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QUALITY AND REFLECTING OF FINANCIAL POSITION: AN ENTERPRISES MODEL THROUGH LOGISTIC REGRESSION AND NATURAL LOGARITHM

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ABSTRACT

The present study entitled "Quality and reflecting of financial position: an enterprises model through logistic regression and natural logarithm", determines the confirmatory effects of PRF analysis, to assess the position or condition of enterprises in the market. The business environment for enterprises shows the diversity of economic activity, but in one form or another they are interconnected, and their main purpose more specifically of the finance and accounting department, is to compile statements and financial reports (PRF) with reliable data where through them the enterprise looks at its financial position and orientation for better decision-making. The data of this research was based on primary and secondary data, such as interviews conducted in 100 enterprises and analysis of published PRFs. To achieve the purpose of the research from the interview and data, three categories of PRFs were used for testing the study hypothesis. Results from data processing in SPSS & R program, through tests and techniques within logistic regression and natural logarithm clearly show that there is an important relationship between the dependent variable and the independent ones and that large enterprises have a better financial position than small enterprises and the bankruptcy of small enterprises is greater.

Keywords: Statements and financial reports, logistic regression, natural logarithm, enterprise size, financial position.

JEL Classification: C1, M41, G14

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INTRODUCTION

The financial statements of enterprises through the financial data incorporated in the reports reflect their success or failure respectively in the financial position facing the competitive market. To understand correctly the financial situation of the enterprise from reports it is required to make a detailed financial analysis. Theoretical research emphasizes that if an investment made has an expected return on the enterprise's assets, is related to profitability or good financial position in the market, on the contrary, if we do not have an expected return from the investment then an enterprise results in a negative financial position in the market. Analytical research emphasizes that

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the profit analysis of the previous period of the enterprise is done for purposes that in addition to reflecting the financial position, to be able to predict success as accurately as possible or profitability for future periods. Accurate accounting information is useful for internal and external users of PRFs, as internal such as senior management, shareholders, employees, etc., while external such as investors, creditors, the State, etc. John N. Myres states that "The analysis of financial statements is primarily a study of the relationship between different financial factors in an enterprise to reflect its financial condition".

LITERATURE REVIEW

For enterprises to succeed and have a good financial position in the market, the decision-making board in cooperation with the financial manager, accountant, and others must work harder and analyze in detail each financial item in the PRF to see their financial position. Based on the research title many authors have made great contributions through their scientific papers, which help this research to become more accurate and important for future research. As follows, **[1]** **[2]** through the capital statement they have analyzed the financial position of the enterprise where they emphasize that PRFs should include a standard analysis of capital and profit growth. **[3]** Through PRFs, financial planning should be analyzed accurately for future profit, for the payment of future liabilities according to the maturity date, as well as how to have a sustainable policy for the benefit of the dividend **[4]** During the research in Australian enterprises recommend that the efficiency of workers, the quality of customer service and the way the enterprise is financed affects the increase of assets and capital in the balance sheet**.** **[5]** Elemerraji in his research analyzed that financial reports are not taken into account at all regarding the investment decision. Many young investors in the market leave their enterprise in the hands of fate and do not look at financial reports. Using more accurate reports during decision-making increases the success of the enterprise. **[6]** they have analyzed that the application of analytical techniques to improve the financial position in the relevant data should be realized through the financial declaration. This analysis of financial statements reduces belief in conjecture and uncertainty, assumptions, and intuitions about business decisions. **[7]** his research analyzed that PRFs include information on the source and use of financial assets, concluding whether the financial condition of the enterprise is good or bad, whether it has improved or deteriorated. Each item in the financial statements should be meaningful and accurate, to help the enterprise begin to improve its financial situation**.** **[8]** Ward recommends that the use of PRFs helps investors look at the percentage of profit they receive from invested funds. An enterprise that shows profit growth in its statements has a better investment opportunity compared to other enterprises**.** **[9]** Minaxi recommends that accurate information in financial statements and the relationship between them can facilitate decision-making by strengthening its market position. **[10]** Riyaaks, recommends that the financial situation and size of the enterprise is a process of examining

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the relationship between financial statements by making comparisons with relevant information regarding stocks, bonds, and other financial instruments**.** **[11]** Hand, recommends that private enterprises have a significant presence in the market, but their accounting practices remain largely unknown due to the lack of financial statements available to the public**.** **[12]** they recommend using a unique sample where financial data should be available, complete, and standardized for enterprises with private equity and public debt**.** **[13]** Katz, recommends that timely recognition of business losses or failures is an attribute of the quality of financial reporting. **[14]** in their research regarding success and financial position, they recommend that some companies attach great importance to intangible assets, some other companies focus on investment analysis and marketing, but again on financial statements lack measurement, reporting, and accurate financial management. **[15]** Lev, recommend opening existing discontent and growing to most enterprises between investors and business leaders, since there is a gap between the capital market, financial information, and reported profit to reflect their success or financial position. **[16]** they recommend the identification and reporting of expenditures could be the first logical step towards reflecting financial position. Lev, **[17]** suggests the research agenda regarding PRFs, to reduce the economic damages arising from the current calculations of the enterprise, as well as information hidden before the audit. Harris and Penman **[18]** related to their financial position recommend that the value of the shareholders depends only on the exposure to market prices. Benston, **[19]** recommends that to gain a competitive advantage or increase profit and success, the enterprise must combine assets and liabilities in a specific and innovative way through the identified outgoing pricing prices. **[20]** they recommend that valuation models have the appearance of accuracy but are often wrapped which means that the financial position of the enterprise is not shown correctly e.g. cash flow analysis may have room for inaccurate use or in a model where income is estimated at the outset, it is especially dangerous because it is income without a transaction. Barth **[21]** emphasizes that the financial position of the enterprise is not known exactly if the values of the financial items are not noted correctly and accurately in the PRF. They **[22]** recommend that comparing enterprise PRFs may have a significant impact on their financial position. **[23]** recommend that a good financial position increases enterprise revenue, but it should always be looked at the problem of assets
presented in the financial statements **[24]**. But also **[25]**, has emphasized that the relationship of financial ratios to net income may be the premise of the enterprise's financial position. (Rowe, 2010), (Amit & Arun, 2005), (Riaz & Afzal, 2011), (Capillo, Serer, & Frerrer, 2010), (Altman, 1968) and (Beaver, 1966**)** recommend that net incomes through the cost of spending and the selling price reflected with a Beta and a higher standard error will affect the growth of inflation in the economy, while **[26]** have analyzed the importance of assets as a predictor of net income, both of which recommendations reflect the financial position. Bahnimad **[27]** in his research emphasizes that after the establishment of data of the PRF in programs for all enterprises continues with the calculation of logistic regression and natural logarithm. According Stokes **[28]**, states that sales efficiency or net profit on the income and expenditures statement, financial position, size of the enterprise, assets

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and total liabilities on the balance sheet, return on equity ratio, asset return ratio are all financial items that will be processed through analysis and the results from regression logistic reflect the financial position of the enterprise. **[29]** the research was carried out in enterprises of various activities (production and service), then using the suggestions of **[30]** the variables were calculated, encoding the financial situation and size of the enterprise on 0 and 1. The larger number of enterprises gives a more accurate result **[31],** also the activity of enterprises in the sample is an important factor to look at their financial position **[32].** If the research sample is small, the work is sensitive to errors in results **[33]** some of the researchers used 50 or more enterprises in the model **[34]**. The most important studies such as **[35]**, **[36]**, **[37],** **[38]**, and **[39]** recommend that errors made by PRF compilers may lead to inaccurate interpretations by **[40]** for the financial position of enterprises. For this reason, the model uses data from current net income as suggested by **[41]**, while to make a model of PRFs can be used a new form such as the economic factor for net income through actual logistic regression **[42]**. They **[43]** recommend that the model should be based on PRF results, the same opinion has **[44]** for the reflection of the financial position according to the financial situation and the size of the enterprise. To look at the financial position of the firm, the research from **[45]** has recommended the simplicity of accounting rules in different countries or the equivalence of PRF methods used by firms **[46]**. Concentration to look at the financial position should be done during the financial reporting process **[47]**, but again **[48]**, emphasize that financial reporting practices do not mean being similar to enterprises, but instead it gives recommendations on how to incorporate financial position in profit growth in PRFs. Such a model may be preferred in enterprises that have similar financial statements **[49].** A similar model with **[50]**. A has given **[51]** through the use of two variables (proxies) in PRFs, reflecting the financial position of enterprises. Models are created to research and make recommendations for enterprises of activities and size different **[52]**. The study, by

[53], proposes measures of comparability of PRFs between periods, for enterprises that have a negative financial position, similar research has also done **[54]**. They **[55],** **[56]** show that by researching in 27 countries, according to De-Franco's opinion, that the comparability of PRFs in similar enterprises helps in reducing asymmetric information, and reflection of the financial position. To reflect the financial situation of enterprises **[57]** they used the regression of profits during the 2003-2006 return to England, while **[58]** they used regression of income in re-evaluation during 2001-2008 in 29 countries. **[59]** during 2003-2007 in 14 EU countries, tested the impact of enterprise size on its financial position. **[60]** to test the financial position in 46 countries for the period 2001-2007 they used the method based on portfolio changes, while Neel (2015) during the period 2001 - 2008 among 41 countries uses the regression of profits in the capital market. To reflect the financial position of the enterprise **[61]** based on the research of **[62]** and (Ohlson, 1995) during the period 2002-2007 in 17 European countries they have used price report in the main book and the sales value ratio, while **[63]** they used PRF evolution theory in the United States. Regarding the reflection

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of the financial position, many reports can be calculated from the financial statements, while the enterprise must identify those that are important for its activity. In this case, **[64]**, recommends that if there is a positive relationship between the liquidity and profit indicator, the total return on assets, the enterprise has success and a good financial position in the market. (Doron N & Stephen H. P, 1999) recommend that ROA's long-term trajectory is the best financial result for the health of a company and an indicator of how its decisions turn out. Understanding this trajectory helps enterprises form a winning strategy for a long-term perspective. (Doron N & Stephen H. P, 1999). **[65]** regarding stability and financial position of enterprises has a similar opinion with **[66]** and **[67].** The return on assets through the analysis of financial ratios is an important indicator of the sustainability of enterprises in the market **[68]**. Discriminatory analysis has revealed some of the variables such as sales growth rate, leverage, current ratio, operating costs to sales, and vertical integration are very important in determining the success of the enterprise. One of the most preferred indicators to reflect the financial position of the enterprise **[69]**, in his study emphasized that the return on equity (ROE) can be defined as the amount of net income returned as a percentage of shareholders' equity, which was also confirmed**.** Furthermore, in terms of reflecting financial position according to **[70]**, assets represent everything that a business owns, while liabilities unlike assets have a negative financial value, i.e. payment to be made for financial transactions **[71]**. Regarding the success or failure of enterprises in the market, in the research with title "CVP analysis in manufacturing and service enterprises", they recommend that applying of techniques cost-volume-profit analysis, during the decision-making process increases the success of enterprises to a large extent. Also, it was found that
the benefits derived from the application of this analysis include effective cost control, high production and service capacity, and increased profitability, therefore and this research makes an important contribution to the success of enterprises in the face of competitors. **[72].** Edmister in his research, through regression, analyzed 594 small enterprises between 1954-1969 in 19 different financial reports, which predicted the failure or success of enterprises with an accuracy of 90%.**[73] .** Based on Beaver's research, **[74]** analyzed opportunities according to the risk index, saying that Beaver's rates are inappropriate to predict the financial failure of enterprises. They created a model for predicting financial failure, according to which the dependent variable is subjected to regression analysis by assisting in recommendations on which enterprises are successful and which are unsuccessful.**[75].**

NEED OF THE STUDY

All researchers in their study included in this research, analyzed the financial position of enterprises in different aspects according to PRFs, giving recommendations as to which voices influence the success or failure of enterprises depending on their size and activity. Based on these recommendations, afterward on the model of logistic regression and natural logarithm, will be analyzed by 100 enterprises to come up with new recommendations for this research.

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OBJECTIVES OF THE STUDY

Some of the objectives of this research are:

1 To understand the reports and financial statements of enterprises,

2 Depending on their size to see the quality and reflecting of financial position,

3 To compare non-dependent variables with the dependent variable,

4 The study the ability of enterprises for success based on logistic regression and natural logarithm,

5 To provide suggestions from the findings of this research for future researchers.

SCOPE OF THE STUDY AND THE COLLECTION OF DATA

The research was conducted in 100 enterprises of different activities (manufacturing or service). The data in this research are primary and secondary. The primary data were realized through interviews with financial manager and other managers of enterprises, while the secondary data were collected from internal sources such as financial reports, documents, various profit/loss analysis, the balance sheet, the income, and expenditures statement, as well as external sources, the agency for businesses, the auditor's office, the ministry of economic development, etc.

PLAN OF DATA ANALYSIS

The data collected from the interview and PRF were studied and analyzed in detail. Considering the procedure of logistical regression analysis and natural logarithm, the necessary data from the financial items are ranked according to the importance they have given to the model regarding the quality and reflection of the financial position of enterprises in the competitive market.

THE LOGISTICAL REGRESSION MODEL AND NATURAL LOGARITHM

The scientific paper in the methodological aspect is parted into the following parts:

HYPOTHESES

Null and alternative hypotheses which test the validity of the model can be written as follows:

H_0: There is no significant relationship between the financial position and size of the enterprise

H_1: There is a significant relationship between the financial position and size of the enterprise

$$B_1 \quad 0 \qquad B_1 \quad 0$$
$$B_2 \quad 0 \qquad B_2 \quad 0$$
$$H_0: (.)=(.) \text{ and } H_1(.)\neq(.)$$
$$B_p \quad 0 \qquad B_p \quad 0$$

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The purpose of these hypotheses is to look, except (GJF | MA) and other variables incorporated in them. Do they have a greater impact on the success of large or small enterprises?

ANALYSIS OF FINDINGS AND INTERPRETATION OF RESULTS THROUGH MATHEMATICAL EQUATIONS OF LOGISTICAL REGRESSION AND NATURAL LOGARITHM

The logistic regression model is based on chances and opportunities. Probability is the ratio of the results of a transaction to their total number. In logistic regression, probability represents the ratio of the probabilities of a phenomenon that has not yet occurred.**[76]** In the United States, **[77]** used the logistic regression model for the first time. He estimated that 96% of enterprises will go bankrupt after three years. **[78]** used regression analysis to determine the risk of financial failure or financial success by concluding the accuracy of the 88% model. According to the analysis of logistical regression in the financial data of "Tobacco" enterprise during the period 2005-2012, would it be possible to predict failure? As a result of the study, it was found that financial failure was estimated as 91% before 1 year, 91% before 2 years, and 74.5% before 3 years.**[79].** Logistic regression, also called logit regression, is a multivariate statistical analysis method that helps predict the dependent variable between two possible options for reflection on the financial position of the enterprises. In this case, according to logistical regression and natural logarithm, the maximum probability method (PM) is used, whereas for the control of H0 & H1 converting statistics from L to -2logL is used **[80]**. In the regression model, there is a continuous state for dependent variables, while a normal distribution of independent variables. These conditions are not required in the logistic regression model, which assumes that there are no problems between multiple connections in independent variables. i.e. no variance-covariance matrix is required.[81]. Logistic regression analysis for all enterprises is obtained with the dependent variable GJF (financial position) of enterprises in the market in relationship with the non-dependent variables (enterprise size (MA), financial items from the balance sheet (BGJ), financial items from the income and expenditure statement (BS) or profit /loss statement, and financial ratios indicators.

The logistical regression model for manufacturing and service enterprises related to the financial position is:

$$L = ln\left[\frac{p_i}{1-p_i}\right] = b_0 + b_1 x_i + e_i \quad \textbf{(1)}$$

In the above equation, L is called Logit. Logit or logistic regression model name comes from here.**[82]**. The parameters of the logistic regression model for all enterprises are obtained through the Maximum Likelihood technique (ML), while the variables for measuring success or failure are obtained through mathematical equations**[83]**:

$$> a(P = GjF) \times b\ (P(MA) > \quad \textbf{(2)}$$

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Table 1 presents the financial position of enterprises in the market, through natural logarithm and mathematical equations. This table indicates according to the variable of financial position as a successful enterprise are 47 large enterprises and 7 small enterprises out of a total of 54 that have a good financial position, while according to the same variable but as unsuccessful enterprises or with very little success are 6 large enterprises and 40 small out of a total of 46. Regarding quality and reflecting of financial position, we continue the research through mathematical equations.

Table.1. Financial position of enterprises in the market through natural logarithm and mathematical equations

Financial Status (Financial Position)	Size Enterprises (MF)		Total
	Big. Ent.	Small. Ent.	
Successful (highest successful enterprises) = 1	47	7	54
Unsuccessful (less successful or not at all successful enterprises) =0	6	40	46
Total	53	47	100

The probability of each enterprise succeeding or having a good financial position is:

$$P(GjF = 1) = \frac{54}{100} = 0.54$$

The probability of each enterprise that has unsuccessful or has a poor financial position is:

$$P(GjF = 0) = \frac{46}{100} = 0.46$$

The probability of each enterprise aims to grow is:

$$P(MA) = \frac{53}{100} = 0.53$$

The probability of non-success or failure of large enterprises is:

$$P(GjF = 0|\, MA = 1) = \frac{6}{53} = 0.113 * 100 = 11.32\%$$

The probability of non-success or failure of small enterprises is:

$$P(GjF = 0|\, MA = 1) = \frac{7}{47} = 0.1489 * 100 = 14.89\%$$

The probability of non-success or failure of an enterprise or the probability of failure of an enterprise it is equal to the probability rate:

$$NM(GjF = 1) = \frac{54}{54} = 1\ apo\ NM = 1/1 \quad \textbf{(3)}$$

The probability of success of a large enterprise is 7.833. This means that the probability of success of a large enterprise is as much as 7.833 or 6 in 47.

$$[NM(GjF = 1|MA = 1) = \frac{47}{6} = 7.833$$

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The success rate of a small enterprise is 1.75. This means that the probability of success of a small enterprise is as much as 1.75 or 7 in 40.

$$[NM(GjF = 1|MA = 0) = \frac{7}{40} = 1.75$$

Od ratios and probabilities to measure the probability of financial statute or financial position according to the size rate of the set of independent variables are as following:

$$P(MA = 1) = \frac{NM(MA = 1)}{1 + NM(MA = 1)} = \frac{7.833}{1 + 7.833} = 0.887$$
$$P(MA = 1) = \frac{P(MA = 1)}{1 - P(MA = 1)} = \frac{0.887}{1 - 0.887} = 7.833$$
$$P(MA = 0) = \frac{NM(MA = 0)}{1 + NM(MA = 0)} = \frac{1.75}{1 + 1.75} = 0.64$$
$$P(MA = 0) = \frac{NM(MA = 0)}{1 - NM(MA = 0)} = \frac{0.64}{1 - 0.64} = 1.75$$
$$P(MA = 0) = \frac{NM(MA = 0)}{1 + NM(MA = 0)} = \frac{0.1489}{1 + 0.148} = 0.129$$
$$P(MA = 0) = \frac{NM(MA = 0)}{1 - NM(MA = 0)} = \frac{0.129}{1 - 0.129} = 0.148$$

Taking into account the calculations from the mathematical equations of natural logarithm (ln), to reflect the success and financial position of enterprises from the equations NM (Gj F = 1 | MA = 1) = 7.83 and NM (Gj F = 1 | MA = 0) = 1.75, we achieve the following results:

$$ln\,[NM(GjF = 1\,|MA = 1)\,] = ln\,(7.833) = 2.058$$
$$ln\,[NM(GjF = 1\,|MA = 0)\,] = ln\,(1.75) = 0.550$$
$$ln\,ln\;\,[NM(MA)]\;\, = 0.550 + 2.058MA \quad \textbf{(4)}$$
$$ln\,ln\,[NM(MA)]\;\, = \mathbf{0.96\%}$$

The increasing the size of the enterprise also increases the natural logarithm of possibility, in other words, the rate of success of a large enterprise compared to small enterprises is higher.

Mathematical equations according to logistical regression model and natural logarithm for independent variables (p), are as following:**[84]**

$$ln\left[MA\left(x_1, x_2, x_3, \dots, x_p\right)\right] = B_0 + B_1x_1 + B_2x_2 + B_3x_3 + \cdots, + B_px_p \quad \textbf{(5)}$$
$$ln\left[MA\left(x_1, x_2, x_3, \dots, x_p\right)\right] = \beta_0 + AT(BGJ)_1x_1$$
$$+DT(BGJ)_2x_2 + THT(PASH)_3x_3 + FN(PASH)_4x_4$$
$$+RF(ROA)_5x_5 + RF(ROE)_5x_5 \quad \textbf{(6)}$$

or

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$$L = ln \ln\left(\frac{p}{1-p}\right) = \beta_0 + AT(BGJ)_1 x_1 + DT(BGJ)_2 x_2 + THT(PASH)_3 x_3 + FN(PASH)_4 x_4 + RF(ROA)_5 x_5 + RF(ROE)_5 x_5 \quad \textbf{(7)}$$

- *MA- Enterprise size,*
- *GJF- Financial position of enterprises,*
- *AT (PBGJ) - Active of the balance sheet of enterprises / current and fixed assets (financial liquidity ratio, asset management ratio, profitability ratio),*
- *DT (PBGJ) - liabilities from passive of the sheet balance of enterprises (financial liquidity ratio, debt management ratio),*
- *HT (PASH) - Revenue and expenditure statement or total revenue (asset management ratio, profitability ratio),*
- *RF (ROA) - Return on assets (balance sheet, profitability ratios),*
- *RF (ROE) - Return on equity (balance sheet, profitability ratios),*
- *NF (PASH) - Net profit in the statement of income and expenses (profitability ratio).*
- *e — Exponent equation*
- *ln – Natural logarithm*
- *p- Probability*
- *L – Logistic regression*

The mathematical equation according to logistical regression and natural logarithm for all enterprises was initially realized with an independent variable on which other variables of the model or set of variables as mentioned above depend **[85]**.

$$L = ln\left(\frac{p}{1-p}\right) = \beta_0 + GJF(PF)_1 x_1 \quad \textbf{(8)}$$

$$P = \frac{1}{1+e^{-(B_0+GJF(PF)_1 X_1)}} \quad \textbf{(9)}$$

$$1 - P = \frac{1}{1+e^{(B_0+GJ(PF)_1 X_1)}} \quad \textbf{(10)}$$

$$\frac{p}{1-p} = \frac{1+e^{(B_0+GJF(PF)_1 X)}}{1+e^{-(B_0+GJF(PF)_1 X)}} = e^{B_0+GJF(PF)_1 x} \quad \textbf{(11)}$$

From the above formulas we have the equation:

$$ln\left(\frac{p}{1-P}\right) = \beta_0 + GJF(PF)_1 x_1 \quad \textbf{(12)}$$

From these we understand that with increasing probabilities from 0 to 1, the Log function for all enterprises takes the values $-\infty \; and \; +\infty$.

For probability values, independent variables related to the quality and financial position of the enterprises in the market can be calculated through the following equation:

$$P = \frac{1}{1+e^{-(B_0+GJF(PF)_1 X_1)}} \quad \textbf{(13)}$$

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ANALYSIS OF FINDINGS AND INTERPRETATION OF RESULTS THROUGH ECONOMETRIC MODEL OF LOGISTIC REGRESSION AND STATISTICAL TESTS IN SPSS & R PROGRAM

LOGISTIC REGRESSION ANALYSIS WITH INDEPENDENT METRIC AND CATEGORICAL VARIABLES-STEP BY STEP METHOD (WALD)

When there is the problem of multiple connections between these variables, one of the best models used to discover the set of independent variables is the step-by-step logistic regression technique. **[86]** The benefit of results through logistic regression for variables GJF and MA based on the set of other variables, for 100 enterprises with different activities (manufacturing and service), are presented in the tables like the following:

Table 2 presents the original values of the dependent variable and other coded values. This table indicates the financial position (highly successful enterprises (1), unsuccessful enterprises or with little success (0)), and enterprise size (large enterprises 47/6=54 and small Enterprises 7/40=47). Out of a total of 54 large enterprises, 47 of them are successful while 6 are less successful or close to financial failure. Out of a total of 47 small enterprises, 7 of them succeed, 40 are at risk of bankruptcy or financial failure.

Table 2. Original values of the dependent variable and other coded values

Data processing for all enterprises			Dependent Variable Encoding		Categorical Variables Coding's		
Unweighted Cases	N	Percent	Original value	Internal value		Frequency	Parameter coding
Selected Cases	100	98.0	Successful (highest successful enterprises)	1	Size Enterprises (MF)		
Included in Analysis					Big. Ent.	47/6=53	1.000
Missing Cases					Small. Ent	7/40=47	
Total	2	2.0			Total	100	.000
Unselected Cases	102	100.0	Unsuccessful (less successful or not at all successful enterprises)	0			
Total	0	.0					
	102	100.0					

Table 3 presents iteration history & classification table & variables in the equation. This table indicates the value of the constant term is .260, the -2LogL statistic which includes the independent categorical variable model is 47.99, the degree of freedom (nk) which includes only the constant term 99 (100- 1), and the degree of freedom that includes the term constant and the variable MA 94 (100-6). Here also presented, Wald statistic which tests the importance of the financial position of enterprises .839, and Exp (P) statistic which shows the change in the probability rate of the

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enterprise when the variables are added per unit 1.174. Approximately the model in the first step (S0) has shown a percentage of accuracy of **88%.**

Table.3. Iteration history & Classification table & Variables in the equation

Iteration History			
Iteration		-2 Log likelihood	Coefficients
			Constant
Step 0	1	47.989	.260
	2	47.989	.260

Classification Table				
				Predicted
Step		Financial situation		Percentage Correct
		Successful (highest successful enterprises)	Unsuccessful (less successful or not at all successful enterprises)	
Step 0	Financial situation			
	Successful	0	46	.0
	Unsuccessful	0	54	100.0
Overall Percentage				88.0

Variables in the Equation							
		B	S. E	Wald	Df.	Sig.	Exp(B)
Step 0	Constant	.260	.301	.839	1	.024	1.174

Table 4 presents the variables that are not considered in different steps and periods. This table indicates the revaluation value of Ki square at the end of the first step is .932 (p=2.1%) and removed x7 (HT -PASH), Ki square at the end of the second step is .881 (p=2.2%) and removed x4 (AT- PBGJ), Ki square at the end of the third step is .971 (p=5,9%) and removed x6 (DT- PBGJ), Ki square at the end of the fourth step is .923 (p=4.8%) and removed x8 (NF- PASH), Ki square at the end of the fifth step is .786 (p=3.8%) and removed x10 (RF-ROE), Ki square at the end of the sixth step is 1.801 (p=1.8%) and removed x3 (RF-ROA). Unsuccessful enterprises unlike those that have successfully, in different periods do not enough attention to these financial items. I.e. financial planning and management do not match. Such a thing, also applies to 6 large enterprises.

Table.4. Variables that are not considered in different steps and periods

	Score	Df.	Sig.
Step 1/removed X7_(TH-PASH)	.932	1	.021
Step 2/removed X4_(AT-PBGJ)	.881	1	.022
Step 3/removed X6_(DT-PBGJ)	.971	1	.059
Step 4/removed X8_(NF-PASH)	.923	1	.483
Step 5/removed X10_(RF_ROE)	.786	1	.375

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Step 6/removed X3_(RF_ROA)		1.801			1			.180	
Iteration	-2 Log likelihood	Coefficients							
		Constant	AT (PBGJ)	DT (PBGJ)	TH (PASH)	NF (PASH)	RF ROA	RF ROE	MF
Step 1	39.479	-1.324			x				+
Step 2	33.865	-.087	x						+
Step 3	28.245	1.892		x					+
Step 4	25.370	6.239				x			+
Step 5	22.234	5.993						x	+
Step 6	19.574	4.145					x		+

Table 5 presents the variables that are not considered in different steps and periods. This table indicates in each step the tested parameters in the significance level of 5%. (Sig.). To verify the data derived from the model in Table 5, through the mathematical equations of natural logarithm in the first and second step, but also in all other steps the data from Table 4 are used.

The equation of natural logarithm is:

Step 1 (Step, Block, Model) = [-2LoglL (Fixed)]

-[-2LogL(fiks+X2)] = 47.989 -39.479= 8.510

Step 2 (Step)= [-2LogL (Fixed +X2)]- [-2LogL (Fixed +X2+X4)] = 39.479- 33865= 5.614

Step 2 (Block)= Step 1 (Block)+ Step 2 (Step)

= 8.510+5.614=14.124

Step 2 (Model)= Step 1 (Model)+Step 2 (Step)

= 8.510+5.614=14.124

Table.5. Omnibus test of model coefficients & Model Summary & Hosmer and Lemeshow Test

Omnibus Tests of Model Coefficients				Model Summary			Hosmer and Lemeshow Test		
Step	Chi-square	Df.	Sig.	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square	Df.	Sig.
Step 1 Step Block Model	8.510 8.510 8.510	1 1 1	.040 .040 .040	43.300	.337	.582	10.892	8	.245
Step 2 Step Block Model	5.614 14.124 14.124	1 1 1	.031 .023 .023	33.328	.141	.236	13.512	8	.095
Step 3 Step Block Model	5.620 19.744 19.744	1 3 3	.041 .012 .012	23.364	.136	.182	11.503	8	.046

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Step 4	Step	2.875	1	.013	23.193	.432	.577	11.928	8	.145
	Block	22.619	4	.007						
	Model	22.619	4	.007						
Step 5	Step	3136	1	.041	22.698	.524	.666	10.979	8	.142
	Block	25.755	1	.004						
	Model	25.755	1	.004						
Step 6	Step	2.660	1	.039	21.501	.869	. 945	4.979	8	.076
	Block	28.415	2	.000						
	Model	28.415	2	.000						

The summary model shows that the models obtained in the next steps represent the data well, showing in the sixth step an important linear relationship between the dependent variable and the independent variables of 86.9% or 87%. In this case, the Nagelkerke R2 statistic also shows that there is a relationship between the dependent variable and the independent ones in the value 94.5% or 95%. (.337-.582, .236-.382, 136-182, 432-.577, .524-666, .769-.845). Pin = 8%. Sig> .076> .080. Cox Snell R2 (87%) and Nagelkere R2 (95%).

Table 6 presents the variables that are not considered in different steps and periods. This table indicates the classification results for each step through the cutoff value and the probabilities provided for the financial situation of enterprises with the better financial position and those with the poor financial position is 57% in the first step, 66.0% in the second step, 71.7 in the third step, 79.1 in the fourth step, 89.0% in the fifth step, 90.2% in the sixth step. In steps (1 & 2 & 3) out of 100 successful enterprises, 22 are classified as unsuccessful while 24 are classified as successful, in steps (4 & 5) the number of successful enterprises increased to 25, while the number of unsuccessful enterprises decreased to 21. In the last step (6) the financial situation or financial position of successful enterprises is 29, while of the unsuccessful ones is 17. In each step, the importance of the financial position according to the size of the enterprises' increases.

In function of the selection of variables, all variables and constants are important at the level of 5%, but the variables with the highest level of importance are in the sixth step: RF (ROA) 8.151 and NF (PASH) 5.453 (Sig.= 0.24 & 0.13). While variables that are important but have negative value are DT (PBGJ) and TH (PASH). Enterprises need to more attention to these two variables to have a better financial position.

In this case, from the data in Table 6 (S6) is gained the equation of natural logarithm as follows:

$$L = ln \ln \frac{\rho}{1-\rho} = 7.090 + 0.312x_4 + 0.213x_6 - 0.131x_7 - 0.197x_8 + 0.314x_9 + 0.512x_{10} \quad \textbf{(14)}$$

Or

$$\frac{p}{1-\rho} = e^{(7.090+0.312x_4+0.213x_6-0.131x_7-0.197x_8+0.314x_9+0.512x_{10})}$$

$$= e^{7.090} e^{0.312x_4} e^{0.213x_6} e^{(-0.131x_7)} e^{(-0.197x_8)} e^{0.314x_9} e^{0.512x_{10}} \quad \textbf{(15)}$$

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From the mathematical equation, we can conclude that there is a significant positive relationship between the logarithm of the probability norm and the variables x_4, x_6, x_9, x_{10}, while between the variables x_7, x_8 there is a negative relationship. The upper equation achieves the value of the Exp (B) column in the sixth step.

Table 6. Classification Table & Variables in the Equation

Observed		Financial situation		Percentage Correct
		Successful (highest successful enterprises)	Unsuccessful (less successful or not at all successful enterprises)	
Step 1	Financial situation			
	Successful	24	22	55.2
	Unsuccessful	21	33	51.1
	Overall Percentage			57.0
Step 2	Financial situation			
	Successful	24	22	52.2
	Unsuccessful	22	32	69.3
	Overall Percentage			66.0
Step 3	Financial situation			
	Successful	24	22	54.5
	Unsuccessful	22	32	69.3
	Overall Percentage			71.7
Step 4	Financial situation			
	Successful	25	21	74.3
	Unsuccessful	20	34	83.0
	Overall Percentage			
Step 5	Financial situation			
	Successful	25	21	74.3
	Unsuccessful	20	34	93.0
	Overall Percentage			89.0
Step 6	Financial situation			
	Successful	29	17	83.0
	Unsuccessful	19	35	95.8
	Overall Percentage			90.2

Elaboration of step 6 with the highest percentage

Variables in the Equation

Step 6	B	S. E	Wald	Df.	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
NF(PASH)	.312	.063	5.453	1	.013	1.161	1.034	1.283
AT(PBGJ)	.213	.097	5.882	1	.042	1.132	.820	.996
DT(PBGJ)	.-131	.068	5.709	1	.025	.968	.735	.867
TH(PASH)	.-197	.080	6.066	1	.036	.880	.532	.732
RF(ROA)	.314	.110	8.151	1	.041	.763	.303	.521
RF(ROE)	.512	.130	5.548	1	.024	.544	.278	.398
Constant	7.090	2.385	5.251	1	.030	441.013		

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From there we have the calculations:

$e^{7.090}$= 1,199.91- with the increasing of one unit to the constant financial situation (financial position), in large enterprises the financial position is 1.2 times higher than in smaller enterprises with the weaker financial position.

$e^{0.312x_4} = 1{,}366.15$ –with the increasing of one unit to the constant of net profit (PASH), the probability of enterprise success increases by 1.4 times, or the probability of success of a large enterprise compared to a small enterprise is 1.4. $e^{0.213x_6} = 1{,}237.38$ –with the increasing of one unit to the constant of (MA), the probability of enterprise success increases by 1.2 times, or the probability of success of a large enterprise compared to a small enterprise is 1.2. $e^{(-0.131x_7)} = 0{,}877.22$- Since we have the negative exponent, with the increasing of one unit to the (Dt-PBGJ), the possibility of increasing success in large enterprises is 0.9 times higher compared to small enterprises. $e^{(-0.197x_8)}$-Since we have the negative exponent, with the increasing of one unit to the (HT-PASH), the possibility of increasing success in small-large enterprises is 0.9 times higher compared to large enterprises.

$e^{0.314x_9} = 1.368{,}89$ – with increasing of one unit to the constant of ROA (RF), the probability of enterprises' success increases by 1.4 times, or the probability of success of a large enterprise compared to a small enterprise is 1.4. $e^{0.512x_{10}} = 1.668.63$- with the increasing of one unit to the constant of ROE (RF), the probability of the enterprises' success increases by 1.7 times, or the probability of success of a large enterprise compared to a small enterprise is 1.7. These statistics indicate that the possibility rate of increasing success to large enterprises compared to small enterprises is higher. The reliability interval in the sixth step (S6) for 95% to the Exp (B) statistics for variables $\boldsymbol{x_3, x_4, x_6, x_9.}$, can be calculated as follows:

$$e^{0.312x_4 \pm 1.96*0.097} = 1{,}652.20$$
$$e^{0.213x_6 \pm 1.96*0.063} = 7{,}195.23$$
$$e^{0.314x_9 \pm 1.96*0.110} = 1{,}698.25$$
$$e^{-0.131x_7 \pm 1.96*0.068} = 0{,}767.76$$
$$e^{-0.197x_8 \pm 1.96*0.080} = 0{,}353.8$$
$$e^{0.512x_{10} \pm 1.96*0.130} = 2{,}158.87$$

Conclusion:

Increase in (GJF & MA) to 286.05 for the variable x_4. Increase in (GJF & MA) to 5.957.85 for the variable x_6. Increase in (GJF&MA) to 329.36 for variable x_9. Decrease in (GJ&MA) to 109.46 for the variable x_7. Decrease in (GJ&MA) to 467.39 for the variable x_8. Increase in (GJ&MA) to 490.24 for the variable x_{10}. The possibility of success of a large enterprise with the set of variables (MA = 1).

$$P = \frac{1}{1+e^{-(7.090+0.312x_4+0.213x_6+0.314x_9+0.512x_{10}*1)}} = 0.99 \textbf{ (16a)}$$

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$$P=\frac{1}{1+e^{-(7.090-0.197x_8-0.131x_7)}}=0.42 \textbf{ (16b)}$$

and if the two variables that have shown a negative value result are not improved then the success will be reduced by (0.42%).

The possibility of success of a small enterprise with the set of variables (MA = 0)

$$P=\frac{1}{1+e^{-(7.090*0)}}=0.50 \textbf{ (17)}$$

Based on the mathematical equation, we conclude that large enterprises are more successful than small enterprises. Through groups (df = G-1). The coefficients in the sixth step and their standard errors are: x_4, x_6, x_9, x_{10} (0.312,0.213, -0.131, -0.197, 0.314, 0.512), S.E (.063, .097, .068, .080, .110, .113).

Then Wald Statistics are:

$$Waldx_4=(0.312/0.063)^2=2.453$$
$$Waldx_6=(0.213/0.097)^2=4.882$$
$$Waldx_7=(-0.131/0.068)^2=3.709$$
$$Waldx_8=(-0.197/0.080)^2=6.066$$
$$Waldx_9=(0.314/0.110)^2=8.151$$
$$Waldx_{10}=(0.512/0.130)^2=15.484$$

According to Wald statistics, it can be said that all the logistic regression coefficients in step six are significant at the 5% significance level.

ASSESSING THE SUITABILITY OF THE MODEL IN LOGISTIC REGRESSION

In statistics, it is very important to evaluate the validity of the developed model. In logistical regression, this is seen in the distribution of errors (non-standard, standard, Jacknife) relationship measurements and multiple link indicators **[87]**. Based on Table 7 we have the following results: the probability of enterprise success 2 is 95.6%. The non-standard error (e) For this enterprise is 0.044 (1-0.956).

Table 7. Normal probability for deviation values

N.	p	Cook	Lever age	Standard errors				Value Df Beta				
				e_i	Logit	St.	Devi.	Fixed	X2	X3	X4	X5
1	.998	.000	.000	0.000	1.000	0.000	0.063	.000	.000	.000	.000	.000
2	.956	.047	.010	0.044	1.047	0.215	0.299	.106	.003	-.005	-.003	-.001
3	.891	.037	.231	0.109	1.123	0.349	0.480	-1752	-0.32	0.68	0.003	.145
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-					
100	.031	.-038	.-137	0.969	0.323	5.601	2.636	.007	.509	-.010	-.047	-.006

Data in logistical regression for enterprises are well represented, following a normal distribution. Mathematical operations of normal probability for deviation values are as following:

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Non-standard error(e_i) = **(1-p_2)** = 1-0.956= 0.044 **(18)**

Log error = $\frac{e_i}{P_i(1-P_i)} = \frac{0.044}{0.956*0.044} = 1.047$ **(19)**

Standard error = $z_i = \frac{e_i}{\sqrt{p_i(1-p_i)}} = \frac{0.044}{\sqrt{0.956*0.044}} = 0.2145$ **(20)**

The value of the standard deviation for successful enterprises or with a good financial position in the market is:

Deviance=$\sqrt{-2\ ln\ ln\ (p_i)} = \sqrt{-2\ ln\ ln\ (0.998) = 0.0632}$ **(21)**

The value of the standard deviation for unsuccessful enterprises or with a poor financial position in the market is:

Deviance= $\sqrt{-2\ ln\ ln\ (1-p_i)} = \sqrt{-2\ ln\ ln\ (1-0.137) = 0.543}$ **(22)**

Leverage- The model includes the effective value 1 and ineffective 0, wherein detail for all the analyzed enterprises is shown the number of parameters and the sample size 100 (10% -90% probability).

Cook- $DC_i = z_i^2\left(\frac{h_i}{1-h_i}\right) = DC_1 = 0.215_1^2\left(\frac{0.180}{1-0.180}\right) = 0.010$ **(23)**

- Z_i= standardized error for enterprises
- h_i- Leverage
- Df Beta

$DfB_{eta}(B_0^{(i)}) = B_0 - B_0^{(i)}$ and $fB_{eta}(B_1^{(i)}) = B_1 - B_1^{(i)}$ **(24)**

$B_0 - B_0^{(i)}$- Parameters for extraction of units from the model of reflecting the success and financial position of the enterprises. At standard deviation, the last enterprise does not signify a positive result, there is a loss in its variables. At deviance, values are well represented and follow the normal distribution, besides enterprises that are at loss. The leverage is well represented, except in enterprises that do not have an impact on the projected values. I.e. they do not carry out the planning they do in the measured variables (Ent. 3,100 etc.).

THE CONFIRMATION OF HYPOTHESIS

Alternative hypothesis is confirmed that there is a relationship between the variables (MA & GJF = 1), because the greater the number of financial transactions, the better is the reflection of the financial position of the enterprises. Such a thing in the model is confirmed by large enterprises, described as follows.

The probability of (MA | GJF) from the set of independent variables (AT-PBGJ | DT-PBGJ | FN-PASG | HT-PASH | RF-ROA | RF-ROE) in enterprises is confirmed by the mathematical equation of logarithm Log (7.833) = 0.8939 & Log (1.75) = 0.24. Due of rate of the possibility or the number of transactions they perform, large enterprises have a better reflection of the financial position than

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small enterprises, and the connectivity of variables is more important in (MA | GJF = 1 than in MA | GJF = 0).

Mathematical equation: ln [NM (GjF = 1 |MA)]
= 0.550 + 2.058MA

In this case, the null hypothesis is refused because the level of significance of the model is below 5% due to the non-inclusion of the number of independent variables and their correlation, while the alternative hypothesis is accepted.

The -2LogL statistic drops down since the B coefficients are not zero, and in the model, there is not only the constant term, again the alternative hypothesis is accepted and verified.

CONCLUSIONS AND RECOMMENDATIONS

Not repeating the theoretical importance given by many authors of books, papers, reports and other documents included in this research, only the purpose of the hypotheses and the objectives of the research will be presented in conclusions and recommendations. Regarding the purpose of the hypotheses, we have the following conclusions:

- The success of large enterprises compared to small enterprises is higher, and with the increase of the variable (MA) the natural logarithm of the possibility of the variable (GJF) increases in ln [NM (GjF = 1 |MA)] = 0.96%.
- Probability of non-success of enterprises (MA=1|GJF=0) compared to (MA|GJF=0) is smaller $P(GjF = 0|\, MA = 1) = 11.32$ & $P(GjF = 0|\, MA = 0) = 14.89$.
- The probability of success of enterprises (MA | GJF = 1) compared to (MA = 0 | GJF = 1) is higher $NM(GjF = 1|MA = 1 = 7.83$ & $NM(GjF = 1|MA = 0 = 1.75$.
- Quality and reflecting of financial position: an enterprises model through logistic regression and natural logarithm in the market (GJF = 1| 0.54) compared to (GJF = 0|0.46) is higher for (GJF = 1).
- The opportunity to growth or improved the financial position in the market (GJF = 0 = 1) for enterprises, (MA = 1 | 0.53) compared to (MA = 0 | 0.47) is higher for (MA = 1).
- In step 0 the correlation between the two variables (GJF|MA = 0|1 & 1|0) has an accuracy of over 0.50 or 88%.
- The revaluation values of the coefficients and the testing of the parameters are interrelated and are important in each step between the value 0.005 (.Sig) or 5% (MA | GJF | AT-PBGJ | DT-PBGJ | FN-PASH | HT-PASH | RF- ROA | RF-ROA).
- There is a significant linear relationship between the dependent variable and the independent variables at 76.9%, and the Nagelkerke R^2 statistic shows the importance of variables (dependent and non-dependent) for reflecting the success or financial position of enterprises at

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85%. The variables that are most important for quality or financial position of enterprises RF (ROA | Sig. = 0.36) and NF (PAS | Sig. = 0.24), while the variables which need to be improved DT (PBGJ | Sig. = 0.68), HT (PASH | Sig. = 0.80).

- The probability of success of a large enterprise with the set of variables (MA = 1) is 0.99 ($P = \frac{1}{1+e^{-(7.090+0.312x_4+0.213x_6+0.314x_9+0.512x_{10}*1)}} = \mathbf{0.99}$
- compared to **0.50** (MA=0), but if the two variables that have shown a negative value result are not improved then the success will be reduced by (0.42%).
- According to Wald statistics, all coefficients are significant at the 5% significance level for enterprises that shown a positive result in the probability of standard deviation, while enterprises that do not show a good positive result (GJF|MA= 1) have losses in their variables, i.e. the planning they do does not realize according to the measured variables.
- At the end of the conclusions, based on the PRFs of all enterprises as well as the results derived from the model of logistical regression and natural logarithm through mathematical equations and tabular data it is emphasized that enterprises that have interrelationships between variables (GJF | MA) reflect greater success and better financial position in the market.

General recommendations

The success rate of large enterprises was confirmed by 94.5 or 95%.

- This research helps enterprises to predict success or failure in the face of competitors.
- The financial condition of the enterprise is very important to attract investors. Models used for this purpose help investors and financial managers to see the financial position of enterprises and as well to anticipate future financial situations by reducing unnecessary expenses.
- Large enterprises need to improve the negative variables to continue successfully in the market,
- Some financial items in some enterprises have financial fluctuations, need to be done for their management and improvement efficiently. More specifically, financial transactions that increase total costs during production and service,
- Financial transactions must be carried out in accordance with financial planning,
- Small enterprises need to increase the number of financial transactions through accurate managerial planning,
- Service and production should be improved in enterprises with poor financial success.

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