sustainability

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The Impact of Formal Agricultural Credit on Farm Productivity and Its Utilization in Khyber Pakhtunkhwa, Pakistan

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Abstract: Agricultural mechanization and the use of mixed inputs ensure higher productivity. In this regard, the Government of Pakistan has executed an approach for the provision of agricultural credit to smallholders for improving agricultural production. However, many issues are involved in the extent, utilization and impacts of credit. This study aims to explore the impact of credit, its utilization, misuse and factors determining the extent of agricultural credit in Pakistan. A semi-structured questionnaire was developed to collect data from 316 farmers in Mardan District. The study was analyzed through statistical tools such as a paired *t*-test, ANOVA and multiple regressions. Results showed that agricultural credit enhanced crops' production. However, according to percentage use, misuse of the credit was more common than its proper utilization. Farmers utilized credit for land preparation, fertilizers, seeds, pesticides and daily labor. They misused agricultural credit for healthcare, education of children, domestic needs and business. Results of the regression model showed that farmers' age, experience, farm size, farm income, farm labor and land ownership were determinants of the extent of agricultural credit. Policy measures should be taken to stop the misuse of agricultural credit to achieve the target set for agricultural productivity.

Keywords: agricultural credit; formal credit; sustainable agriculture; productivity; credit utilization; credit fungibility; Pakistan

Citation: Chaiya, C.; Sikandar, S.; Pinthong, P.; Saqib, S.E.; Ali, N. The Impact of Formal Agricultural Credit on Farm Productivity and Its Utilization in Khyber Pakhtunkhwa, Pakistan. *Sustainability* **2023**, *15*, 1217. https://doi.org/10.3390/su15021217

Academic Editor: Antonio Boggia

Received: 31 October 2022
Revised: 30 November 2022
Accepted: 19 December 2022
Published: 9 January 2023

1. Introduction

Climate change, population expansion and changing dietary habits, global pandemics and conflicts have all posed threats to food security and the development of the agriculture-food sector [1]. These challenges put immense pressure on policymakers to concentrate on creating a global agriculture-food sector that is more resilient and sustainable. To meet these challenges and to end hunger, we must invest, assisting farmers in obtaining the funding they require to become more resilient and sustainable [2]. According to the estimates, around 60% of additional investment is needed to accomplish the Sustainable Development Goals' (SDGs(public financing [3]. On the other hand, studies have shown that smallholders and people living in rural areas are ignored in a variety of ways. They have less access to farming resources and suffer more precarious living situations (e.g., income and nutrition are dependent on weather and ecosystems), although with a lower environmental impact than the agriculture industry [4]. As a result, the agriculture sector development is critical to the world's sustainable development.

Regarding Pakistan, agriculture is one of the most important sectors in its economy. It contributes 26% to the gross domestic product (GDP) of the country [5]. Moreover, it engages 45% of the labor force and 67% of the population directly or indirectly depends on

this sector [6]. The internal and external shocks that affect the agriculture sector are likely to affect the country's national income and a large segment of the population [7]. This volatility has led the government to frame policies to combat these shocks and promote the agriculture sector. For instance, the government has implemented a policy of food security through the provision of agricultural credit for purchasing farm machinery, fertilizers and seeds, etc. [8].

Agricultural mechanization and the use of mixed inputs ensure higher productivity. However, it needs funds for the farmers' community [9]. Farmers use their savings or have to borrow to meet these needs. Thus, to meet the required investment, agricultural credit is an important element [10]. Moreover, agricultural credit is significant for the modernization and commercialization of farming in the growth of developing economies [11]. A review conducted by Nielson and Tierney [12] revealed that agricultural credit gives a chance to farmers to utilize effective innovations and use resources more efficiently to enhance food security. Farmers acquire credit from different sources, both formal and informal. Formal sources include banks, micro-credit organizations and other nongovernmental organizations (NGOs). Informal sources include borrowing from fellow farmers, family members, vendors and private cash loan providers [9,13]. Among these sources, informal credit is very common among farmers who do not have access to formal credit. For example, Amjad and Hasnu [14] revealed that small farmers are increasingly subject to informal sources compared to formal sources. However, informal credit sources cannot satisfy farmers' needs [15].

In Pakistan, the government has instigated an agricultural credit policy to help smallholders in enhancing their agricultural production and food security. For example, the former Zari Tarqiati Bank Limited (ZTBL), now called the Agriculture Development Bank of Pakistan, and other commercial banks such as Khushali Bank, Bank of Khyber, The Bank of Punjab, Allied Bank, United Bank and MCB are providing formal credit to farmers [6,10]. These banks are working under the supervision of the State Bank of Pakistan (SBP). In the year 2014–2015, according to the SBP, it has assigned agriculture credit dispensing of PKR.500 billion to seven microfinance banks, 20 commercial banks and four Islamic banks, which are associated with provision of credit to farmers [16]. Recently, the banks lent PKR.1.174 trillion in 2020 to over 4 million farmers during the last fiscal year [17]. Different farmers have different access to these loans, but smallholders remained less advantaged [8]. According to the World Bank's Rural Development Strategy, smallholders are individuals who have a low resource base and have under 2 acres of landholding [12]. Around 87% of the world's small farmers (500 million) are living in Asia and the Pacific [18]. Moreover, in China, the number of small farmers is 193 million. In India, small farmers represent 93 million, Indonesia has 17 million, Bangladesh has 17 million and Vietnam contained 10 million. In Pakistan, 58% of farmers are smallholders who have less than 2 acres of landholding. These smallholders develop just 16% of the whole landholding, while farmers with more than 10 acres involved account for 37% [19].

Farmers' landholding is a key determinant in their access to formal credit. For instance, Saqib [20] revealed that landholding and access to credit are interlinked. Furthermore, Akram and Hussain [21] reported that small farmers have an absence of guarantees, such as a small landholding size, that limits their access to formal credit. Besides, land was the foremost and quickly acceptable type of guarantee, which denied an enormous number of landless farmers access to informal credit markets. For example, farmers with small landholdings have limited access to rural credit [8]. Likewise, Dzadze et al. [22] reported that large landholding size prompts more access to credit. Moreover, the latest examination has discovered that landholding size affects agriculture credit requests [23]. Additionally, [24] referenced the positive effects of land ownership status on access to agricultural credit. The above investigations deemed landholding size a comprehensive determinant among other financial components influencing access to agricultural credit, which could undermine the significance of credit programs.

In Pakistan, farmers are divided into three groups based on their landholdings: small, medium and large farmers. Saqib et al. [6] revealed that farmers who have landholding up to 12.5 acres are small, economic landholding farmers have above 12.5–50 acres while large landholdings farmers have above 50 acres. To help small farmers, the SBP has apportioned 70% of credit to them. Out of total credit, 20% is apportioned to economic landholding farmers and 10% is assigned to above economic landholding farmers [6]. Similarly, the same group of farmers may have different access to and needs for water, manure, agricultural machinery, different information sources, land use and even access to agricultural credit [25]. Likewise, the same group of farmers will have different landholding sizes, yet they are treated under a similar credit policy. Small farmers with landholding sizes of more than 1 acre obtain more credit under the policy than farmers with less than 1 acre [8].

Ample literature has assessed farmers' access to agricultural credit, its utilization and the misuse of credit. However, limited studies have explored the impact of agricultural credit on production. Besides, studies have assessed the utilization and misuse of credit as percentages. Moreover, previous studies have revealed either access or no access to credit. This study has explored factors determining the amount of credit. Firstly, it explores the impact of agricultural credit on agricultural production by taking data at the farm level. Secondly, it assesses agricultural credit utilization and its misuse. Thirdly, the influencing factors on the amount of credit obtained by farmers have also been examined.

2. Theoretical Framework

2.1. Agriculture Based Economic Development

There are several theories of agricultural finance and economic development that make linkages between agricultural and economic development. According to economic development theorists Wiggins and Leturque [26], an agricultural-based strategy for economic development requires institutional, financial, technical and incentive changes that will increase the productivity of small farmers. Further, Wiggins added that agricultural financial facilities and incentives could play a double role in the course of economic development. Firstly, it will enhance food production and also generate many jobs needed by households to buy other necessary goods. Moreover, agriculture is the world's single largest job producing sector and raising productivity through financial facilities, programs and incentives for farmers can instantly place more purchasing power in the hands of poor rural farmers. They will in turn use the improved additional income for buying more food and other necessary consumer goods [27]. Hence, increased agricultural production will lead to raw materials for a wide-range of agro-based industries and services, further stimulating the formation of new small and large scale enterprises and creating more downstream jobs in the multiplier process, hence ensuring economic development and structural change in the economy [28,29]. Consequently, the capacity of the industrial sector has been determined and found to be a function of improved agricultural production through institutional and financial services to farmers in the form of strategies and policies [29]. Therefore, agriculture finance is a very important indicator of increase in agricultural produce for the welfare of small farmers.

2.2. The New Environmental Modernists' Theory

The New Environmental Modernists, led by the partnership of the Kawakawa and Global 2000 Foundations, argues that "increased agricultural production can only come by high-external-input farming, either on existing Green Revolution lands or on the 'high potential' areas that were missed in the past 30 years of agricultural development" [30]. These 'New Modernists' claim that farmers need more credits to buy high-yielding seed varieties, fertilizers, pesticides and other external inputs, which are the main inputs for the increase of agricultural production [31]. Zepeda [32] argues that high-input-based agriculture is even more environmentally sustainable than low-input agriculture, as low-input agriculture requires the exhaustive use of local resources that may be degraded. Thus,

it is concluded that financing agriculture particularly through the disbursement of credit to farmers remains the absolute key to agricultural-induced macroeconomic development [33].

2.3. Sustainable Agriculture Approach

The terms "sustainable development" and "sustainable agriculture" have been influenced by both scientific discourse and UN political rhetoric [4]. A sustainable agricultural strategy aims to use natural resources in a way that will allow them to recover their capacity for production while also minimizing negative effects on ecosystems outside of a field's edge [34]. The concept of sustainable farming comprises farming production management that allows for the effective use of natural resources in order to generate financial profit while also respecting natural laws and achieving societal expectations [35]. Providing assistance to crop growers with the aid of various agricultural resources is referred to as agricultural development [36]. Adegbite and Machethe [37] discussed the relevance of agricultural financing in ensuring a country's sustainable economic development. In addition to this, access to finance is crucial for the agricultural sector's development. The transition from subsistence to commercial agriculture output necessitates the spending of funds [2].

3. Conceptual Framework

3.1. Agricultural Credit and Socio-Economic Characteristics of Farmers

Various viewpoints are associated with agricultural credit access that has a positive association with farm production, farm income and per capita expenditure. In Bangladesh, small farmer's access to credit resulted in the use of HYVs, which caused increased production and income [38]. Lack of access to financial facilities by small farmers is seen as one of the constraints preventing them from benefitting from credit services. However, in most cases, the access problem, especially among formal financial institutions, is one created by the institutions, mainly through their lending policies [24]. Farmer's access to credit is affected by several socio-economic factors, such as age, experience, landholding size, family size, education and income level [39]; farmers' age, education level, family size, household size, repayment period and amount of loan applied were highly influencing factors in access to agricultural credit. A similar study has found that access to credit sources is significantly influenced by the age of farmers, household size, farm size, education and group membership [23]. Chaudhary and Ishfaq [40] also found that farmers' creditworthiness is based on several factors that bring access to credit sources. They further stated that income, age, amount of loan, occupation, education level, formal training and assets are the significant factors in obtaining credit from formal sources. These socioeconomic factors are very important and determine the farmer's accessibility to credit. These factors are not only confined to institutional credit but also have their role in access to informal sources of credit [6].

Another issue related to agricultural credit is the amount of credit which farmers receive. It is not only important that farmers have access to credit, but its adequacy also matters. Hussain and Thapa [8] reported that in Pakistan credit for smallholders is inadequate and informal sources mostly fill the credit gap. Whenever these farmers have limited access and an inadequate amount is provided, there is only small increase in their production and income.

3.2. Agricultural Credit Utilization

Large farmers have better access to credit and obtain an adequate amount of credit from formal and as well as informal sources. Agricultural credit programs for poor farmers are directly linked with its utilization. If the credit is used in the agricultural sector such as for buying seeds, fertilizers, land preparation and other agriculture inputs, it increases crop production. A study conducted by Chandio et al. [41] showed that a micro-credit program started by the Punjab Rural Support Program (PRSP) proved to be effective in increasing crop production of wheat and sugarcane and improving the living standard of

farmers [42]. The main problem arises when there is fungibility (misuse) in credit and the credit is misused in non-agricultural activities [8]. For seeds and fertilizers can be used to buy clothes and shoes or spent on education, domestic needs and health [19]. When the credit is used for non-agriculture purposes and the investment margin in agriculture is very low, the program or policy designed for improvements in agriculture production and the income of farmers can never achieve its goals (Figure 1).

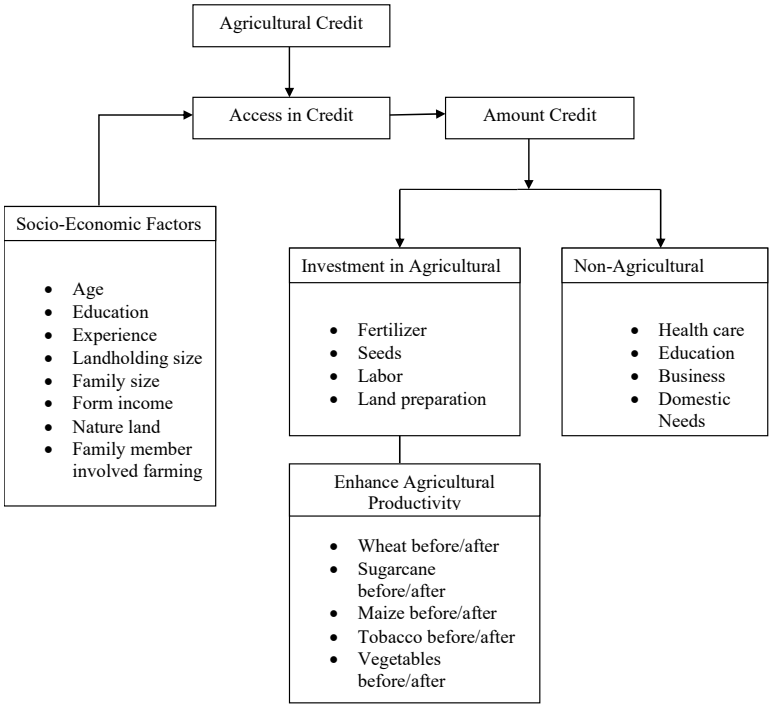

Figure 1. Conceptual Framework.

4. Materials and Methods

4.1. Study Area

Mardan is geographically situated between 71°48′ to 27°25′ east longitude and 34°05′ to 34°32′ north and is the central region of Khyber Pakhtunkhwa. Mardan can be ranked the 19th biggest city in Pakistan and the second biggest of the of Khyber Pakhtunkhwa province. It was conveniently chosen on account of being in the central zone of the province and about 80% of its population directly or indirectly relies upon farming [13]. The overall population is 1.45 million, having a population density of 888.5/sq. km. As per land-use statistical measures, 76% of the overall region is utilized for agriculture, 22% has no cultivation, while just 2% accounts for forestry. Out of the total cultivable region, 75% has a good irrigation system and 24.6% is open to rainfall, while up to 0.4% has no agricultural value [6]. It has one of the best irrigation systems in the world, which was established by the British government under British rule [43]. The northeast of the Mardan area is hilly, whereas the southwest is a fertile plain. Streams often move from north to south. The Kabul River receives the majority of the streams' runoff. The summer months are swelteringly hot. Dust storms are frequent at night in May and June. The months of July, August, December and January have the most precipitation [43]. According to UN-ESCAP [44], overall, the soil in the Mardan was in good condition and had a normal pH. The soil has a lot of organic matter, and compost can further enhance the soil's quality for greater crop output. The data were collected across all three Tehsils of Mardan District at different location shown in Figure 2.

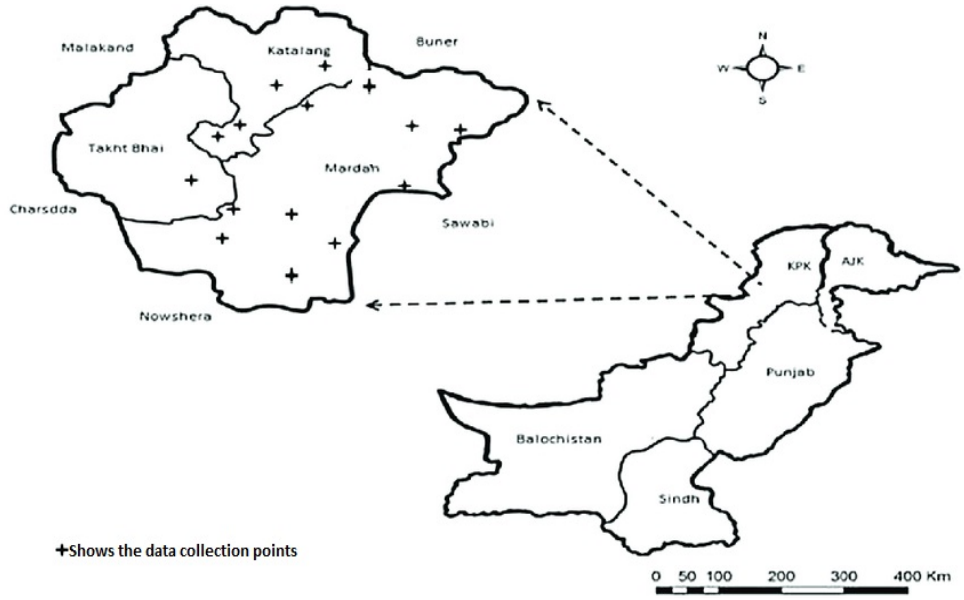

Figure 2. Study area map.

4.2. Sampling

A multi-stage sampling technique was brought into practice for the study. At first, the province of Khyber Pakhtunkhwa was selected as a sample of the study for the whole country. Then another selection was made and. from within the Khyber Pakhtunkhwa, Mardan district was selected as the sample district. The total of agriculture-related families that received credit in 2019 was 2430. From this population, a sample of 343 was taken via Equation (1) [45]. The list of farmers was obtained from the Agriculture Development Bank of Pakistan, Mardan branch, along with their phone numbers and addresses. From the farmers' list, through random sampling, the respondents were selected for the interviews. After collection, the data of 316 respondents were selected and analyzed. Seven respondents were not available at the time of the interview and the data of 20 respondents were incomplete and therefore excluded from the analysis.

$$n = \frac{N}{(1 + Ne^2)} \quad (1)$$

where n = test size in every territory; N = complete quantities of cultivating family units in a region; e = accuracy estimation, set as 10% (0.10)

4.3. Data Collection and Analysis Techniques

The data were collected through a semi-structured questionnaire. The questionnaire had three parts. Part 1 was on the socioeconomic and demographic profile of the respondents. Part II was on crop data before and after the credit. This data was based on their approximation. However, from a few respondents recorded data were available. The collected data were later verified from book records. Part III concerned credit utilization in different farm and off-farm activities. With most of the farmers, this data was recorded for major activities such as land preparation, pesticide use and fertilizers. For illiterate farmers, their children recorded this data in registers.

The data were analyzed through IBM-SPSS version-26. The paired T-test was used to analyze the difference between crops' productivity before and after credit. One-way ANOVA was used to check the differences in utilization of credit in different activities. However, utilization in the category "others" shows amounts when farmers were not sure where they had utilized the credit. Furthermore, multiple-regression (Equation (2)) was

employed to explore the association between the socioeconomic characteristics of farmers and the amount of credit obtained.

$$y = \alpha + \beta_i x_i + \varepsilon \quad (2)$$

where y is the dependent variable, α is constant, β_i represents the estimated parameters of independent variables, x_i shows the independent variables, ε is for the error term of the regression and i ranges from 1 to 10.

Dependent variable

The dependent variable was the amount of credit the farmers obtained from different institutions.

Independent/explanatory variables

Independent variables included farmer's age measured in years. Likewise, education was measured in years of schooling. Farmer's experience was measured in number of years involved in farming activities. Landholding size was measured in acres, as sum of the area under ownership, rented, or both. Farm income data was annual and measured in Pakistani Rupees (PKR). Family size contained the number of family members/household size. Family members involved in farming contained the number of family members whose main occupation was farming. Nature of land contained two categories and was binary: 1 = irrigated land, 0 = non-irrigated land. Irrigated land was defined as that land which was irrigated from a canal system, while non-irrigated land contained that land which was irrigated by tub wells or rain. Likewise, land ownership had two categories: 1 = owner cum tenant, 0 = Owner.

5. Results

5.1. Descriptive Statistics of Socio-Economic Factors

Results in Table 1 show that the minimum age was 40 and the maximum was 80 years. Education shows that the average education level of farmers was 2.84 years and their average experience was 17.95 years. The average landholding size was 2.58 acres. This implies that the farmers had landholding equivalent to that of medium farmers. There were on average 6.58 members per family. Most of the farmers had irrigated land (0.97). Farmers' annual farm income was PKR. 94580.69.

Table 1. Descriptive Statistics.

Socioeconomic Factors	Description	Min.	Max.	Mean	SD
Age	Farmers' age in years	40.0	82.0	58.80	7.07
Education	Farmers' education in the year of schooling	0.0	16.0	2.84	5.00
Experience	Farmers' farming experience in the year	4.0	60.0	17.95	6.51
Landholding Size	Landholding size in acres	0.5	25.0	2.58	3.98
Farm Income	Annual Farm Income in PKR	40,000.0	300,000.0	94,580.69	67,827.63
Family Size	Number of family members	3.0	35.0	6.58	2.44
Family Member Involved farming	Number of family members	1.0	8.0	1.15	0.73
Nature Land	1 = Irrigated, 0 = non-irrigated	0.0	1.0	0.97	0.17
Land ownership	1 = Owner cum tenant, 0 = Owner	0.0	1.0	0.81	0.39

Note. Min. = Minimum; Max. = Maximum; SD = Standard Deviation.

5.2. Impact of Agricultural Credit on Crop Productivity

The farmers were classified into three groups: small farmers < 1 acre, medium farmers 1 to 5 acres and large farmers > 5 acres of land. The paired T-test results for wheat crop production show that before the agricultural credit, the production was 414.68 mounds (equivalent to 40 kg) and 456.49 after the credit (Table 2). The differences in the mean values of small, medium and large farmers were significant at p-value < 0.01. Likewise, mean differences were significant for medium and large farmers in the case of sugarcane. Similarly, all three farmers' groups' mean values in before and after situations were significant for

maize crop. However, the difference between the mean values for tobacco crop production was significant for medium and large farmers. The mean values of vegetable crops display differences between small farmers, medium and large farmers. The analysis showed that all the crops' production improved after the credit.

Table 2. Agriculture credit before and after utilization, effect on productivity.

	Groups of Farmers		
	Small (<1 Acre)	**Medium (1–5 Acres)**	**Large (>5 Acres)**
Crops	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Wheat-Before	414.68 (1128.04)	6599.08 (20,493.53)	42,333.33 (17,614.54)
Wheat-After	456.49 (1222.82)	7242.47 (22,472.87)	48,666.66 (110,881.52)
p-value	0.000 **	0.001 **	0.028 *
Sugarcane Before	1646.53 (14,460.73)	13,966.97 (30,634.09)	21,900.00 (32,583.38)
Sugarcane After	1983.35 (13,906.11)	21,966.97 (47,656.45)	40,866.66 (56,593.39)
p-value	0.642	0.000 **	0.012 *
Maize Before	185.70 (377.38)	969.26 (3004.60)	19,800.00 (43,349.74)
Maize After	209.54 (430.96)	1216.14 (3810.19)	21,783.33 (47,552.31)
p-value	0.000 **	0.003 **	0.016 *
Tobacco Before	160.22 (382.66)	753.39 (1272.21)	30.00 (68.22)
Tobacco After	1425.42 (16,528.73)	825.77 (1386.44)	33.06 (75.20)
p-value	0.310	0.000 **	0.023 *
Vegetables Before	43,163.84 (78,883.48)	75,809.17 (173,313.61)	199,133.33 (238,726.17)
Vegetables After	49,802.25 (90,981.64)	84,587.15 (190,000.15)	223,333.33 (263,348.24)
p-value	0.000 **	0.000 **	0.000 **

Note: * = significance at 5%, ** = significance at 1%, figures in parentheses are values of standard deviation.

5.3. Utilization of Agricultural Credit

Results in Table 3 show that small farmers had average household annual income of PKR. 69336.15, medium farmers had PKR.92880.73 and large farmers PKR. 189066.66. The difference in the mean average income was highly significant at p-value < 0.01. Likewise, the mean difference in agriculture credit among different farmers' groups was significant at p-value < 0.01. The utilization of credit was divided into different farm and off-farm activities. In the utilization amount of credit, the mean difference among the groups of farmers in land preparation was significant at p-value < 0.01. Likewise, mean differences in utilization of credit in other farm activities such as fertilizers, seeds, labor and pesticides were also significant at p-value < 0.01. In percentage utilization of credit, small farmers reported using 28.67% of the total credit in farm activities. Large farmers used 32.25% in farm activities out of the total credit. The smallest percentage (22.9%) was reported by medium farmers. In off-farm activities, 27.54% of the credit was used by medium farmers. The percentage utilization was also calculated for different farm activities for all farmers' groups. Results show that small farmers were utilizing 9.71%, 7.94%, 0.15%, 0.05% and 10% in land preparation cost, fertilizers cost, pesticides cost, daily labor cost and seeds costs, respectively. Land preparation included: ploughing to "till" or dig-up, mix and overturn the soil; harrowing to break the dirt clods into smaller bulk and incorporate plant residue and leveling the field. Medium farmers were using 2.77%, 4.43%, 4.58%, 4.61% and 6.49% of the credit in land preparation, fertilizers, pesticides, daily labor and seeds respectively.

Large farmers were utilizing 6.70%, 6.73%, 5.67%, 5.35% and 7.79% in land preparation, fertilizers, pesticides, daily labor and seeds, respectively. This implies that medium and small farmers were using more credit in farm activities than large farmers. The results of percentage utilization in the different off-farm agriculture activities of small farmers show that they were utilizing 9.03%, 5.12%, 6.51%, 17.83% in health care, education, domestic needs and business, respectively. The results of percentage utilization in different off-farm agriculture activities for medium farmers were 11.48%, 6.92%, 11.68% and 27.54% in health care, education, domestic needs and business, respectively. Large farmers were utilizing 15.70%, 4.72%, 13.36%, 22.59% and 10.71% of the credit in non-agricultural activities such as health care, education, domestic needs and business, respectively. The ANOVA test results were also significant for all the activities in which the farmers utilized credit. The differences were significant at p-value < 0.01. The overall results show that the farmers' utilization of credit was different across all activities.

Table 3. Utilization of agriculture credit.

Activities	Groups of Farmers			F	Sig
	Small (<1 Acre)	Medium (1–5 Acres)	Large (>5 Acres)		
	Mean (SD)	Mean (SD)	Mean (SD)		
Farm Income	69,336.15 (62,591.67)	92,880.73 (53,462.12)	189,066.66 (99,245.05)	45.16	0.00 **
Total Amount credit	101,384.18 (54,628.69)	271,110.0 (111,857.07)	295,666.66 (104,078.33)	171.40	0.00 **
Utilization of credit in agriculture activities					
Land Preparation	9847.45 (3163.06)	7532.11 (6962.18)	19,833.33 (9780.64)	57.16	0.00 **
%	9.71	2.77	6.70	–	–
Fertilizers	8056.49 (2777.17)	12,020.18 (15,414.15)	19,900.00 (9628.80)	20.85	0.00 **
%	7.94	4.43	6.73	–	–
Pesticides	152.54 (1052.27)	12,422.01 (4422.25)	16,766.66 (4415.35)	764.14	0.00 **
%	0.15	4.58	5.67	–	–
Daily Labor	56.49 (751.64)	12,515.59 (5382.89)	15,833.33 (3494.65)	601.62	0.00 **
%	0.05	4.61	5.35	–	–
Seeds	10,954.80 (6735.10)	17,620.18 (7466.36)	23,033.33 (4723.26)	58.39	0.00 **
%	10.80	6.49	7.79	–	–
Total (%)	28.67	22.90	32.25	–	–
Utilization in Non-agricultural activities (misuse)					
Healthcare	9163.84 (13,240.40)	31,128.44 (17,854.91)	46,100.00 (23,016.26)	106.14	0.00 **
%	9.03	11.48	15.70	–	–
Education	5192.09 (9300.98)	18,779.81 (14,724.85)	14,433.33 (7541.53)	50.11	0.00 **
%	5.12	6.92	4.72	–	–
Domestic Needs	6647.72 (11,010.16)	31,688.07 (20,069.18)	39,266.66 (15,411.44)	123.35	0.00 **
%	6.51	11.68	13.36	–	–
Business	18,084.74 (26,377.25)	74,678.89 (41,117.91)	67,833.33 (40,292.96)	105.60	0.00 **
%	17.83	27.54	22.59	–	–
Total (%)	38.51	57.64	56.39	–	–
Other	33,265.53 (15,727.16)	52,541.28 (32,223.81)	32,666.66 (21,961.30)	24.70	0.00 **
Total (%)	32.81	19.38	10.71	–	–

Note: ** = significance at 1%, figures in parentheses are values of standard deviation.

5.4. Regression Model

Socioeconomic factors for the farm households were included in the regression model. Out of ten variables, six had a significant relationship with the amount of credit obtained. The model showed a good fit as revealed by the R^2-value = 0.78. There was no multicollinearity detected in the model as shown by variance inflation factor (VIF) values mentioned in Table 4. Results show that age has a positive association with the amount of credit. This implies that, as age increases by one year, the amount of credit will increase by PKR. 1016.37. Unlike the results for age, experience has a negative association with the amount of credit obtained. Results show that, as experience increases by one year, credit will reduce by PKR. 969.08. Results for farm size show that, as the farm size goes up by one

unit (acre), it will increase the amount of credit obtained by PKR. 2032.26. These results are highly significant at p-value < 0.01. Labor involved in farming is also significantly and positively associated with the amount of credit (p-value < 0.01). The results show that, if farm labor increases by one unit, credit will increase by PKR 17098.47. However, land ownership has a negative and significant association (p-value < 0.01) with the amount of credit obtained. The results show that, as land ownership changes from owner to non-owner, the amount of credit will decrease by PKR. 50143.05.

Table 4. Results of Regression Model.

Variables	Coefficients	Std. Error	*p*-Value	VIF
Age	1016.37	1025.177	0.026 *	1.37
Education	−933.40	1297.914	0.245	1.08
Experience	−969.08	937.891	0.036 *	1.36
Farm Size	2032.26	1498.121	0.000 **	1.12
Farm income	0.47	0.087	0.000 **	1.04
Family size	11,608.36	2784.335	0.146	1.19
Farm labor involved in farming	17,098.47	8901.439	0.004 **	1.09
Nature of Land	6933.79	38,262.998	0.608	1.05
Land ownership	−50,143.05	21,582.13	0.000 **	1.21
Constant	39,764.39	69,926.611	0.57	
R^2 Square		0.785		

Note: * = significance at 5%, ** = significance at 1%

6. Discussion

Food demand will increase by up to 70% by 2050, necessitating yearly investments of at least $80 billion [1], while the majority of developing nations lack the financial infrastructure necessary to support the transition to sustainable agriculture and agri-food production. To achieve the targets of the Sustainable Development Goals, which strengthen the need for sustainable agriculture, huge investment from both public and private sectors is needed [3]. The findings of the study show that agricultural credit plays a significant role in increasing farm productivity. Results revealed that wheat, sugarcane, maize, tobacco and vegetable production increased after the utilization of credit. This implies that the recent agricultural credit policy (allocation of huge funds to the agriculture sector) plays a key role in agricultural development in Pakistan. The results of the study are consistent with the findings of Hussain [46], who reported that crop cultivated areas have increased after credit. According to Ogada et al. [47], the availability of fertilizer and seed variety increased production of maize crops due to the provision of agricultural credit in Kenya. Furthermore, Saqib et al. [6] and Hussain and Thapa [8] have reported that agricultural credit is significant for the modernization and commercialization of farming in the advancement of backward economies. According to another study by Agbodji and Johnson [48], agricultural credit plays a vital role in the productivity of cereal crops.

Findings for agricultural credit utilization show that most small farmers utilized agricultural credit in different agricultural activities. Farmers utilized credit for land preparation, fertilizers, pesticide, daily labor and seeds. However, there was a difference in the use of credit among farmers. Khan [42] revealed that small farmers utilized credit more than large and medium farmers in the process of land preparation, buying fertilizers and seeds. This implies that small farmers needed credit more for these activities. However, in farming activities such as pesticide use and daily labor, they did not need credit. The number of large farmers is insufficient in the farm labor force. Therefore, they hire labor from the labor market. Resultantly, they utilized more credit than small and medium farmers for daily labor. The study also revealed that farmers misused credit in off-farm activities, for example, healthcare, education, domestic needs and business. Hussain and Thapa [8] proved that large-scale farmers do utilize agricultural credit for educational, health-related activities, festivals and repaying of loans. However, our study shows that agricultural credit was mostly misused by large and medium farmers. The findings of

our study are consistent with that of Chandio et al. [41]. They revealed that large farmers show more fungibility than small farmers. According to Nosiru [49], agricultural credit was employed for other than agriculture purposes. A similar study conducted by De Klerk et al. [50] revealed that agricultural credit is mostly used other than for farming purposes. The study is supported by the findings of Katchova and Barry [51], who revealed that agricultural credit was misused in miscellaneous activities. The study of Elahi et al. [52] revealed that poor farmers and loan seekers misused agricultural credit for business and other activities. The study of Raza et al. [53] is similar to that of our study which showed that agricultural credit was utilized in healthcare, education, domestic needs, business and miscellaneous activities.

Influencing factors on access to credit show that an increase in age increases access to credit. The findings for age are consistent with that of Henri-Ukoha et al. [54], who revealed that age influences access to credit. Furthermore, studies show that access to agricultural credit depends on the experience of the farmers. Experienced farmers have more knowledge about the formal procedures needed to obtain loans from the banks. Saqib et al. [39] reported that experienced farmers were obtaining more credit than inexperienced farmers. Furthermore, farm size has a positive and significant relationship with the amount of agricultural credit. Therefore, farm size is a very important socioeconomic factor in accessing credit from formal financial sources. Further, it is a symbol of high social status in society which helps in obtaining credit from formal financial channels. The findings of this study are in agreement with Saqib et al. [10]. They revealed that large farmers had no issue of guarantee and obtained more credit than small farmers. Furthermore, farm income plays a key role in the amount of credit obtained. More farm income means that the farmers' repaying ability is high. Therefore, formal institutions extend more credit to those farmers, who have more income. A study from Pakistan reported that the monthly income of farmers positively influenced the amount of credit [10]. Likewise, farm labor positively influenced the amount of credit. This implies that more farm labor ensures more productivity, consequently providing more financial stability to the farmers. Bhalotra and Heady [55] reported that farms which were well-prepared in terms of labor had good prosperity and productivity. Land ownership led to more credit. This implies that if farmers have ownership of land, they also have ownership documents. Therefore, these farmers have no problems with the guarantee to be produced for the bank.

The study conveys the message that utilization of agricultural credit in farm activities enhanced crop productivity. If banks and governmental agencies ensure credit utilization in agricultural activities and stop its misuse, this can enhance agricultural productivity in the future.

7. Conclusions

Due to smallholdings, traditional farming practices, inadequate irrigation infrastructure and other factors, agricultural productivity is low in developing nations, particularly in Pakistan. Credit is crucial in enhancing agricultural productivity. Farmers can purchase the necessary inputs and machinery for farm operations when credit is readily available. The findings of the study revealed that agricultural credit has improved production, though some farmers were involved in credit fungibility. Farmers utilized credit in various farming activities. However, the utilization of credit in different activities was found to be different among different farmers' groups. It is pertinent to note that large and medium farmers misused agricultural credit more than small farmers. Socioeconomic factors played an important role in the extent of agricultural credit. It is suggested to policymakers that more agricultural credit should be provided to these farmers. This enhances agricultural production and can play a role in food security and poverty alleviation. Moreover, steps should be taken to control the misuse of agricultural credit. Banks should ensure that credit should be used only for agricultural purposes.

Limitations of the Study

The study assessed the agricultural credit that farmers obtained from one of the major banks in Pakistan. If data from other banks were included, the findings may vary. This study has examined formal credit only. The results may differ for credit obtained from informal sources. Furthermore, a significant part of the credit was utilized in ".e., ", the category in which farmers did not remember how the credit was used. If this issue were more carefully handled, the results may be different from this study.

Author Contributions: C.C. has drafted the paper with the help of all authors. S.S. has collected the data analyzed it. S.E.S. has supervised the whole study. P.P. has interpreted the results. N.A. has analyzed the data and interpreted the results. All authors have read and agreed to the published version of the manuscript.

Funding: The publication of this research was financially supported by Mahasarakham University.

Informed Consent Statement: Informed consents were obtained from all participants of the study.

Data Availability Statement: The data and other materials will be shared upon suitable request to the corresponding author.

Acknowledgments: The authors are thankful to the study participants who spared their precious time for interviews. We are also very grateful to the editorial board of the journal and anonymous reviewers for their useful and important comments on the earlier draft of the manuscript. Indeed, their comments have substantially improved the quality of our work.

Conflicts of Interest: Authors declare no conflict of interest.

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