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Comparison between Agricultural Finance in Sudan and Turkey: Credit

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ABSTRACT

This study compares the agricultural finance systems in Sudan and Turkey, focusing on credit availability, access, and utilization. The comparison aims to identify best practices and challenges in agricultural finance in both countries. Methodology the study employs a comparative analysis of agricultural finance systems in Sudan and Turkey, using data from various sources, including government reports, international organizations, and financial institutions. Results show that- Sudan's agricultural finance system is characterized by limited access to credit, high interest rates (Murabah and Salam), and inadequate institutional capacity. Turkey's agricultural finance system is more developed, with a wider range of credit options, lower interest rates, and stronger institutional capacity. The comparison highlights the differences in agricultural finance systems between Sudan and Turkey, including credit availability: Turkey has a more developed credit market, with a wider range of credit options available to farmers. Interest rates: Interest rates in Sudan are higher than in Turkey, making credit less accessible to farmers. Institutional capacity: Turkey has stronger institutional capacity, with more effective financial institutions and regulatory frameworks.

The study concludes that Sudan can learn from Turkey's experience in agricultural finance, particularly in terms of developing a more effective credit system and strengthening institutional capacity.

Keywords: *Agricultural finance, credit, Murabaha, Salam, Sudan, Turkey, comparative analysis, institutional capacity, interest rates*.

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Introduction

Agricultural finance plays a crucial role in development of agricultural sector in both Sudan and Turkey. This study aims to compare and analyze agricultural finance systems in both countries, focusing on credit availability, access, and utilization. Overall goal is to examine credit gaps and bridging in both countries. Methodology employed a qualitative approach, using existing literature and data to analyze the agricultural finance systems in Sudan and Turkey. Resuts of comparison showed significant differences in crediting systems, which pave ways to develop agricultural credits in both.Data sources secondary information are obtained from government reports international organizations such as the Food and Agriculture Organization (FAO) and the World Bank (WB), academic studies and papers on agricultural finance in Sudan and Turkey.

Economic overview

Sudan- GDP per capita: $2,183 (2023) Annual GDP: $109,266 million (2023) - Agriculture is a vital sector, but the country's GDP is heavily influenced by its oil reserves.

Turkey- GDP per capita: $15,471 (2024). Annual GDP: $1,320,837 million (2024)- Turkey's diversified economy and strategic location contribute to its higher GDP

Sudan's agricultural sector is facing challenges due to climate change, water scarcity and limited access to credit for main crops include cotton, sorghum, wheat and groundnuts.

Turkey's agricultural sector is more developed and diversified, with significant production of fruits, vegetables and grains. Turkey has a strong agricultural infrastructure and better access to credit and technology. Creation of rational business capital structure and successful business organization is based on the knowledge, experience and expertise of the operator.

In both Turkey and Sudan credit utilization status of agricultural enterprises decision-making activities in the agricultural sector, not carried out with scientific methods based on knowledge.

In this context, growing need for research to meet information needs of agricultural enterprises funds and credit institutions and organizations.

Capital Structure approaches to credit use of farms in Turkey and Sudan analysis issues at micro and macro levels.

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At micro level, studies on capital structure in agricultural enterprises include studies at level of credit utilization, preferred institutions and organizations in credit utilization, problems in credit utilization and determination of credit needs in enterprises.

At macro level, studies on the credit practices at institutions and organizations that provide funds to the agricultural sector in both countries its an importance contribution of credit utilization in general in agricultural sector and rural development.

Changes and progress in financial management have rates higher than other fields. This implies that its importance to create both fixed and revolving capital combinations, and use of credit in large and small agricultural enterprises.

Capital structure of farms in Turkey and Sudan is influenced by a mix of traditional practices, government support, and modernization efforts. While significant progress has been made in Turkey, challenges such as land fragmentation, access to finance, and climate risks remain critical areas for improvement.

But in Sudan slow improved financial instruments, and microfinance societies but building of rational financing policies could further strengthen the capital base of the agricultural sector.

Study justifications:

Why do comparison is important; comparing Sudan and Turkey's agricultural credit systems can provide valuable insights for several reasons:

1. Different Economic Contexts: Sudan and Turkey have distinct economic profiles, with Turkey having a more developed economy and Sudan facing economic challenges. Comparing their agricultural credit systems can highlight how different economic contexts impact agricultural financing.

2. Agricultural Sector Importance: Agriculture is a vital sector in both countries, but they have different agricultural production systems, crops, and challenges. Comparing their agricultural credit systems can reveal how different agricultural sectors are supported through financing.

3. Islamic Financing: Sudan has experience with Islamic financing modes like Salam, which can be compared to conventional financing systems in Turkey. This comparison can provide insights into the effectiveness of different financing models.

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4. Development Opportunities: By comparing the agricultural credit systems of Sudan and Turkey, opportunities for development and improvement can be identified. This can inform policy decisions and strategies to enhance agricultural finance in both countries.

5. Regional Relevance: Both Sudan and Turkey are located in strategic regions, with Sudan in Africa and Turkey bridging Europe and the Middle East. Comparing their agricultural credit systems can provide insights relevant to regional agricultural development.

6. Learning from Best Practices: Turkey's well-established agricultural credit system can serve as a model for Sudan, while Sudan's experience with Islamic financing can provide lessons for other countries. By comparing their systems, best practices can be identified and adapted.

7. Informing Policy Decisions: The comparison can inform policy decisions aimed at improving agricultural finance, increasing access to credit, and promoting agricultural development in both countries.

By analyzing the differences and similarities between Sudan and Turkey's agricultural credit systems, valuable insights can be gained to support agricultural development and finance in both countries.

Methodology

The study employs a comparative analysis of agricultural finance systems in Sudan and Turkey, using data from various sources, both statistical data results of analysis of share of agricultural credit to total credits for years 2012 to 2023 interest rates and credit volume in addition to results of quantitative data obtained from relevant reports. The graphs below illustrate the trends. Comparison between the two countries in interest rates and (Murabah and Salam), are illustrated.Data analize structural differences between agricultural financing systems of Turkey and Sudan. Aimed to reveal distinctive features of both countries in terms of access to credit, credit volume and interest rates. Descriptive statistics and advanced statistical methods (correlation and logistic regression analysis) were used within the framework of a comparative analysis.

Main material includes national and international research, compilations, projects and theses based on secondary data from relevant institutions and organizations (FAO, OECD, TCMB, Bank of Sudan, Agricultural Bank of Sudan, T.C. Ziraat Bankası, Ministries of agriculture). Data used are quantitative data for the period 2012-2020 (FAO, 2025; OECD, 2025; TUİK, 2025). In addition, qualitative

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findings such as access to credit conditions, institutional capacity levels, and legal framework were obtained through literature review. Data set was brought to a comparative order for analysis and converted to long format. Each observation represents financial indicators belonging to a specific path and country. The country variable was coded in binary form: Sudan = 0, Turkey = 1. The comparative analysis method was adopted in the research. This approach aims to determine similarities and differences by analyzing the agricultural financing systems of two different countries on specific indicators.

Distribution properties of data were tested with the Shapiro-Wilk test to evaluate the prerequisites of parametric tests (Kalaycı, 2017). It was determined that the variables other than the interest rate showed deviations from the normal distribution. Therefore, Spearman's rank correlation coefficient was used in the correlation analysis (Orak and Tahsin, 2023). The level of relationship between the two countries and agricultural credit indicators and interest rates was analyzed using Spearman's rho coefficient. In addition, the dependent variable is two countries (Sudan and Türkiye), and the independent variables are the share of agricultural credits in total credits and interest rates.

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MATERIAL AND METHOD

Data analizestructural differences between agricultural financing systems of Turkey and Sudan. Aimed to reveal distinctive features of both countries in terms of access to credit, credit volume and interest rates. Descriptive statistics and advanced statistical methods (correlation and logistic regression analysis) were used within the framework of a comparative analysis.

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The model is formulated as follows:

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots$$

P= Probability of observation being 1;

B0= Constant Term (Intercept)

X1= Ratio of agricultural loans to total loans

X2=Interest Rates

The significance of the model was evaluated with Wald test, Nagelkerke R2 and p values (Kalaycı, 2017; Özaydın, 2022). Regression analyzes were analyzed in SPSS program.

RESEARCH FINDINGS AND DISCUSSION

When the agricultural financing structure between Turkey and Sudan is evaluated, there are structural and functional differences. Credit systems in the Turkish agricultural sector are more institutionalized, strengthened with different state-supported instruments, and there are elements that facilitate access to financing for enterprises. Institutions such as Ziraat Bank and Agricultural Credit Cooperatives, in particular, offer long-term credit opportunities for the sector with subsidy policies that have been maintained for years (Kusek et al., 2017).

In Sudan, the agricultural credit system is largely based on Islamic finance principles and operates through financing instruments such as Murabaha and Salam. However, this system can

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only provide low-volume, short-term and narrow-scope credit due to both limited institutional capacity and economic vulnerabilities (Mohsin, 2005).

In order to analyze these differences in depth, data on credit and interest rate indicators for the years 2012-2023 were collected and these data were examined with statistical descriptive and analytical techniques.

The data in Table 1 comparatively shows the main components of the agricultural credit system in Sudan and Turkey for the period 2012–2020. The table consists of four main indicators: annual total credit volume, credit amount allocated to the agricultural sector, agricultural credit to total credit ratio, and average annual interest rates.

Table 1 shows the basic components of the agricultural credit system between the two countries in a comparative manner. The table consists of four basic indicators: annual total credit volume, credit amounts allocated to the agricultural sector, the share of agricultural credits in total credits, and average annual interest rates.

When interest rates are compared, it is seen that nominal rates are relatively low in Sudan due to the influence of Murabaha-based Islamic financing systems, but real credit access remains limited. In Turkey, despite periodic interest rate fluctuations, a significant portion of agricultural credit interest rates have been reduced by public subsidies (Mohsin, 2005).

Table 1. Annual Changes in Agricultural Finance Indicators of Türkiye and Sudan (2012-2023)

Years	Sudan				Turkey			
Years	Total Credit	Credit Agriculture	%*	Interest rates	Total Credit	Credit Agriculture	%*	Interest rates
2012	6945,22	0,341	14,8035	9,27	811881	2771,42	45,23529454	8,85
2013	6867,54	0,1882	16,00079	9,45	1018538	1917,67	45,35451876	6,93
2014	6714,07	0,07023	17,39	9,31	1131435	794,687	42,36863067	10,33
2015	8300,99	0,05475	16,706	8,32	125105	684,988	36,764585 66	10,95
2016	9508,74	0,02447	18,4279	8,62	1334156	326,1624	35,80317658	10,23

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2017	14915,98	0,0257	21,07688	9,21	1440735	370,752	32,8931469	8,88
2018	5947,08	0,0219	25,3168	8,91	1351857	296,5387	28,95743456	8,33
2019	5685,46	0,0307	30,5956	18,42	1303376	400,8708	28,06066194	18,5
2020	4618,57	0,0184	25,0466	18,56	1538107	283,433	26,07628611	12,2
2021	863,908	0,0279	23,0117	25,2	1569903	438,523	26,63235452	15,75
2022	847,044	0,0278	18,554	26,3	1245953	347,339	27,92171337	16,01
2023	847,044	0,03315	18,4279	28,3	1152366	382,029	32,59883412	42,52

*Percentage share of Agricultural Credit in Total Credit

Sources: Government Reports International Organizations, as the Food and Agriculture Organization (FAO) and the World Bank (WB), academic studies and papers on agricultural finance in Sudan and Turkey

In this part of the research, correlation analysis was conducted to determine the relationship between the indicators of total credit, agricultural credit, the share of agricultural credit in total credit and interest rates of both countries (Table 2). When the analysis to be used for correlation was evaluated (Razali and Wah, 2011), according to the normality test, the Shapiro-Wilk p-values for the variables Total Credit, Agricultural Credit and Interest Rate were found to be 0.000, 0.000 and 0.000, respectively; this situation revealed that the variables in question did not show a normal distribution. For the Agricultural Credit Rate variable, $p = 0.133$ was calculated and it was determined that this variable met the normal distribution assumption. In addition, since the country variable is an important categorical variable, non-parametric methods were preferred and Spearman correlation analysis was applied.

When agricultural finance indicators of Turkey and Sudan are examined, it is observed that there are significant and high level positive correlations between the country variable and financial indicators. In particular, the correlation coefficient of Total Credit and Agricultural Credit variables with Country is $\rho = 0.867$, and this relationship is seen to be statistically quite significant ($p < 0.01$). This result reveals that Turkey's financial system capacity is much greater than Sudan and this difference is statistically supported at both variable levels.

In addition, it is seen that the relationship between Agricultural Credit % and Country is high ($\rho = 0.807$; $p < 0.01$). This situation shows that the ratio of credits allocated to the agricultural sector to total credit is

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applied more systematically in Turkey and this ratio is a strong predictor in explaining the country difference.

On the other hand, a negative but insignificant relationship was observed between the Interest Rate variable and Country (ρ = -0.060; p = 0.780). This finding reveals that interest rates are not a significant factor in explaining the difference between countries.

Table 2. Correlation Coefficients Between Agricultural Financing Indicators of Türkiye and Sudan

			Ülke	Toplam Kredi	Tarımsal Kredi	%	Faiz Oranları
Spearman's rho	Ülke	Correlation Coefficient	1,000	,867**	,867**	,807**	-,060
		Sig. (2-tailed)		,000	,000	,000	,780
	Total Credit (1)	Correlation Coefficient		1,000	,681**	,538**	-,256
		Sig. (2-tailed)			,000	,007	,227
	Agricultural Credit (2)	Correlation Coefficient			1,000	,703**	-,132
		Sig. (2-tailed)				,000	,538
	%(1/2)	Correlation Coefficient				1,000	-,061
		Sig. (2-tailed)					,776
	Interest Rates	Correlation Coefficient					1,000
		Sig. (2-tailed)					

* Correlation is significant, $p < 0.05$
** Correlation is highly significant, $p < 0.01$

Regression Model

In the study, the logistic regression model established in order to statistically explain the differences between countries has taken the Country variable as the dependent variable (0 = Sudan, 1 = Turkey); Agricultural Credit Rate and Interest Rate variables have been included in the model as independent variables. When the overall model is examined, the low -2 Log Likelihood value (11.567) and the high Nagelkerke R^2 value of 0.794 show that the model can explain the observations quite strongly. In addition, the general significance of the model is statistically supported at the $p < 0.05$ level. It has been found that the ratio of agricultural credits to total credits provided has a significant relationship between the two countries ($p < 0.05$). Each 1% increase in the share of agricultural credits in total credits increases the probability of the relevant unit belonging to the Turkey group by approximately 1.785 times. This situation reveals that Turkey has systematically higher values in terms of agricultural credit rate compared to Sudan and that this difference is a distinguishing factor between the countries. When the two countries and interest rates are evaluated, it is seen that there is no significant relationship between them. This shows that interest rates alone are not sufficient to explain the difference between countries. The fact that interest rates did not show a significant

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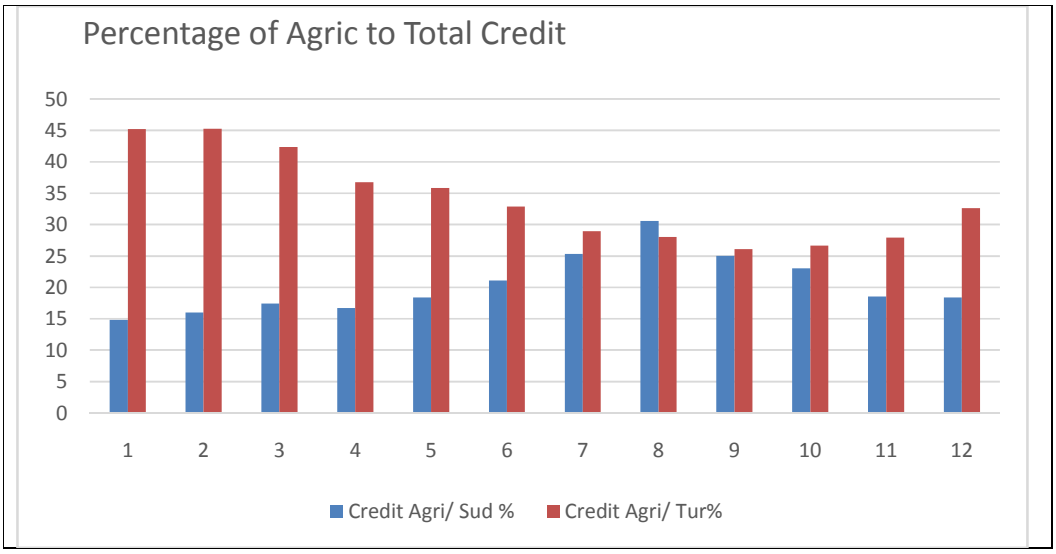
relationship with the country variable in the previous correlation analysis (ρ = -0.060, p = 0.780) supports this finding (p>0.05) (Elbadawi and Ismail, 2021)

Table 3. Logistic Regression Analysis Results for Türkiye and Sudan Separation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	(1/2) Agricultural Credits %	0,579	0,290	3,985	1	0,046	1,785
	Interest Rates	-0,050	0,109	0,214	1	0,644	0,951
	Constant	-14,487	7,265	3,976	1	0,046	0,000
-2 Log Likelihood = 11.567							
Nagelkerke R^2 = 0,794							
Cox & Snell R^2 = 0,595							
p < 0,05 (model anlamlı)							



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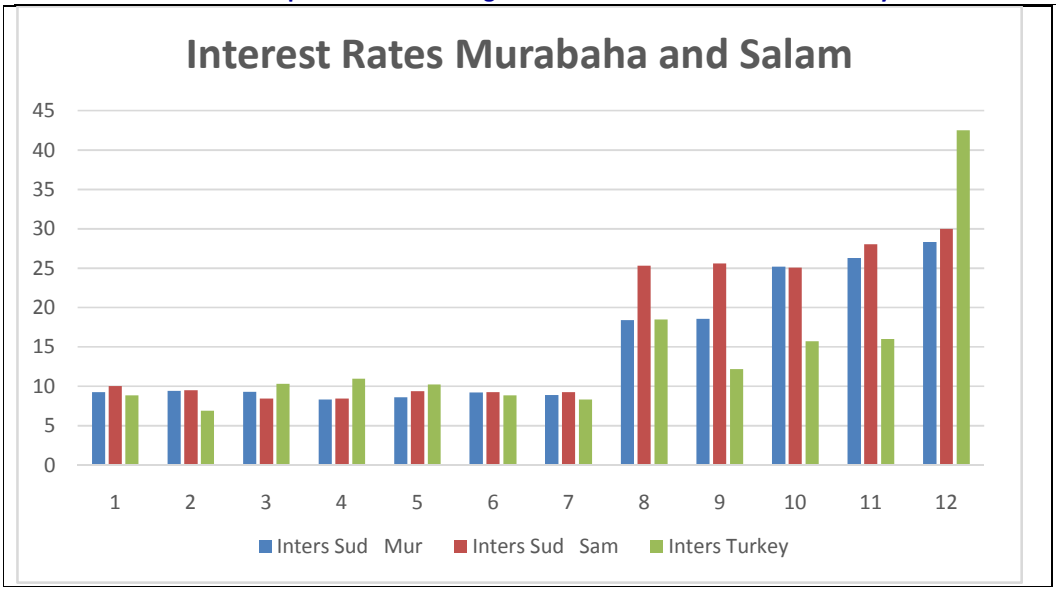

Conclusion and Recommendations

Thefindingsof this study highlight the needfor It has been determined that the most important factors in the low use of credit by farmers are inadequate collateral, fear of not being able to repay the loan, inflexible collection approaches of private banks, lack of payment planning based on cash flow, high interest rates and commissions (Anonymous, 2012).

Thestudyconcludesthat agricultural finance are differ in the tow contouries in terms access to credit interest rates and financial infrastructure. Turkeys well established credit system and developed financial infrastructure provide a better environment for farmers to access credit, while Sudan's agricultural sector faces challenges in accessing credit. This comparison can inform policy decisions and strategies to improve agricultural finance in the two countries.

1. Increase access to credit for small farmers for Sudan. Turkey increase share of agricultural loans provided by foreign banks.
2. Both improve financial infrastructure to support agricultural sector.
3. Reduce interest rate.
4. Promote Islamic Sudan experience of Salam mode can be a model.
5. Partnership and constant profit financing.
6. Flexible loan options

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