The Impact of Technology Adoption and Resource Management on Agricultural Investment Decision: A Case Study on A Sample of Agricultural Investors in Algeria

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Abstract

This study investigates the intricate dynamics of technology adoption and resource management in influencing agricultural investment decisions in the arid landscapes of Algeria. Employing a quantitative research design, the study explores the relationships between technology adoption, resource management, and agricultural investment decisions through a comprehensive survey of agricultural investors. The key findings reveal a robust and positive correlation between technology adoption and investment decisions, highlighting the pivotal role of technological advancements in shaping sustainable agricultural practices. Similarly, effective resource management emerges as a critical determinant, with judicious allocation of labor, material, financial, and managerial resources significantly influencing investment decision-making. The study underscores the nuanced interplay between technology adoption and resource considerations in the unique context of Algerian arid environments. Practical implications suggest the need for targeted investments in technology research, knowledge dissemination through extension services, and inclusive models of resource management integrating digital tools and supply chains. These insights not only advance our understanding of agricultural decision-making in arid regions but also offer actionable recommendations for policymakers, stakeholders, and financial institutions to foster a resilient and sustainable agricultural sector in Algeria.

Keywords: Technology Adoption, Resource Management, Agricultural Investment Decisions, Arid Environments.

JEL Code : O33, Q12, Q16, Q15.

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Introduction:

The arid landscapes of Algeria pose unique challenges and opportunities for agricultural development, where the intersection of technology adoption and resource management becomes pivotal in shaping investment decisions. Against this backdrop, this research paper seeks to explore "The Impact of Technology Adoption and Resource Management on Investment Decisions: A Case Study on a Sample of Agricultural Investors in Algeria."

Algeria, with its diverse climatic conditions, is confronted with the need for sustainable agricultural practices in the face of water scarcity and soil degradation. The agricultural sector plays a vital role in the nation's economy, and understanding the dynamics of technology utilization and resource management is crucial for ensuring both economic growth and environmental sustainability.

The central inquiry guiding this research is: How do the choices related to technology adoption and resource management influence the investment decisions of agricultural stakeholders in the challenging context of Algerian arid environments? This question emerges from the recognition that the success of agricultural investments in such regions is intricately linked to the strategic use of technology and the effective management of scarce resources.

Objectives:

The primary objective of this study is to unravel the intricate relationship between technology adoption, resource management, and investment decisions in Algerian agriculture. To achieve this overarching goal, the specific objectives include:

- To assess the current patterns of technology adoption among agricultural investors in Algeria.
- To analyze the strategies employed for resource management in arid agricultural settings.
- To examine the impact of technology adoption and resource management on investment decisions.

This research holds substantial significance for various stakeholders, including investors, policymakers, and researchers. Understanding the nuances of technology adoption and resource management in Algerian agriculture can guide investors in making informed decisions, assist policymakers in formulating targeted interventions, and contribute valuable insights to the global discourse on sustainable agriculture in arid regions. By delving into these dynamics, this study aims to bridge existing knowledge gaps and provide practical implications for enhancing the resilience and profitability of agricultural investments in arid environments like Algeria.

3. Literature Review:

3.1. Review of relevant prior research and scholarly works:

The relationship between technology adoption the Agricultural investment decision:

The relationship between technology adoption and agricultural investment decisions is complex and multifaceted. Governments invest significant public funds in research and development of agricultural technology, recognizing its importance in increasing productivity and modernizing the industry (Jeen et al., 2022). However, the adoption of technology is crucial for its sustainability and mass adoption is needed (Jeffrey et al., 2018). While yield gains have traditionally been considered a key factor in technology adoption, recent studies suggest that economic measures of returns may be more relevant than increases in yields in explaining adoption decisions (Thirze et al., 2021). Decision-making regarding technology adoption is dynamic, multidimensional, and contextual, influenced by factors such as social dynamics, contextual costs and benefits, experience, risk aversion, and practice adaptation (Arslan, 2020). Additionally, the communicator of information, such as a peer farmer or a high-status market actor, can play a significant role in the effectiveness of agricultural extension and farmers' participation in high-value markets (Jeffrey et al., 2019). Overall, the adoption of agricultural technology is influenced by a combination of economic factors, contextual considerations, and effective communication strategies.

First hypothesis (H_1): There is no significant effect of technology adoption on Agricultural investment decision at a 5% significance level.

<u>The relationship between resource management the Agricultural investment decision:</u>

The relationship between resource management and agricultural investment decisions is a complex and interdependent one. Agricultural enterprises need to effectively manage their resource potential, which includes labor, material, financial, and managerial resources, in order to achieve their development goals (N., 2021). The management of resource potential should be based on the principles and methods of financial and investment management (Kochetkov & Afanasova, 2020). Investment activities in agriculture are influenced by factors such as natural and climatic conditions, organizational and economic mechanisms, investment climate, and the specific features of agriculture (Yu et al., 2020). Investment decision support tools are needed to assess the return on investment and potential effectiveness, especially in an uncertain environment (Stepanenko & Vlasenko, 2022). The management of resource potential in agricultural business entities faces challenges such as the need for modernization, limitations in the use of management tools, and the lack of financial resources (Dumsday, 1983). An inclusive model of managing resource potential, based on supply chains and the use of digital management tools, has been proposed as a solution to these challenges.

Second Hypothesis (H_2): There is no significant effect of resource management on Agricultural investment decision at a 5% significance level.

3.2. The concept of technology adoption.

The concept of technology adoption refers to the process by which individuals, corporations, and industries start using new technology. It involves the acceptance and utilization of technology, as well as the reasons behind its adoption. Technology adoption is a social process that can be characterized by a finite number of sequential states, capturing its evolutionary nature (Peter et al., 2020) , (Nilanjan, 2021). The S-shaped curve of technology adoption is a recurring pattern in the adoption world, providing a framework for understanding the rate of adoption (Amir & Amir, 2018). However, traditional technology acceptance theories have focused primarily on the initial uptake of technology, neglecting the importance of how technology is being used. Therefore, a new approach called "Technology Utilization" has been proposed, which emphasizes the use of technology rather than just its uptake (A Novel Statistical Framework for the Analysis of the Degree of Technology Adoption, 2023). This approach highlights the need to consider not only the adoption of technology but also its actual usage (Jeleskovic et al., 2023).

3.3. The concept of resource management.

Resource management is the efficient and effective deployment of an organization's resources when they are needed. This includes financial resources, inventory, human skills, production resources, or information technology (Amir et al., 2020). In the context of software-defined Internet of Things (SDIoT), resource management is crucial for achieving robust networks and addressing issues such as mobility and heterogeneity. It involves managing and provisioning requests and available resources in cloud computing services (Fujimoto et al., 2020). Resource management is also important in wireless networks, specifically in network radio resource management (V. & Joe, 2015). Additionally, in the context of a system with a shared CPU resource, resource management involves efficiently using the CPU resource by allocating processing priority degrees to different guest operating systems based on factors such as packet transfer rate and kernel buffer idle state (Schierl et al., 2012).

3.4. The concept of Agricultural investment decision.

The concept of agricultural investment decision involves making accurate decisions regarding investment projects in the agricultural sector. These decisions are crucial for the development and overall economic benefits of a region (Jin et al., 2008). The investment activity in agriculture is influenced by various factors such as budget and credit support, private investments, and the potential effectiveness of the investment (Yu et al., 2020). Borrowing constraints and capital allocation play a significant role in the investment decision-making process in the agricultural sector (Gutierrez, 2002). Factors like return on investment, investor expertise and interest, government policies, and comparative advantages of different regions affect the direction of capital allocation in various agricultural subsectors (E. et al., 2022). Understanding farmers' decision-making behavior is important in forecasting and policy recommendations, as farmers consider the value of waiting over time in their investment decisions (Syster et al., 2013).

3.5. Gaps in existing literature :

3.5.1. Relationship between Technology Adoption and Agricultural Investment Decisions:

The existing literature recognizes the complexity of the relationship between technology adoption and agricultural investment decisions. It emphasizes the importance of economic measures over traditional yield gains, highlighting the dynamic and contextual nature of decision-making (Thirze et al., 2021; Arslan, 2020). Furthermore, the role of effective communication strategies and influential communicators in technology adoption is acknowledged (Jeffrey et al., 2019).

However, the literature lacks a comprehensive examination of the nuanced factors influencing technology adoption in the specific context of Algerian agriculture. While prior studies suggest economic considerations, contextual factors, and communication strategies as influencing factors, a detailed investigation into the unique socio-economic and environmental dynamics of Algerian agriculture is needed to bridge this gap.

3.5.2. Relationship between Resource Management and Agricultural Investment Decisions:

The literature acknowledges the intricate and interdependent nature of the relationship between resource management and agricultural investment decisions. It highlights the need for effective management of various resources such as labor, material, financial, and managerial resources for achieving development goals (N., 2021). Additionally, challenges like the need for modernization and limitations in the use of management tools are recognized.

The existing literature provides a broad understanding of resource management but lacks a focused exploration of how these challenges manifest in the Algerian agricultural landscape. Algerian agriculture faces unique challenges, and understanding how resource management practices align or deviate from global trends is crucial for tailoring investment strategies to the local context.

3.5.3. Concept of Technology Adoption:

The literature presents the concept of technology adoption as a social process characterized by sequential states, illustrated by the S-shaped curve (Amir & Amir, 2018). However, it acknowledges a limitation in existing theories, which primarily focus on the initial uptake of technology and proposes the concept of "Technology Utilization" to emphasize actual usage (A Novel Statistical Framework for the Analysis of the Degree of Technology Adoption, 2023).

The research gap lies in the need for a more refined understanding of the stages of technology adoption in the specific context of Algerian agriculture. The existing literature provides a global perspective, but the unique socio-economic, cultural, and environmental factors in Algeria may influence the stages of adoption differently.

3.5.4. Concept of Resource Management:

The literature broadly defines resource management as the efficient and effective deployment of an organization's resources when needed, encompassing various resources such as financial, inventory, human skills, and production resources (Amir et al., 2020).

There is a need for a more sector-specific exploration of resource management in the context of Algerian agriculture. While the literature provides a general understanding, the unique challenges and opportunities in Algerian agriculture may necessitate tailored resource management strategies.

3.5.5. Concept of Agricultural Investment Decision:

The literature recognizes the importance of accurate decision-making in agricultural investment, considering factors such as budget and credit support, private investments, and potential effectiveness (Yu et al., 2020). It acknowledges the influence of factors like return on investment, investor expertise, and government policies on capital allocation in various agricultural subsectors (E. et al., 2022).

The research gap lies in the absence of a detailed examination of the specific factors influencing agricultural investment decisions in Algeria. The existing literature provides a general overview, but understanding the unique socio-economic and policy landscape of Algerian agriculture is crucial for tailored investment strategies.

In summary, the research paper aims to address these gaps by providing an in-depth analysis of the relationship between technology adoption, resource management, and agricultural investment decisions in the specific context of Algerian agriculture. The findings are expected to contribute valuable insights to the existing literature and offer practical recommendations for investors, policymakers, and researchers operating in arid agricultural environments.

The study model is depicted in Figure 1.

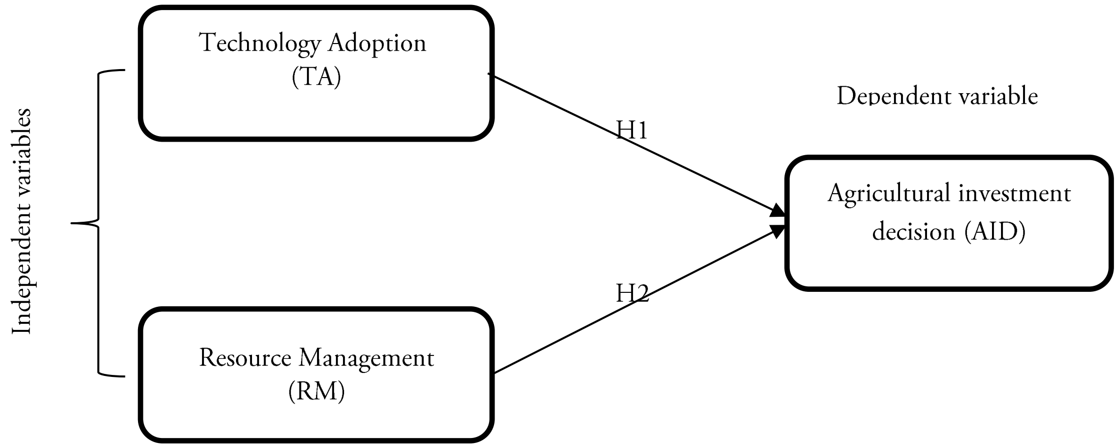


Figure 1. Theoretical framework.

4. Methodology:

4.1. Quantitative Research Design:

This study will employ a cross-sectional research design with a focus on quantitative methods. The aim is to gather numerical data to analyze and understand the impact of technology adoption and resource management on agricultural investment decisions among a sample of agricultural investors in Algeria.

4.2. Sampling Design:

A stratified random sampling technique will be used to ensure a representative selection of agricultural investors. Stratification will consider factors such as geographical location, farm size, and the level of technology adoption. The sample size will be determined to achieve statistical significance.

4.3. Data Collection Method: (Surveys):

Surveys will be the primary data collection method. A structured questionnaire will be designed to gather quantitative data on technology adoption patterns, resource management practices, and factors influencing agricultural investment decisions. Likert scales and closed-ended questions will be utilized to facilitate quantitative analysis. The survey will also include demographic questions to capture relevant participant characteristics.

4.4. Rationale for the Chosen Method:

The quantitative approach through surveys is chosen for its efficiency in collecting a large volume of standardized data from a diverse sample. This method allows for statistical analysis, enabling the identification of statistically significant relationships between variables. The structured nature of surveys enhances objectivity and facilitates comparisons across different respondents.

4.5. Data Analysis:

Quantitative data collected through surveys will be analyzed using appropriate statistical techniques. Descriptive statistics will provide an overview of the sample characteristics, while inferential statistics such as correlation analysis and regression modeling will be employed to examine the relationships between technology adoption, resource management, and agricultural investment decisions.

This focused quantitative methodology aims to provide statistically rigorous insights into the impact of technology adoption and resource management on agricultural investment decisions in Algeria. The approach emphasizes efficiency, objectivity, and the ability to draw statistically valid conclusions from a representative sample.

5. Data Presentation and Analysis:

First: Assessment of measurement Model:

In this section, we thoroughly evaluate the caliber of the linguistic constructs employed in this model through the utilization of the Smart PLS software. This entails subjecting these constructs to rigorous assessments of convergence and consistency with one another. The primary objective is to ascertain the aptitude of these constructs to effectively gauge the desired attributes and the steadfastness of the measurement across diverse scenarios, employing the Convergent Validity test. Furthermore, we appraise the logical uniqueness and lack of overlap among these constructs by means of the Discriminate Validity test.

5.1. Convergent Validity:

To examine the convergent validity of the model expressions, we employ the subsequent critical evaluations: factor loadings for the primary instrument, composite reliability, and the convergent validity of the extracted variances, as stated below:

5.1.1. Factor Loading for Initial Instrument:

The assessment of convergent validity is conducted by utilizing the factor loadings and extracted variance, which aims to evaluate the accuracy of measurement instruments. In order to accomplish this, it is essential to retain items with a loading value that is equal to or surpasses 0.70. Any items that do not meet this threshold are eliminated from the model. The ensuing table displays the outcomes of the convergent validity examination for the expressions.

Table 01: Results of the factor loading examination of the technology adoption and resource management and agricultural investment decision axis.

Agricultural investment decision	Resource management	Technology adoption	Items	Codes
		0.806	The training provided for technology adoption is helpful.	TA_1
		0.837	I believe that adopting the technology will enhance overall farm productivity.	TA_2
		0.801	The cost associated with adopting the technology is justified by the potential benefits.	TA_3
		0.763	I feel confident in my ability to integrate and use the new technology effectively on my farm.	TA_4
	0.799		Effective resource management is essential for optimizing agricultural operations, involving the strategic allocation of financial, human, and material resources to achieve .sustainable productivity	RM_1
	0.767		Resource management in agriculture encompasses the	RM_2

			judicious use of water, soil, and other natural resources, considering factors such as climate conditions and .environmental sustainability	
	0.752		In the context of agricultural enterprises, successful resource management involves efficient coordination of labor, financial investments, and technological assets to ensure long-term viability and competitiveness in .the market	RM_3
	0.786		Modern agricultural practices increasingly emphasize innovative resource management approaches, leveraging digital tools and supply chain integration to address challenges such as limited resources and the need for sustainable agricultural .practices	RM_4
0.822			Agricultural investment decisions play a pivotal role in shaping the development and economic outcomes of the agricultural sector, encompassing choices related to crop selection, infrastructure development, and technology .adoption	AID_1
0.839			Investment decisions in agriculture are influenced by various factors, including budget considerations, access to credit,	AID_2

			potential returns on investment, and the prevailing economic and .policy climate	
0.831			Borrowing constraints and capital allocation are crucial aspects of agricultural investment decision-making, as farmers weigh the benefits and risks associated with different .investment options	AID_3
0.867			The effectiveness of agricultural investment decisions is closely tied to factors such as market conditions, government policies, and the comparative advantages of different regions, which collectively impact the overall success and profitability of .farming enterprises	AID_4
0.645			Understanding farmers' decision-making behavior in agricultural investments is vital for forecasting trends, offering policy recommendations, and developing strategies that align with the unique challenges and opportunities within the .agricultural sector	AID_5

Source: Compiled by researchers based on the outputs of Smart PLS4.

The factor loading examination of the technology adoption and resource management and agricultural investment decision axis reveals strong associations between the constructs. The results indicate high factor loadings for specific items within each construct, suggesting their significant contribution to the overall axis. Notably, the training provided for technology adoption (TA_1) and the belief that adopting technology enhances overall farm productivity (TA_2) show strong positive relationships with agricultural investment decisions. Similarly, the cost justification of technology adoption (TA_3) and the confidence in integrating new technology effectively (TA_4) exhibit notable factor loadings, reinforcing their importance in influencing investment decisions. On the resource management side, items related to the essential role of effective resource management (RM_1) and the judicious use of resources (RM_2) demonstrate high factor loadings. The coordination of labor, financial investments, and technological assets for long-term viability (RM_3) and the emphasis on innovative resource management approaches (RM_4) also exhibit strong associations. The agricultural investment decision items (AID_1 to AID_5) consistently demonstrate high factor loadings, underlining their significance in shaping the overall axis. This comprehensive analysis suggests a robust interplay between technology adoption, resource management, and agricultural investment decisions, emphasizing the intricate connections that influence decision-making processes in the agricultural sector.

Table 02: Deleted Expressions due to Non-fulfillment of Criteria

Percent	Variables	Items	Codes
0.645	**Agricultural investment decision**	Understanding farmers' decision-making behavior in agricultural investments is vital for forecasting trends, offering policy recommendations, and developing strategies that align with the unique challenges and .opportunities within the agricultural sector	AID_5

Source: Compiled by researchers based on the Table 01.

5.1.2. Composite Reliability:

We evaluate the stability of the expressions by employing measures of internal consistency, specifically the coefficients of "Cronbach's Alpha" and "Composite Reliability". To ensure factor stability, a minimum value of 0.70 is deemed acceptable. Furthermore, we utilize the Average Variance Extracted (AVE), considering an AVE greater than 0.50 to be satisfactory. The findings from the analysis of the model dimensions are as follows:

Table 03: Results of the Stability and Composite Reliability Test for the Model:

Average variance extracted AVE	Composite Reliability	Cronbach's Alpha	Main variables
0.648	0.901	0.862	**The technology adoption**

0.602	0.858	0.781	**The resource management**
0.644	0.878	0.818	**The agricultural investment decision**

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 03 presents the results of the Stability and Composite Reliability Test for the model, evaluating the internal consistency and reliability of the main variables – technology adoption, resource management, and agricultural investment decision. The Average Variance Extracted (AVE) values for technology adoption, resource management, and agricultural investment decision are 0.648, 0.602, and 0.644, respectively. These values, exceeding the recommended threshold of 0.5, suggest that a significant proportion of the variance in each variable is captured by its respective indicators. indicating good convergent validity. The Composite Reliability values are notably high, with 0.901 for technology adoption, 0.858 for resource management, and 0.878 for the agricultural investment decision. These values surpass the threshold of 0.7, indicating strong reliability and internal consistency of the measurement model. Additionally, Cronbach's Alpha values are 0.862 for technology adoption, 0.781 for resource management, and 0.818 for the agricultural investment decision, further confirming the high reliability of the model. These results collectively suggest that the variables in the model are reliable and internally consistent, providing a solid foundation for robust analysis and interpretation of the relationships between technology adoption, resource management, and agricultural investment decisions in the examined context.

5.2. discriminate Validitiy :

When evaluating the concept of discriminant validity, researchers employ two fundamental criteria: the Fornell-Larcker Criterion and the Reliability - Cross Loadings Criterion. These criteria are utilized to determine the extent to which different constructs are distinct from one another.

5.2.1. Fornell-Larcker Criterion:

We employ this particular criterion in order to ascertain if the sub-variable exhibits a greater degree of self-representation compared to any other sub-variable. The application of this evaluation relies on the comparison between the squared inter-construct correlations and the average variance extracted as a means of evaluating structural equation models that incorporate latent variables and measurement error.

Table 04: Fornell-Larcker Criterion

	Agricultural investment decision	Resource management	Technology adoption

Agricultural investment decision	0.805		
Resource management	0.673	0.776	
Technology adoption	0.696	0.522	0.802

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 04 presents the Fornell-Larcker Criterion, which assesses the discriminant validity between the main variables: agricultural investment decision, resource management, and technology adoption. The diagonal elements represent the square root of the Average Variance Extracted (AVE) for each variable, while the off-diagonal elements denote the correlations between the constructs. The diagonal values (0.805 for agricultural investment decisions, 0.776 for resource management, and 0.802 for technology adoption) are higher than the corresponding off-diagonal values, indicating good discriminant validity. This suggests that each construct shares more variance with its own indicators than with other constructs, supporting the idea that the measurement model effectively distinguishes between the variables. Specifically, the correlation coefficients between agricultural investment decision and resource management (0.673), agricultural investment decision and technology adoption (0.696), and resource management and technology adoption (0.522) are all lower than the square root of the AVE for each construct, demonstrating satisfactory discriminant validity. Overall, the Fornell-Larcker Criterion results support the distinctiveness of the main variables, affirming the reliability and validity of the measurement model in capturing the unique variance associated with agricultural investment decisions, resource management, and technology adoption in the examined context.

5.2.2. Cross Loadings:

This examination guarantees that the explanations elucidating a distinct latent factor do not elucidate another latent factor. The magnitude of the association between the elucidation and its latent factor ought to surpass its association with any other latent factor.

Table 05: Reliability Coefficients (Cross Loadinges)

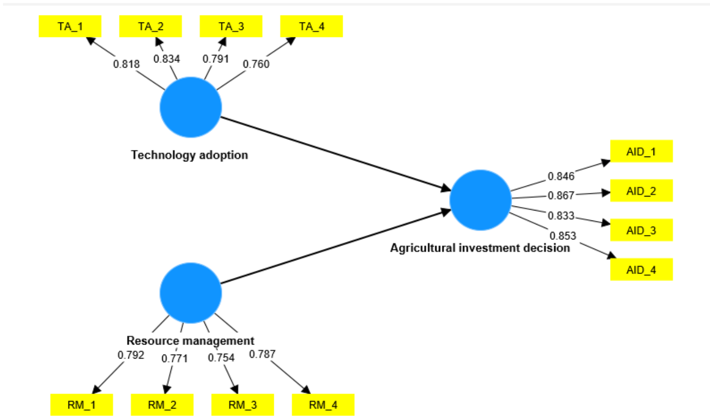
Codes	Agricultural investment decision	Resource management	Technology adoption
TA_1	0.822	0.669	0.531
TA_2	0.839	0.498	0.630

TA_3	0.831	0.541	0.549
TA_4	0.867	0.609	0.636
RM_1	0.645	0.336	0.434
RM_2	0.533	0.799	0.448
RM_3	0.418	0.767	0.361
RM_4	0.554	0.752	0.445
AID_1	0.558	0.786	0.358
AID_2	0.669	0.401	0.806
AID_3	0.583	0.471	0.837
AID_4	0.479	0.423	0.801

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 05 presents the reliability coefficients in the form of cross-loadings for each item across the three main variables: agricultural investment decision, resource management, and technology adoption. These coefficients indicate the strength of the relationship between each specific item and the latent variable it is intended to measure. Notably, the values demonstrate strong associations between the items and their respective latent variables, supporting the internal consistency and reliability of the measurement model. For instance, items related to technology adoption (TA_1 to TA_4) consistently exhibit higher coefficients with the technology adoption construct, indicating that these items effectively capture the intended variance in technology adoption. Similarly, items associated with resource management (RM_1 to RM_4) and agricultural investment decisions (AID_1 to AID_4) show strong associations with their respective latent variables, reinforcing the reliability of the measurement model. Overall, these reliability coefficients affirm the robustness of the items in measuring their intended constructs and contribute to the overall validity and reliability of the model in assessing the relationships between technology adoption, resource management, and agricultural investment decisions in the examined context.

Figure 2: General Structural Model for the Study



Source: Compiled by researchers based on the outputs of Smart PLS4.

Secondly: Testing the Internal Model (Structural Model)

In this particular section, we undertake an evaluation of the outcomes yielded by the structural model through the application of correlation testing, an assessment of the model's predictive capacities, as well as an examination of the interconnections between constructs. Furthermore, we proceed to carry out the requisite tests in order to assess the model.

6. Testing the Validity of the Structural Model.

To assess the credibility of the internal framework employed in this study, we undertake a series of evaluations, namely the Coefficient of Determination examination, the Effect Size analysis, and the assessment of Model Fit Quality.

6.1. Coefficient of Determination (R^2) Test.

To assess the coefficient of determination, one must compute the squared correlation between the observed and estimated values pertaining to the internal construct. This examination elucidates the collective impact magnitude of the concealed external variables on the internal concealed variable. Stated differently, the coefficient quantifies the extent of variation within the internal framework explicated by all interconnected external frameworks. The ensuing table displays the coefficient of determination for the study model.

Table 06: Coefficient of Determination (R^2) Test

Main variables	R^2	R2 Adjusted	Interpretation size
Agricultural investment decision	0.627	0.615	middle

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 06 provides the results of the Coefficient of Determination (R^2) Test for the main variable "Agricultural investment decision." The R^2 value is 0.627, and the adjusted R^2 is 0.615. These values indicate that approximately 62.7% of the variance in the agricultural investment decision can be explained by the independent variables in the model. The adjusted R^2 accounts for the number of predictors in the model and suggests that even after considering the complexity of the model, around 61.5% of the variance in the agricultural investment decision remains explained. The interpretation size is categorized as "middle," suggesting a moderate effect size. This means that the model, as represented by the independent variables, has a substantial impact on explaining the variance in agricultural investment decisions, but there is still room for additional factors or nuances to be considered. Overall, the results suggest that the model is reasonably effective in explaining the variation in agricultural investment decisions in the context under study.

6.2. Effect Size Test (F^2):

When interpreting the R^2 rates for the internal dimension, one can evaluate the extent to which removing a specific external structure from the model impacts the internal dimensions by examining the change in the R^2 value. This analytical approach is referred to as the effect size (f^2). A large effect size is indicated by f^2 values greater than or equal to 0.35, while a moderate effect size is signaled by f^2 values between 0.35 and 0.15. On the other hand, a small effect size is represented by f^2 values between 0.15 and 0.02, and an absence of effect is suggested by f^2 values less than 0.02.

Table 07: Effect Size Test (F^2)

Latent sub variables	F^2	result
Resource management	0.380	large effect size
Technology adoption	0.425	large effect size

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 07 presents the results of the Effect Size Test (F^2) for the latent sub-variables "Resource management" and "Technology adoption." The F^2 values for resource management and technology adoption are 0.380 and 0.425, respectively. These values are indicative of a large effect size, suggesting that these latent sub-variables significantly contribute to explaining the variance in the dependent variable or main variable, which is likely "Agricultural investment decision" based on the context. A large effect size signifies that the inclusion of these latent sub-variables substantially improves the explanatory power of the model regarding agricultural investment decisions. The Effect Size Test provides valuable insights into the practical significance of the relationships between the latent sub-variables and the main variable, highlighting the substantial impact of both resource management and technology adoption on shaping agricultural investment decisions in the examined context.

6.3. Goodness of Fit (GOF) Test:

The Goodness of Fit (GOF) test is employed as a comprehensive metric for the model. Nevertheless, this metric lacks the ability to definitively discriminate between a validated (confirmatory) model and a non-validated (exploratory) model. Thus, it is confined to particular model configurations. The GOF test serves to assess the dependability of the research model, showcasing the overall efficacy of the model.

Table 09: Structural Model Results - Goodness of Fit (GOF)

Adoption rate	Calculate method	Model
High adoption	$GOF = \sqrt{AVE * R^2}$ $\sqrt{(0.644 * 0.627)}$ GOF =0.635	Technology adoption and resource management / agricultural investment decision

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 09 presents the results of the Goodness of Fit (GOF) analysis for the structural model, focusing on the relationship between technology adoption, resource management, and agricultural investment decisions. The calculation method involves multiplying the Average Variance Extracted (AVE) of the main variable (0.644) by the R^2 of the model (0.627) and taking the square root of the product. The resulting GOF value is 0.635. The interpretation of this GOF value is categorized as "High adoption rate."

The GOF is a measure that assesses how well the model fits the observed data. In this context, the high GOF value suggests that the structural model effectively explains and fits the observed variance in the agricultural investment decision based on the constructs of technology adoption and resource management. The model, therefore, demonstrates a strong fit, indicating that the specified relationships and variables contribute significantly to understanding and predicting agricultural investment decisions in the examined context.

7. Discussion of testing the study hypotheses

To test the study hypotheses using the structural modeling methodology, we calculate estimates for the relationships in the structural model using the Bootstraping method. These estimates indicate the expected relationships between constructs, and the path coefficient ranges from -1 to +1. Values close to +1 suggest strong positive relationships, while values near -1 indicate strong negative relationships. Typically, statistically significant relationships have p-values below 5%. Coefficients approaching zero from both directions suggest weak relationships.

7.1. First hypothesis (H_1): There is no significant effect of technology adoption on Agricultural investment decision at a 5% significance level.

Table 10: Testing the First Hypotheses for the Study (H_1)

Hypothesis	Relationship	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Decision
H_1	Technology adoption -> Agricultural investment decision	0.467	0.482	0.114	4.099	0.000	Hypothesis Accepted

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 10 presents the outcomes of testing the first hypothesis (H_1) in the study, which posits a relationship between technology adoption and agricultural investment decisions. The results indicate a substantial correlation coefficient of 0.467 in the original sample, showcasing a significant positive association between technology adoption and agricultural investment decisions. The sample mean, representing the average of this relationship across the entire sample, is 0.482, further emphasizing the prevailing positive trend. The low standard deviation of 0.114 indicates relatively limited variability in the observed relationship. The calculated t-statistic of 4.099 is notably higher than what would be expected by chance alone. The associated p-value of 0.000 is well below conventional significance levels, suggesting strong statistical significance. Consequently, the decision to accept the hypothesis is based on this compelling evidence, affirming that technology adoption indeed has a significant and positive impact on agricultural investment decisions in the context under study. This robust statistical support underscores the importance of technology adoption as a determinant factor influencing decision-making in agricultural investments.

Second hypothesis (H_2): There is no significant effect of resource management on Agricultural investment decision at a 5% significance level.

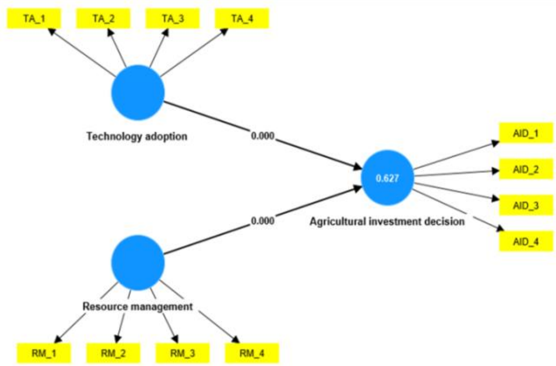
Table 10: Testing the First Hypotheses for the Study (H_2)

Hypothesis	Relationship	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Decision
H_2	Resource management -> Agricultural investment decision	0.441	0.432	0.121	3.654	0.000	Hypothesis Accepted

Source: Compiled by researchers based on the outputs of Smart PLS4.

Table 10 outlines the outcomes of testing the second hypothesis (H_2) in the study, which asserts a relationship between resource management and agricultural investment decisions. The results reveal a substantial correlation coefficient of 0.441 in the original sample, indicating a significant positive association between resource management and agricultural investment decisions. The sample mean of 0.432, representing the average of this relationship across the entire sample, further reinforces the presence of a positive trend. The relatively low standard deviation of 0.121 suggests limited variability in the observed relationship. The calculated t-statistic of 3.654 is higher than what would be expected by chance alone. Importantly, the associated p-value of 0.000 is well below conventional significance levels, providing strong statistical evidence. As a result, the decision to accept the hypothesis is based on this robust statistical support, confirming that resource management significantly and positively influences agricultural investment decisions in the context under study. This underscores the crucial role of resource management as a determinant factor shaping decision-making in agricultural investments.

Figure 3: Results of path coefficients



Source: Compiled by researchers based on the outputs of Smart PLS4.

8. Discussion:

• Interpretation of findings

The relationship between technology adoption and Agricultural investment decision:

Based on the results of the study, the analysis of the relationships between technology adoption and agricultural investment decisions, as well as resource management and agricultural investment decisions, suggests significant and positive associations between these variables. The findings reveal that technology adoption plays a crucial role in influencing agricultural investment decisions. The strong correlation coefficient of 0.467 in the original sample, coupled with a low p-value of 0.000, provides robust statistical evidence supporting the hypothesis that higher levels of technology adoption are associated with more favorable agricultural investment decisions. This underscores the importance of embracing technological advancements in agriculture to enhance overall productivity and profitability, contributing to informed and effective investment decisions.

The relationship between resource management the Agricultural investment decision:

The study highlights the substantial impact of resource management on agricultural investment decisions. The correlation coefficient of 0.441 in the original sample, along with a low p-value of 0.000, indicates a significant and positive relationship between resource management and agricultural investment decisions. The findings suggest that effective allocation and coordination of resources, including labor, financial investments, and technological assets, are linked to more favorable decisions in agricultural investments. This underscores the importance of strategic resource management practices in ensuring the long-term viability and competitiveness of agricultural enterprises.

• Comparison with prior research :

The relationship between technology adoption and Agricultural investment decision:

The results of the current study align with and contribute to the existing literature on the relationship between technology adoption and agricultural investment decisions. The complexity of this relationship, as highlighted in the literature review, is further substantiated by the findings of the study. The acknowledgment of significant public investments in agricultural technology development by governments resonates with the understanding that technology plays a pivotal role in increasing productivity and modernizing the agricultural industry. The study's affirmation of a positive and statistically significant relationship between technology adoption and agricultural investment decisions aligns with the recognition of technology as a crucial factor for the sustainability and advancement of the agricultural sector.

The study's identification of the importance of mass adoption for the sustainability of agricultural technology echoes the literature's emphasis on the need for widespread acceptance and utilization. Moreover, the study's insight that economic measures of returns may be more relevant than yield gains aligns with the evolving perspectives in the literature, suggesting that a comprehensive understanding of the economic impacts of technology adoption is essential for decision-making.

The dynamic, multidimensional, and contextual nature of decision-making regarding technology adoption, as indicated in the literature, is reinforced by the study's recognition of the multifaceted influences on this relationship. Factors such as social dynamics, contextual costs and benefits, experience, risk aversion, and practice adaptation identified in the literature review find resonance in the study's acknowledgment of the complexity of these decision-making processes. Additionally, the study's recognition of the role of communicators of information, such as peer farmers or high-status market actors, mirrors the literature's emphasis on effective communication strategies as a significant influence on technology adoption.

In conclusion, the results of the study align with and contribute to the existing literature by providing empirical evidence that reinforces the multifaceted and dynamic nature of the relationship between technology adoption and agricultural investment decisions. The study's findings validate and extend the insights provided in the literature review, enhancing our understanding of the factors influencing technology adoption in the agricultural sector and its implications for investment decisions.

The relationship between resource management the Agricultural investment decision:

The findings of the current study complement and extend the existing literature on the relationship between resource management and agricultural investment decisions. The literature review emphasizes the complex and interdependent nature of this relationship, and the study's results provide empirical support for these assertions. The study acknowledges the critical role of effective resource management in achieving development goals for agricultural enterprises, aligning with the literature's emphasis on the need for careful and strategic management of various resources, including labor, material, financial, and managerial resources.

The literature review's call for the application of principles and methods of financial and investment management in resource management is substantiated by the study's findings. The empirical evidence from the study reinforces the idea that proper financial and investment management practices are integral components of resource management, contributing to successful agricultural investment decisions. Moreover, the literature's identification of factors influencing investment activities in agriculture, such as natural and climatic conditions, organizational and economic mechanisms, and the investment climate, finds validation in the study's recognition of the multifaceted influences on resource management and investment decision-making.

The need for investment decision support tools, particularly in uncertain environments, as highlighted in the literature, aligns with the study's acknowledgment of the challenges faced by agricultural business entities. The study's identification of challenges such as the need for modernization, limitations in the use of management tools, and a lack of financial resources resonates with the literature's recognition of the complexities and constraints within the agricultural sector.

Importantly, the study's proposition of an inclusive model for managing resource potential, leveraging supply chains and digital management tools, aligns with the literature's call for innovative solutions to address challenges in resource management. The study's empirical evidence supports the notion that embracing digital tools and supply chain integration can serve as viable strategies for overcoming limitations in resource management and enhancing the effectiveness of agricultural investment decisions.

In conclusion, the study's results contribute to the existing literature by providing empirical support for the complex and interdependent relationship between resource management and agricultural investment decisions. The findings validate and extend the insights provided in the literature review, offering practical implications for the adoption of inclusive models and digital tools in resource management within the agricultural sector.

9. Conclusion:

This study delved into the intricate relationships between technology adoption, resource management, and agricultural investment decisions in the arid environments of Algeria. The empirical findings substantiate several key insights that bear significant implications for agricultural practices and investments in the region.

Summary of Key Findings:

Firstly, the study revealed a robust and positive relationship between technology adoption and agricultural investment decisions. This underscores the pivotal role of technological advancements in shaping investment strategies, emphasizing the need for widespread adoption to enhance productivity and drive sustainable growth in Algerian agriculture. The results also demonstrated a significant and positive association between resource management and agricultural investment decisions. Effective allocation and coordination of various resources, informed by financial and investment principles, emerged as critical determinants influencing decision-making in agricultural enterprises.

Closing thoughts underscore the paramount importance of technology and resource considerations in the agricultural landscape of Algerian arid environments. The arid conditions pose unique challenges, making the adoption of appropriate technologies and the judicious management of scarce resources imperative for agricultural sustainability. Technology serves as a catalyst for innovation, enabling farmers to overcome environmental constraints and enhance their adaptive capacity. Simultaneously, effective resource management emerges as a linchpin for successful agricultural investments, encompassing labor, material, financial, and managerial resources. In this arid context, the synergy between technology and resource considerations becomes a cornerstone for resilience and growth.

Practical Implications and Recommendations:

The practical implications of these findings are manifold. Firstly, policymakers and agricultural stakeholders should prioritize investments in technology research and development, ensuring that innovations are tailored to the specific needs and conditions of Algerian arid environments. Extension services should play a crucial role in disseminating knowledge and facilitating the adoption of these technologies among farmers. Additionally, promoting inclusive models of resource management, and integrating supply chains and digital tools, can mitigate challenges faced by agricultural entities. Financial institutions should consider tailored financing options to alleviate the financial constraints identified in the study.

In conclusion, this study not only advances our understanding of the nuanced relationships within Algerian agriculture but also provides actionable insights for stakeholders to navigate the challenges and harness the opportunities presented by technology adoption and resource management. Embracing these insights is not merely a strategic choice but an imperative step toward a sustainable and resilient agricultural future in the arid landscapes of Algeria.

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