Greener Journal of Economic and Accountancy

ISSN: 2354-2357

Efficacy Assessment of Z-Score in Selected Sectors of Emerging Economy

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Research Article

Efficacy Assessment of Z-Score in Selected Sectors of Emerging Economy

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ABSTRACT

This study is focused on empirical investigation of the effectiveness of Z-Score Corporate Insolvency Prediction Model on selected industrial sectors of a developing economy. The specific objectives are to assess the efficacy of Z-Score corporate insolvency prediction model on industrial sectors of Agriculture, General Services, Oil Services, Transport & Aviations, Merchandising and Manufacturing of a developing economy and to identify which of these sectors is most susceptible to insolvency diagnoses using Z-score model. Seven hundred financial statements from three hundred and fifty failed companies were analyzed. Z-Score variables for quoted and non-quoted companies were professionally extracted. Univariate and Multivariate Analysis at 5% significant levels were employed in testing of results against formulated null hypotheses. The outcome of the research shows that Z-score is a significant effective tool for predicting corporate failures in emerging economies. It is also found that the predictive ability of Z-Score across Industrial Sectors in a developing economy is significantly different. Z-Score Corporate Insolvency predictive Model is found to be significantly effective for Agriculture, Oil Services and Manufacturing sectors. However, the model is found not to be significantly effective for predicting corporate insolvency of Corporate bodies operating in General Services, Transport & Aviation and Merchandising sectors of a developing economy.

Key Words: Z-Score Model, Developing Economies Forecasting, Corporate Failure Prediction, Industrial Sectors' Corporate Insolvency Predictions, Effectiveness of Z-Score Insolvency Model.

INTRODUCTION

Background to the study

A company is considered insolvent when it is unable to pay its debts as and when they fall due. Lack of working capital is cancerous. This cancerous vermin is harmful as it will prevent the creditor from being paid according to its terms. When the cancer (indicators of insolvency) is diagnosed early enough, the creditor wants the firm to get treatment. The type of treatment to be administered depends on the level of the cancerous vermin. Many a time the cure will be Organizational restructuring, refinancing, rightsizing, closure of production lines but if it defied treatment, corporate failure looms. Solvency tests are like a test for the cancer which does come from different perspectives. Insolvency likewise is defined from many loci. These varied conceptions notwithstanding, one of the most significant threats for many businesses today despite their size and nature of operation is the ability to continue in business. One of the most powerful tools of diagnosing corporate insolvency is Z-Score predictive model.

Statement of the Problem

Many research studies have been undertaken on predicting corporate failures in the Manufacturing and Banking Sectors operating in Nigeria but very few on sectors such as General Services, Oil Services, Transport & Aviation, Agriculture and Merchandising.

Nigeria is a developing economy. Research studies concerning such a huge populace and developing economy need to be broad so as to cover many relevant and valued sectors of the economy. Appraisals of exiting numerous studies on the efficacy of Z-score on Nigeria seems to suggest that Manufacturing and Banking Sectors of the economy are the only ones that have really experienced great economic shocks and distresses in recent years. The present global grounding economic met-downs have introduced added impetus to broaden research on efficacy of Z-score on other industrial sectors apart from Manufacturing and Banking.

Objectives of the Study

The focus of this research is to assess the efficacy of Z-Score insolvency prediction model on selected industrial sectors in a developing Economy anchored on 'flow-based' insolvency measurements using Nigeria as a study case. Specific objectives are to:

- i. assess the efficacy of Z-Score corporate insolvency prediction model on Nigerian industrial sectors of Agriculture, General Services, Oil Services, Transport & Aviations, Merchandising and Manufacturing, and
- ii. Identify which of these sectors is most susceptible to insolvency diagnoses using Z-score model.

Research Questions

The stated research objectives prompted the following questions:

- i. Can Z-score insolvency prediction model effectively predict corporate failures in Nigerian business sectors of Agriculture, General Services, Oil Services, Transport & Aviations, Merchandising and Manufacturing?
- ii. Which of the study sectors is most susceptible to insolvency diagnoses using Z-Score corporate insolvency prediction model in Nigerian developing economy?

Research Hypotheses

In order to answer the research questions aimed at making definite assertions, the following null hypotheses are hereby formulated:

Ho₁: Z-Score model is not a significant effective tool for predicting corporate failures from financial statements of Nigerian Companies.

Ho₂: The Z-Score predictive ability across selected industries in developing economy is not significantly different.

Scope of the Study

This study is limited to the analysis of events that appear in the financial statements of companies from selected industrial sectors. General economic indicators of corporate failures were not considered as relevant variables for this study. The research is concentrated on Z-score operating variables. The research covers a ten year period of 2001 to 2010. The justification for the choice of the cut-off period is because within the stated period, the Nigerian economy witnessed greater corporate shocks than other prior times.

Literature Review

General overview of Corporate Insolvency

Uslaw.com (2008) stated that Solvency is a question of fact and in finding whether or not a company was solvent at a particular point of time in the past and shows that 'time frame' is material in the determination of solvency or insolvency. It is this time frame that enables us to differentiate between temporary illiquidity and endemic shortage of working capital. Adegoke (2007) said that working capital is the aggregate of funds, which are continuously in use and turned over many times in a year. Every corporate body requires an amount of working capital, though they differ in their degree of requirements. Working capital is vital for business survival. Adegoke (2007) cited Brealey & Myers (1996: 824) which describes working capital as the effective blood of any business. Brigham & Houston (2008) agreed to this assertion by saying that working capital represents the amount of money that the firm must obtain from non-free sources to carry its current operating assets. This means that it is not limited to Manufacturing and Banking Sectors of any economy. However, many scholars are of the view that Banking sector needs more solvency than working capital. Ejem (2007) attempted differentiating between liquidity and solvency thus; liquidity is the availability of cash or near cash items sufficient to settle immediate obligations or the ability of a company to meet its liabilities as and when they fall due. On the other hand, solvency is the condition of business when assets exceed liabilities (not including net worth) and liabilities are met as they mature. In a situation where the said company is unable to weather the financial storm, liquidation sets in but where the company overcomes the financial storm, she is said to have suffered insolvency. A financial institution such as bank, generally, is considered to be insolvent if its ratio of capital to assets is at or close to zero, or its capital assets are such a poor quality that its continued existence is uncertain. Egbu (2001) asserted that although liquidity refers to a firm's ability to meet debt payment obligations by

having sufficient cash, near cash, credit or its equivalents, however a firm needs not to be liquid in order to be solvent but it is only necessary to be solvent in order to be able to become sufficiently liquid if the need arises. This means that a large working capital balance does not necessarily guarantee that current liabilities will be paid when due. It then follows that the adequacy of working capital as a measurement of liquidity depends on its composition. This reinforces the 'Adequacy concept' of corporate insolvency. George (2008) agreed with the above assertions when he wrote that a person may still have an excess of assets over liabilities, but be insolvent if unable to convert assets into cash to meet financial obligations. It is financial insolvency that often precedes bankruptcy or liquidation. In order to determine the extent of corporate financial distress, it becomes expedite to run a distress test. Ojo (2008) asserted that the objectives of solvency test legal provisions are;

- a. to recognize that in the modern world, the creation of wealth depends upon system founded on credit and that such a system requires as a correlative, an insolvency procedure to cope with its casualties;
- b. to diagnose and treat an imminent insolvency at an early rather than late stage;
- c. to relieve and protect where necessary, the insolvent from any harassment and undue demands by its creditors, balance its rights against those of its creditors whose own position may be at risk because of the insolvency and prevent conflicts between individual creditors;
- d. to realize the assets of the insolvent which should be properly taken to satisfy its debts promptly with minimum expense, to distribute the proceeds of the realization among the creditors a fair and equitable manner while returning any surplus to the debtor and to ensure that the processes of realization and distribution are administered in an honest and competent manner;
- e. to provide a means for the preservation of viable commercial enterprise capable of making useful contributions to the economic life of the country;
- f. to devise a framework of law for the governing of insolvency matters which command universal respect and observance, and yet is sufficiently flexible to adapt to and deal with the rapidly changing conditions of our modern world.

Current genesis of Corporate insolvency in Nigeria

Suleiman (2009) asserted that the recent global economic crisis started in the U.S.A in August 2007 due to certain laxities in the United States Financial system. It spread to Europe and has become global. Suleiman went further to assert that 'global economic crisis' started as 'financial crisis'. Even countries not affected by the financial crisis are now affected by 'second-round effects' and one of such countries is Nigeria. Asein (2009), quoting Rene Ricoi (2009), gave Suleiman's (2009) support in his keynote address, traced the origin of present global financial crisis to the period leading to the summer of 2007, which was characterized by exceptional growth in the distribution of credit, financed through extensive use of leverage within the financial system. Banks following the trends of economic activities sold their loans on financial markets in a totally unregulated manner through structured investment vehicles and other off-balance sheet vehicles. Short-term investors financed these investments which held long-term claims of varying quality. After several years of these macroeconomic conditions and risks associated with these increasingly complex new financial products, which were nevertheless receiving high ratings (implying low risks to investors, financial firms and other users), the market ran into troubled waters of immense depth. Credit default rate spread like wide fire across the globe via inter-bank relations' crisis of confidence with profound losses to investors, pensioners, workers and firms facing huge insolvency problems. Osaze (2011) opined that financial meltdown effect is akin to the melting down of a nuclear reactor which leads to financial crises all around the world with varying effects on national economics, Nigeria not left out.

U.S.A. is a 'Credit' economy unlike Nigeria that is a 'Cash' economy; therefore one wonders how far events that started in the U.S.A. had affected Nigerian Cash economy. Cash Economy is akin to a Developing Economy. FIN24.com (2009) stated that between 2000 and 2008, eight hundred and twenty (820) manufacturing companies had been liquidated in Nigeria. As at 1st January 2005, thirteen (13) other corporate institutions (banks) have been liquidated. The Central Bank of Nigeria had recently bailed out five banks from looming financial distress. Nigeria is an emerging or developing economy whose main focus will be expanding economic intuitions and corporate bodies rather than experiencing very large business failures.

Forms of Financial Indicators of Corporate Insolvency

Financial Statement indicators are indicators that are seen from corporate financial statements. Analysis of financial statements for indicators of insolvency will lead to ascertaining the net worth of the Organization and/or ascertaining the Organization's ability to meet with its current demand for repayments. Atman (1993) agreed with this assertion.

Ross et al (2002) defined financial distress as a situation where a firm's Operating Cash Flow are not sufficient to satisfy current obligations and the firm is forced to take corrective action she should not have taken if it had sufficient cash flow. Altman (1968) came out with two forms of insolvency namely; Stock-based insolvency and Flow-based insolvency. The stock-based insolvency occurs when a firm has negative net worth. In this case, the firm's assets are less than the value of its debts while Flow-based insolvency occurs when operating cash flow is insufficient to meet current obligations. This means that Flow-based insolvency refers to the inability to pay one's debts whether there is sufficient assets or not. The main focus of this research is on flow-based insolvency measurements in Nigeria.

Australian Securities and Investment Commission (2007) listed and explained many combinations of factors that indicate that a company is insolvent. Worreles (2012) while agreeing with ASIC (2007) on these macro-economic indicators added a very long list.

Effects of Pro-Longed Insolvency on Corporate Bodies

Prolonged insolvency usually leads to reconstruction, re-engineering, rightsizing, involuntary takeover, bankruptcy, liquidation and winding-up. Walsh(2003) captured vividly the short term effect of prolonged insolvency as he wrote that a company must maintain sufficient cash resources to pay all legitimate bills as they arise, where the company cannot do so, she is said to have run out liquidity which is a very serious financial condition. The mid-term effect will be that the company's management has lost the power to make independent decisions. An outside agency, such as an unpaid creditor or a bank whose loan is in default will decide the fate of the company. Other effects of lack of working capital or solvency include arrangements and turnarounds.

Mbonu (2000) describes arrangement and compromise as any change in the rights and liabilities of members, debenture-holders or creditors of a company or any class of them effected in line with the provisions of Companies and Allied Matters Act 1990. A compromise or arrangement may be entered into by a company with its members or any class of them, without going into liquidation. NetMBA.com (2007) opined that times of corporate distress present special strategic management challenges. In such situations, a firm may be in bankruptcy or nearing bankruptcy. Often turnaround consultants are brought into the company to devise and execute a plan of corporate renewal, assuming that the firm has enough potential to make it worth saving. Where a business cannot be saved, it is said to have 'failed'.

Walsh (2003) still on immediate, midterm and long term effects of insolvency on corporate bodies wrote that the fate of insolvency could be bankruptcy, a forced reconstruction, an involuntary takeover, or the company could be allowed to continue in some altered form. The reality is that management has lost its authority. It is also likely that the owners have lost their entire investment. Agarwal & Taffler (2007) asserted that administration, receivership or creditors or voluntary liquidation constitute insolvency or business failure. Business failure is concluded via liquidation. Liquidation is another name for winding up of a corporate body. Ibiyemi (1999) citing section 408 of Company and Allied Matters Act 1990 as amended listed the causes of liquidation as follows;

- a. if the company has by special resolution, resolved that the company should would up;
- b. if the company defaults in submitting its statutory reports to the Commission or in holding its statutory meeting;
- c. if the number of its members is reduced below two;
- d. if the company is unable to pay its debts;
- e. if the court is of the opinion that it is just and equitable that the company should would up.

From the above listed reasons for winding up a company, it is of high interest to the researchers to note an item which is 'if the company is unable to pay its debts'. Prolonged inability to pay debts leads to liquidation. A corporate body is adjudicated 'liquidated' by a court of appropriate jurisdiction on application by an aggrieved party or by the corporate body itself.

Ibiyemi (1999) and Mbonu (2000) are of the view that there exist three ways, a corporate body may be wound up. These are;

- i. by the Court;
- ii. voluntary (that is by the members and/or creditors initiated) and
- iii. Subject to the supervision of the court in accordance with provision of the Companies and Allied Matters Act 1990 as amended.

Unegbu (2007) disagreed to the three methods of winding-up propounded above but rather opined that there are two main methods of winding up. They are;

- a. voluntarily winding up
- b. compulsorily winding up

In a voluntary winding up, one or more of the relevant stakeholders in the company had successfully decided that the company be wound up due to any acceptable reason. Voluntary winding up may be initiated by shareholders or by creditors. Olakanmi (2006) and Mbonu (2000) agreed to this assertion:

- a. i. In shareholders (members) winding up process, the assets and liabilities of the must be declared with a statement showing that the company assets will be able to pay in full all the debts of the company. In this type of winding up, shareholders are responsible for the appointment of a liquidator. A liquidator once appointed takes charge of the company and sees to the realization and distribution of the assets of the company to the stakeholders in the order prescribed by law. Olakanmi (2006) concurred with the above and went further to stipulate that in Members' voluntary winding up occurs a statutory declaration of solvency has been made and delivered to the Commission by the directors of the Company. Where this is not done, it shall be referred to as creditors' voluntary winding up as provided in section 462 subsection 4 of the Act. A statutory declaration of solvency is a document made by the directors of the company intending a voluntary winding up, to effect that they have made full inquiry into affairs of the company and that having done so, they have formed the opinion that the company will be able to pay its debts in full within such period not exceeding 12 months from the commencement of the winding up as provided by section 462, subsection 1 of the Act. Sofowora (1992) agreed with the above stipulations of Olakanmi (2006).
- a. ii. In a creditors initiated voluntary winding up happens where the company showed enough indication of her ability to pay creditors as and when due. Under this process, the liquidator is appointed by the creditor(s). Where there is conflict of interest between members appointing liquidator and creditors appointing liquidator, the one appointed by the creditors shall be deemed to be the rightful liquidator.

Reasons for voluntary winding up of a company according to Olakanmi (2006) are;

- a. when the period, if any, fixed for the duration of the company by the articles expires, or the event, if any, occurs, on occurrence of which the articles provides that the company is to be dissolved; and
- b. if the company resolves by special resolution that the company be wound up voluntarily.

Unegbu (2007) concurred with the reasons given by Olakanmi (2006) for voluntary winding up but added to it as follows;

- c. a creditor or group of creditors had successfully obtained the consent of the court to wind up the company because of debt repayment difficulties;
- d. it is in the best interest of members that the affairs of the company be brought to an end.
- b. Compulsory winding up according to Unegbu (2007) is also divided into;
 - i. court order;
 - ii. subject to the supervision of the court.

Olakenmi (2006) quoting section 408 of the Companies and Allied Matters Act outlined the grounds for winding up of a corporate body by a court as follows;

- a. it has passed a special resolution resolving that it be wound by the court;
- b. default is made in delivering the statutory report to the commission or in holding the statutory meeting as provided in section 211 and 212 of the Act;
- c. the number of members is reduced below 2 people;
- d. the company is unable to pay its debts as provided in section 409 of the act.

Unegbu (2007) while agreeing with the above made the following additions;

- e. the company could not commence business after six months on obtaining certificate of incorporation; (to others, this amounts to deletion of company from the register of the Commission)
- f. if the court deems it fit and proper and for public interest to wind up the company.

Sofowora (1992) captured it vividly in winding up subject to the court supervision in the same way Unegbu (2007)

had it, quoting section 410 subsection 1 of the Act which states that if a company passes a resolution for voluntary winding up, the court may on petition, order that the voluntary winding up shall continue but subject to such supervision of the court. To a lay man's understanding, even voluntary winding up may turn into 'winding up subject to court supervision' on receiving petition from any or combination of the following;

- a. the company;
- b. creditor(s);
- c. a contributory;
- d. the corporate affairs commission;
- e. a personal representative of a creditor or contributory.

Ibiyemi (1999) listed the effects of the Court order on winding up as follows;

- i. immediately the winding up order is made, the official receiver, by virtue of his office, becomes the provisional liquidator, if one had not been appointed before then;
- ii. no action shall be proceeding with, or commenced afresh against the company except by leave of the court as provided by section 417;
- i. any disposition of the property of the company and any transfer of shares or alteration in the status of the members after the commencement of the winding up is void unless the court otherwise orders;
- ii. on the appointment of a liquidator, the powers of the directors cease as provided in section 422 subsection 9 and
- iii. Once the winding up order has been made, the services of the company's servants become terminated.

Reasons for Corporate Insolvency Prediction Studies

It is a known fact that many failed businesses worldwide would probably still be in existence today if, and only if their managers were warned early enough about the impending catastrophe on their firms (Worrels 2012). The introduction of an "early warning" tool that could effectively predict and warn about financial problem spots is necessary now that it seems that the application of the present tools of financial management can no longer highlight effectively, possible financial problem points which managers need to know in order to detect notable signs of insolvency and reduce the consequent rising rate of insolvency and business liquidations worldwide. Therefore, the research problem under investigation here is that bankruptcy and business liquidation will continue to take their tolls on business enterprises worldwide unless there is an effective insolvency predictive tool and reliable prior information generation system to act as an early warning device which will guide managers on the best way to avoid actions that could lead to insolvency in their daily decision making process. In the words of Sung, et al (1999) corporate bankruptcy brings with it economic losses to management, stockholders, employees, customers, and others, together with great social and economical cost to the nation. Corporate failures exert negative pressures on the economy. It dries up household feeding hands and breed crimes, thus the need to undertake a study of Nigerian Corporate Insolvency becomes necessary to expedite.

Tools for Solvency Management

Methods of sustaining Organizational solvency includes but not limited to:

- (i) Organizational efficiency and effectiveness: The measurement of organizational efficiency underscores in real terms the viability and feasibility expectancy of that organization. How effective an organization becomes is a matter of how competent the overall management is. Efficiency is a function of effectiveness but the two are jointly used to appraise the consequential outcome of the operational activities of an organization which in turn determines the feasibility expectancy of that organization. Efficiency is less precise and definite than effectiveness in that it denotes the relationship existing between inputs and resultant outputs (Anyigbo 2004). It was further asserted that more efficient organizations produce more outputs, using the same amount of given inputs (Anyigbo 2004, citing the works of F.W. Taylor). Implicit in this concept is the notion that workers are lazy, detest work and may become wasteful. Perhaps, a better approach towards understanding the effects of organizational efficiency lies in the study of the learning curve theory. The "going concern" posture of an organization is greatly anchored on the continued solvency of that organization. Solvency in turn is determined by the continued viability of the firm; and viability of any organizations is (most certainly) a function of the organizational efficiency.

- (ii) Working Capital Management: working capital represents the circulating capital of an organization and it may comprise of;
 - i. Stocks of trading goods, raw materials work-in-process and stationeries.
 - ii. Debtors
 - iii. Marketable securities and other short term claims on third parties and other receivables

The definition of working capital is however, incomplete without the other side of it; the current liabilities –which include short term claims by third parties on the business. Working capital is the net difference between the organization's current assets and the current liabilities. *Van Horn (1977)* described working capital management as the administration of current assets in the name of cash, marketable securities, receivables and inventories. According to *Osisioma (1997)*, working capital management is the regulation, adjustment and control of the balance of current assets and current liabilities of a firm such that maturing obligations are met, and the fixed assets are properly serviced.

Continuing, *Osisioma (1997)* opined that good working capital management must ensure an acceptable relationship between the different components of a firm's working capital so as to make for an efficient mix, which will guarantee capital adequacy. In the same vein, working capital management should seek to make available to the management the desirable quantities of each component of the working capital. The common components of working capital for most organizations include cash, debtors, receivables, inventories, marketable securities and redeemable futures. The question as to the adequacy of each component is a matter of conjecture based on more stringent measure tailored in accordance with the need, size and scope of the operations of the firm. Insolvency and other unsavory financial problems occur as a result of the inability of the management to identify this need, size and scope and the corresponding quantity of each component of working capital necessary for them.

- (iii) Financial Management: This refers to a decision making process in the prudent utilization of capital resources of a business enterprise (*Okeke, 2000*). Financial management can also be defined as the management of business capital resources (*Ezeagba, 2000*). In other words, financial management can equally be said to cover the core subject of management since it is also seen that the main objective of management is equally anchored on the prudent utilization of capital resources in the achievement of an organizational goal. Financial management provides the basis for business planning, investment, diversification and cash flow statements (*Okeke 2000*). Thus, it can rightly be said that the objective of financial management in any organization revolves around prudent management / utilization of the capital resources of that organization towards the achievement of its primary goals in business. To achieve this objective, the firm needs to attain high efficiency in its financial management because the major reason for poor performance is usually weak and ineffective financial management. *Enyi (2006)* asserted that the major tools of analysis for financial records are ratios.

Ratios are figures obtained by comparing actual outcome with an expected outcome usually expressed in decimal fractions, percentages and sometimes real numbers. Ratios are useful for comparative analysis of facts and for feedback. Without adequate/accurate feedback, there will be no control or corrective decision making, hence, plans and objectives may become difficult, if not impossible, to attain. *Enyi (2006)*, in his contribution, is of the view that the common tools currently used for analysis of financial information include:

- a. Aggregate Business Ratios: They are figures representing a statement of fact; for instance, the business net worth figure shows the actual worth of the business unencumbered at a particular date. Unless the net-worth is negative, it is meaningless until compared with another company's or period. Same goes for the aggregate income. It states in figurative terms the net excess of all revenue over all expendable costs and may go further to show the viability of the business.
- b. Business Solvency Ratios are those ratios that revolve around the financial solvency and viability of a business. They border on liquidity and hence, going concern principle of the business enterprises. Though, these ratios depend to a great extent on the profitability of the operational activities of a business, they are the main tool upon which financial analysis concerning the liquidity and the ability to meet financial obligations are based.

In summary, financial management function covers a wide and most strategic area of the management of an enterprise such as Financial planning, Sourcing, Working capital management; and Maintaining the life span or "going concern" principle of the organization.

- (iv). Use of Corporate Solvency Stress Tests: Unegbu et al (2011) discovered that there is a declining use of ratios in many financial management decisions. Despite the usefulness of ratios, "new generation managers" seem to be moving toward the elimination of univariate analysis which in the financial arena is popularly called ratio analysis as an analytical technique in assessing the performance and solvency management of the business enterprise (Unegbu et al 2011). The new focus of financial management is geared towards the use of solvency prediction tools in addition to other statistical and analytical tools. Solvency stress tools include the use of Z-Score and Operating Cash flow models.

Exploratory review of Insolvency Conceptualizations

An author in BusinessDictionary.Com defined 'Insolvency' a situation where the liabilities of person or firm exceed its assets. In practice, however insolvency is the situation where an entity cannot raise enough cash to meet its obligations, or to pay debts as they become due for payment. In line with the above conceptualization of insolvency, Carter (2011) did a brief exploratory study on the differences between 'Insolvency' and 'Bankruptcy'. According to him, it is common for people to confuse insolvency and bankruptcy. Carter (2011) went further to assert that a company can be insolvent without being bankrupt. Insolvency leads to bankruptcy. In summary, according to Carter (2011), insolvency might just be a temporary situation but bankruptcy is final state of a going concern, going off into oblivion. Peterson (2012) while agreeing with Carter (2011) went further to add that the concepts of insolvency, bankruptcy and liquidation are used both for financial and legal fields. In certain countries (Britain and Nigeria), bankruptcy is applied to individual and insolvency to businesses but in U.S the term bankruptcy applies to both individuals and corporate entities. Apart from application of these terms in different countries, their conceptualizations also differ. The research works of (Shultz 1995 and Franks et al.1996) highlighted these differences. According to them, countries such as the US the insolvency laws are debtor oriented. Corporate bankruptcy in the U.S procedures encourages companies in financial difficulty to continue as going concerns. Therefore it is possible for companies that file for bankruptcy to reorganize and emerge from bankruptcy, or to merge with another entity as a going concern. In a debtor oriented bankruptcy concept, it is the Company (debtor) that acknowledges insolvency and files for adjudication of such from a competent court of law. It is a protective measure taken by the debtor entity against further use of her resources aimed at ensuring that her creditors are paid according to available resources or in full after a successful reorganization. This is in contrast to the insolvency procedures in creditor oriented countries such as the UK, Germany, Australia, Nigeria and New Zealand where liquidation is the most common outcome of corporate insolvency (Kaiser, 1996; Franks et al., 1996). In a creditor oriented insolvency conceptualization, it is the creditor entity who will file a case to appropriate court of law asking that the court declares the debtor insolvent for inability to make payment as and when due. In conclusion, Agarwal and Taffler (2007) vividly stated that the use of the word 'bankruptcy' in the USA is different in conception from that of the United Kingdom or Nigeria. According to them, 'bankruptcy' in the United Kingdom applies to individuals that have been adjudicated insolvent by a relevant court. Agarwal and Taffler (ibid) in support of Njemanze (2003), asserted that the Nigerian conception of insolvency is the same with that of United Kingdom where an insolvent person may be declared bankrupt, while an insolvent corporate body may be placed under receivership/manager-ship and later on (if not well reorganized) goes into liquidation. In this research, both words were used interchangeably, depending on the context.

Recent Studies of Z-Score Efficacy in Nigerian Business Failures

Enyi (2005) conducted a study in order to pin-point probable hidden deficiencies in the existing working capital management tools vis-à-vis the current, liquidity, capital adequacy and capital gearing ratios, which have so far culminated in their seeming failure to foresee financial problem spots of an enterprise. The study particularly focused on the need to develop and proffer a lasting solution or remedy. Enyi (2005) study focused mainly on the use of Z-Score to detect Banks that considered insolvent and those that are solvent considering their then current capitals. Olaniyi (2006) examined bankruptcy prediction through financial strength analysis, a case study of Trade Bank Plc and asserted that apart from profitability ratios, performance evaluation ratios, and liquidity ratios, the outcomes of Z-Score prediction is a good indicator of bankruptcy region useful for adjudging the financial healthiness of a corporate body. The relevance of this study is that it was not only conducted in Nigeria but it also added to the repository of knowledge by asserting that Z-Score prediction is a good indicator of the state of financial health of the bank, three years before it failed.

Ugwunta and Okelue (2012) The study applied Z-Score model in predicting group of failed and healthy banks in Nigeria to ascertain if Z-Score is a veritable tool to predict business failure in the Nigerian banking industry. The result of the study is that Z-Score not only predicts business failure but revealed that the warning signals of impending failure became manifest for one to two years before the studied banks actually failed.

RESEARCH METHODOLOGY

Sampling technique and Sample size determinations

Jackknife sample selection technique of three hundred and fifty (350) failed corporate bodies were chosen for analysis. The period covered by this post-failure investigation is from years 2001 to 2010. The cut-off period is selected as a result of increased corporate failures in Nigeria within the period.

The sample size selected for each industrial sector of Agriculture, General Services, Oil Services, Transport & Aviation, Merchandising and Manufacturing is Fifty (50). The sample selection strategy adopted is availability of two years financial statements prior to the failure year. In essence, the financial statements analyzed for each sampled firm is two and three years financial statements before the company failed. The range of two years prior to failure are selected for its strategic of ascertaining Z-Score's ability to generate looming signals before the firm failed and more importantly in order to test research formulated null hypotheses.

Techniques of Data Analyses and Testing

The appropriate Z-Score variables for quoted and non-quoted companies were professionally extracted. Univariate and Multivariate Analysis at 5% significant levels were employed in testing of results against formulated null hypotheses. Where necessary, Percentages were used for further explanations. SPSS software version 16 facility is used in running the analyses.

DATA PRESENTATION AND RESULTS

Data Presentation

Table 4.1: Z-Score Predictions across Industrial Sectors for the 2nd and 3rd Years prior to Failure

Sectors	Rightly Predicted as Heading Towards Failure	Wrongly Predicted as Not Prone to Failure	Total sampled Frequencies
Agriculture	78	22	100
General Services	45	55	100
Oil Services	67	33	100
Transport & Aviation	53	47	100
Merchandising	39	61	100
Manufacturing	84	16	100

Source: Analysis of Failed Firms for two year's financial statements.

TESTING OF HYPOTHESES AND DISCUSSION OF RESULTS

Ho₁: Z-Score model is not a significant effective tool for predicting corporate failures from financial statements of Nigerian Companies.

To test this hypothesis, the data in table 4.1 were used and test-running it with Univariate analysis, the result is as seen in table 4.2.

Table 4.2: Univariate Test Results of Outcome of Predictions using Z-Score model

Source	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Contrast	Outcome of Predictions	17.617	6	2.936	13.461	.000
	Frequencies of Occurrences	49517.509	6	8252.918	36.567	.000
Error	Outcome of Predictions	151.160	693	.218		
	Frequencies of Occurrences	156405.600	693	225.694		

The outcome of the test-running showed that Z-Score is adjudicated as a significant effective tool for predicting corporate failures from financial statements of Nigerian Companies. This decision is reached because the outcome of predictions with F-value as high as 13.461 is 0.0001 which is significantly less than 0.05. The outcome of the result thus led to the rejection of the null hypothesis which states that Z-Score model is not a significant effective tool for predicting corporate failures from financial statements of Nigerian Companies.

Testing of hypothesis two

Ho₂: The Z-Score predictive ability across selected industries in developing economy is not significantly different. To test this hypothesis, parameter estimates from Multivariate analysis is employed so as to test the effectiveness of Z-Score on each of the selected sectors. The outcome of this is depicted in table 4.3. In carrying out the test in order to clearly make apparent the predictive effectiveness of Z-score on each of the sampled sectors, a dummy sector (sector 7) was inserted with 50% of right and wrong predictions. The dummy sector served as yardstick of comparisons.

Table 4.3: Parameter Estimates Z-Score on each of the Sampled Sectors

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Outcome of Predictions	Intercept	.500	.047	10.706	.000	.408	.592
	[Sectors=1]	-.280	.066	-4.239	.000	-.410	-.150
	[Sectors=2]	.050	.066	.757	.449	-.080	.180
	[Sectors=3]	-.170	.066	-2.574	.010	-.300	-.040
	[Sectors=4]	-.030	.066	-.454	.650	-.160	.100
	[Sectors=5]	.110	.066	1.665	.096	-.020	.240
	[Sectors=6]	-.340	.066	-5.148	.000	-.470	-.210
	[Sectors=7]	0 ^a	.	.	.	.	.
Frequencies of Occurrences	of Intercept	50.000	1.502	33.282	.000	47.050	52.950
	[Sectors=1]	15.680	2.125	7.380	.000	11.509	19.851
	[Sectors=2]	.500	2.125	.235	.814	-3.671	4.671
	[Sectors=3]	5.780	2.125	2.721	.007	1.609	9.951
	[Sectors=4]	.180	2.125	.085	.933	-3.991	4.351
	[Sectors=5]	2.420	2.125	1.139	.255	-1.751	6.591
	[Sectors=6]	23.120	2.125	10.882	.000	18.949	27.291
	[Sectors=7]	0 ^a	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

The outcome of the hypothesis two tests as shown in table 4.3 led to the rejection of the null hypothesis which states that the Z-Score predictive ability across selected industries in developing economy is not significantly different. The result did show that Z-score predictive ability across selected industries in developing economy is indeed significantly different. While the predictive ability of Z-Score is significantly effective for Agriculture, Oil Services and Manufacturing sectors, it is insignificant for General Services, Transport & Aviation and Merchandising. The variations and directions of this different levels of significance/insignificance are captured in percentages by table 4.4.

Table 4.4: Industrial Sectors * Outcome of Predictions Cross-tabulation percentages

			Outcome of Predictions		Total
			Rightly Predicted to be heading to failure	Wrongly predicted as not prone to failure	
Industrial Sectors	Agriculture	Count	78	22	100
		% within Outcome of Predictions	21.3%	9.4%	16.7%
	General Services	Count	45	55	100
		% within Outcome of Predictions	12.3%	23.5%	16.7%
	Oil Services	Count	67	33	100
		% within Outcome of Predictions	18.3%	14.1%	16.7%
	Transport & Aviation	Count	53	47	100
		% within Outcome of Predictions	14.5%	20.1%	16.7%
	Merchandising	Count	39	61	100
		% within Outcome of Predictions	10.7%	26.1%	16.7%
	Manufacturing	Count	84	16	100
		% within Outcome of Predictions	23.0%	6.8%	16.7%
Total		Count	366	234	600
		% within Outcome of Predictions	100.0%	100.0%	100.0%

The results in percentages as shown in table 4.4 affirms the rejection of the null hypothesis which states that Z-Score predictive ability across selected industries in developing economy is not significantly different. As captured by table 4.4 results, Agricultural sector had 21.3% rightly predicted by Z-score while General Services, Oil Services, Transport & Aviation, Merchandising and Manufacturing were rightly predicted at 12.3%, 18.3%, 14.5%, 10.7% and 23% respectively.

The outcome showed that the order of Z-score significant predictive effectiveness across industrial sectors is Manufacturing, Agriculture, Oil Services, Transport & Aviation, General Services and Merchandising. This order of significance of effectiveness of Z-Score on selected industrial sectors of developing economy notwithstanding, table 4.3 apparently depicted that while the model is significantly effective for predicting corporate insolvency for Agriculture, Oil Services and Manufacturing, it is insignificantly effective for others.

FINDINGS AND CONCLUSION

The outcome of the research shows that Z-score model is a significant effective tool for predicting corporate failures from financial statements of Nigerian Companies before they failed. It is also found that the predictive ability of Z-Score across Industrial Sectors in a developing economy is significantly different. Z-Score Corporate Insolvency predictive Model is found to be significantly effective for Agriculture, Oil Services and Manufacturing sectors. However the model is found not to be significantly effective for predicting corporate insolvency of corporate bodies operating in General Services, Transport & Aviation and Manufacturing sectors.

In conclusion, the use of Z-Score Corporate Insolvency Prediction Model should be applied with caution in forecasting corporate failures in General Services, Transport & Aviation and Merchandising sectors in a developing economy.

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