



## Factors influencing financial performance in South Africa's food and beverage industry: An empirical analysis

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**Abstract:** *Purpose:* This study aims to investigate the determinants of financial performance in the food and beverage sector of South Africa, focusing on 11 listed companies on the Johannesburg Stock Exchange. *Methodology:* The study employs panel data regression analysis using secondary data sourced from the Integrated Real-time Equity System (IRESS) Library, covering the period from 1988 to 2017. Return on assets (ROA) is used as the performance indicator, while the explanatory variables include debt ratio, cash conversion cycle, leverage, labour, and capital. *Results:* The study's findings reveal that labour and capital are statistically significant determinants of financial performance in the food and beverage sector of South Africa. On the other hand, debt ratio, cash conversion cycle, and leverage have an insignificant impact on the firms' performance. *Theoretical contribution:* This study contributes to the literature on the determinants of financial performance in the food and beverage sector, particularly in the context of South Africa. The findings highlight the importance of labour and capital as key factors influencing financial performance in the sector. *Practical implications:* The study's results have practical implications for managers and stakeholders in the food and beverage sector of South Africa. It is recommended that firms in the sector pay more attention to labour and capital as these variables have proven to be strong determinants of financial performance.

**Keywords:** financial performance, financial statements, Johannesburg Stock Exchange, secondary data, explanatory variables, autoregressive distributed lag.

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## 1. Introduction

A firm's financial performance is paramount to its stakeholders, including shareholders, investors (current and potential), financial institutions, government, tax authorities, creditors and labour unions. The interests of each of these categories of stakeholders vary from one to the other. These stakeholders rely on financial data to make financial and economic decisions regarding a company (Olayinka, 2022). For instance, a firm's shareholders will mainly be interested in wealth maximisation and its ability to generate profits, while profit maximisation is one of the significant objectives of managers. Tax authorities would be interested in the firm's efficiency in paying its taxes as and when due. Financial institutions will be interested in ensuring the creditworthiness of the firm and its ability to repay loans. However, an obvious fact is that all these parties are interested in one thing: the firm's financial performance. Firm performance could be affected by either internal or external factors.

It should be noted that the internal factors are firm-specific, while external factors are not peculiar to individual firms. These external factors could include market perceptions and preferences, regulations, and the state of a nation's economy. Evaluating financial statements involves assessing the company's history, current financial situation, and performance (Osadchy, Akhmetshin, Amirova, Bochkareva, Gazizyanova and Yumashev, 2018). According to Mandipa and Sibindi (2022), profitability measures determine firm performance.

Several studies have attempted to investigate some variables influencing firm performance and reasons for variation in firms' profitability levels; however, the subject of firms' financial performance seems inexhaustive and has drawn the research community's attention. There are various measures of financial performance employed by firms, but the most common measures of financial performance are financial ratios. Financial ratios provide information about a company's performance and can also be used to forecast a company's future performance (Alqam, Ali and Hamshari, 2021). One significant advantage of financial ratios is their ability to link various financial statements together. The most commonly used ratios in the literature are Return on Assets and Return on Equity (Matar & Eneizan, 2018; Samiloglu & Akgun, 2016; Çekrezi, 2015; Akenga, 2017). However, this study uses return on assets to proxy firm performance. The management of firms must understand the elements that influence their performance to remove the negative factors and strengthen those that positively impact the business, thereby improving the overall performance of the food and beverage industry. This study will contribute to the limited literature on the determinants of firms' financial performance in South Africa's food and beverage sector. The choice of the sector was borne out of an observed vacuum, so this study is significant as it will provide relevant stakeholders with an understanding of these factors, which will enhance the sector's growth and promote its contribution to economic growth. In addition, to the best of the researcher's knowledge, there are no existing studies on the subject matter in the South African context.

The rest of this paper is organised as follows: section two covers the literature review, and the third section addresses the data, variables and methodology used. The fourth section covers the regression results of the model and discussion. Section five concludes the study, summarises the research findings and offers recommendations.

### 1.1 Hypothesis

To examine factors that determine firms' financial performance.

H<sub>0</sub>: There is no significant relationship between debt ratio, cash conversion cycle, leverage, capital, labour and firms' financial performance.

H<sub>1</sub>: There is a significant relationship between debt ratio, cash conversion cycle, leverage, capital, labour and firms' financial performance.

### 1.2. Scope of the study

The study covers eleven (11) quoted companies in the food and beverage sector in South Africa, and the selection of the firms was made based on data availability. The period covered was from 1988 to 2017, as the available data was only for this period, and only items considered relevant to the study were selected from the financial statements of the selected firms. Firms that merged during the period covered in this study and those de-listed from the Johannesburg Stock Exchange were excluded. Firms newly listed at the JSE were also not included in the sample due to the non-availability of historical data. The study employed panel data and secondary data.

### **1.3. Significance of the study**

The determinants of the financial performance of firms are of particular interest to all stakeholders, considering their stake and investments. The findings of this study will contribute to understanding the corporate performance mechanisms of the South African food and beverage industry. The findings of this study will help listed food and beverage firms in South Africa to understand those factors that impact their financial performance and concentrate on them. This will enhance better decision-making on these factors as well as improve performance in the industry at large. This study will be helpful as a reading material for students and researchers and will serve as a reference for future studies on the determining factors of firms' financial performance.

### **1.4 Food and beverages sector in South Africa**

The manufacturing industry plays a critical role in the economic growth and development of South Africa. The sector is the country's fourth largest industry, contributing 14% to the nation's gross domestic product (GDP). The food and beverage sector is the largest component and most important player in South Africa's manufacturing industry, contributing 25% to total manufacturing activity (South African Market Insights). It is believed that South Africa has the most developed food and beverages (F & B) market in Africa, with international brands continuing to make inroads into the country and growth in sales in the sector is expected to continue to be on the rise (JHI Chief Executive Officer, Nomzamo Radebe). In light of the sector's enormous contribution to the economy's growth and development, this study focused on this crucial sector.

## **2. Literature review**

### **2.1. Theoretical framework**

This section deals with some theories relating to the study. Theories examined in this section are Agency theory, Risk-return trade-off theory and Cobb-Douglas production function theory. These theories are found suitable for this study as supported in the literature (Herlambang, Murhadi & Andriani, 2020; Roy & Bandopadhyay, 2022; Al-Mawsheki, 2022; Tronchoni, Rozès, Querol & Guillamón, 2012).

#### **2.1.1. Agency theory**

The agency theory is a theory that was developed by Jensen and Meckling (1976), and it highlights the costs that arise due to conflict of interest between the owners of the company, i.e., the shareholders (principal) and the manager (agent). While the shareholders desire to increase their wealth and income, the managers are concerned with running the company on behalf of the shareholders (Moloi & Marwala, 2020). The owners always expect the agents to act and work in their best interests. The reality, however, is that this is not always the case. Jensen and Meckling (1976) considered this ensuing conflict a major one that could lead to agency problems and costs. Agency costs are defined as costs that arise as a result of agency conflicts. Moloi and Marwala (2020) viewed agency cost as the 'value loss' to shareholders caused by a conflict of interest between shareholders and the company's management. Jensen and Meckling grouped agency costs into monitoring, commitment or obligation, and opportunity costs. Monitoring costs are expenses incurred by the principal to minimise the agent's opportunistic behaviour; obligation costs are any expenses incurred by the agent to gain the principal's trust, while opportunity costs refer to the loss of utility suffered by the principal as a result of differences with the agent (Zogning, 2017). This theory was considered applicable to this study as it establishes a link between the shareholders and management of the companies. The agency theory is helpful in proffering solutions to agency issues, offering techniques to boost an organisation's profitability, and explaining why some organisations outperform competitors.

#### **2.1.2. Risk-return trade-off theory**

This theory highlights the relationship between the return that a firm gains on an investment and the level of risk undertaken. It states that an increase in return in compensation for the higher risk should accompany an increase in risk. When examining their portfolios, investors believe the risk-return trade-off is critical to investment decisions (Tamilselvan, Palamalai, Kumar, Aswathaman

& Veerabhadrapa, 2022). In other words, the higher the return, the higher the risk and vice versa. One fundamental assumption for the risk-return trade-off is that investors are risk-averse, and thus, investors demand compensation for bearing risks. However, managers are risk seekers who always make decisions with a greater probability of loss and aim for a higher futuristic gain (Olawaju, Doorasamy & Oladejo, 2017). The risk-return trade-off theory is closely linked with working capital management because the latter involves making decisions to ensure a trade-off or balance between firms' liquidity and profitability levels. This theory was considered applicable to this study as it establishes a link between the level of risk undertaken on an investment and the amount of returns gained from such an investment. Carefully considering and applying this theory will result in improved financial performance.

### **2.1.3. Cobb-Douglas production function theory**

This theory was propounded in 1947 by Professors Paul Douglas and Cobb, C.W. Production function is used extensively in theoretical and applied research to establish a relationship between some input sets (labour and capital) with the corresponding output. According to Hájková and Hurník (2007), the use of the production function method for the measurement of potential output growth takes into account different sources of an economy's productive capacity, namely the contributions of labour, capital and total factor productivity, the latter containing information about technological and allocative efficiency. The theory is considered unique in the literature because, according to Muhammad, Hanan, Shah, Yuan, Khan and Sun (2023), it provides a variety of inputs to the problem, resulting in a unique outcome. However, its fundamental disadvantage is that it imposes arbitrary substitutability between inputs (Reynés, 2019). This theory was considered suitable for this study due to its efficiency in dealing with issues relating to output and input relationship, not only to aggregate output but also to firm performance.

## **2.2. Empirical review of literature**

Several studies have sought to examine the factors that determine the financial performance of firms using data from various countries and periods. The results from these studies are quite diverse. While most of these studies have concluded that a positive relationship exists between these determining factors and the financial performance of firms, others have established a negative relationship. Some of these studies, including their findings, are discussed and analysed in this section. These studies have been categorised into those conducted in other continents, such as Africa and South Africa.

### **2.2.1. Studies from other continents**

One study was reviewed from Vietnam, Mongolia, and Jordan, while three studies were reviewed from Indonesia.

Ekadjaja, Wijaya and Vernetta (2021) examined the factors affecting firm performance in manufacturing companies listed on the Indonesian Stock Exchange. Purposive sampling was utilised, and 44 companies listed on the Indonesian Stock Exchange (IDX) were included. The study focused on all manufacturing firms listed in Bursa Efek Indonesia from 2017 to 2019. The study's findings showed that liquidity and firm age had no significant impact on firm performance, while growth and firm size significantly impacted firm performance. Furthermore, leverage had a negative significant impact on firm performance.

Nguyen, Nguyen and Do (2021) measured the internal factors affecting the performance of food and beverage (F&B) firms listed on the Hanoi Stock Exchange (HNX) in Vietnam. From 2015 to 2019, data was collected on 15 F&B enterprises listed on the HNX. A blended style of research that includes both qualitative and quantitative components was employed. The Stata13 software was used as the supporting instrument for the quantitative research approach. The results of the Ordinary Least Squares (OLS) regression method showed that total assets and short-term debts/total liabilities negatively impacted the ROA and ROE. In contrast, the growth of total assets of the growth factor positively impacted the ROA and ROE.

Sari (2020) analysed the factors affecting firm performance in all the listed manufacturing companies on the Indonesia Stock Exchange from 2014 to 2016. Purposive sampling was employed to gather the samples, and 62 manufacturing companies listed on the Indonesian Stock Exchange matched the sampling criteria, yielding 186 data points used in the research. Multiple linear regression and hypothesis testing were used to analyse the data. The study found that ROE and

earnings quality significantly impacted firm performance, while institutional ownership, independent commissioner, audit committee, board size, leverage, and long-term debt did not.

Megawati, Yumna, Cheisviyanny and Tasman (2020) analysed the factors that shaped the financial performance of micro-enterprises in the city of Padang, Indonesia. Based on clustered proportional random sampling, 119 samples from all micro-businesses were used in the study, while the data was analysed using multiple regression analysis. The study findings showed that financial literacy, internal locus of control, financial inclusion and risk perception directly affected the financial performance of the enterprises.

Batchimeg (2017) analysed the financial determinants of organisations in 100 companies listed on the Mongolian Stock Exchange. The study's findings showed that return on assets, growth in sales, earnings per share and returns on cost positively impacted financial performance. On the other hand, short-term debts to total assets ratio and cost-to-revenue ratio have negative impacts.

Matar and Eneizan (2018) explored the determinants of financial performance in industrial firms with evidence from Jordan. The findings reveal that liquidity, profitability, and revenues positively relate to the return on assets (ROA). On the other hand, leverage and firm size are negatively related.

Financial performance was measured in different ways in the studies reviewed above. It was measured as return on assets (ROA), return on equity (ROE), return on investment (ROI), net operating profit and gross profit margin. The researchers also made different findings and drew different conclusions from their studies. However, it is noted that most of the studies confirmed a positive relationship between the determining variables and financial performance. In conclusion, having reviewed literature from Africa and other economies on examining those factors that affect the financial performance of firms, the different findings indicate diverse views on the subject matter.

This study contributes to existing empirical literature on the factors determining firms' financial performance in the South African Food and Beverage industry. Also, this study stands unique in that, to the best of the researcher's knowledge, there has been no study on the subject matter in the South African context using the Auto Regressive Distributed Lag (ARDL), a recent and more sophisticated estimating technique.

### 2.2.2. Studies from Africa

One study that surveyed 27 African countries was reviewed, two studies from Ethiopia were reviewed, and one from Ghana, Nigeria, Tanzania and Kenya were reviewed, respectively.

Bolarinwa, Akinlo and Onyekwelu (2021) investigated the determinants of firm profitability in Africa. The study employed the generalised method of moments (GMM) estimating technique to analyse the sizeable firm-level dataset of 896 firms in 27 African countries between 2005 and 2017. The study found size, age, leverage, tangibility, managerial efficiency and firm growth to be significant firm-level predictors of firm profitability in Africa.

Dodoo, Appiah and Donkoh (2020) examined the determinants of firm performance in 15 non-financial Ghanaian companies listed on the Ghana Stock Exchange over ten years (2008-2017). The estimating methods used in the analysis include the two-step system generalised method of moments (GMM) and the ordinary least squares (OLS) method. The study's findings revealed that firm size, cash flow ratio and growth significantly and positively impacted firm performance, while equity debt negatively impacted firm performance.

Horera and Maganya (2020) empirically investigated the determinants of firms' profitability in Tanzania. Ten insurance companies out of the 25 general insurance companies operating in Tanzania from 2008 to 2017 were involved in the study. In some cases, the data was collected from financial statements provided in the TIRA Report and via a documentary review. The research performed a preliminary test using panel unit root to determine variable stationarity. The Hausman specification test was then used to determine the fitness of the model utilising the relevant fixed and random effect model tests. The study found that the age of the firm had a significant impact on firm profitability, while firm size had no statistically significant impact on firm profitability.

Deyganto and Alemu (2019) investigated the factors affecting insurance companies' financial performance in Hawassa City Administration, Ethiopia. The study's findings showed that underwriting, premium growth, solvency ratio, growth rate of GDP, and inflation rate have significant effects on financial performance. In contrast, reinsurance dependence, company size and interest rate have no significant effect.

Odusanya, Yinusa and Ilo (2018) used the Generalized Method of Moments (GMM) approach to explore the determinants of corporate profitability for 114 firms listed on the Nigerian Stock Exchange (NSE) from 1998 to 2012. The study findings showed that lagged profitability had a significant positive impact on firm profitability, while interest rate, inflation rate, financial risk and short-term leverage negatively impacted firm profitability.

Woldemariam (2017) examined the determinants of profitability with evidence from ample manufacturing food and beverage companies in Addis Ababa. The research findings revealed that firm size, leverage, and capital intensity have statistically significant and negative impact on profitability.

Audax (2018) studied factors affecting manufacturing firms' financial performance in the Nairobi Securities Exchange, Kenya. The study established a significant influence of firm size, leverage and liquidity on financial performance.

### 2.2.3. Studies from South Africa

Msomi and Nzama (2022) investigated the effect of firm-specific factors on the financial performance of South African insurance companies. The study was focused on the performance of 36 publicly-traded insurance companies and had quantifiable markets from 2008 to 2019. The study found a negative and insignificant association between premium growth rate and ROA, while a strong positive and significant relationship was discovered between liquidity ratio and ROA.

Sitharam and Hoque (2016) examined the internal and external factors affecting the performance of SMEs in the KwaZulu-Natal province of South Africa. The cross-sectional study was conducted among 74 SME owners and managers. The study's results revealed that technological advancement would improve the performance of SMEs, and most respondents viewed competition as a significant challenge. Also, most respondents stated that crime and corruption affected business performance. It was observed that competition was the only factor among the studied internal and external factors that revealed a significant association with the performance of SMEs.

Marimuthu (2021) analysed the factors driving the financial performance of 33 commercial state-owned enterprises in South Africa. The study employed a multiple regression model, and the data was estimated using the Two-Step System GMM estimator. The main variables of the study were financial performance and leverage. The study's findings indicated that leverage, measured by long-term debt, growth opportunities, liquidity and non-debt tax shield, significantly negatively affected the financial performance of SOEs.

## 3. Methodology

### 3.1. Model specification

The study employed a linear econometric model premised on the Cobb-Douglas production function. The Cobb-Douglas production function has been popularised due to its efficiency in dealing with issues relating to output and input relationship, not only to aggregate output but also to firm performance. Hence, the model is based on the Cobb-Douglas Production Function. The model, derived from Tronchoni *et al.* (2012) and Robinson *et al.* (2012), establishes that factor inputs determine firm performance.

$$Y = f(K^\alpha, L^\beta) \quad (1)$$

However, Solow (1956) brought in the concept of residual in the form of total factor production (FTP), where the aspect that L and K do not capture is sub-hummed into Total Factor Production. Following Tronchoni *et al.* (2012) and Robinson *et al.* (2012), the Cobb-Douglas Production Function is given thus:

$$Y_{it} = A_{it}(K_{it}^\alpha, L_{it}^\beta) \quad (2)$$

Where  $A_{it}$  are other factors not captured by labour and capital. These factors include Debt Ratio (DR), Cash Conversion Cycle (CCC) and Leverage (LV).

Following Kutu and Ngalawa (2016), the total factor productivity ( $A_{it}$ ) can therefore be simplified as:

$$A_{it} = f(DR_{it}, CCC_{it}, LV_{it})^\rho \quad (3)$$

Therefore, by substituting equation (3) into equation (2), the Cobb-Douglas production function can be given as:

$$Y_{it} = A_{it}(K_{it}^\alpha, L_{it}^\beta) \quad (4)$$

When the log is linearised, its equivalent gives:

$$\log Y_{it} = \log A_{it} + \alpha \log K_{it} + \beta \log L_{it} \quad (5)$$

The part of variables for firm performance that is not captured by K and L is represented in A.

Where:

$$Y_{it} = f(DR_{it}, CCC_{it}, LV_{it})^{\Omega_i} + K_{it}^{\alpha} + L_{it}^{\beta} + u_{it} \quad (6)$$

Following Omar, Ariffin and Ahmad (2015), the linear equivalence of the equation, when logged, becomes:

$$\log Y_{it} = \Omega_1 \log DR_{it} + \Omega_2 \log CCC_{it} + \Omega_3 \log LV_{it} + K_{it}^{\alpha} + L_{it}^{\beta} + u_{it} \quad (7)$$

In dynamic form, the equation becomes:

To make our model dynamic, we introduce the lag of the dependent variable to the right-hand side of model 7;

$$\log Y_{it} = \Omega_0 + \log Y_{it-1} + \Omega_1 \log DR_{it} + \Omega_2 \log CCC_{it} + \Omega_3 \log LV_{it} + K_{it}^{\alpha} + L_{it}^{\beta} + u_{it} \quad (8)$$

Equation 9 is the short-run and the long-run model with the error correction term.

$$\begin{aligned} \Delta \ln ROA_{it} = & \Omega_0 + \sum_{j=1}^n \Omega_{1j} \ln ROA_{it-j} + \sum_{j=1}^n \Omega_{2j} \Delta \ln DR_{it-j} + \sum_{j=1}^n \Omega_{3j} \Delta \ln CCC_{it-j} + \\ & \sum_{j=1}^n \Omega_{4j} \Delta \ln LV_{it-j} + K_{it}^{\alpha} + L_{it}^{\beta} + \sigma_1 \ln ROA_{it-1} + \sigma_2 \ln DR_{it-1} + \sigma_3 \ln CCC_{it-1} + \sigma_4 \ln LV_{it-1} + K_{it}^{\alpha} + \\ & L_{it}^{\beta} + U_{it} \end{aligned} \quad (9)$$

Where:

ROA = Return on Assets

DR = Debt Ratio

CCC = Cash Conversion Cycle

LV = Leverage

K = Capital

L = Labour

t = Time period

n = Lag length

$u_{it}$  = The stochastic or composite error term

$\Delta$  = The difference operator

$$\Omega_{1j} - \Omega_{4j}, \sigma_1 - \sigma_4, \alpha, \beta \text{ are the coefficients of the concerned variables}$$

$$A \text{ - priori expectation: } \Omega_{1j} - \Omega_{4j} > 0, \sigma_1 - \sigma_4 > 0$$

## 3.2. Description of variables

### 3.2.1. Dependent variable

ROA = Return on Assets, which is used to proxy firm performance. It is computed as the ratio of profit-after-tax to total assets.

$$\frac{\text{Profit After Tax}}{\text{Total Assets}} \times 100$$

ROA was selected as the dependent variable in this study because it is an important indicator of a company's financial performance, particularly in the food and beverage industry. ROA has been used in several studies to proxy firm performance (Msomi *et al.*, 2023; Sharma *et al.*, 2018; Eitokpa, 2015; Matar & Eneizan, 2018; Batchimeg, 2017).

### 3.2.2. Independent variables

These variables are the firms' financial performance determinants and are described in Table 1 below. A thorough review of the literature guided the selection of both the dependent and

independent indicators as explanatory factors. The variables selected and listed below have been suggested to impact the return on assets (ROA) of food and beverage companies.

**Table 1: Variables with their descriptions**

Variables	Description
Capital (K)	This would be proxied by Working Capital: $\frac{\text{Current Assets}}{\text{Current Liabilities}} \times 100$
Labour (L)	Labour ratio would be used as its proxy $\frac{\text{Personnel Costs}}{\text{Total Assets}}$
Debt Ratio (DR)	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$
Cash Conversion Cycle (CCC)	$\text{Account Receivable Days} + \text{Inventory Days} - \text{Accounts Payable Days}$
Leverage (LV)	$\text{Ratio of Total Debt to Total Assets}$ (introduced as a control variable)

This study analyses the relationship between these firm-specific factors and return on assets (ROA).

### 3.3. Estimating technique

Following Rafindadi and Yosuf (2013), Mohaddes and Raissi (2014), this study adopts the Panel Autoregressive Distributed Lag (P-ARDL) model of Chudik and Pesaran (2013) to determine those factors that determine firms' financial performance in the South African Food and Beverages sector. This estimating technique was chosen and considered suitable for this study's data analysis because it provides a more detailed outcome than other traditional techniques and produces dependable results helpful in creating short- and long-term data relationships (Sulaiman, Baharin and Al-Hadi, 2018).

### 3.4. Regression results

#### 3.4.1. ARDL unit roots test result

**Table 2: Unit root test result**

Variable	ADF		Philip Perron	
	P-Value	Level	P-Value	Level
ROA	0.0000	I(0)	0.0000	I(0)
CCC	0.0000	I(0)	0.0000	I(0)
DR	0.0000	I(0)	0.0000	I(1)
LV	0.0000	I(0)	0.0003	I(0)
K	0.0000	I(1)	0.0000	I(1)
L	0.0000	I(1)	0.0064	I(1)

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library.

Note: ROA = return on assets

CCC = Cash conversion cycle

DR = Debt ratio

LV = Leverage

K = Capital

L = Labour

Table 2 shows that while return on assets, Cash conversion cycle, Debt ratio and leverage are stationary in levels, i.e., I(0), the other variables, Capital and Labour, are integrated of order one, i.e., I(1). Also, none of the variables is I(2), which satisfies the Pesaran *et al.* (2001) condition for testing and running an ARDL model.

### 3.4.2. Summary statistics

This section describes the properties of the variables in the model, ranging from the mean, median, maximum, minimum, standard deviation, skewness and Kurtosis.

**Table 3: Summary statistics**

	ROA	LV	L	K	DR	CCC
Mean	13.72350	0.376220	8.620906	1.797598	41.43083	72.15053
Median	12.99500	0.380000	0.000000	1.710000	42.30500	39.92725
Maximum	50.10000	1.050000	37.46000	7.010000	89.11000	26896.87
Minimum	-19.71000	0.000000	0.000000	0.000000	0.000000	-16955.31
Std. Dev.	8.232861	0.171206	10.83757	0.848298	15.52488	2112.920
Skewness	0.320486	0.018170	0.783598	1.944042	-0.425711	6.000367
Kurtosis	5.126126	3.934513	2.193632	12.37068	4.018740	120.1914
Jarque-Bera	52.18914	9.256552	32.87535	1089.309	18.65577	146873.9
Probability	0.000000	0.009772	0.000000	0.000000	0.000089	0.000000
Sum	3485.770	95.56000	2189.710	456.5900	10523.43	18326.23
Sum Sq. Dev.	17148.34	7.415772	29715.61	182.0612	60978.56	1.13E+09
Observations	254	254	254	254	254	254

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

From Table 3, the independent variable in this analysis is Return on Assets (ROA), whose mean value is 13.72 with a maximum value of 50.10. In contrast, the minimum value is as low as -19.71, with a standard deviation of 8.23. Since the value of our standard deviation in this result is closer to the minimum than the maximum, there is a clear indication that ROA is low in the sector, and the outcome of this result conforms with a-priori expectation. However, the reliability of this result is subject to further empirical investigation.

All the explanatory variables, that is, leverage (LV), labour (L), Capital (K), debt ratio (DR) and cash conversion cycle (CCC), follow the same trend. The minimum values of all these variables are low when compared with their maximum values and appear closer to both the mean and standard deviation values. Hence, these results imply that all these variables are fundamentally low in the food and beverage sector in South Africa; therefore,  $H_1$  is accepted. This denotes that these variables do not significantly determine firms' financial performance, proxied by ROA.

### 3.4.3. Bounds test

**Table 4: Bounds test**

F-Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.341667	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

The computed F-statistic of 4.34 in Table 4 is higher than the upper bound value of 4.15 at the 1% level. Therefore, the null hypothesis of no cointegration is rejected, implying the long-run cointegration relationship among the variables. This implies a long-run relationship among return on assets, cash conversion cycle, debt ratio, leverage, capital and labour.

### 3.4.4. ARDL Long-run regression result

**Table 5: ARDL Long-run regression result**

ARDL Long Run Form				
Dependent Variable: D(ROA)				
Selected Model: ARDL(2, 0, 1, 1, 1, 0)				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.980008	1.564512	1.265576	0.2069
ROA(-1)*	-0.305641	0.056629	-5.397298	0.0000
LV**	2.809643	6.405821	0.438608	0.6613
L(-1)	0.028530	0.038534	0.740390	0.4598
K(-1)	0.425879	0.535694	0.795004	0.4274

DR(-1)	0.001740	0.068830	0.025280	0.9799
CCC**	1.12E-05	0.000180	0.062014	0.9506
D(ROA(-1))	-0.185350	0.061580	-3.009877	0.0029
D(L)	0.208208	0.073453	2.834575	0.0050
D(K)	2.160036	0.664371	3.251250	0.0013
D(DR)	0.083552	0.076163	1.097017	0.2737

\* p-value incompatible with t-bounds distribution.  
\*\* Variable interpreted as  $Z = Z(-1) + D(Z)$ .

Levels Equation

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LV	9.192618	20.57757	0.446730	0.6555
L	0.093345	0.123574	0.755378	0.4508
K	1.393396	1.722019	0.809164	0.4192
DR	0.005693	0.225374	0.025260	0.9799
CCC	3.65E-05	0.000589	0.062024	0.9506
C	6.478210	4.979527	1.300969	0.1945

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

### 3.4.5 ARDL Short-run regression result

**Table 6: ARDL Short-run regression result**

Dependent Variable: ROA				
Method: ARDL				
Selected Model: ARDL(2, 0, 1, 1, 1, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ROA(-1)	0.509009	0.061824	8.233191	0.0000
ROA(-2)	0.185350	0.061580	3.009877	0.0029
LV	2.809643	6.405821	0.438608	0.6613
L	0.208208	0.073453	2.834575	0.0050
L(-1)	-0.179677	0.074292	-2.418532	0.0163
K	2.160036	0.664371	3.251250	0.0013
K(-1)	-1.734157	0.655799	-2.644343	0.0087
DR	0.083552	0.076163	1.097017	0.2737
DR(-1)	-0.081812	0.039713	-2.060077	0.0405
CCC	1.12E-05	0.000180	0.062014	0.9506
C	1.980008	1.564512	1.265576	0.2069
R-squared	0.485113	Mean dependent var		13.68361
Adjusted R-squared	0.463748	S.D. dependent var		8.253011
S.E. of regression	6.043614	Akaike info criterion		6.478551
Sum squared resid	8802.591	Schwarz criterion		6.632613
Log-likelihood	-805.2974	Hannan-Quinn criteria.		6.540542
F-statistic	22.70638	Durbin-Watson stat		2.021703
Prob(F-statistic)	0.000000			

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

The estimation result indicates that the positive sign of the coefficient reflects a positive relationship with firms' financial performance and thus conforms to the a-priori expectation. Also, labour and capital are the only statistically significant factors in determining firms' financial performance in the long run. The regression result reveals that leverage, the control variable depicted above, is an insignificant but positive factor in determining firms' financial performance. This implies that an increase in leverage will lead to an increase in ROA, but leverage is not a significant determinant of firms' financial performance.

It is also observed that labour with a coefficient value of 0.21 is significant at 1%. This could be interpreted as labour being a positively significant determinant of firms' financial performance in the South African food and beverage sector.

The regression result also reveals that capital is significant at 1%. This means that capital is a positively significant determinant of firm performance and that for every one percent (1%) increase in capital, the ROA of the firms will increase by 216%.

The study's findings also reveal that the debt ratio with a positive coefficient value of 0.084 has a positive but insignificant relationship with firms' financial performance. This implies that a 1% increase in debt ratio will cause firms' financial performance to increase by 8.4%. However, this relationship is not significant as the debt ratio is found to be an insignificant determinant of firms' financial performance.

It is also observed that the cash conversion cycle (CCC) with the coefficient of 1.12E-05 has a positive but insignificant relationship with the ROA. This implies that the cash conversion cycle should not be considered a critical determinant when considering factors that can influence the financial performance of the firms.

In the short run, as shown in Table 6, all the variables are statistically significant except for leverage, debt ratio and cash conversion cycle. Again, it is noted that labour, capital and debt ratios exhibited an inverse relationship with firms' financial performance in the previous year (lag). The R-squared ( $R^2$ ) measures the power of the independent variables on the dependent variable. In this case, the  $R^2$  of 0.49 depicts the proportion of variations in the financial performance of the South African food and beverages industry that the independent variables can explain. This implies that 49% of the total variation in ROA was caused by leverage, labour, capital, debt ratio, and cash conversion cycle, while other variables outside the explanatory variables caused 51%.

The adjusted  $R^2$ , a more conservative method of viewing the coefficient of determination, is similarly less than 50%, at 0.46, implying that only 46% of the variations in the dependent variable are explained by the independent variables. This indicates that leverage, labour, capital, debt ratio and cash conversion cycle are not the significant determinants of Return on Assets (ROA) of the 11 selected firms operating in the South African Food and Beverage sector, as other factors determine 54%.

Also, the F-statistics have a probability value of 0.00, indicating that the regression analysis is valid, appropriate and reliable for examining the factors determining firms' financial performance in the sector under consideration.

The Durbin-Watson test at 2.02 confirms the absence of autocorrelation.

### 3.4.6. Error correction regression

**Table 7: Error correction regression**

ARDL Error Correction Regression				
Dependent Variable: D(ROA)				
Selected Model: ARDL(2, 0, 1, 1, 1, 0)				
ECM Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROA(-1))	-0.185350	0.060073	-3.085403	0.0023
D(L)	0.208208	0.070049	2.972294	0.0033
D(K)	2.160036	0.592433	3.646045	0.0003
D(DR)	0.083552	0.036984	2.259127	0.0248
CointEq(-1)*	-0.305641	0.054764	-5.581067	0.0000

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

As presented in Table 7, the negative sign of the ECM coefficient shows that disequilibrium exists in the short run, and it is being corrected by the system, which will bring about convergence at the speed of 31%. The ECM value of -0.31 indicates a relatively slow speed of adjustment from the short-run deviation to the long-run equilibrium. In addition, the error correction term is statistically significant at a 1% significance level.

### 3.4.7. Serial correlation LM test

**Table 8: Serial correlation LM test**

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.274641	Prob. F(2,239)	0.7601
Obs*R-squared	0.577832	Prob. Chi-Square(2)	0.7491

Source: Authors' computation using E-Views 9, based on data obtained from IRESS Library

The p-values of the Breusch-Godfrey serial correlation test in Table 8 are insignificant at 5%, implying that the variables in the models are not serially correlated. Since it is statistically significant, the null hypothesis of no serial correlation is rejected, and it is concluded that the model is serially correlated.

### 3.4.8. Wald test

**Table 9: Wald test**

Wald Test: Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	33.49933	(6, 241)	0.0000
Chi-square	200.9960	6	0.0000

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=0

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

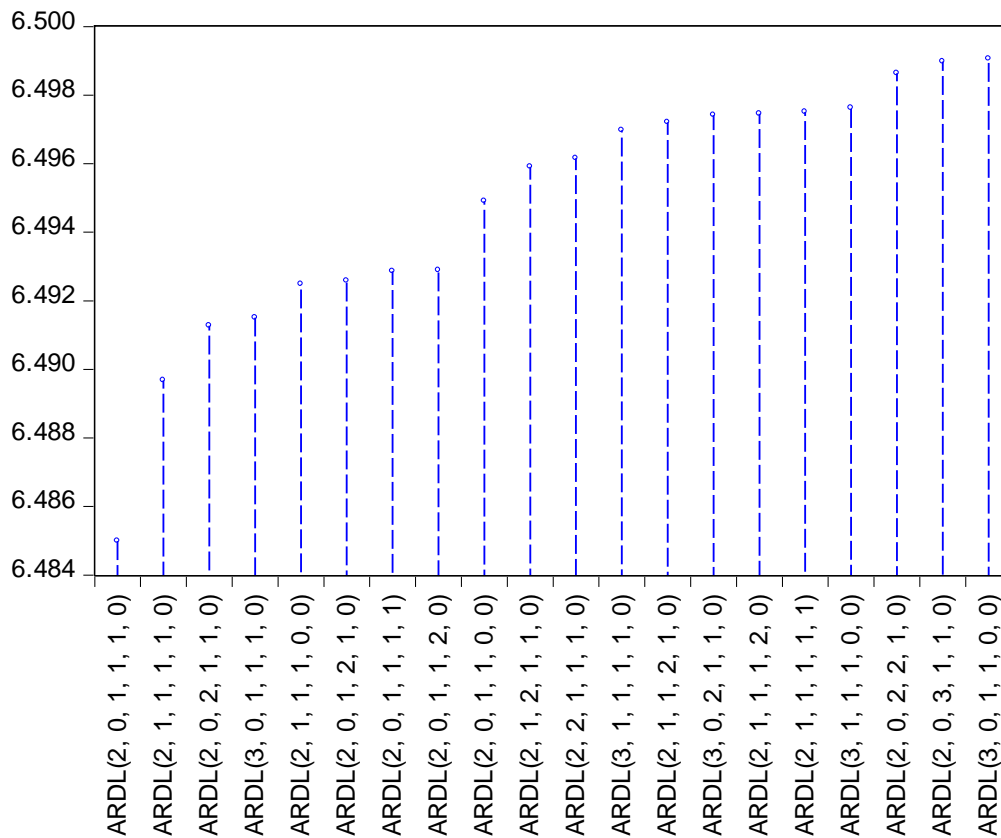
Table 9 shows a probability value of less than 0.05. Therefore, the study rejects the null hypothesis of no cointegration and fails to reject the alternative hypothesis that a long-run cointegration relationship exists among the variables in the model. The F-statistic value of 33.49933 is larger than the upper band of Pesaran's critical value of 4.09 at the 5% level (Refer to Pesaran and Pesaran, 1997:478). This is an indication of cointegration. A significant and positive value of the F-statistical value indicates that a long-run cointegration relationship exists between the variables in the model.

### 3.4.9. Akaike Information Criteria

As depicted in Figure 1, the first ARDL (2, 0, 1, 1, 1, 0) model appears to be most preferred over the others since it gives the lowest (most negative) value of the Akaike Information Criterion while the ARDL (2, 1, 1, 1, 1, 0) model will be preferred next.

**Figure 1: Akaike information criteria**

Akaike Information Criteria (top 20 models)

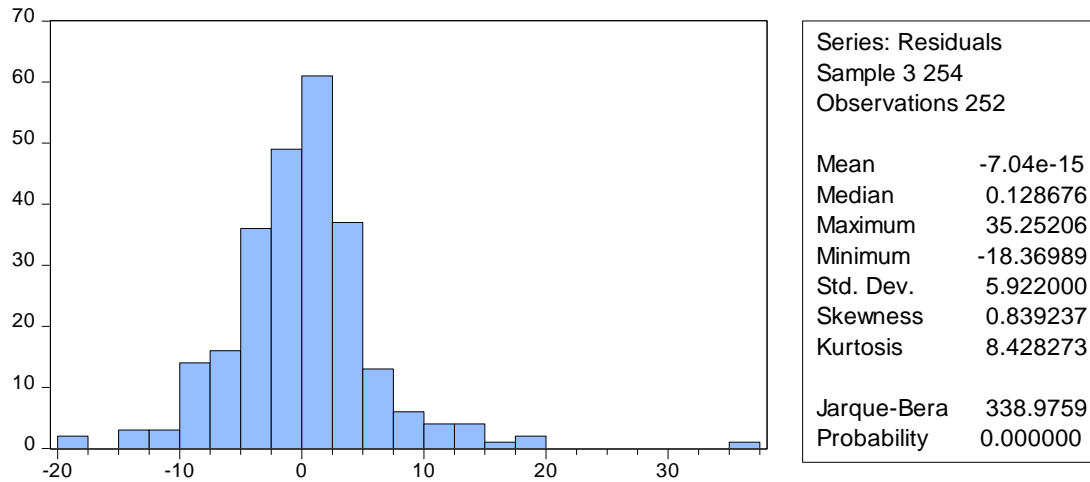


Source: Computer analysis using EViews 9, based on data obtained from IRESS Library

### 3.4.10. Histogram

The Kurtosis of 8.43 in Figure 2 is considered normal, hence its acceptance as normal height. The Jarque-Bera (JB) is a further normality test that combines the values of Kurtosis and Skewness. The standard is that if the JB value is < 5.99, it indicates normality; hence, the  $H_0$  should not be rejected. However, if the JB value is > 5.99, there is no normality; hence, the null hypothesis ( $H_0$ ) is rejected. With the JB value of 338.9759, it is concluded that there is normality; hence, we do not reject  $H_0$ .

Figure 2: Histogram



Source: Computer analysis using EViews 9, based on data obtained from IRESS Library

### 3.4.11. Heteroskedasticity Test

Heteroskedasticity often occurs due to non-normality in the distribution of variables. The test is often carried out to check the normality of residuals in the result.

Table 10: Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.121601	Prob. F(10,241)	0.3465
Obs*R-squared	11.20640	Prob. Chi-Square(10)	0.3417
Scaled explained SS	38.06774	Prob. Chi-Square(10)	0.0000

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

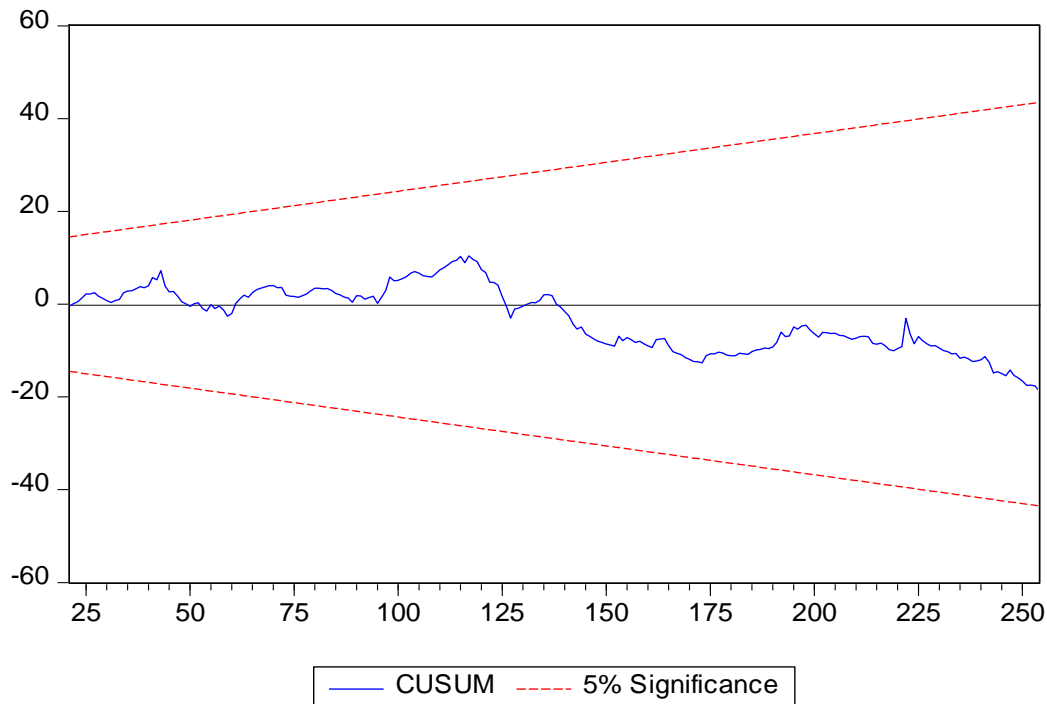
The test of heteroskedasticity for the model, as presented in Table 10, shows that the model is free from heteroskedasticity.

### 3.4.12. Stability Test

#### CUSUM

The graph, as depicted in Figure 3, shows the CUSUM test for the model. The results indicate the coefficients' stability since the CUSUM plot falls within the critical bands of the 5% confidence interval. Based on this, it is interpreted that the model is stable.

Figure 3: CUSUM test



Source: Computer analysis using EViews 9, based on data obtained from IRESS Library

### 3.4.13. Correlation Matrix

This is often carried out to explain the level of relationship among the variables under consideration. It helps to highlight the existence of a high relationship among variables, which amounts to multicollinearity.

Table 11: Correlation matrix

	ROA	LV	L	K	DR	CCC
ROA	1.000000					
LV	0.242103	1.000000				
L	0.233257	0.109289	1.000000			
K	0.150716	-0.221394	0.166838	1.000000		
DR	0.222191	0.923550	0.147579	-0.099879	1.000000	
CCC	0.015652	-0.004602	-0.008154	0.025948	0.001795	1.000000

Source: Authors' computation using EViews 9, based on data obtained from IRESS Library

While it is observed that the variables exhibit various forms of association with one another, as shown in Table 11 above, of particular interest to this study is the relationship between Return on Assets (ROA), being the dependent variable and all the explanatory variables, namely Leverage (LV), Labour (L), Capital (K), Debt ratio (DR) and Cash conversion cycle (CCC). ROA positively but weakly correlates with all the explanatory variables. This clearly indicates that the model is free from the problem of multicollinearity. However, this correlation matrix is not a basis for generalising the relationship between ROA and the various determinants of firms' financial performance. This is because the correlation matrix merely shows the degree of association between the dependent and independent variables.

## 4. Discussion of research findings

This section will discuss this study's findings, and a comparison will be made with the findings of past studies.

**Hypothesis:** To examine factors that determine firms' financial performance.

$H_0$ : There is no significant relationship between debt ratio, cash conversion cycle, leverage, capital, labour and firms' financial performance.

$H_1$ : There is a significant relationship between debt ratio, cash conversion cycle, leverage, capital, labour and firms' financial performance.

It is observed that labour has a positive significant impact on ROA in the long run and the short run. This implies that an increase in personnel costs and seeing more to the welfare of staff will lead to an increase in ROA in a significant way, both in the long run and in the short run. Consequently, it can be stated that labour is a significant determinant of firms' financial performance in the sector under review. The study, therefore, rejects the null hypothesis ( $H_0$ ), which states that there is no significant relationship between labour and firms' financial performance. The result from this study is supported by Waititu, Kihara and Senaji (2017), who found that employee welfare measures increase the productivity of firms and promote motivation and healthy organisational relations, thereby maintaining industrial peace and retaining the employees for a longer duration. The study further posited that welfare facilities are essential for the firm's health since they are closely connected with the labour force's productivity. All these will contribute to a healthier financial status of the firms. This result, however, contradicts Kruse (1992), who reported a negative insignificant impact of labour on ROA.

Capital is also observed to have a positive significant impact on ROA. This implies that an increase in working capital will lead to a significant increase in ROA. This forms the basis for rejecting the null hypothesis ( $H_0$ ), which presumes that capital has no significant relationship with firm performance. This increase will ensure that the firms are liquid enough to meet financial obligations as and when due to not negatively affect financial performance. Capital is, therefore, said to be a strong determinant of firms' financial performance. This regression result is consistent with Eitokpa's (2015) and Zahra and Azam (2012) findings. However, this result negates Abang's (2012) and Qasim and Ramiz (2011) findings.

It is observed from the regression results that leverage, which is introduced as a control variable in this study, is a positive but insignificant factor in determining firms' financial performance. This implies that an increase in leverage will lead to an increase in ROA, but leverage is not a significant determinant of firms' financial performance. This could result from the fact that the less efficient firms use more leverage (less equity) than other firms. This makes this study accept the null hypothesis ( $H_0$ ), which states that no significant relationship exists between leverage and firms' financial performance. This result is consistent with the findings of Laurent (2000) and Abuzayed (2012) but negates the findings of Eitokpa (2015) and Ahmad, Malik, Nadeem and Hamad (2014), who found a negative significant impact of leverage on firm performance.

The study's findings also reveal that the debt ratio has a positive but insignificant relationship with ROA. This implies that an increase in debt ratio will cause firms' financial performance to increase. However, this relationship is not significant. Therefore, this study accepts the null hypothesis ( $H_0$ ), which states no significant relationship exists between debt ratio and firms' financial performance. The debt ratio is an insignificant determinant of firms' financial performance in the South African food and beverages sector. This outcome supports the findings of Abubakar (2015) but contradicts the findings of Muscettola and Naccarato (2016) and Kebewar (2013), who found a negative relationship between the two variables.

The expectation is that debt should increase the financial performance of a firm. If the reverse is the case, then it could be that the firms have engaged in unprofitable ventures by employing debt as an extra way of raising funds without comparing the cost of capital with the investment. Firms should only embark on profitable projects; otherwise, all benefits would accrue to the lenders of capital.

It is also observed that the cash conversion cycle (CCC) has a positive but insignificant relationship with ROA. This implies that an increase in CCC will lead to an increase in ROA. However, the cash conversion cycle should not be considered a critical determinant of the financial performance of the firms. Based on this result, the study accepts the null hypothesis ( $H_0$ ), which states no significant relationship exists between the cash conversion cycle and firms' financial performance. This result is consistent with the findings of Zakari and Saidu (2016) but negates the findings of Sugathadasa (2018), who found that the cash conversion cycle is negatively related to firm performance.

## 5. Conclusion, limitation and future research direction

The study concludes that labour and capital are statistically significant determinants of financial performance in the food and beverage sector in South Africa. The findings have practical implications for managers and stakeholders in the sector, as they highlight the importance of investing in labour and capital to improve financial performance. From a scientific point of view, the study contributes to the literature on the determinants of financial performance and provides empirical evidence on the factors that influence financial performance in the food and beverage sector in South Africa. The study has some limitations, such as the small sample size and the focus on a specific sector, which

provide opportunities for future research. It is recommended that future studies investigate the determinants of financial performance in other sectors and compare the results with those of this study. It is also recommended that managers in the food and beverage sector in South Africa should channel more efforts towards employee training, learning and development, feedback solicitation from workers/staff, and employee appreciation and reward. They should also ensure an improvement in their companies' working capital to guarantee they can meet financial obligations, keep operations running smoothly and maintain a consistent production flow. Additionally, future studies could use a larger sample size and a more extended time period to provide more robust results.

## Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Not applicable.

### Availability of data and material

The data are available on request.

### Competing interests

The authors declare no conflict of interest or competing interests.

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