such, labour has been completed prior to disbursing cash), therefore allowing it to be perceived as being Islamicly compliant, or at least being nominally framed as being Islamicly compliant. This evidence points towards a strong demand from within farming communities for more Shariah-compliant forms of finance.

A model has been proposed as a bridge or link between formal banking and smallholders to improve access to credit in smallholder agriculture (Quartey et al., 2012; Haq et al., 2013). This model (or intermediary) would facilitate the matching of smallholder farmers with appropriate banks (by way of identifying and screening potential borrowers), as well as redistributing funds to the identified borrowers as the intermediary's own loan in return for a commission. In addition, the farmer will receive access to and training on current agricultural practices, machinery and inputs, while the intermediary will act as a loan recovery agent for both the bank and the farmer. On the whole, this model expands the arthi's existing functions and connects them to institutional financing — which may be an effective means to eliminate the credit gap in rural agriculture (Zeeshan, 2019).

2.1.8 Government and SBP Initiatives in Agricultural Credit

In the latter half of the past decade, a growing consensus has formed between the Government of Pakistan and the State Bank of Pakistan that agricultural credit plays an important role in developing and sustaining rural populations via financial support for

physical development and economic growth. Due to this view, SBP and the Government of Pakistan have taken proactive action to increase and create better options for agricultural financing. The preliminary target for agricultural loan disbursement by SBP for FY2022 was Rs 1,700 billion, a 24.5 percent increase over the Rs 1,366 billion disbursed in FY2021 (Pakistan Economic Survey, 2021–2022). Currently there are fifty formal financial institutions providing agricultural loans, consisting of five large commercial banking groups, fourteen medium domestic private banks, five Islamic banks, two specialized banks, eleven microfinance banks, and thirteen microfinance institutions and rural support programs (Pakistan Economic Survey, 2021–2022).

The analysis of the sector specific allocation of agricultural financing for FY2022 indicates that the farm sector received Rs 474 billion (49.5 percent of total allocation), compared to the non-farm sector at Rs 484.3 billion (50.5 percent). The data regarding farm credit and land holdings indicated that subsistence size farms received a total of Rs 170.5 billion of farm credit, a 13.7 percent increase over the previous year, thus showing a trend of increasing support to smaller farmers by the providers of agricultural finance (Pakistan Economic Survey, 2021–2022).

The SBP's Agriculture Loan Policy provides a framework for the distribution of agricultural loans from banks, which are to be allocated in specific ratios; 70% to farmers who are land-holders with land less than the subsistence holding, 20% to farmers who hold more land than the subsistence holding and 10% to farmers who hold more than the economic holding (Agriculture Credit Department Appendix-1, SBP, n.d.). For the purposes of this policy, subsistence holdings for the area of Punjab are defined as farmland of less than 12.5 acres, economic holdings of farm land between 12.5 and 50 acres, with farm land of over 50 acres defined as unlimited economic holdings. This policy framework is the product of an intentional policy that directs credit to smaller, poorer vulnerable farmers.

SBP has offered a novel mechanism for expanding access to credit to small farmers who do not have sufficient assets as security. In group-based lending, loans are extended to individuals through their membership in a peer group that guarantees repayment of each member’s loan. The mutual obligations and peer pressure from group members act as a substitute for traditional security requirements (Agriculture Credit Department SBP, 2008). To reach out to small agribusinesses, especially in rural communities, SBP and its partners have established the Small Farmer Group (SFG) scheme which lends to groups of small farmers engaged in agribusinesses such as cattle raising, dairy, poultry, fish farming, and horticulture (Agriculture Credit Department SBP, 2008). This program takes its model from successful international examples such as the Grameen

Bank in Bangladesh and the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand, which have both successfully demonstrated that small farmers can save money and repay loans without having tangible assets (Agriculture Credit Department SBP, 2008).

SBP has established a comprehensive scoring model to evaluate how well banks are meeting agricultural credit needs, which was approved during the ACAC's FY 2021 - 2022 annual meeting (SBP, 2015). These institutional initiatives have helped provide significant improvements, but gaps still exist between policy intent and actual implementation at the ground level.

2.1.9 Agricultural Mechanization and Technology Adoption

Pakistan's agriculture faces a serious challenge due to low agricultural productivity caused by limited use of contemporary machinery and equipment. Research indicates that below-average pre- and post-harvest machinery can contribute to poor farm productivity and reduce farm productivity anywhere between 40 to 80 percent (Akram et al., 2020), illustrating the need for mechanized farming. However, as with any investment, farmers need credit to invest in mechanization; thus, smallholder farmers will face the same problem of not having sufficient access to credit to purchase modern equipment and technology. Additionally, the quick pace of technological advancement and changes in agriculture mean that required investment for farmer credit is constantly growing as new seeds, pesticides, and fertilizers have been developed and agricultural mechanization has occurred rapidly over time (Mahmood & Arshed, 2022). However, despite this increase in required credit, farmers still lack access to the formal agricultural finance system due to a lack of credit products specifically designed for this purpose, thus preventing many farmers from transitioning to new technologies that would provide them with an increase in productivity.

Seeds are an extremely important component of agricultural production and were linked to a significant increase in the productivity of the agricultural sector of Asia during the Green Revolution of the 1960s. The increase in the use of fertilizer and improved seed varieties were two of the contributing factors to the increase in agricultural productivity during that time (Rahma, 2020). Irrigation is another very significant factor impacting agricultural growth by allowing farmers to grow crops outside of the normal growing season, have multiple harvests per year, and grow more land. However, in Pakistan, only a small percentage of Mouzas have modern implementations of drip or sprinkler irrigation systems, while most of them still rely on tube wells or traditional canal systems for irrigation purposes.

Recent developments of tunnel farming for off-season vegetables are one way that farmers have been able to capitalize on growing high-value vegetables throughout the year and, therefore, receiving premium prices for their products and ensuring that they have food available all year long (Ali et al., 2017). However, the additional cost of constructing tunnels and installing agricultural inputs makes access to appropriate financing very important. The creation of cold storage facilities would also help forward-thinking farmers successfully and profitably adopt tunnel farming methods.

In a research project done by Vadlamudi (2019) there are many challenges for farmers who use traditional or customary farming practices and have restricted access to capital. Additionally, there is great promise in the use of artificial intelligence (AI), among other new and advanced technologies, to support food security and improve the sustainability of agriculture. However, creating a viable supply chain will necessitate that farmers have adequate access to financing, along with resources and training, so they can implement more effective and sustainable farming strategies.

2.1.10 Challenges Facing Agricultural Financing in Pakistan

There remains much work to be done to advance agricultural finance despite recent successes; both supply- and demand-side challenges persist within agriculture finance markets. Financial institutions generally regard lending to agriculture as a high-risk-low-return proposition, and The World Bank (2018) describes several barriers experienced by financial institutions when providing rural farmer finance: high costs to serve agribusinesses, highly risky nature of providing rural farmer financing, limited number/range of tools to manage risk associated with agriculture, limited experience managing agricultural credit portfolios, and ineffective policy frameworks related to agriculture.

Sadler et al. (2016) also outline three primary lending impediments to rural farmer access to financing: high transaction costs, an unsupportive enabling environment, and the inherent risky nature of farming. Agricultural production is particularly exposed to a variety of risk factors, including price fluctuations, adverse weather patterns, natural disasters, and pest infestations; these risk factors impede the ability of financial institutions to accurately price and/or effectively manage loans in the agribusiness sector (Tropea and Devuyst, 2016). Sudden declines in agricultural income (due to eventualities such as adverse weather or price drops) frequently lead to agribusinesses being unable to repay financing; subsequent defaults lead to financial institutions establishing larger loan loss provisions (Hendri, 2016).

Yet another major obstacle to providing agricultural finance arises from an asymmetrical distribution of information. Poorly documented records of borrowers' credit histories create difficulties for financial institutions when attempting to assess borrowers' credit risk. Agricultural clients' main sources of collateral to secure loans are land and crop production, and both present problems for banks to use as collateral since land cannot be easily foreclosed in the event that the borrower defaults (Hendri 2016). In addition, a dispersed rural clientele increases the costs involved in providing oversight of these clients; further, inadequate transportation and communication systems impede banks' ability to recruit qualified lending officers to serve the remote borrowing communities.

There are also barriers to farmers' access to formal credit on the demand side of the market. Farmers cite as a primary reason for not seeking loans from formal lending institutions the lack of ease associated with the application process and the complexity of documentation needed to apply for a loan. According to a study conducted by Bangash (2020), 72% of respondents reported that collateral (specifically, a mortgage on the property) was the primary reason that they had not applied for a loan from a commercial bank. Likewise, 58% of the respondents identified that they had religious objections to paying interest and therefore were discouraged from applying for a loan. Based on these results, it can be inferred that fundamental changes to the structure of the agricultural finance industry, including the establishment of authentic Shariah-compliant products for financing agricultural production, would increase the number of Muslim farmers who obtain formal credit for farming operations.

There are still major hurdles to be overcome in order to expand financial inclusion across Pakistan. Global Findex reported in 2017 that only 21% of Pakistani adults have an account, and of those with an account, just 7% are women (Demirguc-Kunt et al., 2018). The Financial Inclusion Insight Survey indicates that as of 2020, only 19% of the population are financially literate (Financial Inclusion Insight Survey, 2017). As shown in the statistical data above, it will not be easy to reach out to provide formal financial services to rural farming communities in that country.

Islamic Banking Institutions (IBI) represent a significant opportunity to transform the lives of rural farmers living in Pakistan by providing them with a way to access the formal financial system without violating religious laws governing some of the different types of loans. However, currently participation by IBI in the agricultural finance market is woefully inadequate. Despite the fact that the SBP's banking regulations and guidelines provide for both agricultural finance products by IBI as well as agricultural finance programs, most agricultural financing product offerings from IBI exist only as

product offerings on institutional websites—not as active programs providing financing to farmers in rural areas (Khan et al., 2022). A widespread, and urgent, need exists to close the gap between what is statutorily recognized at the institutional level, and what actually occurs in rural areas related to the delivery of agricultural finance.

3. Recommendations and the Way Forward

The agriculture of Pakistan is also experiencing multiple challenges and solutions to those challenges will be complex. A comprehensive, multi-stakeholder approach is needed that utilizes Islamic concepts for equity, cooperation and social development, in addition to contemporary financial and agricultural technology. Therefore, there is a need for recommendations based on the discussion above which can be summarized as follows.

The provision of Shariah-compliant agricultural financing must be a top priority; the rural farmers of Pakistan are motivated by religious beliefs so therefore will always have an issue with using interest-based conventional forms of credit. Ultimately, Islamic Banking Institutions will need to go beyond providing agriculture finance products on the Internet and find concrete ways to provide agriculture finance products at the farm gate so that small farmers can obtain Shariah compliant credit. Moahid and Maharjan (2020) confirm that having access to Shariah-compliant credit from a formal financial institution will significantly enhance a household's confidence in using Shariah-compliant credit.

The second pathway for demonstrating that intermediaries could connect formal financial institutions to small farmers who are otherwise not being served is through an intermediary model—a way of formalising and regulating commission agents (for example, arthis)—and leveraging their existing relationships (between banks, commission agents and customers), as well as their local knowledge and risk management skills, to effectively use an intermediary to reach new, previously underserved markets in a cost-effective manner (Haq et al, 2013; Quartey et al, 2012). In addition to providing credit to small farmers, the intermediary model could also provide them access to new farming techniques and modern agricultural equipment, thus providing greater value than just providing financing.

The third pathway for improving agricultural mechanisation investment is that agricultural mechanisation investment must be supported through financial services. The provision of rental services for farming equipment lowers small farmers' overall cost of mechanisation and allows them to efficiently use agricultural machinery. Specific financial schemes designed to assist progressive farmers in acquiring

machinery (to improve their productivity) will allow them to invest in value-added technology for their businesses (Akram et al., 2020). Providing financing as a "must-have" for agricultural mechanisation initiatives will create a sustainable path for the component of the agricultural sector to grow, while also reducing the production risk for farmers.

The advancement and aggressive promotion of group-based lending mechanisms will assist in developing sustainable group loan programs that utilize peer-based accountability instead of collateralized security, similar to the successful models of the Grameen Bank, BAAC in Thailand and Bank Rakyat in Indonesia (Agriculture Credit Division, State Bank of Pakistan, 2008). Such a mechanism has been shown to effectively reach smallholder farmers and have a high repayment rate.

Sufficient investment in managing water resources and developing irrigation systems will be critical for achieving growth and production levels in agriculture. One component of achieving this will involve investment in modern irrigation technology, such as drip and sprinkler systems; however, only a very small percentage of the Mouzas in Punjab currently utilize modern irrigation (Pakistan Bureau of Statistics, Agricultural Census Wing, 2020). Widespread use of these modern systems will enhance efficiency of water use and allow a significant number of farmers throughout Punjab the opportunity to produce off-season crops.

In addition, there is a need to recognize and provide for the contribution of women to agriculture. Women farmers in rural areas are significant contributors to the agricultural and livestock production of their households; however, they are often inhibited by cultural barriers from accessing financing and technology and/or exerting influences on issues relating to agricultural production decisions. Kausar (2022) highlights the need to educate women about the use of technology in agriculture if we want to encourage more women to participate in the industry. Providing access to short-term loans for women will also promote their participation in agricultural sectors through increased availability of funds.

In addition, it is essential that governments provide funding for agricultural literacy programs, financial literacy programs, and extension services to assist farmers in navigating modern agricultural practices and formal financial systems. A lack of awareness regarding new agricultural practices continues to exist among many farmers, despite the fact that new technologies and methods are widely available (Mahmood & Arshed, 2022). Therefore, without targeted efforts directed towards creating awareness and developing the capacities of farmers at a community level, even the best-designed

financing options and government policies may not be able to generate the desired impacts.

4. Conclusion

Presently, Pakistan's agricultural sector is at a crossroads. There are significant advantages that can be utilized in Pakistan to enhance agricultural production, such as: (1) Fertile land, (2) Different climatic conditions, (3) An extensive irrigation system, and (4) A large population of farmers dependent on agriculture. However, there are fundamental structural difficulties that impede agricultural production, such as (1) Limited access to financial resources to acquire and produce goods, (2) Old technology, (3) The land distribution is highly inequitable, (4) Limited access to financial resources for farmers in general, and (5) The gap between the supply of formal credit (i.e., banks and other institutions) and the demand for agricultural loans is extremely large.

The discussion that follows illustrates that simply changing policies through small increments is not going to solve the above problems. A complete paradigm shift in the way that the agricultural credit system is designed, delivered and related to the cultural and religious aspects of the farming community is needed. The Islamic principles of equity, cooperation and prohibition of exploitation provide a framework for creating a financial solution for agricultural financing that will address the inherent problems of the conventional credit system and meet the needs of the Muslim farmer population in Pakistan.

Pakistan has the ability to harness the true potential of its agricultural sector through increased availability of Shariah-compliant financial products, formalized models for intermediaries, investments in mechanization and irrigation, promotion of group-based lending, empowerment of female farmers, and improvement of financial literacy at the grassroots level. When done properly, these many changes would lead to economic growth and would also reflect the ideals of Islam by ensuring that all resources are equitably distributed among all members of society and to ensure that all members, including farmers in vulnerable situations, have their needs met. Due to limited resources and time, the study descriptively outlines the findings, suggesting that future research could explicitly address challenges and solutions by surveying ground realities in agricultural practices in Pakistan.

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