

# Focus of Agricultural Bank Finance on Mechanized Agricultural Activities in Rahad Agricultural Scheme of Sudan

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**Abstract:-** The paper aimed to assess the role and impacts of the Sudanese Agricultural Bank (ABS) and its focus on the mechanized agricultural activity in Rahad Scheme. Primary data were collected from 279 respondent farmers in Rahad scheme through stratified random sampling. Targeted simple random sampling was also used to select officials from the Agricultural Bank of Sudan, respondents were 59 (response rate = 94.9%). Two structured questionnaires were used to collect the primary data. Secondary data was also obtained from relevant sources. Descriptive statistical analysis and chi-square test were adopted. Socio-economic factors, level of technology; Agricultural Bank policy and finance constraints were tested. Results of the study showed that ABS used to focus on financing operational cost and play a very minor role in financing machinery and capital cost, finance was the main obstacle for farmers to adopt the recommended technical package. The study concluded that more attention to machinery finance is required from the ABS.

**Keywords:-** Agricultural Bank, Finance, Mechanized, Rain-Fed and Irrigated Sector.

## I. INTRODUCTION

The agricultural sector continues to be the backbone of Sudan's economy in terms of its contribution to GDP. The agriculture sector is expected to regain its role as a key source of foreign exchange. The loss of oil revenues in 2011 after the separation of South Sudan has been followed by resurgence in agriculture's share in the country's exports, reaching 55% in 2019 as reported by the United Nations International Trade Statistics Database, and helping cushion some of the impact of the loss of oil revenues. The contribution of agriculture to the GDP was about 29 % in 2017 with 4.9% growth rate (Sudan Bank, 2017 annual report 54). Agriculture contributes about 90% of non-oil exports (CTA, 2008). Agriculture contribution also reflected in the activities of other sectors such as transportation, industry, and commerce. Agriculture and related activities provide 80% of the labor force in Sudan. Moreover, the agricultural sector was the main source of Sudanese exports before oil extraction in 1991 (Mustafa, 2006). Agriculture accommodates three major farming systems i.e. the traditional rain-fed farming sector, the mechanized rain-fed farming sector and the irrigated farming

sector. The irrigated farming sector is identified mainly by a prominence of schemes irrigated by gravity from the River Nile and its tributaries, and Sudan is generally considered the largest irrigated area in sub-Saharan Africa (UNEP, 2008)). These schemes are the Gezira Irrigated scheme, the Rahad irrigated, New Halfa and El Suki irrigated scheme. These schemes produce mainly cotton, sorghum, groundnuts, and sunflowers. There are five major sugar schemes, four of which are government schemes (UNEP, 2008). The fifth and largest sugar plantation is Kenana Sugar Company, which is an international public-private joint venture (UNEP, 2008). Farming practices in irrigated schemes are more intensified than in rain-fed sectors and it includes crop rotation, mechanized land preparation, and a regular use of improved seeds, fertilizers, pesticides, and herbicides provided by credit institution through a program called scheme-based credit (CFSAM, 2011). The average yield produced in the irrigated sector is economically higher than that in the rain-fed sector; it contributed 26% to the Sudanese GDP in 2002 (CFSAM, 2011). Livestock production is most prevalent in the traditional rain-fed farming systems, but is increasing in irrigated areas. The Gezira Scheme was initially financed by the Sudan Plantations Syndicate in London and later the British government guaranteed capital to develop it. The Sudan Gezira Board took over from private enterprise in 1950. Later the central bank used to finance all the other agricultural activities through credit which will be reimbursed at the end of the season. The same system was applied to other irrigation schemes. In 1992, the government of Sudan (SG) adopted a major reform and introduced liberal economy where all the government irrigated schemes were to be financed through a consortium of banks (mainly private banks) which were instructed to finance agriculture in the country. The interest of the Banks' credits were extremely high (about 70%) in comparison to the facilities offered by the Central Bank; financed without interest. This system resulted in a severe setback to the whole agricultural production. The consortium of banks doesn't have the sufficient resources; so this situation resulted in reduction of cultivated areas and lower productivity. Banks as Financial Intermediary are very important, due to their importance in the financial system and influence on national economies, they are highly regulated in most countries. Most banks are profit-making, private enterprises. However, some are owned by government, or are non-profit organizations (Wikipedia the free encyclopedia April 2015).

FAO (2004) classified banks into Development Banks and Commercial Banks. Development banks are often not geared towards mobilizing local funds, but use their share capital, treasury funds and external loans for lending. The use of such long-term funds for short-term loans is highly inefficient, and the transformation of development banks into banks operating along commercial lines, is vital. Development banks should have a diversified portfolio, in which agriculture plays an important, but not an exclusive role. There is now a consensus among economists, policy-makers and donors that financial services matter for the rural producers, while the existing sources of finance (formal and informal) are not sufficient to accelerate income growth. Entrepreneurship in agriculture is constrained by lack of access to a wider range of financial services. Funds are needed to finance infrastructure projects including irrigation, drainage and marketing, purchase of machinery, improved inputs, human capital development, etc. In addition to channeling external resources to agriculture, financial intermediaries can facilitate the transfer of savings within agriculture, assist in appropriate risk, liquidity management, better use of financial surpluses and other assets, and provide an array of valuable noncredit services. According to FAO (2003), risks, transaction costs, lack of information and collateral are the main factors affecting the demand and especially the supply of term finance. According to Claudio Gonzalez-Vega and Douglas H. Graham, (1995) the state-owned agricultural development banks were created several decades with the objective of supplying either the longer-term agricultural credit that the commercial banks were not prepared to grant, or the loans "needed" by specific (risky) clientele, such as small and even medium farmers, who lacked access to the financial services of the traditional banking sector, as they were considered by the governments of the developing nations to be a priority. They stated four defining features for state owned financial banks; their state national ownership, their focus on agriculture, their non-commercial orientation, and their bank charter. Agricultural Bank of Sudan was the only formal agency specializing in farm credit prior to 1990. The bank is owned by the government and it is now the most geographically widespread bank in the country. Previously, the bank was not engaged in deposit-taking and its lending capacity was determined by its capital and supported by the central bank. Agricultural loans are generally viewed by members of the commercial banks' consortium (CBC) as risky, costly to administer and less rewarding as they do not allow quick circulation of funds. Since 1999 the ABS began to venture into commercial lending to reduce risk and increase its income. Being unable to attract adequate amounts of savings, 75% of lending by the ABS relied on external subsidized funds (other than capital and deposits). The ABS sustained huge losses since 1998 due largely to nonperforming loans that claimed between 14% and 41% of total annual finance. The bank exercises its business activities through the main branch in Khartoum in addition to others in different states as well as the 2 silos in Gedarif and Port Sudan. The bank deals with at least 500000 farmers in the irrigated traditional and mechanized rain-fed sectors.

## II. METHODOLOGY

The study was conducted in Rahad scheme which was established in 1973. It is one of the National Four Irrigated Schemes in the Sudan. The Rahad Irrigation Project was constructed to be a key element in expanding the production of export crops through fully mechanized irrigated agriculture (USAID, 1982). It is situated between 14° 23" – 13° 43" latitude North, and longitude 34° 23" and 33°-30" East (Ibrahim, 2004). The scheme administratively falls in two states: Gedarif and Gezira, covering an area of 140 km in length north-south, and 15-25 km in width (Ibrahim, 2004). The scheme lies in a semi-arid climate; the annual rainfall varies from 300 mm in the north to 450 mm in the south. The temperature in April is 40 °C maximum and 36 °C in October as a secondary maximum. January is the coldest month with 17 °C average. The soil of irrigated land of the Rahad scheme lies within the central clay plains of Sudan. The scheme is a socio – economic enterprise based on tenancy system. The area is inhabited by about 250,000 families, the production relationship is based on land and water charges as determined by the corporation from season to season. The existing Rahad scheme comprising 350,000 fed, irrigated through pumping station at Meina on Blue Nile. The area allocated to 15,000 tenants. The size of holdings is 22 feds for field crops and 20,000 feds are allocated for individuals each five (5) feds, planned to grow vegetables, fruits, forests and fodders. The Ministry of Agriculture appointed the Rahad Agricultural Corporation to be the responsible body for managing farm operations in the Rahad scheme. Currently administratively, the scheme is divided into 3 groups; southern, central, and northern groups; each group consists of three sections also known as blocks. Every section contains five villages; villages were given numbers from 1-46. The project is divided into nine (9) groups of approximately 33.000 feds as a basic administration unit. A tenth section was established in the north of the scheme as the third phase of the Rahad scheme. The main cropping system was; cotton, groundnuts and sorghum as summer crops while wheat and sunflower as winter crops in addition to horticultural and fodder crops (Rahad Agricultural Corporation, 2010).

### ➤ *Population Sampling and Sample Size of the Study*

Farmers of Rahad scheme and Bank officials of the Agricultural Bank of Sudan were targeted in this research. Stratified simple random sampling was done for the farmers in Rahad scheme. The process was done in consultation with the manager of the scheme intending to cover the 10 sections of the scheme with the larger portions for heavily populated areas or sections. Total number interviewed was 310 farmers, the respondents were 279 (response rate was 90%) of the total selected sample. Targeted simple random sampling was done to officials who worked or currently working in the finance department of the Agricultural Bank. Total number interviewed was 59; the respondents were 56 (response rate 94.9%).

➤ *Data Collection*

Primary and secondary data were obtained. Primary data collected through surveys by face to face interviews with farmers, Rahad management officials and bank officials using two questionnaires as tools for data collection in addition to interviews with some Key informants. Secondary data collected from previous studies, published papers, workshops, seminars proceedings, studies, annual reports and other relevant sources.

➤ *Data Analysis Procedures*

Data collected were grouped into themes mainly socio-economic features productivity and level of technology adopted, finance source, agricultural bank policy, employee’s performance and gender effect. Further the data were coded; computerized and analyzed using the SAS1 program to carry out descriptive analysis frequency matrix and percentages for the variables of the study. Chi-square Test was used to test the significance of the association between variables.

**III. RESULTS AND DISCUSSION**

The results showed that the majority (64.21%) of the respondents were involved in crop production, followed by animal husbandry (17.34%) as shown in figure 3.1.

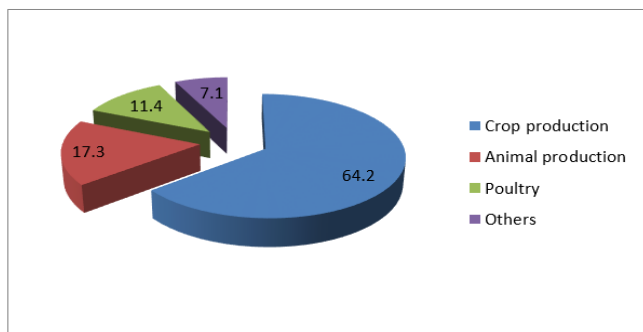


Fig 1 Percentage Distributions of Respondents by Activity type

Figure 2 Illustrated that some farmers had stockyard, buildings, and the least portion (2.15%) owned machinery in their fields.

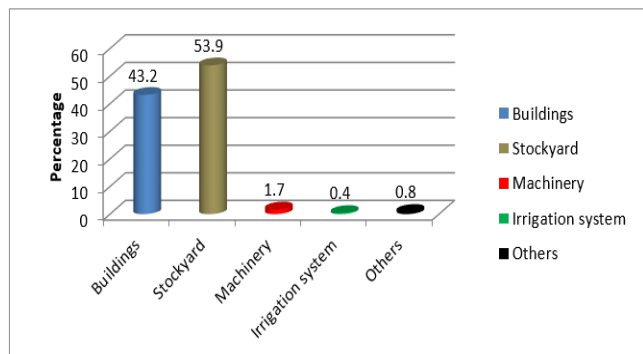


Fig 2 Percentage Distribution of Respondents by Assets Existence

The level of technology adopted and implemented was very negligible and low productivity was the main characteristic.

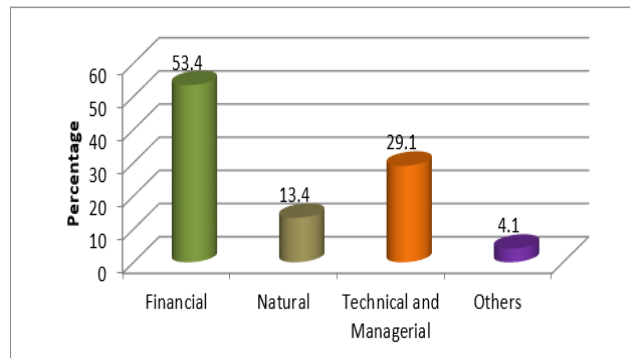


Fig 3 Percentage Distribution of Respondents by Low Productivity Reasons

Figure 3 showed that more than half (53.4%) of the respondents attributed their low productivity to financial reasons, while 28.99% referred that to technical and managerial reasons which also might be related to financial reasons.

Allam Ahmed (2004), emphasized that farmers need new high-payoff inputs and technologies to increase their productivity.

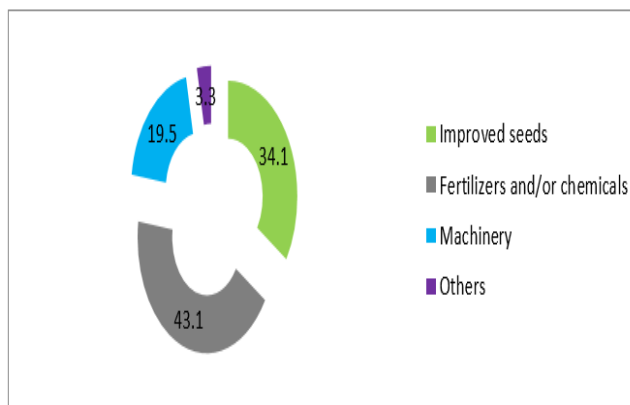


Fig 4 Percentage Distribution of Respondents by Technical Package Used

Figure 4 illustrated that about 43.1% of farmers said that they were using fertilizers and /or chemicals as technical packages in their cultivation, and those who were using machinery (mostly for land preparations and harvesting) were only 19.5%. Low level of technical package and the machinery use were indicators for the low mechanization level and technology been adopted in Rahad scheme which is supposed to be fully mechanized. It was found that 12.5% of farmers admitted that the finance for the operational cost was done by banks and the rest which was the majority by informal sources as shown in figure 3.5.

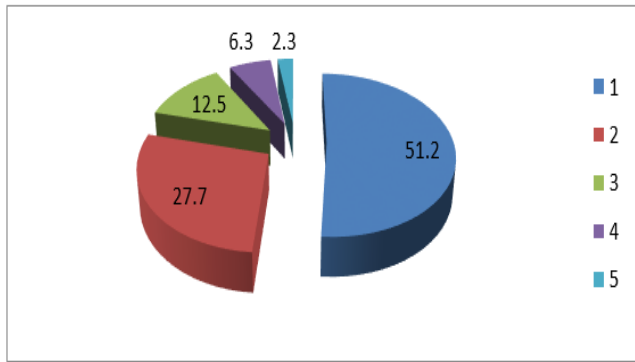


Fig 5 Percentage Distribution of Respondents by Operational cost Finance Source

Figure 6 showed that 33.2 % of those who had machinery and equipment were financed by the banks and mostly by the Agricultural Bank of Sudan, again the rest by the informal sources.

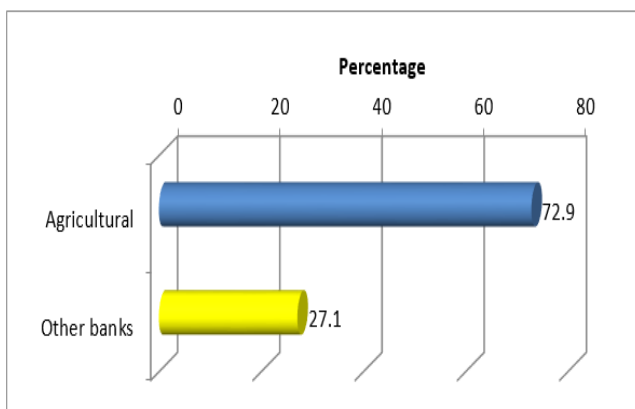


Fig 6 Percentage Distribution of Respondents by Bank type

The informal sources of finance were more dominant in the scheme than the formal for both operational and capital cost. It was found that the informal sources play a vital role in financing operational cost but they failed in financing machinery and agricultural technology. This was confirmed by FAO (2013) which stated that high capital and operational costs of mechanization coupled with low commodity prices were the most important factors that have driven agricultural mechanization in the past 60-70 years in the region.

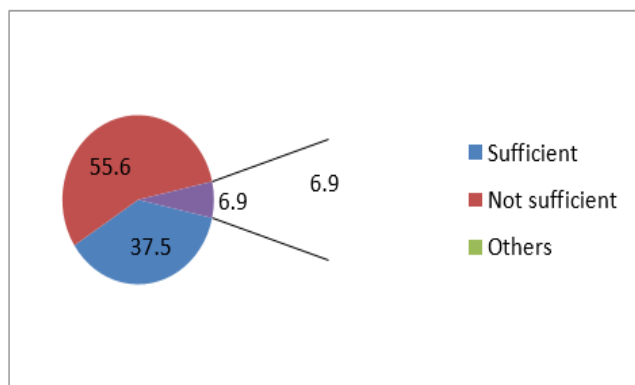


Fig 7 Percent Distribution of Respondents by Finance Sufficiency

Results in figure 7 indicated that 55.6% of those who were financed by the agricultural bank claimed the insufficiency of finance. Murabahah was the dominant mode for both operating cost and capital one. According to State Bank of Pakistan (2008) a distinction should be made in terms of loan type and modes between operational and capital cost.

Figure 8 showed that about 56.6% of the respondents did not fulfill their loans repayment or fulfilled them partially and they attributed that to the unsuitability of the payback criteria, insufficiency of the grace period, low productivity, marketing obstacles, or using the loan in other purposes (Fungibility). The majority (61.7 %) said they did their payment from their off-farm additional jobs beside the transaction itself.

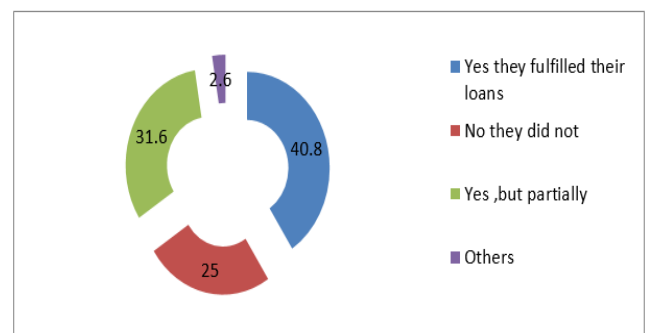


Fig 8 Percentage Distribution of Respondents by Loan Fulfillment

About 57.2% denied the suitability of the collateral for them as small farmers. The majority (94.2%) of bank officials agreed with the necessity of land contract as collateral and about 80.00% disagreed with the fact that the bank should focus only on agriculture Figure (3.9). Adams (1994), attributed the failure of agricultural development banks to the policy environment in which they operated, which severely penalize the agricultural sector and further exacerbate difficulties typical of rural financial markets.

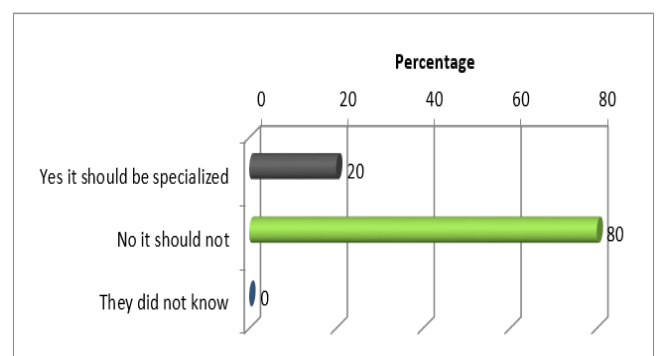


Fig 9 Percentage Distribution of Respondent by bank official's Opinion in bank Specialization

Bourne and Graham (1984) concluded that concentrating on agriculture rather than on both farm and off-farm activities, state-owned agricultural development banks further reduced their opportunities for portfolio diversification. Almost all (98.5%) of bank officials agreed that the bank should focus on both the operational cost and

the capital cost. The majority (81.5%) said that the finance portfolio is done due to agricultural density and the number of farmers in the area. Most (73.6%) of them agreed with the fact that finance was becoming more specialized and classification was done according to payback period, volume and quality of finance. They described the current modes as

ineffective and unsuitable for agriculture in general and /or for agricultural technology in particular, however, there was lack of awareness of Islamic Model of financing among traditional agricultural financing bankers and Islamic Banks were simple to the requirements and business cycles of farm and non-farm sectors in the country.

Table 1 The Chi-Square Results of Technical Package Used with Finance Source

Technical package used	Finance source					
	Themselves	Relatives	Banks	Shale	Others	Total
Improved seeds	27 (10.2)	8 (3.0)	17 (6.4)	1 (0.4)	1 (0.4)	54 (20.4)
Fertilizers and /or Chemicals	56 (21.2)	39 (14.8)	52 (19.7)	1 (0.4)	0 (0.0)	148 (56.1)
Machinery	19 (7.2)	9 (3.4)	27 (10.2)	1 (0.4)	0 (0.0)	56 (21.2)
Others	3 (1.1)	1 (0.4)	1 (0.4)	1 (0.4)	0 (0.0)	6 (2.3)
Total	105 (39.8)	57 (21.6)	97 (36.7)	4 (1.5)	1 (0.4)	264 (100.0)

Chi value = 22.7 p=0.03

According to SBP (2008) specific modes (participatory modes of finance) should be used to finance fixed assets and Muraabahah is more suitable to trade based finance. It seems that the bank allowed financing the same person from two sources and that might increase the risk factor. The majority (68.5%) agreed that the social situation of the client had sometimes its effect on the type of action taken towards him. Technical, administrative and client credibility were the most important finance obstacles.

➤ Based on Assumptions that there were Relationships Between some Selected Variables;

The analysis of the results indicated that there was a significant relationship (p=0.03) between technical package used and finance source table 1. There was no significant relationship (0.6) between technical package used and the bank as source of finance and technical package used and finance volume (p=0.11).

Table 2 The Chi-Square Results of Technical Package Used with Finance Mode

Technical package used	Finance mode					
	Muraabahah	Musharakah	Muzarahah	Salam	Others	Total
Improved seeds	28 (16.2)	1 (0.6)	3 (1.7)	16 (9.3)	1 (0.6)	49 (28.4)
Fertilizers and /or Chemicals	30 (17.3)	20 (11.5)	23 (13.3)	5 (2.9)	0 (0.0)	78 (45.0)
Machinery	17 (9.8)	10 (5.8)	10 (5.8)	4 (2.3)	0 (0.0)	41 (23.7)
Others	3 (1.7)	0 (0.0)	2 (1.2)	0 (0.0)	0 (0.0)	5 (2.9)
Total	78 (45.1)	31 (17.9)	38 (22.0)	25 (14.4)	1 (0.6)	173 (100)

Chi value = 41.1 p=0.0001

Table 2 below showing a highly significant relationship between technical package used and finance mode (p=.0001).

Table 3 Illustrated a significant relationship between technical package used and finance inaccessibility (p=0.04)

Table 3 The Chi-Square Results of Technical Package Used with Finance Inaccessibility

Technical package used	Finance inaccessibility						
	Provisions	Procedures	Modes	Feasibility study	All of them	Others	Total
Improved seeds	18 (6.9)	19 (7.3)	0 (0.0)	2 (0.7)	12 (4.6)	0 (0.0)	51 (19.5)
Fertilizersand/or Chemicals	41 (15.8)	27 (10.4)	9 (3.5)	28 (10.8)	37 (14.2)	4 (1.5)	146 (56.2)
Machinery	15 (5.8)	21 (8.1)	5 (1.9)	6 (2.3)	9 (3.5)	1 (0.4)	57 (22.0)
Others	3 (1.2)	2 (0.7)	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	6 (2.3)
Total	77 (29.6)	69 (26.5)	14 (5.4)	36 (13.9)	59 (22.7)	5 (1.8)	260 (100.0)

Chi value = 25.6 p=0.04

Table 4 and 5 revealed that it was very highly significant relationship (p=0.0001) between machinery used and finance source as well as very highly significant relationship (p=0.0001) between machinery used and the bank as source of finance .



Table 4 The Chi-Square Results of Machinery Used with Finance Source

Machinery used	Finance source					
	Themselves	Relatives	Banks	Shale	Others	Total
Land preparation	37 (17.6)	9 (4.3)	29 (13.9)	2 (0.9)	0 (0.0)	77 (36.7)
Irrigation	14 (6.8)	6 (2.9)	4 (1.9)	0 (0.0)	0 (0.0)	24 (11.6)
Harvesters and Threshers	19(9.0)	7 (3.5)	4 (1.9)	1 (0.5)	0 (0.0)	31 (14.8)
Others	18 (8.0)	24 (11.5)	37 (17.0)	1 (0.5)	0 (0.0)	80 (36.9)
Total	87 (41.0)	47 (22.2)	73 (34.4)	4 (1.9)	1 (0.5)	212 (100.0)

Chi value = 137.4 p=0.0001

Table 5 The Chi-Square Results of Machinery Used with Bank As Source of Finance

MachineryUsed	Bank as finance source				
	Agricultural Bank	Other Bank A	Other Bank B	Other	Total
Land preparationmachinery	43 (34.3)	5(4.0)	2(1.6)	0 (0.0)	50(39.9)
Irrigation	12 (9.6)	6 (4.9)	3 (2.5)	0 (0.0)	21(17.0)
Harvesters+ Threshers	10 (7.9)	3(2.3)	2 (1.5)	0 (0.0)	15(12.0)
Others	34 (27.0)	4(3.3)	1 (0.8)	0 (0.0)	39(31.1)
Total	99 (78.6)	18 (14.3)	8 (6.3)	1 (0.8)	126(100.0)

Chi value = 137.29 p=0.0001

Table 6 The Chi-Square Results of Machinery Used with Finance Volume

Machinery used	Finance volume			
	<10000	10000-50000	>50000	Total
Land preparation machinery	35 (24.7)	26 (18.5)	2 (1.5)	63 (44.7)
Irrigation	21 (14.9)	1 (0.8)	0 (0.0)	22 (15.7)
Harvesters and Threshers	8 (5.7)	7 (4.9)	2 (1.5)	17 (12.1)
Others	14 (9.9)	25 (17.6)	0 (0.0)	40 (27.5)
Total	79 (55.6)	59 (41.6)	4 (2.8)	142 (100)

Chi value = 28.6 p=0.0004

It was very highly significant relationship (p=0.0004) between machinery used and the finance volume as well as very highly significant relationship (p= 0.0001) between machinery used and finance mode (as shown in table 3.6 & 3.7).

Table 7 The Chi-Square Results of Machinery Used with Finance Mode

Machinery used	Finance mode					
	Muraabahah	Musharakah	Muzarahah	Salam	Others	Total
Land preparation machinery	38 (27.1)	5 (3.6)	3 (2.1)	16 (11.4)	0 (0.0)	62 (44.2)
Irrigation	7 (5.0)	6 (4.3)	8 (5.7)	1 (0.7)	0 (0.0)	22 (15.7)
Harvesters and Threshers	2(1.4)	4 (2.9)	9 (6.4)	1 (0.7)	0 (0.0)	16 (11.4)
Others	12 (8.6)	9 (6.4)	13 (9.3)	6 (4.5)	0 (0.0)	40 (28.7)
Total	60 (42.9)	24 (17.1)	33 (23.6)	23 (16.4)	0 (0.0)	140 (100.0)

Chi value =43.43 p= 0.0001

However, regarding inaccessibility there was no significant relationship (p= 0.11) between machinery used and finance inaccessibility.

Table 8 The Chi-Square Results of Machinery Purpose with Finance Source

Machinery existed	Finance Source					
	Themselves	Relatives	Banks	Shale	Others	Total
Personal use	17 (6.5)	4 (1.5)	4 (1.5)	1 (0.4)	3 (1.2)	29 (11.1)
Hiring	60 (23.1)	24 (9.2)	35 (13.4)	2 (0.8)	0 (0.0)	121 (46.5)
Both	21 (8.1)	29 (11.2)	58 (22.3)	1 (0.4)	0 (0.0)	109 (42.0)
Others	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)
Total	98 (37.7)	58 (22.3)	97 (37.3)	4 (1.5)	3 (1.2)	260 (100.0)

Chi value= 62.2 p=0.0001

Table 8 showed that it was very highly significant relationship (p=0.0001) between the purpose of machinery existed and finance source.

There was no significant relationship (p= 0.21) between the existence of additional job and the finance source. There was a high significant (p=0.01) relationship between additional job and the annual income, while no significant (p=

0.27) relationship between finance volume and loan fulfillment, no significant ( $p=0.49$ ) relationship between gender and bank specialization. There was no significant relationship ( $p=0.98$ ) between gender and finance focus, no significant ( $p=0.17$ ) relationship between gender and finance classification, no significant ( $p=0.92$ ) relationship between education and finance focus and no significant ( $p=0.48$ ) relationship between working experience and finance focus.

#### IV. CONCLUSION

The study concluded that; Low productivity was a common feature in Rahad Scheme and that was mainly due to low adoption and use of the recommended technical package and mechanization. Finance was the main obstacle for farmers. Banks were playing a minor role in financing agriculture and machinery. The informal sources were more dominant in the scheme than the formal ones for both operational and capital cost. Lack of finance is the vital constraint for farmers to adopt agricultural technologies and modernizing the agriculture. The ABS have to be revitalized to perform its role efficiently and compromise developmentally and commercially. Innovative credit programs should be designed and tailored according to the special needs of the small farmers and special focus should be on machinery finance.

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