

Original Research

Received 16 May 2026

Revised 18 June 2026

Accepted 09 July 2026

Natural Resources for Human
Health 2026, Vol. 6 (6s): 1234–1246

KEYWORDS:

Working Capital Management;
Corporate Financial Performance;
Cash Conversion Cycle (CCC);
Inventory Management; Agro-
Based Industries

The Relationship between Corporate Financial Performance and Working Capital Efficiency: Evidence from Agro-Based Industries in Rajasthan

¹Malvika Dudi, ²Dr. Boola Choudhary, ³Dr. Vikas Shrotriya,

¹Research Scholar, Department of Management Studies, Faculty of Management, Vivekananda Global University, Jaipur

malvika@vgu.ac.in

Orcid id: 0009-0006-2205-4925

²Associate Dean, Faculty of Humanities and Social Sciences, Vivekananda Global University, Jaipur

boola.choudhary@vgu.ac.in

Orcid id: 0000-0002-5220-7965

³Associate Dean, Faculty of Management, Vivekananda Global University, Jaipur

vikas.shrotriya@vgu.ac.in

Orcid id: 0009-0007-9006-4751

ABSTRACT: In agro-based industries, which are typically seasonal in nature, involve high inventories and fluctuating market conditions, working capital efficiency is a crucial measure of the financial performance of a company. The present study investigates the relationship of working capital efficiency and financial performance of selected agro-based industries of Rajasthan. The quantitative longitudinal research design was followed with secondary financial data for five companies from the five-year period FY2019-FY2024 (30 firm-year observations). The financial performance measure was Return on Assets and the measure of working capital efficiency was Days Sales Outstanding, Days Inventory Outstanding, Days Payable Outstanding, Working Capital Turnover Ratio, Cash Conversion Cycle ratio and Financial Leverage ratio. The IBM SPSS Statistics Version 26 software was used for data analysis including descriptive statistics, correlation analysis and Principal Component Analysis (PCA). Results show that the most important dimensions of working capital efficiency are those of inventory management and the cash conversion cycle (CCC), comprising 70.95% of the total variance. There was a strong positive correlation between Days Inventory Outstanding and Cash Conversion Cycle while the Cash Conversion Cycle had a moderate negative correlation with profitability. Strong positive correlation was found between DIO and Cash Conversion Cycle while moderate negative correlation was found between leverage and profitability. Based on the study, it is concluded that appropriate inventory, receivables and payables management along with liquidity can improve the efficiency of the agro-based industries and increase the long-term financial sustainability and competitiveness of the industries in the state of Rajasthan.

1. INTRODUCTION

The agro based sector is a key driver of the economic growth of India, as it provides jobs, livelihoods for rural communities, and large contributions in national income and exports. (Bharatkumar et al., 2023) Rajasthan is one of the largest states in India with diverse agriculture base and has industries like food processing, edible oils, dairy, spices, pulses, cotton, agrochemicals (Arumugam & Manida 2023). These industries are also the link between farm production and industrial value addition that not

only promote regional economic development but also enhance the supply chain development (Negia & Kumar 2020). As a result of this, the agro-based firms face challenges of seasonal agricultural production, price volatility of raw materials, variability in consumer demand, and uncertainty in climatic conditions (Khan, 2021). In such situations, it is essential that a company has good financial practices in place to keep business going and make it sustainable (Charishma & Singh, 2024). Working capital management is one of the most important functions of financial management as it determines the capacity of a firm to finance short-term activities, provide liquidity, and overcome short-term fluctuations in the market (Zou & Muan, 2020).

Working capital efficiency measures a company's ability to effectively utilise its short-term assets and liabilities and maintain smooth business operations at the lowest possible cost of finance. Effective management of Cash, Inventory, Accounts Receivable and Accounts Payable helps the firms to have good liquidity position while maintaining the profitability of the businesses (Shanthakumari & Geetha, 2020). However, poor working capital management can lead to high inventory levels, slow collection of receivables, poor cash flow management and reliance on expensive external sources of finance, which negatively impact the performance of the business (Suryavanshi, 2023). Working capital problems are a key issue for agro-based industries as these industries hold huge inventories of seasonal inputs, provide credit facilities to distributors and retailers and suffer from uncertain payment cycles (Venkatesh, 2021). Therefore, managers of businesses need to balance liquidity and profitability on a constant basis to ensure efficient use of the resources. Working capital efficiency and its correlation with corporate financial performance have therefore emerged as an area of interest, especially in industries with a very high dependence on agricultural production and market volatility (Seth et al., 2021).

Corporate financial performance is a measure of an organization's performance in generating acceptable returns to shareholders while ensuring financial stability and future competition. Some of the financial ratios that are used for evaluating the profitability, efficiency, and market performance are Return on Assets (ROA), Return on Equity (ROE), Net Profit Margin (NPM), Earnings per Share (EPS), and Tobin's Q (Almomani et al., 2021). Empirical research so far has yielded mixed results about the effect of the working capital efficiency on the performance of the company (Boisjoly et al., 2020). Many researchers have found that a shorter cash conversion cycle and the effective management of inventories, receivables and payables are beneficial in improving profitability, but too tight a working capital policy can limit production, limit sales opportunities and increase the risks of operations (Wang et al., 2020). The differences imply that the performance of working capital management is affected by industry factors, firm factors and economic conditions (El-Ansary & Al-Gazzar, 2021). Therefore, through sector-specific investigations, it is necessary to grasp the effect of financial management practices on the performance of the industry in various business environments (Anton & Afloarei Nucu, 2020).

In spite of the huge importance of agro-based industries in Rajasthan, studies on the relationship between working capital efficiency and financial performance of companies in the agro-based sector are still limited (Laghari & Chengang, 2019). Previous studies have focused on general manufacturing industries or companies listed at national level, thus giving limited information about the financial dynamics of the agro-based enterprises in the specific agricultural and economic set-up of Rajasthan (Celestin & Vanitha, 2019). The aim of the present study is to fill the gap by examining the relationship between important dimensions of working capital efficiency (C.C.C, inventory efficiency, collection period, deferral period of payment and working capital turnover) and corporate financial performance. The findings will help corporate managers in optimizing their short-term financial policies, help investors to assess financial efficiency and help the policy makers in designing the financial sustainability and competitiveness of the agro-based industries of Rajasthan (Graham, 2022). The study provides empirical evidence in the sector, which adds to the expanding literature in the field of corporate finance and working capital management in emerging economies (Morin, 2024; Omopariola & Aboaba, 2019).

2. LITERATURE REVIEW

Based on the studies that have been considered in the literature, it is possible to say that working capital management (WCM), financial efficiency, agricultural finance, industrial development and sustainability are closely related to organizational productivity and long-term growth. Researchers in the past have studied these aspects on various angles, such as operational efficiency, institutional development, financial inclusion, industrial competitiveness, and sustainable business. But few studies have tried to combine these dimensions in the Indian manufacturing and agro based industries which present an opportunity for further studies.

Seth et al. (2021) applied Data Envelopment Analysis (DEA) approach to analyse the efficiency in working capital management of manufacturing companies in India through one of the most comprehensive studies. The study assessed the efficiency of 1,391 manufacturing companies in the period 2008-2019 based on the BCC input-oriented DEA model and panel data fixed-effect regression. They found that the working capital efficiency of Indian manufacturing industries has remained relatively stable during the study period despite the considerable economic ups and downs. The study also showed that the internal resource generation, firm size, firm age, productivity, gross domestic product (GDP) and interest rates are significant factors affecting the efficiency of WCM. It was concluded by the authors that an efficient management of working capital increases the value of the firm and also improves the operational performance and investor confidence. Their study has given a significant empirical evidence of the role of financial efficiency in manufacturing organisations and has presented an important basis for further research on the optimization of working capital.

Singh (2019) studied the performance of the institutionalised inputs and collective institutions from the community level across different agricultural activities in India. The study was done in detail through literature review and evidence based on cases to review how the water users' associations, cooperatives, self-help groups and producer companies function. The results indicated that the four determinants of institutional performance are governance quality, member participation, financial sustainability, and policy support. It was discovered that community organizations can enhance the rural livelihoods, the productivity of agriculture and inclusive development. But, lack of management capability, financial resources, and institutional coordination remain major challenges in their effectiveness. The research highlighted the importance of robust institutional arrangements and supportive government policies in attaining sustainable agricultural development.

One of the key factors identified as influencing economic growth in the rural areas is agricultural finance. Kambali and Panakaje (2022) analysed secondary sources to understand the access of the farmers to agricultural finance and its effect on the income of the farmers. They concluded that timely and affordable agricultural credit facilities are key to encourage farmers to invest in irrigation, mechanization, land development and improved farm technologies which in turn improves the productivity and farm income. The study also identified some key constraints such as access to financial institutions, lack of infrastructure, high rates of interest on borrowing, regulatory issues etc. which are still prevalent. It was concluded that the growth of financial inclusion, reinforcement of institutional lending mechanism, and enhancement of agricultural credit policy is key in achieving sustainable agricultural development.

The textile sector is one of the major manufacturing sectors in India and plays a critical role in providing jobs, exports and industrial development. Prakash et al. (2020) have highlighted the challenges and opportunities Indian textile industry is facing in the era of globalization. The authors highlighted that the main criteria for sustaining competitiveness on international markets are the ability to modernize machinery and its equipment, as well as to increase the efficiency of working capital management, technological innovation, compliance with labor laws and productivity. Make in India, Startup India, and Ease of Doing Business were also noted as key initiatives to drive foreign direct investment and industrial growth. The authors claimed that the streamlining of logistics, the amendment of policies and the construction of infrastructure would enhance the industry's competitiveness in the international market.

Within agro-based industries, financial performance has also been a subject of great research. Kumar (2019) analyzed the financial aspects and growth of agro industries like rice mills, flour mills and oil mills which are closely related to agricultural production. The study noted that agro-based industries play a significant role in employment generation, value addition and food security in the region. Their performance is heavily influenced by agriculture productivity, good financial management, market demand, and investment in processing technology. The author noted the need to enhance agro-industrial development in order to spur the socio-economic development of the region and rural areas in general.

Sustainability in the environment is growing as a crucial aspect of corporate performance. Chouhan et al. (2021) studied the sustainability reporting on the basis of financial and non-financial disclosure indicators in selected cement companies of India. The Multivariate Analysis of Variance (MANOVA) was used to find that there are significant differences between the sustainability reporting practices of firms. The results showed that environmental sustainability is understood as a key issue at organizations, however, reporting varies among companies. The authors suggested to adopt internationally recognised sustainability frameworks to enhance transparency, stakeholder confidence and corporate governance. They emphasize the increasing significance of embedding environmental responsibility alongside organisation performance.

Mehta (2022) also discussed agricultural finance at the regional level in his study on the performance of agricultural financing in Gujarat. The study revealed that despite Gujarat seeing an enormous growth in industries, agriculture still occupies a crucial segment of the state's economy. However, the capacity of agriculture is still constrained due to poor irrigation facilities, lack of modernisation and lack of financial resources. The study highlighted the need for government financial schemes including crop loan, micro-credit and crop insurance to enhance the farmers' income and to modernize agriculture. The results support the important role that institutional finance plays in encouraging sustainable agricultural development.

The adoption of technology and better agricultural varieties have also been shown to be significant factors affecting agricultural productivity. Meena and Meena (2020) compared the performance of the variety Pratap Urd-1 of black gram under Agro-Climatic Zone V of the State of Rajasthan. They found that the area they cultivated the improved variety increased significantly because of the resistance of YMV and high yield potential. Disease tolerance was identified as the most important factor in adoption by farmers. It showed that the adoption of improved crop varieties can significantly boost agricultural output and rural incomes, and improve food security.

Many development economists have been interested in regional industrial development. Yadav et al. (2022) analyzed the existing regional disparities in Hadauti region of Rajasthan with reference to industrial development pattern. The study concluded that industrial development of districts is found to be uneven due to infrastructure, investment, policy implementation and availability of resources etc. In spite of the efforts by the government to promote industrialization in underdeveloped areas, there are evident inequalities. The authors recommended industrial policies, infrastructure investment and investment incentives in order to create a balanced regional development and minimize inter-regional disparity.

The literature reviewed reveals that most of the studies were consistent that financial efficiency, good working capital management, institutional development, agricultural finance, technological innovation, sustainability reporting and supportive public policies have very positive impact on the organizational and regional economic performance. There are some studies that have studied these factors separately in manufacturing, agriculture and industrial sectors, but so far, few studies have combined operational efficiency with other financial and macroeconomic factors. Additionally, empirical studies in the field of working capital efficiency, based on the use of more sophisticated efficiency measurement techniques, are still limited, even as far as manufacturing industry is concerned, and even more so in developing economies. Given this, the present study makes a contribution by examining the efficiency of working capital management and its determinants in Indian manufacturing industries in a comprehensive manner, which fills this research gap and adds to the academic literature as well as policy making in practice.

2.1 Research Gap

A lot of research has been undertaken in the field of working capital management and financial performance both at the corporate and national level, however most of these studies have concentrated on large manufacturing companies. In industries that produce according to seasonal production cycles, are inventory intensive, and sensitive to market conditions, limited empirical evidence is available about working capital efficiency in agro-based industries in Rajasthan. Furthermore, the available literature mostly used conventional statistical methods including regression analysis whereas little research has been done on the joint use of PCA and the Classification and Regression Tree (CRT) analysis to determine the main factors affecting financial performance. Hence, the present research work aims to fill this gap by exploring the association of working capital efficiency and financial performance of selected agro-based industries in Rajasthan through the multivariate statistical methods.

2.2 Research Questions

The present study aims at answering the following research questions:

- RQ1. How the working capital efficiency is related to the financial performance of the selected agro-based industries of Rajasthan?
- RQ2. What are the key variables of working capital that affect the performance of the financial aspect of agro-based industries?
- RQ3. What are the main dimensions of working capital efficiency based on the Principal Component Analysis (PCA)?
- RQ4. What are the most significant financial measures to predict Return on Assets (ROA) by the Classification and Regression Tree (CRT) model?

2.3 Objectives of the Study

The study was conducted for the following purposes:

1. To study the relationship between working capital efficiency and financial performance of selected agro-based industries of Rajasthan.
2. To evaluate the working capital efficiency of the selected agro-based companies by analysing indicators like Days Sales Outstanding (DSO), Days Inventory Outstanding (DIO), Days Payable Outstanding (DPO), Working Capital Turnover Ratio (WCTR), Cash Conversion Cycle (CCC) and Financial Leverage.
3. To use Principal Component Analysis (PCA) to determine the main dimensions of the working capital efficiency.
4. To identify the most important factors that influence the Return on Assets (ROA) using Classification and Regression Tree (CRT) method.
5. To recommend managerial improvements to financial performance by using good working capital management practices.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study was explanatory, quantitative and longitudinal research design in which the focus was on the relationship between the Corporate Financial Performance and Working Capital Efficiency in the agro-based industries of Rajasthan. The analysis was conducted using secondary financial data from last 6 years (FY2019–FY2024). IBM SPSS Statistics Version 26 was used to analyze the data with the following advanced techniques: Principal Component Analysis (PCA), Decision Tree Analysis, and Mediation Analysis in order to find the key determinants of corporate financial performance and to explore the direct and indirect relations between the financial variables.

3.2 Sample Selection

The study was conducted on five agro-based companies in Rajasthan. Purposive sampling technique was used since only the companies which had full and complete financial statements for the complete study period were used, the financial statements for the 30 Firm-Years (5 Companies X 6 Years). All the comparative financial statements were balanced to guarantee a consistent comparison.

3.3 Data Source

The study has adopted secondary data that was obtained from the audited financial statements of the selected agro-based companies. Balance sheet and income statement data were gathered for the computation of indicators of working capital efficiency and indicators of corporate financial performance. The data was entered into the Microsoft Excel spreadsheet and then analyzed in IBM SPSS Statistics Version 26.

3.4 Variables of the Study

Corporate Financial Performance (CFP) measured by Return on Assets (ROA) was a dependent variable. The independent variables related to working capital efficiency were Cash Conversion Cycle (CCC), Inventory Conversion Period (ICP), Accounts Receivable Collection Period (ACP), Accounts Payable Payment Period (APP), and Working Capital Turnover Ratio (WCTR). Furthermore, to control organizational differences, two control variables were included: Firm size (SIZE), and Financial leverage (LEV).

3.5 Principal Component Analysis (PCA)

To reduce the number of variables of working capital efficiency and to extract the principal components of the financial factors affecting financial performance of the company, Principal Component Analysis (PCA) was used. The suitability of the data set was examined prior to the extraction of components by examining the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. Eigenvalues of components were those > 1 , and components were varimax rotated for interpretability. The first principal components that were extracted would be the key dimensions of working capital efficiency and they will be utilized in the following analyses.

3.6 Statistical Analysis

The analyses were conducted in IBM SPSS Statistics Version 26. Firstly, descriptive statistics were calculated to summarise the financial features of the companies. Then, PCA has been applied to reduce the dimensions of working capital efficiency and Decision Tree Analysis was used to determine the most influential working capital efficiency dimensions in predicting corporate financial performance. Finally, Mediation Analysis was used to assess the indirect relationships among the study variables. The level of significance used to assess the statistical significance was 5% ($p < 0.05$).

3.7 Ethical Considerations

All financial statements were used in the study were publicly available, and the study did not include human participants or confidential organizational data. So, there was no requirement for ethical approval. The financial information was examined independently and the information was only used for academic studies.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The characteristics of the financial and working capital variables were analyzed for the 30 firm-year observations using descriptive statistics. The mean, standard deviations, minimum and maximum values of the study variables are summarized in Table 1.

Table 1. Descriptive Statistics of Study Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
ROA	30	-0.7348	0.4133	0.0185	0.1987
DSO	30	0.2207	61.7953	12.9121	16.4517
DIO	30	8.9043	138.4006	58.8439	35.2109
WCTR	30	-303.3999	133.7902	16.6543	78.0568
DPO	30	0.0000	42.0717	12.4814	13.4281
Leverage	30	0.1247	0.9809	0.6636	0.2029
CCC	30	11.6654	142.5246	59.2746	33.4541

The Return on Assets (ROA) of the selected agro-based companies was relatively low with an average of 1.85%. The negative minimum ROA (-73.48%) indicates, however, that some firm-year observations had significant financial losses. The average Days Sales Outstanding (DSO) of 12.91 days is relatively efficient at collecting receivables, while the mean Days Inventory Outstanding (DIO) is 58.84 days, meaning that, on average, inventory was held for about two months before it was sold. The Cash Conversion Cycle (CCC) was computed to be 59.27 days on average which means that firms took almost two months for cash to come back into their working capital. In addition, the Working Capital Turnover Ratio is quite high with a large standard deviation of 78.06, which indicates that there is a significant variation across firms in the utilization of working capital.

4.2 Correlation Analysis

Before conducting Principal Component Analysis, the correlation matrix was examined.

Table 2. Correlation Matrix

Variable	ROA	DSO	DIO	WCTR	DPO	Leverage	CCC
ROA	1.000	0.024	-0.002	-0.150	0.003	-0.360	0.008
DSO	0.024	1.000	0.019	0.171	0.029	0.198	0.500
DIO	-0.002	0.019	1.000	-0.044	0.614	0.305	0.815

WCTR	-0.150	0.171	-0.044	1.000	0.037	-0.133	0.022
DPO	0.003	0.029	0.614	0.037	1.000	0.315	0.260
Leverage	-0.360	0.198	0.305	-0.133	0.315	1.000	0.292
CCC	0.008	0.500	0.815	0.022	0.260	0.292	1.000

The highest positive correlation was found to be between DIO and CCC, which is 0.815. This shows that Inventory management greatly affects the whole cash conversion cycle. There was a moderately strong relationship between DIO and DPO ($r = 0.614$) and a moderate association between DSO and CCC ($r = 0.500$). ROA only exhibited weak relationships with most of the working capital variables, however, ROA exhibited a moderate negative relationship with leverage ($r = -0.360$) suggesting that higher debt levels may negatively affect profitability. SPSS also showed that the correlation matrix was not positive definite, which suggests that the factor solution should be taken with a pinch of salt given the relatively small sample size.

4.3 Principal Component Analysis

The Principal Component Analysis (PCA) has been used to determine the main factors affecting working capital efficiency and financial performance.

Table 3. Communalities

Variable	Initial	Extraction
ROA	1.000	0.826
DSO	1.000	0.745
DIO	1.000	0.884
WCTR	1.000	0.426
DPO	1.000	0.553
Leverage	1.000	0.671
CCC	1.000	0.861

Communality values show how much variance in each variable is accounted for by the extracted factors. The communalities of DIO (0.884), CCC (0.861) and ROA (0.826) were the highest, indicating that the principal components were well represented by these variables. WCTR (0.426) had the lowest communality, so it represented comparatively poorly.

Table 4. Total Variance Explained

Component	Eigenvalue	Variance (%)	Cumulative (%)
1	2.463	35.182	35.182
2	1.265	18.075	53.257
3	1.239	17.698	70.954

The Kaiser's criterion was used to select three components with eigenvalues larger than one. These components accounted for 70.95% of the total variance, which is considered to be sufficient at 60% or above, indicating that the extracted components were able to summarize the information contained in the original variables.

Table 5. Component Matrix

Variable	Component 1	Component 2	Component 3
ROA	-0.133	0.720	0.539
DSO	0.397	-0.430	0.634
DIO	0.882	0.320	-0.058
WCTR	0.010	-0.531	0.380
DPO	0.656	0.251	-0.243
Leverage	0.583	-0.338	-0.467
CCC	0.860	0.025	0.348

DIO (0.882) and CCC (0.860) were the main components of component 1, suggesting that the two main aspects of working capital efficiency are inventory management and the cash conversion cycle. In Component 2, ROA (0.720) dominated the corporate profitability, while DSO (0.634) and ROA (0.539) are the most significant factors in Component 3, indicating the importance of receivables management in explaining financial performance.

Table 6. Decision Tree Model Summary

Specification	Result
Growing Method	Classification and Regression Tree (CRT)
Dependent Variable	Return on Assets (ROA)
Independent Variables	DSO, DIO, WCTR, DPO, Leverage, CCC
Validation Method	10-Fold Cross Validation
Maximum Tree Depth	5
Minimum Cases in Parent Node	5
Minimum Cases in Child Node	2
Independent Variables Included	Leverage, WCTR, CCC, DIO, DSO
Number of Nodes	7
Number of Terminal Nodes	4
Tree Depth	3

Table 6 shows the overall summary of the Classification and Regression Tree (CRT) model for predicting Return on Assets (ROA). The model selected six working capital variables and included the following variables in the analysis: Leverage, Working Capital Turnover Ratio (WCTR), Cash Conversion Cycle (CCC), Days Inventory Outstanding (DIO) and Days Sales Outstanding (DSO). The reliability of the model was tested by using a 10-fold cross-validation method. A final decision tree was created with 7 nodes, 4 of which were terminal nodes, and a maximum tree depth of 3, which suggests an interpretable model for describing the corporate financial performance.

Table 7. Decision Tree Node Summary

Node	Parent Node	Splitting Variable	Split Criterion	N	Mean ROA	Improvement
0	–	Root Node	–	30	0.0185	–
1	0	Leverage	≤ 0.9077	28	0.0476	0.012
2	0	Leverage	> 0.9077	2	-0.3894	0.012
3	1	WCTR	≤ 44.1723	20	0.0854	0.003
4	1	WCTR	> 44.1723	8	-0.0469	0.003
5	3	DIO	≤ 33.8154	5	0.2802	0.008
6	3	DIO	> 33.8154	15	0.0205	0.008

The sequence of splits produced by the CRT model is given by Table 7. Financial leverage was found to be the most important splitting variable as it was found to have the most influence on ROA. The second level of the tree was defined by Working Capital Turnover Ratio (WCTR) and the final split was defined by Days Inventory Outstanding (DIO). The highest average ROA (0.2802) was for the firms with $DIO \leq 33.82$ days, while the lowest average ROA (-0.3894) was for the firms with $Leverage > 0.9077$. The results indicate a possible relationship between having lower leverage and improved financial performance, as well as efficient inventory management.

Table 8. Gain Summary of Terminal Nodes

Terminal Node	Cases (N)	Percentage (%)	Predicted Mean ROA
5	5	16.7	0.2802
6	15	50.0	0.0205
4	8	26.7	-0.0469
2	2	6.7	-0.3894

The characteristics of the decision tree's terminal nodes are summarized in table 8. The most profitable group of firms were those with the highest predicted mean ROA (0.2802) which had 16.7% of the observations as Node 5. The most common observation was at node 6 (50%) with a moderate predicted ROA (0.0205). On the other hand, the firms with the best financial performance had the highest predicted ROA, with the lowest being in Node 2 (-0.3894).

Table 9. Risk Estimate

Method	Risk Estimate	Standard Error
Resubstitution	0.015	0.006
Cross Validation	0.074	0.036

Table 9 shows the predictive accuracy of the CRT model. The risk estimates for the resubstitution and cross validation were relatively small at 0.015 and 0.074 respectively, with relatively small standard errors. The results showed that the decision tree has a reasonably acceptable level of prediction accuracy, and it has a good level of generalizability given the relatively small sample size.

Leverage was the most important factor affecting the financial performance (ROA) of the selected agro-based industries among all the variables as revealed by the Classification and Regression Tree (CRT) analysis. The first split was based on a leverage ratio of 0.9077, where it was found that firms with lower financial leverage generally had higher profitability as compared to the highly leveraged firms. In the group of companies that did not have leverage above the limit, the second factor that was most influential was the Working Capital Turnover Ratio (WCTR) with companies having WCTR below or equal to 44.17 reporting higher average ROA. When split by Days Inventory Outstanding (DIO), firms with DIO of 33.82 days or less recorded the highest average ROA of 0.2802 while the firms with DIO above 33.8 days had noticeably lower profitability (0.0205). The decision tree had 7 nodes, including 4 terminal nodes, and had a maximum depth of 3. The model had a resubstitution risk of 0.015 and a cross-validation risk of 0.074, which showed an acceptable predictive accuracy of the model despite the relatively small sample size, suitable for exploratory analysis.

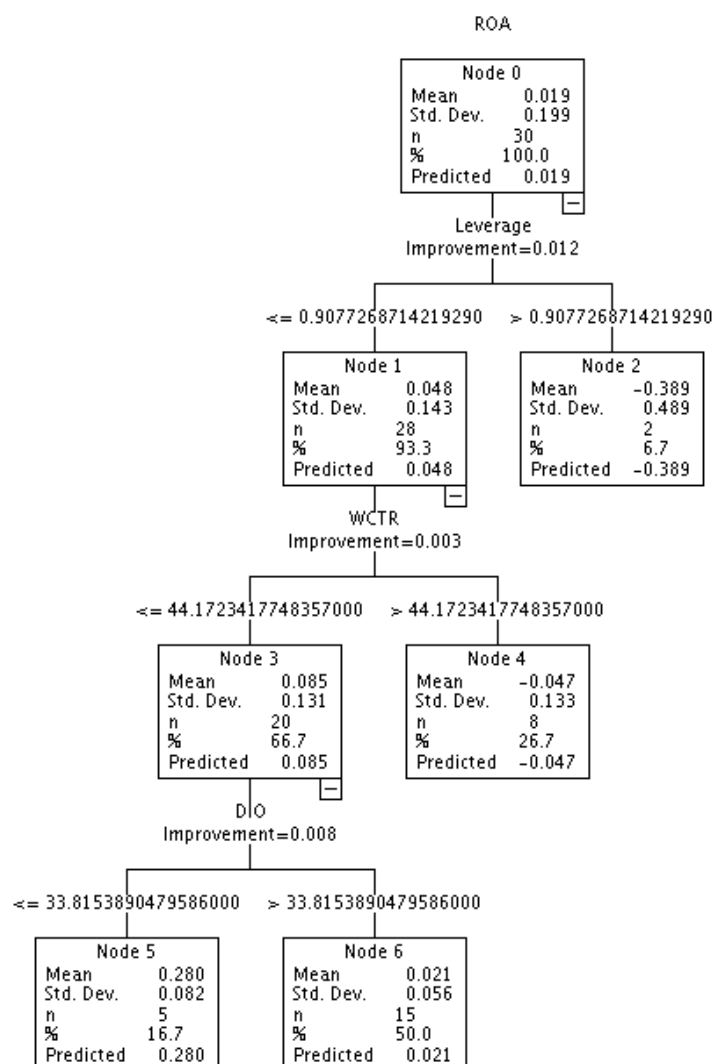


Figure 1. Classification and Regression Tree (CRT) Depicting the Decision Rules for Predicting Corporate Financial Performance (ROA).

Key findings: According to the decision tree, financial leverage, working capital turnover and inventory management (DIO) are the most important variables on the financial performance of the selected agro-based industries. These results correspond with the results from the correlation and PCA, showing the order in which these variables are important in forecasting profitability.

4.5 Discussion

In the present study, the relationship of working capital efficiency with corporate financial performance of selected agro-based industries in Rajasthan has been tested through descriptive statistics, correlation analysis, Principal Component Analysis (PCA) and Classification and Regression Tree (CRT) analysis. The results show that inventory management, liquidity management and financial leverage are very important in explaining the differences in corporate financial performance. The use of multiple analysis techniques brings a more complete understanding of the relationship between various dimensions of working capital and profitability in agro-based industries.

The descriptive statistics showed that there was a significant difference in profitability and working capital indicators of the sampled companies. The selected companies have relatively low average ROAs, indicating that the companies' assets had a

relatively low return during the period of study. Meanwhile, large differences in the Working Capital Turnover Ratio (WCTR) and Cash Conversion Cycle (CCC) indicate differences in firms' efficiency levels of using their short-term assets and liabilities. The results obtained in the agro based industries are anticipated due to seasonal production cycle, price variation of raw materials and market demand. The same has been reported by Seth et al. (2021) who stress the importance of the management's efficiency, and there's a wide variety of operational practices in a firm that has a significant impact on the performance of working capital in the manufacturing industry.

The correlation analysis showed that days inventory outstanding (DIO) had the highest positive correlation with cash conversion cycle (CCC) showing that inventory management is one of the important factors affecting liquidity efficiency. Inventory is a major component of current assets in agro-based industries and a long inventory holding period directly lengthens the cash conversion cycle and will make money invested in inventory difficult to retrieve. The moderate negative relationship between leverage and ROA also implies that the higher leverage may negatively impact profitability due to increased interest payments and financial risk. The results of this study corroborate previous research of Boisjoly et al. (2020), Wang et al. (2020), and Almomani et al. (2021) that found that effective inventory management and wise financial decisions have a positive effect on firm performance.

The Principal Component Analysis also confirmed that inventory management and liquidity conversion are the major factors of the working capital efficiency. Days Inventory Outstanding and Cash Conversion Cycle had high loadings on the first principal component, suggesting that they account for a significant amount of the variation in working capital efficiency. The second component was more closely correlated with Return on Assets and the third component was related to Days Sales Outstanding, which is a measure of the receivables management. The results indicate that the working capital efficiency is multi-faceted and cannot be measured by a single financial ratio. Rather, it is crucial for companies to coordinate inventory management, receivables collection and cash flow management to make the financial performance of the company better.

The Classification and Regression Tree (CRT) analysis gave further information on the order of importance of the working capital variables. Financial leverage was the most significant variable affecting Return on Assets and followed by Working Capital Turnover Ratio and Days Inventory Outstanding among all the indicators. Firms with lower leverage were more profitable, suggesting that having an appropriate capital structure could improve financial performance. In addition, the company that had the lowest inventory holding period had the highest predicted ROA, which highlights the need to manage inventories effectively in order to lower the companies' holding costs, minimize spoilage, and maximize cash recovery. These findings are complimentary to the results of the PCA in that they not only identify the important variables but also show how one variable affects the other sequentially with respect to profitability.

The results imply that the managers of agro-based industries should give more attention to inventory optimization, effective collection of receivables and careful management of debts for better financial performance. Optimal stock levels minimise the expense of storage and shorten cash flows, good credit management will speed cash flow and increase liquidity. Likewise, there is also the potential that excessive financial leverage will yield lower financing costs and/or greater long-term profitability. These strategies, taken together, can enhance operational efficiency, increase the financial sustainability and competitiveness of agro-based industries in a dynamic agricultural environment.

While important, the results are the outcome of a relatively small number of firm-year observations (30), and were obtained from five firms only. Results may not be generalizable due to limited sample size, especially for the use of advanced multivariate methods like PCA and CRT analysis. Further research should expand the number of firms, time horizon and add other financial and macroeconomic data. Other models such as panel regression models or structural equation modelling can also be used to gain deeper insights into causality between working capital efficiency and corporate financial performance.

Overall, the study identifies an important link between working capital management and financial performance of the company in agro-based industries. The results of this correlation analysis, Principal Component Analysis and Classification and Regression Tree analysis all indicate that the inventory management, liquidity management and financial leverage are important factors in improving profitability. The results enrich the existing body of literature on working capital management by providing empirical evidence from the agro-based industries in Rajasthan, thus providing useful suggestions for managing financial sustainability and competitiveness through working capital management in agro-based industries in particular and in agriculture generally.

5. CONCLUSION

The study involved an application of descriptive statistics, correlation analysis, Principal Component Analysis (PCA) and Classification and Regression Tree (CRT) analysis to explore the relationship between working capital efficiency and corporate financial performance of selected agro-based industries in Rajasthan. The results indicated that the three factors that affect the financial performance of companies are inventory management, cash conversion cycle and financial leverage. The inventory management and liquidity variables accounted for a significant amount of variance in total variance as revealed by PCA, and financial leverage, Working Capital Turnover Ratio and Days Inventory Outstanding variables were found to be most significant predictors of Return on Assets by using the CRT model. The study emphasizes on the significance of maintaining an efficient stock level, a better approach to receivables management, the effective use of working capital and financial leverage to boost profitability. The results are informative for managerial purposes, but are limited to 30 firm-year observations. It is suggested that future studies should use larger samples and more sophisticated analysis to enhance generalizability and robustness of the results.

REFERENCE

- [1] Seth, H., Chadha, S., & Sharma, S. (2021). Benchmarking the efficiency model for working capital management: data envelopment analysis approach. *International journal of productivity and performance management*, 70(7), 1528-1560.
- [2] Singh, S. (2019). Community and Collective Organizations for Sustainable Agricultural Development in India: Experience, Challenges and Policy. *Indian Journal of Agricultural Economics*, 74(1), 96-122.
- [3] Kambali, U., & Panakaje, N. (2022). A Review on Access to Agriculture Finance by Farmers and its Impact on their Income. *Available at SSRN 4104741*.
- [4] Prakash, Y., Charwak, B., & Kumar, P. V. (2020). Textile industry in new India: challenges and opportunities. *International Journal of Indian Culture and Business Management*, 21(4), 435-458..
- [5] Kumar, R. (2019). Review on Agro Industry Performance of Financial and Growth Aspect. *The Research Journal*, 5(1), 1-7.
- [6] Chouhan, V., Sharma, R., & Goswami, S. (2021). Sustainable reporting practices of selected cement companies in India: A case study. *Accounting*, 7(1), 151-160.
- [7] Mehta, R. (2022). A study on agriculture finance: new paradigm for Gujarat agriculture sector. *PARIPEX INDIAN JOURNAL OF RESEARCH*.
- [8] Meena, K. C., & Meena, L. K. (2020). Performance of Pratap Urd 1 Variety of Blackgram in Agro-Climatic Zone-V of Rajasthan. *Editor's Message*, 210.
- [9] Yadav, S., Khan, Z., & Sharma, D. K. (2022). Industrial Development in Hadauti Region: Status and Prospects. *International Journal of Innovative Research in Science Engineering and Technology*, 11(122), 10-15680.
- [10] Bharatkumar, D. P., Khatun, P., Kumar, C., & Yadav, A. K. (2023). Role of agriculture processing in export growth of agricultural products. *Journal of Current Research in Food Science*, 4(1), 49-56.
- [11] Arumugam, U., & Manida, M. (2023). Agripreneurship for sustainable economic development in India. *ComFin Research*, 11(4), 15-23.
- [12] Negia, C. S., & Kumarb, S. (2020). Promoting agro-based industry in India (issues and challenges). *INTERNATIONAL JOURNAL OF TRADE & COMMERCE-ILARTC*.
- [13] Khan, M. A. (2021). Impact of agriculture sector on sustainable development of Indian economy: An analysis. *Agricultural Mechanization in Asia (AMA), Africa & Latin America*, 52(2), 3243-3252.
- [14] Charishma, K. S., & Singh, R. (2024). Contribution of agriculture sector in exports of India-an economic analysis. *Journal of Education (nd)*.
- [15] Zou, L., & Muan, J. M. (2020). The Economy of Agro-Based Industries in Manipur. *International Journal of Management*, 11(9).
- [16] Shanthakumari, S., & Geetha, K. (2020). A study on role of agro-based MSMEs in India. *Sambodhi*, 43(4).
- [17] Suryavanshi, M. (2023). *Food processing industries in India: A study for increasing rural income* (No. 2023-45-06).
- [18] Venkatesh, G. M. (2021). Status of Agro-based Industries in India: Special reference to Food Processing Industries. In *Virtual National Conference on THE CHANGING ECONOMIC MODELS AND TRENDS IN THE POST COVID-19 WORLD* (p. 139).

- [19] Seth, H., Chadha, S., Sharma, S. K., & Ruparel, N. (2021). Exploring predictors of working capital management efficiency and their influence on firm performance: An integrated DEA-SEM approach. *Benchmarking: An International Journal*, 28(4), 1120-1145.
- [20] ALMOMANI, T. M., ALMOMANI, M. A., & OBEIDAT, M. I. (2021). The relationship between working capital management and financial performance: Evidence from Jordan. *The Journal of Asian Finance, Economics and Business*, 8(6), 713-720.
- [21] Boisjoly, R. P., Conine Jr, T. E., & McDonald IV, M. B. (2020). Working capital management: Financial and valuation impacts. *Journal of Business Research*, 108, 1-8.
- [22] Wang, Z., Akbar, M., & Akbar, A. (2020). The interplay between working capital management and a firm's financial performance across the corporate life cycle. *Sustainability*, 12(4), 1661.
- [23] El-Ansary, O., & Al-Gazzar, H. (2021). Working capital and financial performance in MENA region. *Journal of Humanities and Applied Social Sciences*, 3(4), 257-280.
- [24] Anton, S. G., & Afloarei Nucu, A. E. (2020). The impact of working capital management on firm profitability: Empirical evidence from the Polish listed firms. *Journal of risk and financial management*, 14(1), 9.
- [25] Laghari, F., & Chengang, Y. (2019). Investment in working capital and financial constraints: Empirical evidence on corporate performance. *International Journal of Managerial Finance*, 15(2), 164-190.
- [26] Celestin, M., & Vanitha, N. (2019). A causal linkage of working capital management and profitability: Empirical evidence from consumer goods industry in Rwanda. *European Academic Research*, 7(8), 4102-4105.
- [27] Graham, J. R. (2022). Presidential address: Corporate finance and reality. *The Journal of Finance*, 77(4), 1975-2049.
- [28] Morin, S. L. (2024). The financial trap of short-term focus eroding long-term value in financial management: a theoretical analysis. *Financial Markets, Institutions and Risks*, 8(4), 148-162.
- [29] Omopariola, B. J., & Aboaba, V. (2019). Comparative analysis of financial models: Assessing efficiency, risk, and sustainability. *Int J Comput Appl Technol Res*, 8(5), 217-231.