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Applying the logistic regression to the effect of the Profitability ratio on the quality of financial reporting in the stock exchange for the Period 2016-2022

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ABSTRACT: This study aims to determine the effect of profit margin on the quality of financial reports using a binary logistic regression model. Therefore, in the study, an attempt was made to provide a conceptual aspect for each of the profitability ratio and quality of financial reports applicable aspects using the model.

The study was obtained based on purposeful sampling. This is the audited financial list of (11) companies in the manufacturing sector out of (28) companies registered on the Iraqi Stock Exchange for the period (2016-2022). In the study, the quality of financial reports in manufacturing firms is used as the dependent variable. against profitability ratio as the independent variables, where each (gross profit margin, net profit margin, return on assets, and return on equity) was used as a measure of profitability ratio.

The results of the analysis of this study show that the variable (return on assets) has a weak relationship with the quality of financial reports, which is the dependent variable. Since the dependent variable is influenced by the independent variable by 22.8%, and the model that has been constructed has proved a significant test and has a correct classification ability of 66.2%

Keywords: logistic regression, Wald Test, Maximum likelihood method, Profitability ratio, Quality of Financial Reporting.

1 INTRODUCTION

The manufacturing sector is considered one of the most important sectors in Iraq, it plays a major role in the country's economic development. Therefore, efforts have been made to develop this sector since the fall of the previous regime. It is a source of increased employment opportunities and increased national income. Therefore, to understand this development, the profit margins of companies should be properly shown in their financial statements. This is important because one of the important objectives of preparing and presenting financial lists to managers and users is to familiarize them with the established financial situation and encourage them to provide the best skills and decision-making [1]. Therefore, the term profit margin in institutions is meant to maintain the profits made year after year. Because a percentage of the revenue that companies earn is profit. This profit contributes to improving individual lives, but on the other hand, the lack of profit causes failure, which has a terrible negative impact on economic growth [2]. Managers, investors, and users of financial listings have a plethora of criteria they use to determine profit margins in companies [3]. Therefore, these ratios are tools for determining the profit margin using the numbers in the financial statements. The most important of these are return on assets (ROA), net profit margin (NPM), return on equity (ROE), and gross profit margin (GPM) [4], [5] and [6]. Therefore, the profit margin of companies is considered one of the most common ways to achieve the planned goal within a certain time for the company to achieve [7]. Because the financial listings provided by accountants reflect past events that have occurred. However, they also indicate the most important events and can predict the future of companies [8]. Therefore, a high profit margin indicates that the institution is managing its available resources correctly and efficiently in order to achieve the targeted amount of profit [9].

Therefore, the quality of financial reporting plays an important role in the development of institutions. Because financial reports will affect decision-making if they are not provided with quality financial reports. This leads to imbalances, a lack of transparency, and reduced confidence of users of financial lists, which directly affects the profitability of the institution [10]. The [11] study defines the quality of financial reports as “financial reporting is the quality of complete and transparent financial information that is not designed to obscure or mislead users." Therefore, if the quality of financial reporting is to achieve its objective, financial reporting must serve two important objectives: to provide the financial information needs of users while protecting the information of investors. Because the accuracy of the rates derived from the financial statements depends on the quality of the financial reports. That can affect share prices and net income and affect stock market behavior [12]. Therefore, one of the most important tasks of presenting financial statements is to present information about the company but also to identify weaknesses to the board of directors in order to hold accountable the causes of these weaknesses and resolve them as soon as possible [1]. Therefore, finally, transparency and high quality in the financial reporting of manufacturing companies should be implemented [13]. In order to take steps to develop all sectors.

The purpose of using logistic regression in the study was that the dependent variable consisting of the quality of financial reports varies continuously in linear regression, but at the same time in logistic regression can be ranked among them. This is in addition; to other methods, linear regression has more than one hypothesis that must be used. However, when using a logistic regression model, the researcher can choose the hypothesis he intends to use.

1.1 Research problem

Financial lists are one of the most important tools relied upon by investors operating in the financial markets in order to assess the financial condition of the company. The profit margin is one of the aspects shown in the financial statements. The study focuses on the relationship between profit margin and the quality of financial reports. It involves how quality and profitability are demonstrated in manufacturing companies, which has a strong impact on the decision-making process of investors in financial institutions.

According to the financial lists of production companies published on the Iraqi Stock Exchange. There is strong evidence that the quality of financial reporting is substandard. In particular, the point is felt that companies have not been held accountable in an imposed manner for the time and date of submission of their financial lists to the relevant authorities. This is a major problem for researchers in this field because the time is not taken into account in the reports, and the general framework in which financial reports are presented is not compatible with today's developments. On the other hand, there is a sense of playing with results in terms of profits and assets owned by institutions that do not meet accounting standards.

1.2 Research objective

The main objective of this research is to build a statistical model to determine the impact of profit ratio on the quality of financial reports using the logistic regression model, in addition to other existing methods and models, on industrial companies listed on the Iraq Stock Exchange for the period (2016-2022).

1.3 Importance of research

The variables used in the study demonstrate the importance of this study, along with the solutions that are proposed to address the research problem. Thus, the importance of the study that focuses on analyzing the quality of financial statements of manufacturing companies listed on the Iraqi Stock Exchange, with the identification of the variables that most affect the quality of manufacturing firms’ financial reports.

The overall structure of this paper is divided into five sections. The first part is a brief introduction and presents the problems and objectives of the research. With that, Section 2 shows a literature review on the profitability and quality of financial reports using logistic regression. Section 3 describes the methodology followed in the study. In the pre-final section, the analysis and interpretation of the results are presented. In the final section, which is the fifth section, the results of the study are discussed.

2 Literature Review:

2.1 Profitability ratios

The emergence of any institution is aimed at increasing the amount of profit, whether it is spiritual or material. It is up to the institution's management policy [14]. Therefore, profitability is one of the tools that can help the board of directors and stakeholders determine how successful the policy followed in the management of the institution is [9]. Therefore, the profit margin is used as a measure of how efficiently the company uses the assets it owns to generate net income. This income works on the company's shareholders' equity. Or, on the other hand, the efficiency of the institution

is measured by the amount of profit it has made, which is part of the implementation of the plans [15] & [16]. This shows that in the business working environment, profitability counts as a measure of the success of an institution to practice optimal performance [17]. Profitability is vital to the success and growth of a business. Profitability ratios, such as return on assets and return on equity, are key indicators for decision-making and management functions [6]. Since the financial statements show events that have occurred within the entity. Therefore, the management of the assets and capital available tells us about the policy followed in the institution [8]. Therefore, the amount of profit in companies determines the policy, which is followed in the sale of total assets owned by the company. That is why profitability ratios, or the ratios used to express profitability, are important to managers and investors because they are an indicator of management efficiency [18].

Therefore, there is more than one indicator to measure and show the amount of profit in companies, just as gross profit margin, net profit margin, return on assets, and return on equity [19].

2.1.1 Gross Profit Margin

The company operates to make a profit. Therefore, the gross profit margin is considered one of the criteria by which the profit margin can be determined. Therefore, the higher the gross profit margin, the better the company's performance, which is an important factor in the company's success [20]. According to the study results [4], the higher the gross profit margin, the better. The lower the cost of the products is compared to the revenue, the better the sign. The percentage of gross profit from revenue from goods sold minus the total cost of goods sold is divided by revenue from goods sold by multiplying the result of the equation by 100%. where the formula for the gross profit rate is [21]:

$$\text{GPM} = \frac{\text{Net Revenue} - \text{Cost of Goods Sold}}{\text{Net revenue}} * 100 \qquad (1)$$

2.1.2 Net Profit Margin

The net profit margin can be shown by proportionately comparing net income to the total sales of the establishment. The higher the net profit margin ratio, the higher the income of the institution, because this indicates that the institution has earned better income [22]. Because this net profit ratio is based on a comparison between net income and total sales, the higher the net profit ratio, the more productive the company's performance, which builds investor confidence and leads to an increased investment process in the institution. Because the net profit margin shows the percentage of profit on a penny of sales [23]. To find the result of the net profit rate, we used this formula, which summarizes the net profit after taxes, divided by the income from the sale or provision of services [5].

$$\text{NPM} = \frac{\text{Net Income After Tax}}{\text{Revenue}} * 100 \qquad (2)$$

2.1.3 Return on Assets

Return on assets is considered by competitors to be one of the most important metrics to measure the profitability of an entity [7]. Therefore, return on assets is considered one of the most important ratios to measure the company's profitability because competitors and managers look at it [24]. This ratio is considered one of the measures that can be used to measure the ability of the manager of the institution to use the available assets efficiently to generate income [16]. The higher the net income from the assets owned by the institution, the more profit the institution will make from using those assets. This shows there is labor efficiency in the facility [2]. According to the study [25], the formula for return on assets is the summary division of income by the total assets owned by the company during a fiscal year. Thus, this formula is used.

$$\text{ROA} = \frac{\text{Net Income}}{\text{Average Total Assets}} \qquad (3)$$

2.1.4 Return on Equity

The change in stock price affects financial performance. Therefore, when a company has a good past and good performance, it will encourage investors to want to invest in the company because they know that this type of investment will benefit them. Therefore, the return on equity ratio reviews how well the company is managing the assets it owns. to determine the income eligible for the shares [26]. Therefore, the importance of return on equity (ROE) is evident when it determines how efficiently the company has used the capital available to generate net income over a given period [3]. Therefore, the higher this ratio, the better the company's capital management because it provides more income to shareholders. So more than one factor affects the return on equity (ROE). One factor that affects sales is the amount of

sales at the same cost or in exchange for reducing the cost of goods produced [27]. The following formula can be used to calculate return on equity in ratio units [28]:

$$ROE = \frac{Net\ Income}{Shareholders'\ Equity} \qquad (4)$$

2.2 Quality of Financial Reporting

According to the 2018 Quality Concepts Framework, financial reports are prepared with the aim of providing useful information to managers and users of financial reports [29]. Therefore, when companies submit financial statements, they are intended to show information about the company and the financial performance of the institution to the parties listed on the stock exchange. Because these parties must have full confidence in the quality of information in the financial statements shown to influence economic decisions, Therefore, the quality of financial reporting (FRQ) should be such that it provides transparency on the performance and financial position of the institution [11]. Therefore, these reports should clearly show the company's situation [30]. However, assessing the quality of financial reports has been one of the most difficult assessments for researchers in the last decade. A major problem with assessing and measuring this type of quality is that it is not simple [13]. Therefore, the criteria used to assess the quality of financial reports vary from place to place. Sometimes it even varies from city to city. So, the criteria used for this type of assessment depend on the researcher's choice of which of these criteria he uses to measure the quality of financial reports. Therefore, the criteria used in general to assess the quality of information provided by financial statements to managers and users of financial statements must be reliable, but the information must be properly related to the overall accounting process in the entity [31]. At the same time, the information must be understandable and comparable to data from competitors or previous years. In addition, such information must be provided in a timely and verifiable manner [29]. Therefore, the quality of the financial reports provided helps in the decision-making process in institutions, which leads to economic growth, which in some way affects society as a whole in the future [11]. Therefore, the information in the financial statements should reflect the economic phenomena occurring in the company. Once the information provided provides this reflection, it can also be of full benefit to stakeholders [32].

2.3 Concept of Logistic Regression Model

Logistic regression is a widely used technique for modelling binary response data. In binary responses, the outcomes are often represented as 1 and 0, where 1 typically denotes success and 0 represents failure. However, the specific meanings of 1 and 0 can vary depending on the study's objectives [33] In this study, 0 means that the financial report has poor quality, and 1 means that the financial report has good quality, Logistic regression models are commonly employed in statistics, data analysis, and research across various fields, including finance and economics. The primary goal of binary logistic regression is to identify a model that explains the relationship between the dependent variable (the characteristic of interest) and a set of independent variables (nary Torosyan). In this model, the relationship between variables is nonlinear when dealing with a binary dependent variable (y), which can take two possible values: either zero or one, corresponding to success with probability (p) or failure with probability (1-p), [34].

In the logistic regression model If we have one independent variable, we can write the model as follows [35]:

$$p(x) = E(Y/X) = \frac{e^{B_0+B_1x}}{1+e^{B_0+B_1x}} \qquad (5)$$

Where:

$E(Y/X)$: Represent the conditional mean of (Y) given x .
B_0 , B_1 : Are the parameters of the logistic regression models .

However, if we have more than one independent variable in a logistic regression model, suppose we have (k) independent variables, then it is indicated by the following mathematical equation

$$p(x) = E(Y/X) = \frac{e^{\beta_0+\beta_1x+\cdots+\beta_kx_k}}{1+e^{B_0+B_1x+\cdots+B_kx_k}} \qquad (6)$$

So far, this model is non-linear and a logit transformation is used to convert equation (3) to linear form, the equation for the logistic transformation function then becomes [36].

$$\frac{p}{1-p} = e^{\beta_0+\beta_1 X_1+\beta_2 X_2 \dots+\beta_k X_k} \qquad (7)$$

The p/(1-p) in equation (7) refers to the odds ratio of the event; by taking the natural logarithm of both sides, the equation is transformed into a linear equation and the below equation can be used to determine the relationship between variables. The logistic regression model is written as follows if we have more than one independent variable.

$$p(x) = \text{Log}\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots . + \beta_k x_k \qquad (8)$$

2.3.1 Estimation of Logistic Regression

To estimate the logistic regression parameters, the maximum likelihood method is used, which is considered a good method for linear and nonlinear models, The maximum likelihood method is considered to be an iterative method and relies on repeating the calculations several times until a good estimate of the parameters is reached Through which we can interpret and analyze the data [37].

Using the maximum likelihood method is one of the most convenient methods of estimation in statistics because it has many statistical features, instead of using the least squares method, which aims to reduce the squared error to the smallest level, as usual in the case of linear regression, Where the maximum likelihood estimation involves finding parameter values that maximize the likelihood function for a single observation, This method requires no conditions for the independent variables, i.e., a convenient way to estimate the independent variables whether they are nominal, ordinal, or categorical [34], So the mathematical formula for the maximum likelihood function in binary data is defined as follows: [35]

$$l(\beta) = \prod_{i=1}^{n} p_i^{yi} \ (1-p_i)^{1-yi} \qquad (9)$$

By taking the natural logarithm for both sides and simplifying it, we obtain equation No (10)

$$L(\beta) = \text{Ln}\big(l(\beta)\big) = \sum_{i=1}^{n} \{y_i \ \text{Ln}\ p_i + (1-y_i)\text{Ln}\ (1-p_i)\} \dots \dots \dots \dots (10)$$

To maximize the objective function for the parameters (β), we derive equation No. (10) for the parameters to be estimated and made it equal to zero, which results in several nonlinear equations that can only be solved by the iterative algorithm [38].

2.3.2 Parameters Test for Logistic Model

1. Wald Test: it is a measure of testing the statistical significance of each of the logistic regression coefficients, this statistic is calculated as:

$$w = \left(\frac{b}{S.E(b)}\right)^2 \qquad (11)$$

b: Represents the value of the logistic regression coefficient for the independent variables.

$S.E(b)$: It is the standard error value of the logistic regression coefficient for the independent variable
The statistical hypothesis for the model is as follows:
$H_0: b = 0$
$H_1: b \neq 0$

Each Wald statistic is compared with chi- chi-square distribution with one degree of freedom, If the value of the Wald statistic is statistically significant, meaning the $p - Value < 0.05$ we reject the null hypothesis that the logistic regression coefficient is not equal to zero, meaning the independent variable x affects the prediction of the dependent variable value

However, if the $p - Value > 0.05$ we accept the null hypothesis that the logistic regression coefficient is equal to zero [39].

2. Hosmer-Lemeshow test: is one of the tests used to determine the goodness of fit of a logistic regression model. It is to determine whether the observed incidence rates and predicted probabilities of incidence are the same The Hosmer-Lemeshow test is also used to determine whether the model represents the data well or not [35].

The formula for this test is:

$$H = \sum_{i=1}^{k} \frac{(O_i - n_i p_i)^2}{n_i p_i (1 - p_i)} \qquad (12)$$

Where:
n_i: Represent the total number of cases in the i^{th}group.
Oi: is the number of event outcomes in the i^{th}group
p_i: Represent the mean estimated probability in the i^{th}group

The hypothesis testing for the Hosmer-Lemeshow test is as follows:
H_0 : There are no significant differences between the observed and expected values.
H_1 : There are significant differences between the observed values and the expected values.

If the value of the Hosmer-Lemeshow test is greater than 0.05, then the model represents the data well, and thus we accept the null hypothesis that there is no difference between the observed values and the expected values
The test statistic asymptotically follows a chi-square distribution with n-2 degree of freedom.

2.3.3 The Coefficient of Determination R^2

In logistic regression, there are several statistics similar to R^2 that can be used to test the explanatory power of a relationship between the dependent variable and the independent variables by the two statistics Cox & Snell $\boldsymbol{R^2}$ and Nagelkerke $\boldsymbol{R^2}$ [40]. The Cox and Snell R^2 and Nagelkerke R^2 statistics provide the geometric mean squared improvement per observation, and take the formula:

$$R^2_{\text{Cox-Snell}} = 1 - \left(\frac{L_0}{L_1}\right)^{\frac{2}{n}} \qquad (13)$$

$$R^2_{\text{Nagelkerke}} = \frac{R^2_{\text{Cox-Snell}}}{1 - (L_0)^{\frac{2}{n}}} \qquad (14)$$

Where:
n: Represent the total number of observations.
L_0: Maximum likelihood function involving only one constant term.
L_1: Maximum likelihood function including all the independent variables.

If the model fits the data perfectly, the value should be 1, but the Cox-Snell R2 statistic does not take this value. The Nagelkerke R2 statistic adjusts the Cox-Snell R2 statistic to take the value of [36].

3 Research design

3.1 Data collection

We use logistic regression to ascertain how profit margins impact the quality of financial reports. It relies on manufacturing companies listed on the Iraqi Stock Exchange for the period (2016-2022). as indicated in Table 1. Audited financial statements were relied upon to obtain the study data. Of the companies listed on the stock exchange, only 11 had all the margins required in the study. By applying the logistic regression model, the effect of profit margin on the quality of financial reports for manufacturing companies in 2016-2022 can be determined. which is the independent variable for which the profitability ratio is measured (gross profit margin, net profitability ratio, return on assets, and return on equity). The dependent variable is the quality of financial reporting for the firms used in the study.

Table 1: Examples of manufacturing companies

No	Name of companies	Code Number
1	Modern Chemical Industries Company	IQ000A0Q21A5
2	National Chemical and Plastic Industries Company	IQ000A0M7T09
3	Al Khazer Road Company	IQ000A0M9DB4
4	Modern Sewing Company	IQ000A0M7T66
5	Baghdad Packaging Materials Manufacturing Company	IQ000A0M7TW0
6	Al Mansour Pharmaceutical Industries Company	IQ000A0M7TZ3
7	Al-Kindi Company for Veterinary Vaccines Production	IQ000A0M7T41
8	Iraqi Carpets and Furniture Company	IQ000A0M7T33
9	Ready-made clothing production company	IQ000A0M9C89
10	Baghdad Soft Drinks Company	IQ000A0M7TT6
11	Al-Iraqiya Engineering Works	IQ000A0M7TX8

3.2 Measure of variables

3.2.1 Independent variables

The profitability ratio is used as the independent variable in the study. Therefore, profitability is considered one of the most important criteria for evaluating the ability of manufacturing companies. Because all institutions aim to make a good amount of profit, for the sake of profit, and development always strives to improve its performance. Therefore, in this study, not only the profit margin was used but also each of the measures (gross profit margin, net profit margin, return on assets, return on capital) mentioned in Section 2, which is considered one of the most important measures. To identify these measures for the independent variable, rely on studies of each [2], [20], and [21].

3.2.2 Dependent variables

The study used the quality of financial reports as the independent variable for manufacturing companies in Iraq over seven years. Therefore, the quality of financial reports is considered one of the most difficult financial evaluations in the accounting profession because the evaluation and measurement of financial reports is not a standard basis for this type of evaluation, but it depends on researchers. Therefore, there are many differences in the criteria used from one place to another. So, the researcher says the criteria used in this study are the most important (transparency, relevance, reliability, timeliness, verifiability, and understandability). So, the criteria generally used to assess the quality of information provided by financial statements to managers and users of financial statements should be replaced by trusts. Still, the information must be properly linked to the accounting process in the entity. According to researchers [31], [41], and [30].

3.3 Data Description

QFR: Quality of Financial Reporting (Dependent variables).
GPM: Gross profit margin (Independent variables).
NPM: Net profit margin (Independent variables).
ROA: Return on Assets (Independent variables).
ROE: Return on Equity (Independent variables).

4 Data Analyses and Results

The research data represented data from 11 companies from different sectors during the period (2016 - 2022), and the variables were represented as follows:

Table 2: Case Processing Summary

Unweighted Cases [a]		N	Percent
Selected Cases	Included in Analysis	77	100.0
	Missing Cases	0	.0
	Total	77	100.0
Unselected Cases		0	.0

Total	77	100.0

a- If weight is in effect, see the classification table for the total number of cases.
b- Table 1 shows the data entered for analysis, which is 77 cases with zero missing cases

Table 3: Dependent Variable Encoding

Original Value	Internal Value
Poor Quality	0
Good Quality	1

Table 3 shows the coding plot for the dependent variable values. A code of 0 indicates that the annual financial reports of manufacturing firms in Iraq are of poor quality. In contrast, a code of 1 indicates that the annual financial reports of manufacturing firms in Iraq are of good quality.

Table 4: Iteration History a,b,c,d

Iteration		-2 Log likelihood	Coefficients				
			Constant	GPM	NPM	ROA	ROE
Step 1	1	92.790	-.490	.136	-.339	.323	-17.217
	2	92.277	-.549	.142	-.468	.397	-21.295
	3	92.196	-.551	.126	-.570	.409	-21.789
	4	92.179	-.550	.114	-.642	.414	-21.939
	5	92.179	-.550	.111	-.657	.415	-21.978
	6	92.179	-.550	.111	-.657	.415	-21.979
	7	92.179	-.550	.111	-.657	.415	-21.979

a. Method: Enter
b. Constant is included in the model.
c. Initial -2 Log Likelihood: 106.628
d. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

The results of Table 4 show the value of the number of iterations required to obtain the minimum negative value of twice the logarithm of the maximum likelihood function (-2 Likelihood), which was reached at the time of the seventh iteration with a value of (92.179). Starting with a model that included only fixed terms, this value was (106.628). The process stopped after the seventh iteration because the changes in parameter values were less than 0.001. Therefore, the parameter values obtained at this point are considered to be the best estimates.

Table 5: Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step1	Step	14.449	4	.006
	Block	14.449	4	.006
	Model	14.449	4	.006

Table 5 shows the chi-square parameter value for the model. That results in 14.449, with 4 degrees of freedom and a significance level of 0.006, which is less than 0.05, i.e., significant. and therefore, the model used in the study fits the data.
Accordingly, Table 5 shows the results of the maximum likelihood ratio test, based on a chi-square distribution and with a degree of freedom equal to the number of independent variables, with efficiency with the overall quality of the model. The formula for this test is as follows: [33]

$$x^2 = 2\,(\log L_0 - \log L_1) \qquad (15)$$

Where**:**
L_1 : The value of the maximum likelihood function that contains only the constant term
L_0: The value of the maximum likelihood function that contains all variables

$$x^2 = 106.628 - 92.179 = 14.449$$

Table 6: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	92.179a	.171	.228

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 6 presents the Model Summary, which provides key statistics to evaluate the logistic regression model's fit. The -2 Log likelihood value of 92.179 indicates the goodness of fit of the model; lower values suggest a better fit to the data. The Cox & Snell R Square value of 0.171 and the Nagelkerke R Square value of 0.228 represent the proportion of variance explained by the model. While these values indicate that the model accounts for a modest portion of the variance, the Nagelkerke R Square is generally considered a more accurate measure, especially in logistic regression, as it adjusts for the maximum possible value.

Table 7: Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	7.863	8	.447

The Hosmer and Lemeshow Test in Table 7 assesses whether the predictions made by the logistic model align well with the observed group memberships, testing the null hypothesis that the model's predictions are a perfect fit. This test uses a chi-square statistic to compare the observed frequencies with those expected under the model. A nonsignificant chi-square result suggests a good fit between the model and the data.

In this case, the test produced a chi-square value of 7.863 with 8 degrees of freedom and a P-value greater than 0.05, this value indicates that we failed to reject the null hypothesis which means that the model fits the data well. Therefore, there is no significant difference between the observed frequencies and the model's predictions, the results of Table No. 8 confirm this at a 5% significance level.

Table 8: Contingency Table for Hosmer and Lemeshow Test

		QFR = Poor Quality		QFR = Good Quality		Total
		Observed	Expected	Observed	Expected	
Step1	1	6	6.580	2	1.420	8
	2	8	5.606	0	2.394	8
	3	5	5.140	3	2.860	8
	4	3	4.851	5	3.149	8
	5	5	4.744	3	3.256	8
	6	3	4.396	5	3.604	8
	7	5	3.850	3	4.150	8
	8	3	2.735	5	5.265	8
	9	2	1.624	6	6.376	8
	10	0	.474	5	4.526	5

Table 9: Classification

	Observed		Predicted		
			QFR		Percentage Correct
			Poor Quality	Good Quality	
Step1	QFR	Poor Quality	33	7	82.5
		Good Quality	19	18	48.6
	Overall Percentage				66.2

a. The cut value is .500

According to the result, Table No. 9 presents the accuracy of the test results based on the classification table. The correct classification rate was 66.2%, indicating that 51 cases were correctly classified, while 26 cases were misclassified.

Table 10: Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step1a	GPM	.111	.459	.058	1	.809	1.117
	NPM	-.657	.751	.767	1	.381	.518
	ROA	.415	.194	4.576	1	.032	1.515
	ROE	-21.979	13.723	2.565	1	.109	.000
	Constant	-.550	.328	2.810	1	.094	.577

a. Variable(s) entered on step 1: GPM, NPM, ROA, ROE.

In Table 10, Column 2 shows the results of the logistic regression parameters, and the estimated equation for the logistic regression model is as follows

$$p(x) = \text{Log}\left(\frac{p}{1-p}\right) = -0.550 + 0.111\text{GPM} - 0.657\text{NPM} + 0.415\text{ROA} - 21.979\text{ROE}$$

The results of Table 10 are shown in the fourth column, which represents the value of the Wald statistic that tests the unique contribution of each predictor to the model, which is formulated as:

$$\text{wald} = \left(\frac{b}{\text{S.E}(b)}\right)^2 \qquad (16)$$

It is distributed according to the chi-square distribution with one degree of freedom. The Wald statistic for the first variable is

$$\text{wald for } x_1 = \left(\frac{0.111}{0.459}\right)^2 = 0.058$$

And column 6 displays the probability values (P values) the contribution of each predictor is considered significant if the p-value is less than the 5% significance level,
Here the variable (return on assets) affects the quality of financial reporting. Because p values are less than 0.05, assuming a 95% confidence level; therefore, the null hypothesis is rejected.
The values in the seventh column (EXP(B)) represent the odds ratios associated with the independent variables gross profit margin, net profit margin, return on assets, and return on equity.
If the value of (EXP(B)) is greater than one, the odds ratio of the quality of financial reports increases. However, if the value of (EXP(B)) is less than one, any increase in the value of the independent variable leads to a decrease in the odds ratio of financial quality reports according to the formula

$$\text{EXP}(\beta_1) = \text{EXP}(0.111) = e^{0.111} = 1.117 = \text{Odds Ratio}$$

In the above formula we see, that the odds ratio for the Gross profit margin is greater than one, and therefore any change in the Gross profit margin by one unit will increase the financial quality reports.

5 Conclusion:

This study aimed to develop a logistic regression model to determine the effect of profit margin on financial reporting quality for the period 2016–2022. In a separate model for each year, the year with adequate financial reporting quality is distinguished from the year with inadequate reporting quality. Using the logistic regression method. The designed model considered two aspects of the independent and dependent variables, where the independent variable measured by profitability ratio (gross profit ratio, net profit ratio, and return on assets, return on assets) versus financial reporting quality was shown as the dependent variable. The results show that asset returns affect the quality of financial reporting. With improved reporting quality, the return on assets increased for the fiscal year. For return on assets, the beta value is equal to.415, with sig less than 0.05. This result also shows the importance of return on assets on the quality of financial reports. However, simultaneously, variables gross profit ratio, net profit ratio, return on equity, and their trailing value beta are equal to, .111 -.657, and -21.979 with sig greater than 0.05. This result shows that none of these variables affect the quality of financial reporting in manufacturing companies in Iraq.

In addition to the above results using binary logistic regression to classify observations, the result also presented in Table 9 is that the proportion of correct classification was 66.2%. In comparison, the proportion of incorrect classification was 33.8%. That is, this result indicates that 51 cases were correctly classified, while 26 cases were incorrectly classified.

Regarding the results of the hypothesis testing of the study, the Hosmer and Lemeshow tests were used. In the results presented in this case, the test produced a chi-square value of 7.863 with 8 degrees of freedom, and the Hosmer and Lemeshow significance level value was equal to (sig = 0.447), which is greater than (0.05). This value indicates that we have failed to reject the null hypothesis. We therefore accept the null hypothesis that the observed cases are equal to the predicted cases, which means that the model fits the data well. Therefore, there is no significant difference between the observed frequencies and the predictions of the model; the results confirm that for the goodness of fit of the model. At the same time, the results proved that the value of R squared Nagelkerke was 0.228. This result represents 22.8% of the proportion of variance explained by the logistic regression model. So, these values indicate that the model accounts for a fraction of these variations; the Naglkerke square R is generally considered a more accurate measure, especially in logistic regression, as it adjusts to the maximum possible value.

6 Recommendation

The results of the study highlight the factors that affect the quality of financial reporting of manufacturing companies on the Iraqi Stock Exchange. However, the study only targeted manufacturing firms, so it is recommended that other different sectors should be studied in future studies with increasing the duration of the studies and not limiting the study size to only one sector. Another suggestion is the need to add other variables such as capital structure and shareholders' equity to the research model to enhance the quality of financial reporting in order to reduce deficiencies in financial reporting.

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