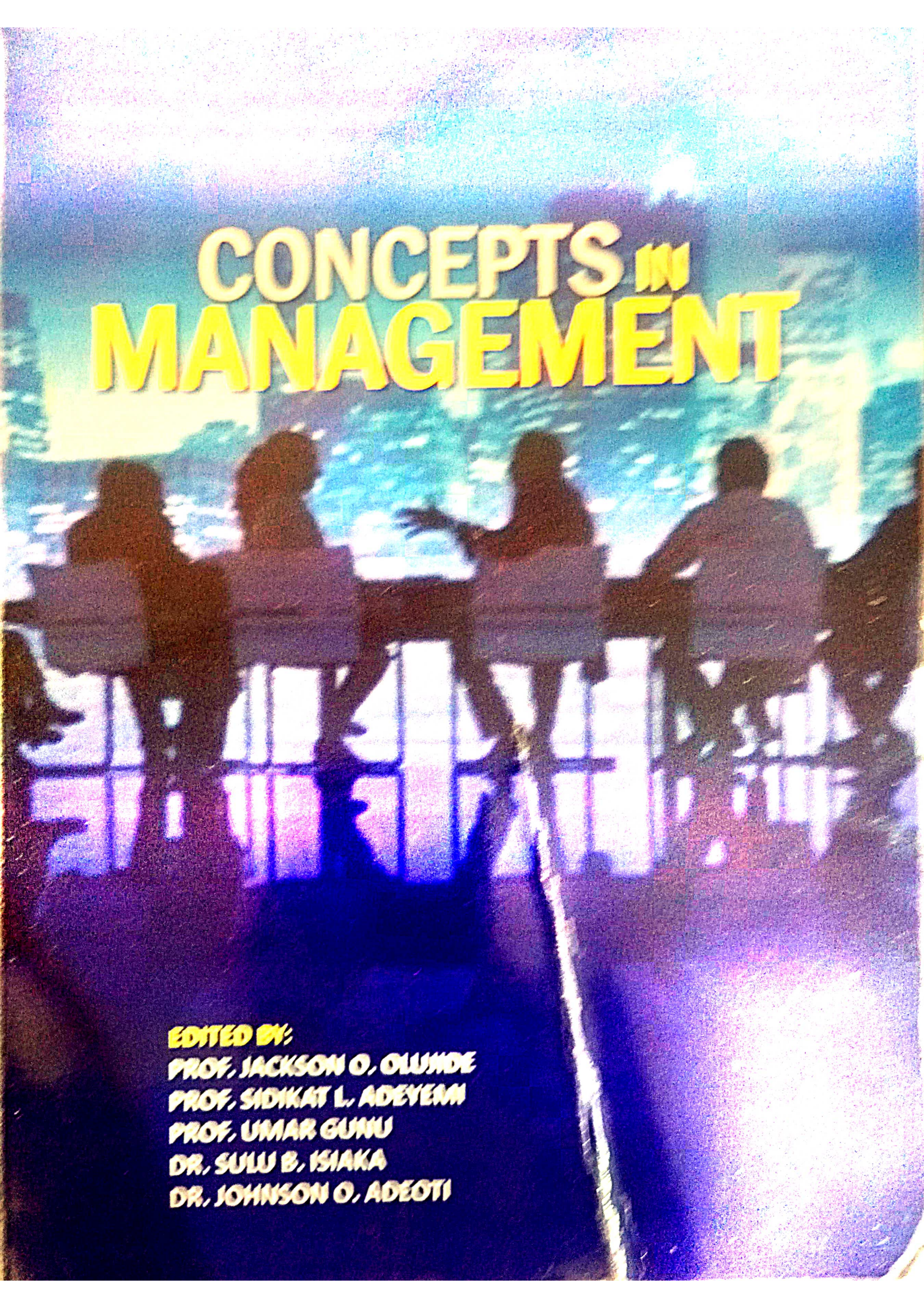




CONCEPTS ^{IN} MANAGEMENT

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Chapter Ten

FINANCIAL DISTRESS PREDICTION: A SURVIVAL AND TURNAROUND APPROACH


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Introduction

In the last three decades, Nigeria's economy has witnessed a great decline in organisational performance due to corporate failure in almost all sectors. The rate at which profitable businesses go into extinction is very alarming with colossal implication evidenced by decrease in overall standard of living, loss of jobs, decline in Gross Domestic Product (GDP), and general social disequilibrium in the macro-economy. The economic liberalisation in 1992 exposed Nigerian companies to large scale domestic and international competition. While few firms confront the situation, a reasonable number of organisations were adversely affected and were in financial distress (Adeyemi, 2011). Financial distress is a state when a firm cannot meet or face difficulty in paying off its financial obligations to all stakeholders. The chances of corporate financial distress increase when a firm's fixed costs are high, assets are illiquid, or there is a fall in revenues. These situations led most companies to bankruptcy and an eventual collapse.

The distress scenario observed in virtually all the sectors of the Nigeria economy has a negative effect on the expected growth and development. The noticeable failure in the banking, brewing, textile, agriculture, oil and gas, consumer goods companies and many more posed serious problems to developing countries like Nigeria because the consequences are huge and capable of hindering expected growth and development. Early prediction and application of remedial measures will ravage most of these problems. There are several business decisions. But, one of the most paramount decisions in any business that have continuity and survival as one of its objective is the solvency decision. The consequences of failure are enormous and far reaching on the business firms, the society where they operate and the economy at large. Corporate failure often results in major costs; direct and indirect costs to stakeholders, such as shareholders, suppliers, customers, managers, creditors, employees, investors, auditors, and the community. Likewise, financial distress leads to direct and indirect costs on the firm. Direct costs include tangible and any other expenses paid for the purpose of liquidation or a means of reorganisation towards rejuvenations of the ill enterprise. These direct costs include legal cost, bankruptcy fees, accountants' levy and other professional services in a case of liquidation; loss sales because of perceived failure, which leads to decline in firms' profit, are classified as indirect cost. Customers are always willing to buy from the firms that are stable to deliver on promise rather than the ones that might fail. In the same vein,

suppliers are reluctant or less generous in offering credit facilities to the firms that might soon close down their operations. This impaired relationship has adverse effect on the firm and may even worsen the situation leading to bankruptcy.

To ensure sustainable economic growth, it is crucial to control the number of businesses that failed. Corporate solvency must be controlled in the most effective manner to guarantee the systematic growth and continued existence of such organisations. However, to control a firm's liquidity therefore, it is imperative to make use of tools that are more proactive rather than reactive in their general approach towards detection and remediation of the possible danger. The most valuable tool for any business organisation must be the one that gives an "advance" warning of an impending disaster rather than the sign of it, as symptoms only manifest when a patient is already under attack.

Organisations are faced with risks which hinder their growth. These kinds of risks include political insecurity, fierce competition from international companies and instability of monetary and fiscal policies. The risk of default, bankruptcy or failure is one of the vital risks in businesses. Risk is not 100 percent avoidable in any business but predictable and it can be effectively managed. The signs of possible corporate failure become evident months or years before the actual bankruptcy materialises. Actual prediction of declining business activities leading to bankruptcy gives room for corrective measures or actions by the stakeholders. This chapter, therefore, evaluates financial distress prediction from the perspective of firm's survival and turnaround strategies.

Concept of Bankruptcy, Insolvency, Default and Failure

Bankruptcy is defined as the net worth state of an enterprise, which can either be a formal or legal statement, supported by a petition to either dissolve firms' assets or try a recovery programme (Altman, 2006). Rejuvenation programme is legally defined as insolvent reorganisation. The legal reorganisation is an official process that is regularly the last evaluation in a sequence of attempted remedies.

Insolvency is another concept depicting the negative performance of a firm and it is used usually in technical terms. Technical insolvency occurs only when a firm does not meet-up its current obligations, indicating poor liquidity position (Altman, 2006). It may be a temporary condition but, if often, it is the instant cause of legal bankruptcy declaration. A situation of critical insolvency is when firm's total liabilities are more than the fair valuation of its total assets. Therefore, the firm records a negative real net worth.

Failure as distinct from other concept, and based on economic criteria, is defined as the realized rate of return on invested capital, including allowances for risk consideration, which considerably and continuously on similar investments, is lower than predominant rates. Different economic measures have been used, including deficient income to cover expenses and cases of an average return on investment being lower than the firm's cost of equity. There are no statements about the presence and discontinuance of any entity in this economic situation. Normative conclusions to stop activities is based on the likely returns and the capability of the variable cost of a firm to cover up. It suffices to say that business enterprise could be in economic breakdown for many years, and still fail to meet up its obligations due to the total or little absence of lawfully enforceable debt (Whitaker, 2000). Altman (2006) opined that when a company fails to continually meet the rightfully enforceable creditors demands, it is often called legal

failure. Although, legal as a word can be misleading due to its condition, it may occur without formal court contribution. Similarly, business failure can be referred to as business operation that terminates following obligation or bankruptcy. It involves companies that terminate operation with debt to creditors after actions such as attachment, execution or foreclosure; or those that withdraw voluntarily, without paying unsettled obligations; or those involved in court actions as arrangement, receivership or reorganisation; or those that willingly co-operate with creditors.

Another condition associated with distress is default. Default can either be technical or legal and would always involve the association between the debtor and creditor. Technical default takes place when a debtor breaches a state of contract with a creditor. This can be the grounds for a legal action (Altman & Hotchkiss, 2006).

The Concept of Financial Distress

Harris and Gibson (2006) described financial distress in a broad perspective as a costly occurrence that affects the relationship with non-financial stakeholders and debtors. Consequently, a company increases its weak access to fresh capital thereby bearing the increased costs of maintaining this disturbed relationship. As a regulation, "financial distress" as a term is used in negative situations to describe the financial state of a company faced with a temporary liquidity deficiency and with complications that arise in the fulfilment of the financial obligations on plan and to the full extent (Galloway & Jones, 2006).

Bwisa (2010) argued that the advancement of financial distress theory is a process having specific dynamics. Financial distress, as Gordon (2001) highlighted, is only one phase of the process, accompanied by failure then restructuring, and should also be defined in relation to security valuation and financial structure. The corporation encounters this situation when its earning generating ability becomes weaker and the sum of debt is greater than the value of the company's total assets.

Whitaker (1999) understood financial distress as a vital occurrence that differentiates the time of a company's financial health from its financial illness thereby taking corrective measures to overcome the disturbing situation.

Gestel, Baesens, Suykens and Willekens (2006) categorised of financial distress into two. The first one is non-payment of a debt; the second is an attempt to restructure debt to avoid the default situation. Financial distress arises when a company lacks the ability to fulfil its liabilities to the third parties. Increase in commercial banks and delisted of public companies non-performing loans in Nigeria is a distinctive phenomenon of corporate financial distress (Ayeni, 2012). Gestel, Baesens, Suykens and Willekens (2006) illustrate failure and financial distress as the outcome of chronic losses caused by a disproportionate increase in liabilities which is followed by reduction in the asset value.

Turetsky and MacEwen (2001) explain financial distress as a sequence of successive stages characterised by a distinct set of opposing financial events. Each stage having a distress point which continues until the next distress point is reached. Each stage of financial distress technically is an interval between two distress points. The beginning of financial distress starts with having a volatile decrease from a positive cash flow to a negative cash flow. The reduction shows the change to the next phase of financial distress leading to default. Technical default on debt leads to troubled debt restructuring usually

reducing the risk of probable bankruptcy. Thus, for the first time, researchers thrived at describing financial distress as an unceasing process with a clear structure and a classification of the distress events.

Business Failure Indicators

A financially distressed company is one whose Earnings Before Interest and Taxes (EBIT) is lower than its interest expenses. Financial leverage encompasses the replacement of fixed-cost and debt for owner's equity in light of increasing equity returns. Financial performance is improved by financial leverage when financial business prospects are positive but negatively impact financial performance when things are going poorly. Therefore, increasing the ratio of debt to equity in a firm's capital structure implicitly makes the firm fairly less solvent and financially riskier than a company without debt (Bello, 2010). Capital adequacy is the ability of a firm to have sufficient capital to finance its plans. If a firm's capital is inadequate, then it must be able to either successfully issue new equity, acquire new debt or merge. The amount of debt a company can successfully absorb and repay from its continuous operations is referred to as the company's debt capacity (Thynne, 2006). The following are the firms' failure indices:

- *Poor Cash Flow*

Many small and newly formed businesses have single most important reason for business failure. This problem arises when the cash inflow is not sufficient to cover the costs of production. It is central to note that it is the availability of money to pay debts as at when due that is the most paramount in business survival, not just ability to generate revenue to cover cost (Patrick & Ooghe, 2004).

- *Poor Business Planning*

Many businesses before receiving loans or financial help from a bank have to put together a business plan. These plans take time and effort that are crucial for success. Poor information or bad planning on which the plan is to be based would likely lead to difficulties for the firm (Chiritou, 2002). Any businesses that are based on faulty or poor plans will soon be in serious danger of failure.

- *Reduction in Product Demand*

A fall in sales might be a sign that there is something wrong with either the price or the product or an aspect of marketing mix being used. Often, falling sales could be due to competitors providing a better service or product. For any firm to revert this, it is important to identify the causes of fall in demand and developed appropriate measures to curb the menace (Moyer, 2006).

Changes in fashion, taste and technology can lead to demand for products to fall - the firm needs to be cognisant of these trends. Demand can fall for other reasons out of the firm's control. It might be as a result of change in economic climate of the country. People may intend to cut down their spending due to economy downturn (Sipika & Smith, 2002).

- *High Overhead*

To develop a high profile image for a company by acquiring a fancy logo, an expensive office space and website most time does not contribute to the success of the business. Moreover, high overheads can drive out any business very fast, since the golden principle for the successful business is to keep low overheads especially at the early stage (Argenti, 2003). Customer base diversification is an important influence in building the business, also being able to flexibly adapt to new trends and ideas is vital to staying in business (Eidleman, 2003).

- *Lack of Control over Costs*

Production costs can rise for quite a number of reasons. It could be because of increase in prices of raw materials, increase in wages, payment by businesses for meeting some new legislation or standard and so on. Most times, such changes could be in a firm's plan and they might also have the capacity to consider them. But when an unexpected rise in costs arise, it can catch a firm by surprise and result into insolvency (Kip, 2002).

- *Uncontrolled Growth*

Another cause that may lead a firm to fail, if not handled properly, is uncontrolled growth. Obesity in an individual's health is also a business problem. For a business to experience growth, proper planning must be in place. A professional management team to oversee the affairs of firms through proper systems as well as control and flexible organisations are required for a successful growth (Eidleman, 2003).

The Costs of Financial Distress

In theory, bankruptcy and financial distress can impose costs on stakeholders other than the firm's capital owners (Taffler, 2001) to a large extent that. Financial distress and bankruptcy are costly. If these costs are inevitable, then virtually all corporate financial decisions will be affected by such costs. Thus, the magnitude of financial distress and bankruptcy costs is an important empirical question.

- *Direct Costs*

Direct costs are the administrative, advisory and legal fees that are incurred by the firm because of the formal liquidation process. Millihni (2003) calculated the direct cost to be approximately 4% of the pre-bankruptcy value of the firm, with a sample of railroad bankruptcies from 1933 to 1955. Weiss (1990) as cited in Kip (2002) used 37 bankrupt firms as sample between 1980-1986, thereby calculating the direct costs to be approximately 3% of the firm's pre-bankruptcy value. Altman and Hotchkiss (2006) offered a summary of direct bankruptcy cost estimates in their literature. All the study's findings suggest that the cost of direct bankruptcy are not likely to signify a substantial factor of the capital structure decision of the firm.

- *Indirect Costs*

Potentially, the indirect costs of financial bankruptcy and distress are more relevant and significant because of the indirect nature and effect on the stakeholders and

the firms. These indirect costs can be seen as opportunity costs because they identify the result of sub-optimal decisions collectively by stakeholders when the firm is financially bankrupt (Altman & Hotchkiss, 2006). Thus, costs incurred as a result of holdout problems, higher operating costs, intra or inter-group conflicts of interest, lost sales, competitive positions, ineffective time management and asymmetric information, potentially represent bankruptcy indirect costs altogether.

Concept of Financial Distress Management: Turnaround Strategies

Whitaker (2009) categorised financial distress into two; distress as a result of economic decline (common factors), and distress due to poor management (firm specific distress). There are various strategies for corporate financial distress turnaround. These include:

- Managerial Restructuring

One of the main conditions argued for changes in top management in a firm's turnaround is that it gives signal to creditors that steps are being taken to rejuvenate distressed firm (Richardson, 2004). The cause of financial distress may be due to incompetent managers through ineffective planning or inefficient decision-making. This is defined as firm-specific distress. Managers need to be replaced with managerial teams that canvass the distress source accurately and implement necessary strategies for a successful turnaround (Stead & Smallman, 2000). Perez (2006) also emphasized significance of management in turning distressed firms around. He argues that, managers that lack the necessary skills to respond efficiently and in a timely manner will result in continuous performance decline and then eventual failure of the firm.

Sudarsanam and Lai (2001) suggested that creditors, if reassured that management will be able to manage distress, will solely give financial support. In a study by Taliani (2010), he found that 36% of the sampled firms experience managerial turnover in top executives following decline in performance.

Managerial restructuring involves the replacement of senior management and/or the Chief Executive Officer (Beheran & Palmer, 2004). Overall, managerial restructuring may be a crucial determinant in the turnaround process of a distressed firm.

- Operational Restructuring

Operational restructuring is defined as the efficiency or operating turnaround strategy. The turnaround strategy aims at restoring profitability by controlling costs and overhead reduction through the sale of their unprofitable lines of business that are not essential to firm's operations (Agarwal & Taffler, 2008). In the study of Chiritou (2002), he posited that poor performing firms will be inspired to divest lines of business that do not create competitive advantage. By minimising input and maximising output, firms can generate cash flow (at least in the short term) thereby increasing liquidity. When distress becomes obvious, operational restructuring is the first strategy usually implemented. Although important, operational restructuring is basically a short term fix for generating quick cash flow. Sudarsanam and Lai (2001) argued that operational restructuring when used as a stand-alone strategy, may not be enough to recover from distress. Past literature reveals that operational restructuring in form of purchases are less likely than sales.

Nevertheless, if productivity can be increased significantly, new plants, equipment or investments in more advanced technology may be built by distressed firms.

- *Asset Restructuring*

Firms in distress may sell off surplus fixed resources such as equipment, offices and land. Such firm is said to be engaging in asset restructuring. The purpose of this form of restructuring is to adjust the effort of the firm by decreasing unrelated diversification and strategising the business portfolio around core competencies (Adeyemi, 2011). Asset restructuring permits a firm to re-evaluate its operations and rearrange its business units into more efficient groups. This form of restructuring is very necessary if agency costs have caused over diversification by management.

Though, in distress companies, one of the leading form of corporate asset restructuring has been found to be contraction policies (Engelman, Hayden & Tasche, 2003). It could also be referred to as actions increasing the firm size such as joint ventures, investments, licensing agreements and strategic alliances (Sudarsanam & Lai, 2001). For instance, through economies of scale, acquisition of similar businesses that fit core competencies could help to maximize the competitive advantage of distressed firms. As they involve capital expenditure from firms already facing low cash flows, these restructuring strategies becomes risky. Small firms will basically have lower cash reserves. This form of restructuring may not be appropriate or possible.

- *Financial Restructuring*

Financial restructuring commonly refers to variations in the capital structure of the firm with reference to leverage. It seeks to decrease pressure of payment through debt-based and equity-based strategies. Debt-based strategies involve the adjustment of interest, maturity, or debt/equity ratio, while equity-based strategies involve dividend cuts or issuance of shares as a way to hold or generate funds. Dong and Su (2010) found that large firms are expected to respond to distress with quick and aggressive dividend deductions. Retained funds are then able to be used to pay debt obligations.

- *Restructuring Effectiveness*

Sipika and Smith (2002) found that the size of a firm controls all other variables in predicting successful conclusion of the reorganisation process. Large firms with assets variability are more likely to restructure successfully as they are better able to have several businesses to serve as the fundamental, survive significant losses, and have enough assets which can be sold to provide cash to continue operations. Sudarsanam and Lai (2001) found that firms that recover are more likely to be involved in acquisitions and investments in their restructuring decisions. This means that, distress recovered firms are more forward looking, expansionary, and have an external market perspective. Firms that failed to recover from distress are found to be more focused internally and get involved in short term fire-fighting techniques of financial and operational restructuring.

Stein (2005) also argued that fruitful turnaround is dependent on the ability of the firm to change its structure, strategy, and ideology instead of cost-cutting tactics or short-term efficiency restructuring basis. They found that effective restructuring is as a result of shifting the strategic change to suit the market demands and the competitive environment

in which a firm operates. Layoffs and cost-cutting are found to be ineffectual strategies by Taliani (2010) who posits that operating performance improvements are mostly attributed to asset restructuring.

Corporate Governance Attributes and Firms' Survival: A link

The central strategic question is the reason why firms succeed or fail. Corporate governance is the order by which companies are directed, managed and controlled (Chancharat, 2008). The responsibility of a company's governance and firm strategy development is on the board of directors (Whitaker, 2000). It is also expected that survival and corporate performance are affected by corporate governance attributes.

Over the last two decades, corporate governance structure in explaining companies' survival has become a topical issue. This is because corporate failures in most countries of the world now focus attention on the influence of corporate governance on the firms' survival. Recently, some authors have investigated the survival of companies by utilizing corporate governance attributes. Taliani (2010), for instance, explored the influence of ownership and incentives induced on the survival of high-tech and young firms confirming that the firm in new economy industries needs a governance structure different from that needed by traditional firms. The study also found a nonlinear relationship between board size and expected corporate survival time. Furthermore, Thynne (2006) discovered a positive relationship between insider retention of ownership and the survival of e-companies (i.e. internet firms)

The corporate governance determinants include: offering characteristics, company-specific variables, corporate governance attributes and financial ratios because the study allows time-varying variables rather than using time-variant variables in Cox proportional hazards variables. This research explores the influence of firms' survival in relation to corporate governance (Chancharat, 2008). In this study, there are three areas of corporate governance including board independence, board size and ownership concentration. This will be examined based on the Cox proportion hazards model to see if these attributes affect the survival likelihood of companies. Studies on survival of companies in Nigeria are scanty. This study will add to the existing literature on this concept with particular reference to the Nigeria economy.

Agency theory development postulates that there is a link between corporate governance and firm performance (Audretsch & Lehmann, 2004). If corporate governance influences corporate governance performance, then corporate survival will be affected (Goktan et al., 2006).

In literature, there is a clear link between corporate governance structure and corporate survival. For instance, Lee and Yeh (2004) presented the link between corporate governance and financial distress and pointed out that weak corporate governance firms are liable to economic downturns and the probability of being financially distressed. This finding is in line with Johnson et al. (2000). In this section, the study explores three aspects of corporate governance which are board size, board independence and ownership concentration.

1. Board Size

There are divergent views in relation to the effect of the board size on survival of firms. Lamberto and Rath (2008) pointed out that procedures of good governance approve

larger board sizes on the basis of resulting in accountability. Also, Pfeffer and Salancik (1978) as cited by Lamberto and Rath (2008) argued that there would be a wider range of views and external connections with large boards, thereby exploiting greater opportunities and strengthen the power of the board relative to the Chief Executive Officer (CEO).

However, board size is discovered to have inverse relationship with firm value (Elsayed, 2007). It was pointed out that small boards exhibit more favourable financial ratios value and stronger CEO performance. Elsayed (2007) found that board size has no significant impact on corporate performance. The finding is consistently in line with the finding of Parker, Peters and Turetsky (2002) and Lamberto and Rath (2008) which revealed that board size has no significant effect on survival. During an investigation on life insurance company in Thailand, Connelly and Limpaphayom (2004) confirmed that board size is not significantly related to firm performance.

2. Board Independence

Although there has been a consensus on board independence, the concept still have different meaning in relation to 'independence' (Brennan & McDermott, 2004; Kang et al., 2007). In previous studies, the phrase "outside directors" has been used rather than 'independence' to describe directors who are independent of the management (Ajinkya et al., 2005). It is considered in some existing literature that the difference between 'executive' and 'non-executive' directors are in three aspects (Kang et al., 2007; Lamberto & Rath, 2008).

Based on agency perspective, Fama and Jensen (1983) averred that if most of the board of directors are independent directors, it is less likely that the CEO and inside directors exercise behaviours that are self-serving on the shareholders' cost. Consistently, Pass (2004) opined that since non-executive directors can pass independent judgment, the shareholders interest will be protected by the presence of independent directors. Furthermore, the company could gain from non-executive directors since valuable expertise of external business can be contributed to the company. They can often see the company's risk and opportunities, which might have been disregarded by the company's executive directors who are typically engrossed in the day-to-day running of the business.

Existing literature in relation to the effects of proportion of non-executive directors on corporate performance and survival are of mixed result. Some literature discovered evidence to support expectations that the higher the proportion of non-executive directors in the board, the better the corporate performance, thereby leading to higher probability of corporate survival (Rosenstein & Wyatt, 1990, Daily & Dalton, 1994, Beasley, 1996 as cited by Brennan & McDermott, 2004. In contrast, Hermalin and Weisbach 1991), Yermack (1996) and Klein (1998) as cited by Pass (2004) found a negative relationship between the proportion of outside directors and corporate performance. Furthermore, Bhagat and Black (2001) and Balatbat, Taylor and Walter (2004) discovered that there is no relationship between the proportion of non-executive directors and corporate performance. Sukcharoensin (2003), in Thai's context, is of the opinion that an independent board member of Thai listed firms is a significant factor to explaining corporate performance. Also, the finding of Connelly and Limpaphayom (2004) also discovered a positive relationship between board composition (measured by

the number of outside directors divided by the total number of board members) and insurance firm performance.

Secondly, the leadership of the board is the responsibility of the chairman, for the efficient conduct and organisation of the board's function and to brief all directors in relation to arising issues at board meetings (Weir & Laing, 2001). This means that non-executive chairman enhances the survival likelihood and corporate performance. On the contrary, the executive chairman is expected to have a greater knowledge of the firm and its industry as well as have huge commitment to the organisation than an outside or non-executive chairman (Pass, 2004).

This argument, therefore, expects a negative relationship between a non-executive chairman and firm performance and survival. It is evidenced that there is a conflicting argument about the effect of non-executive chairman on corporate performance and survival. It therefore remains an open question whether oil and gas companies are more likely to survive with the presence of a non-executive chairman.

Finally, board independence measurement is the use of independent leadership structure. When the same person is the firm's CEO and board of directors' chairman, it is known as CEO duality leadership structure while independent leadership structure can be described as a situation where different individuals serve in these positions.

Conflicting opinions exist about the costs and benefits of using these leadership structures. Proponents of the independent structure posit that CEO duality structure may cause a definite conflict of interest and systematically reduce the ability of the board to fulfil its governance function (Weir & Laing, 2001). Given that one of the board's major functions is to monitor the top management performance, allowing the CEO performs both roles may lead to affecting the desired system of checks and balances (Bhagat & Black, 2001). The inappropriate governance structures may influence firm crisis and eventual bankruptcy (Pass, 2004). CEO duality structure advocates maintained that CEO duality provides a clear focus for operations and objectives (Weir & Laing, 2001). Also, the independent leadership structure may cause potential rivalry between the chairperson and the CEO, thereby making it difficult to pinpoint blame for poor performance (Pass, 2004).

However finding from studies have shown that CEO duality does not have any impact on corporate failure (Connelly & Limpaphayom, 2004) and corporate performance (Elsayed, 2007). A dummy variable is used for the measurement of independent leadership structure. Specifically, if the CEO and chairman are different people, then a value of 1 is recorded, 0 otherwise. The third aspect that the mechanisms of corporate governance examined in this study is the concentration of ownership. Corporate governance literature has given particular attention to ownership concentration as a factor to a more effective corporate governance and shareholders' value maximization.

3. Ownership Concentration

Agency theory relates to the set of governance rules that will lead to efficiency enhancement and wealth maximization (Connelly & Limpaphayom, 2004). The main concern is whether managers pursue their own interests rather than maximize value of shareholders.

Using the agency theory of monitoring and convergence of interest hypothesis, in a case where shareholders are too loose to monitor managers, managers can use corporate assets as benefits rather than shareholders, wealth maximisation (Elsayed, 2007). Furthermore a company is more likely to survive if ownership concentration is high, this is because shareholders are likely to influence management's decisions and also expend cost monitoring as they have a relatively high stake in the firm (Bhagat & Black, 2001).

Based on information asymmetry theory, when stockholdings are concentrated, there is a low information asymmetries; stockholder's ability to remove a management team is high and managers are more likely to pursue strategies that are in stockholders' interests. In contrast, when stockholding are diffused, a significant information asymmetries are likely to exist and management is more likely to be in pursuit of strategies that are not in the interest of stockholders (Bhagat & Black, 2001).

The subject of many theoretical and empirical researches has been the effect of ownership concentration on corporate performance. However, the empirical results of the effect of ownership concentration on firm performance are mixed. For instance, Claessens and Djankov (2009) suggested that the higher the profitability and labour productivity, the more concentrated the ownership. Consistently, Bai et al. (2004) posited that there is a positive relationship between corporate values and ownership concentration.

Conversely some studies, suggested that ownership concentration has a negative relationship with corporate survival. (Kang, Cheng & Gray, 2007). Furthermore, Demsetz and Lehn (2005) averred that corporate ownership concentration does not relate to the company's rates of accounting profit of a company. In line with Hovey, Li and Naughton (2003), it was indicated that ownership concentration does not explain firm performance. Having consistent focus on firms analysis in finance industry, Dhnadirek and Tang (2003) observed that Thai system lacks diversity in governance mechanisms and is ineffective in concentration.

However, Suehiro (2001) found that family-owned firms are positively related to corporate performance measured by ROA and ROE. Evidence is also found in Yammeesri, Lodh and Herath (2006) that there is a positive relationship between concentrated ownership and non-financial firms performance.

Methodological Review

Predicting Financial Distress: An Overview

Beaver (1966) was the first to give a serious thought on the use of financial ratios as a predictor of corporate financial distress in 1966. Beaver discovered and afterwards concluded that some ratios are more predictors than others after many trials from failed and non-failed firms. Beaver concluded that ratio of cash flow to debt was the best sole predictor of financial distress five years prior to authorized filing of bankruptcy (Janer, 2011).

Beaver used the univariate statistical model because of its traditional financial ratio analysis, the ratios served as clarifying variables or predictors and they were observed one after another. Thus, the unified effect of any set of financial variable or ratio is lost. Beaver's univariate analysis presumed a linear proportionate relationship between a set of financial ratio variables (Kamau, 2007). It is however not the case because, in most cases, a constant can play a role in the relationship between two financial variables.

Potential errors present in univariate analysis are lessened using multivariate analysis. Several discriminant functions were developed by prediction scholars. Altman Z-score being the first one was developed in 1968 using public firms stratified by size and industry. This model has a high predictive power two years prior to bankruptcy.

Furthermore, two versions of the 1968's Z-score model are existing: the Z -score Altman (1993) which is similar to the previous one except the discrimination zones and the Z -score Altman of 2006 which differs from the previous MDA models in that it uses four financial ratios and has lower discrimination zones (Altman, 2006).

Altman employed the multivariate discriminant analysis to study a group of 33 failed and non-failed firms, the results indicated quite a number of financial ratios that differentiated between failed and non- failed firms. The second revised model developed by Altman (2006) used five ratios in predicting failure as the 1968 model but discrimination zones was the difference. Recently, he developed a MDA model in which four financial ratios instead of five were used. These ratios cover the area of gearing, liquidity, management efficiency and profitability.

Pandey (2005) defined financial ratio as a virtual magnitude of two selected numerical values extracted from a company's financial statement. In accounting, there are quite a number of standard ratios used in evaluating the overall financial condition of a corporation. In financial analysis, the benchmark used for evaluating the financial performance and state of a firm is the ratio (Qasim & Ramiz, 2011). Financial ratios can either be used by potential and current shareholders of a firm, managers within a firm or by the firm's creditors.

Financial ratios are used by financial analysts to compare the company's weaknesses and strength. The core ingredient of multivariate discriminant analysis is financial ratios. This confirms that financial ratios and ratio analysis are valuable tools for tracking financial health of an enterprise. Olson (1980) cited in Natalia (2007) concluded that total liability divided by total assets, current liability divided by current assets and size are the most important predictors after using eight traditional financial ratios. Predictive power of financial ratio depends on its capacity to differentiate between non-bankrupt and bankrupt. Financial ratios applications include determination of internal liquidity, financial risks, operating performance and growth.

Altman (2006) explained that financial ratios are interrelated and therefore, are analyzed in relation to each other. Changes in financial ratios and cash flow trend overtime or compared with similar firms in the industry may indicate potential problems or symptoms in specific area. For example, increasing or high current ratio indicates poor efficiency of working capital and related symptoms could be high cash conversion cycles, low receivables turnover or low return on assets. Benjamin and Kamalavali (2006) used trend and interactions between three net cash flows and found that non-bankrupt firms usually have unstable trend with negative cash flows in the first, second and third year before bankruptcy.

Business Failure Models

Models of business failure can be broadly categorised into two groups: (i) qualitative models which is based on an assessment of the company concerned internally; (ii) quantitative models are largely based on published financial information. They both

attempt to point out characteristics, whether financial or non-financial, thereby differentiating between failing and surviving firms (Robinson & Maguire, 2001).

- *Qualitative models*

This model rests on the conclusion that the organisational performance is limited to the sole indicators. Therefore, qualitative models rests on qualitative or non-accounting variables. The A score model is one of the most used models and it is attributed to Argenti (2003), which proposed that failure process follows an expected sequence – Defect, Mistakes and Symptoms of failure. This is as Illustrated in figure 1

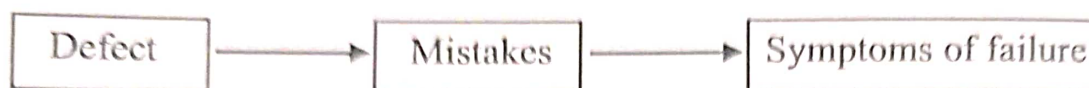


Figure1: The A Score Model (Process of Failure)

Source: Argenti (2003)

The failure process starts with the observable defect that leads to mistakes which causes reduction in cash flow in and out of the company. The mistakes will eventually turn out to showing of failure symptoms which symbolises that the firm is already under attack.

- *Quantitative models*

Quantitative models point out values of financial ratios differently marked between failing and surviving companies, and can be used subsequently to identify companies exhibiting characteristics failing firms (Argenti, 2003). Financial indicators of impending failure that are commonly accepted are: high variability of income, assets in relation to low profitability, high gearing, poor capital and dividend liquidity, and low equity returns.

- *Edward Altman's Z – Score Model*

Credit managers mostly use traditional ratio analysis to determine a firm's health status. Altman (2006) opined that ratios measuring solvency, liquidity and profitability ratios are most significant. It is, however, difficult to know which is more significant as several studies have identified several ratios as potential problem indicators. For example, a company with poor liquidity ratios may be heading for liquidation. The profitability of the company may reduce the potential risk highlighted by poor liquidity ratios. Therefore, it may be incorrect to use traditional ratio analyses.

Altman's 1968 model took the following form:

$$Z = 0.012A + 0.014B + 0.033C + 0.006D + 0.999E$$

Thus, this was later translated to;

$$Z = 1.2A + 1.4B + 3.3C + 0.6D + .999E$$

$Z < 2.675$; then the firm is classified as "failed"

WHERE

A = Working Capital/Total Assets

B = Retained Earnings/Total Assets

C = Earnings before Interest and Taxes/Total Assets

D = Market Value of Equity/Book Value of Total Debt

$$E = \text{Sales/Total Assets}$$

$$Z = \text{Overall index}$$

- *Financial Ratios in Z score*

Z-score is calculated by multiplying each of the financial ratios by an appropriate coefficient and then summing the results. The ratios rely on retained earnings, market value of equity, total assets, EBIT, net worth and working capital. Working Capital is calculated by subtracting current liabilities from current assets (Milkete, 2001). Total Assets is the sum of the assets section of the financial position statement. Retained Earnings can be found in the equity section of the financial position statement. Earnings before Interest and Taxes (EBIT) is the profit or loss from any extraordinary or unusual items from operations excluding the tax effects of these items. It is calculated as follows: calculate the net income; subtract any income tax benefits, add back any income tax expenses, then add back any interest expenses. Market Value of Equity is the sum value of all shares of preferred and common stock. The dates of the values chosen does not exactly need to correspond with the financial statement dates to which the market value is compared (Milkete, 2001). Another name for net worth is Shareholders' Equity

Applied Forecast Methods: A Review

There are different techniques and methods used in forecasting as well as predicting the future occurrence. The application advantages, assumptions and drawbacks of the multivariate statistical forecast methods were reviewed.

- *Logistic regression analysis (Logit)*

This is a widely used approach to model relationships between likelihood of a binary response and explanatory variables (Chatfield & Collins, 2000). The survival/bankruptcy values to the weighted independent variables is procedurally ordered by fitting a regression function logic calculated by the maximum likelihood method.

The advantages of the method are easy interpretation, exact appearance of relative contributions and robustness. Drawbacks are the accidental emergence of multicollinearity, possibility of small-sample biasedness, application of predefined function-type and sensitivity to outliers. If the rate of solvency is different from the population sample, the calculated probability of the value of survival may be modified by probability-calibration in a way that the desired rate equals the average probability of survival, while at the same time, the procedure of probabilities calculated for the observations must be preserved (Bilanas & Harris, 2004).

- *Decision trees*

A decision tree by iteration is to be built by a procedure using constructing branches, univariate partitioning and setting simple decision rules (Ahn, 2000). A homogeneous class is the most important goal to be achieved. As long as the algorithm finds partitioning variables, branches are being established. The first partitioning variable is found at the top of the tree. After partitioning, the solvent and insolvent classification is denoted by the root of the tree.

The few application assumptions and the obvious interpretation of the decision rules are the advantages of the method. Drawbacks of the method are the non-overlapping between the groups, accidental appearance of overtraining and the assumption of discrete classification capability. The relative role of variables cannot be unambiguously determined and no statistical testing can be carried out on the model. The probability of survival values can be estimated on the basis of decision rules (Janer, 2011).

- *Neural networks (NN)*

Neural networks are information processing systems having the ability to perform concurrently in a shared way and built on the basis of biological neural systems (Charitou, 2002). Networks gain their problem-solving ability by learning which consists of interconnected, parallel function in neurons. Neural network have fundamental components such as the elementary neurons organised in layers. The learning process establishes the weighting of the networks.

The method possesses some advantages such as intelligent learning of relationships, universal approximation feature, and few application assumptions. Drawbacks are arriving at local minima, the inability to carry out statistical tests, the black box problem, the indirect determination of relative contributions, and the accidental appearance of overtraining (Perez, 2006). Neural networks can estimate chances of survival/bankruptcy values automatically. If the population's rate of solvency and the sample are substantially different from each other, probability-calibration might be important.

Some publications by early researchers (Ghiassi, Saidane & Zimbra, 2005) have proven that a more accurate forecast is provided by a dynamic neural network model because they perform significantly better than the traditional neural networks such as feed forward or back propagation. Therefore, in empirical research, the neural network model was trained by the exhaustive prune technique (Stein, 2005). Network training measures are taken with exhaustive prune to ensure a very detailed search for possible models space.

- *Case-based reasoning approach (CBR)*

Case-based reasoning (CBR) can be defined as a similar process to human being decision process. The essential idea involves using previous cases and their solutions to solve new problems. The CBR's approach solution algorithm is based on both a combination function and a distance function, The combination function adds up the results from several neighbours to get an answer while the distance function also known as the Euclidean distance estimates the distance between two records. An interesting characteristic method is that solutions are very encompassing and can be reused directly or indirectly to solve new problems encountered (Sudarsanam & Lai, 2001). This method was introduced firstly by researchers like Jo and Han (1996) into the domain of business failure prediction (Jo, Han, & Lee, 1997), Bryant (1997) as cited by Sudarsanam and Lai (2001). Evidence from the results of their study was not enough to say that CBR models were more applicable than other reference models. However, some researchers have proven interest in this method, attempting to increase its initial predictive performance.

- *Operations research (OR)*

Operations research before World War II originated with military efforts. Operations research can be defined as an interdisciplinary mathematical science that relies

on the effective use of organisational technology. Mathematical programming techniques is applied by operations research to decision-making, focusing on optimal or near-optimal solutions to complex problems. Mathematical Programming (MP) methods compared to statistical techniques offer three major advantages (Stein, 2011). Firstly, as nonparametric methods, MP methods do not rely on firm assumptions like statistical techniques do. Secondly, MP methods are correctly able to function on a broader variety of data. Finally, any outlier observations have less influence on the fitted model in MP technique. The literature has introduced different models and methods. Freed & Glover in 1981 were one of the first to introduce linear programming methods to the classification problem. Subsequent studies followed their work thereby implementing complimentary and comparable models. In general, findings have shown that mathematical programming approaches can function as good as traditional statistical techniques (Sunday, 2011). Also, when assumptions underlying the statistical approach are seriously violated, MP approaches may be preferred. However, Sun (2011) found out that practitioners and researchers will be more eager to accept MP approaches as nonparametric procedures when there is the availability of simple but powerful multiple-class MP model.

- *Support vector machines (SVM)*

Support vector machine (SVM) as one of the latest methods was implemented and developed to forecast corporate liquidation/bankruptcy. Boser, Guyon, and Vapnik (1992) introduced the technique while Vapnik and Cortes propagated it in 1995. The underlying idea of this technique is to plan the input vector into a high dimensional feature space through a nonlinear mapping chosen a-priori (Agarwal & Taffler, 2008). A linear decision surface in this space is built with unique properties that ensure the ability to network under high generalisation. SVM is fast becoming popular because of many striking features and outstanding generalisation performance on a wide range of difficulties. Also, this technique suggests two main advantages: (i) it assumes the principle of minimisation of structural risk that reduces over-fitting the model on the training data set for a stronger classifying ability; and, (ii) it takes linear non-separable situations into account, which extends the model's possibilities and flexibility in finding suitable or undiscovered variables in predicting bankruptcy (Qasim & Ramiz, 2011).

However, a major principle drawback of this technique is the procurement of little variable explanation that contributes to bankruptcy (Patrick & Ooghe, 2004). Therefore, this technique offers superior predictive capacity but researchers who attempt to fix an anticipated bankruptcy (at least in a simple stand-alone mode) do not prefer it.

- *Soft computing*

This technique is a combination of various individual techniques towards the maximisation of the advantages to minimize combined weakness of the model. The basic idea is that, in more conventional techniques, gains achieved by certainty and precision are not justified by their costs (Nazmil & Shamen, 2012). Among researchers and practitioners, this method has recently become popular and one of the recent trend in corporate prediction modelling (Dong & Su, 2010). Association and combination have many different possibilities. Combination of methods is not reserved exclusively to only artificial intelligent methods but is often found complementarily (Nazmil & Shamen, 2012). Operations research, statistical method, as well as other methods useful in

bankruptcy can be combined to generate the ultimate model. For instance, Huang, Tsai, Yen, and Cheng (2008) posited a hybrid financial analysis model which included trend and static analytic models to build and train back-propagation neural network (BPN) model. Their performance surpassed other models including back-propagation neural network model, decision tress, and discriminant analysis.

- *Other techniques*

In this study, several models are discussed. However, the outlined techniques are not thorough and several different models were not discussed in this review implemented for testing bankrupt prediction. Among these models are: Fuzzy set theory, Genetic algorithm (GA); Risk index model; Cash flow models; Gambler's ruin model; Rough sets; Isotonic separation; and others such as Gaussian processes, Option pricing theory, Cash flow models, Return variation models, Risk index models, Trait recognition, Self-organising learning array method and Dynamic modelling techniques to mention but few.

Multivariate Discriminant Analysis was used in this study to predict financial distress of selected companies in Nigeria because the model had been used to predict banks failure in Nigeria by different authors but scanty researches are available for oil and gas companies. Besides, other methods of predicting failure such as support vector machines, soft computing and the likes are not popular in Nigeria due to technology, Nigeria peculiarity and other factors involved.

Survival Analysis Techniques: An Overview

Survival analysis is one of the statistical methods used to study the timing and occurrence of events. In this statistical technique, an 'event' is known as a qualitative change situated in time (Chancharat, 2008). The state of companies might vary from 'healthy' to 'distress' and then to bankruptcy or failure. In this study, the interest of event is known to be when a company enters into financial distress.

However, over a time horizon of different periods, the changes usually occur a period of time rather than immediately. The identification of symptom variables in initial conditions gives rooms for the predictability of the model. The conditional symptoms then changes over time in a progressive way as financial distress worsens (Perez, 2006).

This study adopts survival analysis method to examine corporate financial distress in comparison to traditional methods: there are two major advantages to survival analysis. These advantages are: its ability to manage censored observations and time-varying variables. The time varying variables are the explanatory variables that change with time. It is expected that the symptoms of financial distress are known through the decrease in financial ratio or that the effect of the ratios on corporate distress do not stay the same over time (Chancharat, 2008). In contrast to the traditional method, which determines at a given point in time, the level of variable as it makes in time, the observation at a click. A major advantage of survival analysis technique is the procedural estimation that considers variable changes in value overtime. It becomes a reasonable application of statistical technique because of the gradual occurrence of financial distress over a number of years as a firm's financial health is preceded by deterioration (Chancharat, 2008).

Censored observations are the observations that never experience the event during the observation time (Stein, 2005). In this study, the active companies are the censored observations because they have not entered into a financial distress state during the period

of study. It is possible with survival analysis to implement the information from these observations by adding them to censored observations and by using the partial or maximum likelihood technique to provide consistent parameter estimates. In contrast to the traditional technique, it cannot incorporate information from censored observations (Chancharat, 2008).

Survival analysis involves two main functions: the hazard and survivor function. The survival function, $S(t)$, gives the probability that the time until the event is experienced by the firm, T , is greater than a given time t . Given that T is a random variable that explains the event time for some particular observation, then the survival function is defined as;

$$S(t) = \Pr (T > t) \quad \dots\dots 1$$

The hazard function explains the immediate risk of an occurring event at time t given the firm survival to time t (Gujarati, 2002). Another name for hazard function is the 'hazards rate' because of its quality dimension that possesses the form of the number of events per time interval. The hazard function is defined as

$$h(t) = \frac{\lim_{\Delta t \rightarrow 0} \Pr(t < T < t + \Delta t | X, T > t)}{\Delta t} \quad \dots\dots 2$$

The relationship between the hazard and survival function is that the hazard function is equal to the change in log-survival function, that is,

$$H(t) = \frac{d \ln(s(t))}{dt} \quad \dots\dots 3$$

To calculate hazard and survival functions, there are parametric and nonparametric models. The advantage of adopting parametric models is the specific completion of the model making a better prediction of survival time, but may also result to an inconsistent estimation due to some distributional assumptions (Chancharat, 2008). The nonparametric methods are very useful for descriptive purposes.

The Cox proportional hazards model is a semi-parametric model for survival analysis, which is most widely used. In Cox's study in 1972, there are two significant innovations namely, the proportional hazards model and maximum partial likelihood. The proportional hazards model is represented as follows;

$$H_{i(t)} = h_0(t) \exp(X_i \beta) \quad \dots\dots 4$$

Where $h_0(t)$ is an arbitrary unspecified baseline hazard rate that measures the time effect of hazard rate for an individual with all zero valued variables. X represents the vector of those variables influencing the hazard β which is the vector of their coefficients. It is the specific lack of baseline hazard function that makes the model semi-parametric or distribution free.

Equivalently, the regression model is written as;

$$\text{Log } h_{i(t)} = \alpha(t) + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_n X_{in} \quad \dots\dots 5$$

Where $\alpha(t) = \text{log } h_0(t)$ and $h_0(t)$ is an arbitrary unspecified baseline hazard rate (Chancharat, 2008).

The model does not require the specification of survival times of probability distribution in particular, but possesses the property that different individuals have proportional hazard functions, that is,

$$\frac{h_i(t)}{h_j(t)} = \exp[\beta_{i1}(X_{i1} - X_{j1}) + \beta_2 (X_{i2} - X_{j2}) + \dots + \beta_n (X_{in} - X_{jn})] \quad \dots\dots 6$$

there is no variability with time t for two individuals in hazard function ratio. These special properties make the Cox proportional hazards model robust and popular amongst researchers.

To estimate the coefficient of β , Cox proposed a partial likelihood function based on a conditional failure probability by assuming that there are no tied values in the survival times. The function was later modified to handle ties (Stein, 2005). The SAS PROC PHREG can be used to complete the calculation much more easily.

In the above Cox PH model, it assumed that the ratio of hazard functions for any two individuals is independent of time t , or that the variables are not time-dependent. However, it is common in practice for a study to include both time-dependent and time-independent variables. The most common time-dependence variables are those that are observed repeatedly at different follow-up time points, which is true of most of the variables in the dataset. Other kinds of time-dependent variables include those that change with time according to a known mathematical formula, for example, age (Agarwal & Taffler, 2008). In general, the hazard function of Equation 2 depends on the complete time path of regression $X(t)$, so that equation 2 becomes

$$H(t) = \lim_{Dt} \frac{\Pr(t < T < t + dt / X(t), T > t)}{Dt} \dots\dots 7$$

A time-varying variable may exhibit feedback and this will result in the coefficients β in the regression equation 5 which are also depend on time t . This situation should be common in financial studies because a company is always willing to adjust its behaviours according to relative variables (Stein, 2005). This study assumes that the variables are weakly exogenous; that is, whether the process underlying the time variation is stochastic or deterministic, the parameters of that process in estimating the hazard model under consideration do not need to be considered.

One rather simple solution is to replace the time-dependent variable by its mean value during the spell. A tedious, but useful method for handling one or more time-dependent variables is represented using the counting process style. The subject will be represented as one or more observations, each consisting of a time interval, the status, and the values of fixed variables over the interval (Perez, 2006). The per-subject residuals for a given subject is the sum of residuals for its observations.

Prediction or determination of corporate status in terms of classification into either distress or healthy firms is not the most important. Rather, the early identification of distress and providing means of survival in the midst of distress with the view of rejuvenation is essential. Survival analysis through hazard and survival function did not only bring out the cause of distress but revealed survival options of either restructuring, change strategy or opt for merger and acquisition with the view of firms survival and continuity

Classification of Corporate Bankruptcy Prediction Models

- Statistical Models

Statistical models, according to Aziz and Dar (2004), can be categorised into five major forms of analysis: linear probability; probit models; univariate analysis; logit

model; and multivariate analysis. Multivariate analysis is frequently being used in many studies by using multiple discriminant analysis.

The development of statistical models in the banking sector to predict a bank's performance has been dominant since the early 1990s (Sahajwala & Van den Bergh, 2000). According to Sahajwala and Van den Bergh (2000), the major aim of the statistical models in the banking system is directed towards the uncovering of risks likely to cause adverse future conditions. Statistical models attempt to recognise banks with high-risks of distress or failure in advance. In some cases, more innovative quantitative techniques are used to examine casual economic relationships between explanatory variables and their outcomes such as distress, bank fragility, survival or failure.

- *Univariate analysis*

Financial accounting information has been widely used to explain corporate financial failure possibility. Amongst the most cited instances are the work of Beaver in 1966 (used Univariate); Altman in 1968 (used Discriminant Analysis) and Ohlson in 1980 (used O-Score Logit model) (Chancharat, 2008). Beaver being the pioneer for using financial ratios adopting univariate model in constructing a corporate failure prediction model is called the "univariate discriminant analysis model".

Univariate analysis is a traditional technique used to interpret financial statements using the firms' financial ratios. These ratios are used as bankruptcy predictors or explanatory variables, likely to exhibit important differences across failing and non-failing firms. Emphasis is placed on individual failure signs in a failure prediction model. Furthermore, variables are observed and examined one after the other (Aziz & Dar, 2004). To classify if a firm is failing or not, each ratio is analysed and measured separately in accordance with the optimal cut-off point. Generally, a firm is categorized as failed if its ratio value is below the cut-off point and vice versa (Patrick & Ooghe, 2004).

- *Multiple Discriminant Analysis (MDA)*

Multiple Discriminant Analysis is a form of multivariate method that gives room for distinguishing between two or more object groups with respect to several variables concurrently. MDA is used to categorise an observation into one of the several a-priori groupings (the bankrupt and non-bankrupt) depending on the observation's individual features (Aziz & Dar, 2004).

The study by Altman in 1968 first distinguished the statistical multivariate analysis method into a model developed and called the "Z-score model" and the failure prediction model. Multiple discriminant analysis as defined by him is "a statistical technique used to classify an observation into one of several priori groups depending upon the observation's individual characteristics which attempts to derive linear [or quadratic] combination of these characteristics which are 'best' discriminates between the groups" (Okebalama, 2014).

Therefore, MDA is defined as the classification of distinct sets of observations which tries to find the combination of variables that predicts the group to which an observation fits. Linear discriminant function is the combination of predictor variables and can be shown as follows:

$$D = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

where:

D is a discriminant score

β_0 is an estimated constant

β_n are the estimated coefficients, and

X_n are the variables

An observation is categorised into the suitable group based on the discriminant function score. The specialised discriminant model estimation procedure is followed by which discriminant coefficients are obtained (Eljelly, 2004). The model is a combination of different variables into a single discriminant score. At a particular cut-off point, the firm is then categorised into the failed or non-failed group. Though, in most of the study, when the discriminant score (Z-score) is less than the cut-off point, the firm is said to be a failing firm. Otherwise, if the score is more than or equal to the cut-off point, the firm is said to be a non-failing firm (Ayeni, 2012).

The organisation of accuracy of the MDA model is measured on the basis of the type I and Type II error rates. As a matter of fact, researchers applying MDA, will try to minimise the error rates as much as possible. This is because the cost of wrongly categorising a failing firm (type I error) is often larger than the costs of wrongly categorizing a non-failing firm (Type II error). A Type I error is categorizing a failing firm as non-failing firm, and a Type II error is categorizing a non-failing firm as a failing firm (Balcaen&Ooghe, 2006).

The best instance for the multiple discriminant models is the Altman developed model known as the Altman Z-score model. It is a ratio linear combination as follows: working capital/total assets, retained earnings/total assets, earnings before interest and taxes/total assets, market capitalization/total debts, and sales/total assets (Altman, 2006). Altman (2006), posit that apparently insignificant variables on a univariate analysis will offer significant information in a multivariate context.

- *Logit Model*

Logit analysis has been used to determine the relationship between ordinal or binary response probability and explanatory variables. Preferably, this technique fits with a linear regression model for ordinal or binary response data by using the method of maximum likelihood. Therefore, to find the explanatory motive behind a certain event, logit models are employed (Gujarati, 2002). The dependent variable is constructed as a binary variable. The variable will then take the value of 1 if the company has failed and the 0 if the company has not failed within the defined period.

Each of the independent variables using this model will be weighted and allotted a score in failure probability form for each company in a sample. Similarly, the probability of distress is obtained by substituting into the cumulative probability function. Any company is classified as distress if the calculated probability from the logit model is more than 0.5, otherwise it would be non-distress (Bejamin, 2002).

Ohlson, in his study in 1980, was among the first users of logit analysis in the context of financial distress. This bankruptcy prediction model has been very helpful with various parties such as auditors, analysts and investors (Perez, 2006). This model, however, owing to some restrictions, is an incomplete solution to risk measurement.

Hence, it is just one of the tools used to evaluate management effectiveness and the risk associated with an investment opportunity.

Probit Model

Zmijewski in his study in 1984, used this model. He established the Zmiejewski model by applying probit analysis. Three financial measures are only used in this model; financial leverage, liquidity and return on assets (Aziz & Dar, 2006). In this model, two steps are applied. First, each parameter and the constant of the model must be multiplied by 1.8138 and then multiplied by the financial measure. After the financial measure is multiplied by the adjusted parameter, the products are accumulated to a quantity referred to as an Adjusted Score. The Adjusted Score is then translated into a measure of probability by the following formula:

$$\text{Probability Bankruptcy} = 1 / 1 + [\exp (-\text{Adjusted Score})]$$

Adjusted Score Probability:

$$1 / 1 + (1 + \exp - (-0.000085)) = .50$$

$\geq .5$ is classified as Bankrupt

$< .5$ classified as Not Bankrupt

The above formula score can be translated into a probability that lies between 0 and 1 and is interpretable likelihood terms (Charfield & Collins, 2000). The use of the 50 percent cut-off implies that when failure is more likely than not, it can be deduced that the company is distressed. Therefore, if the probability lies at or above 50 percent, it is signified as a distressed condition (Wallace, 2004).

Conclusion

To ensure sustainable economic growth, it is crucial to control the number of businesses that failed. Corporate solvency must be controlled in the most effective manner as to guarantee the sustained growth, continuity and survival of that organisation. This necessitates the need for corporate financial distress studies by business analysts to curb and prevent direct and indirect costs associated with financially distressed companies tending towards bankruptcy. Thus, the need for a model that can provide early warning signs of possible failure is paramount.

The Multiple discriminant model is effective and practical model to predict the insolvency of companies as well as maintaining and monitoring of most enterprises in Nigeria. However, the distress signs are always obvious before the actual bankruptcy materialise. This necessitate the need to predict financial health status of Nigeria companies.

Turnaround strategic actions taken by distressed firms differ in an attempt to ameliorate the situation. Previous research revealed that turnaround strategies were intensive in the distressed year while the intensity reduced as the distress passed out. Timing of implementations of most of these strategies differs as asset restructuring, employees' layoff and dividends omission/cut take precedence in distress year while other strategies were employed after the distressed year. The reason(s) for this is (are) due to the fact that other strategies involve several consultations before implementation. Turnaround strategies were effective towards the remediation and rejuvenation of the distressed firms.

For firm survival, there is probability of corporate survival for distressed firms since factors responsible for firms' failure can be predicted. Besides, covariates such as return on equity, return on asset, debt ratio, working capital to total asset, total asset turnover, size of company, squared size and excess returns are the most of the early warning signals or variables of corporate financial distress for most firms in Nigeria.

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