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Break- Even Analysis and Decision Making: An Empirical Investigation of Selected Listed Non-Financial Firms in Nigeria

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Abstract: The study examined effect of break-even analysis on decision making of listed non-financial firms in Nigeria, between 2010 and 2020. Specifically, the study examined the effect of selling price, production cost and sale volume on profit after tax of listed non-financial firms in Nigeria. The study adopted an ex-post-facto research design and secondary data was gathered to analyze the relationship between the variables. The population of the study consisted fifteen (15) industrial companies listed on Nigeria Exchange Group; however, only five (5) samples were selected from the population. The data was collected from annual reports of 5 sampled listed non-financial firms covering a period of ten (10) years (2010-2020). The collected data were analyzed using correlation analysis, panel regression and other post estimation techniques. The decision making was measured with profit after tax. From the results of the findings, it was revealed that profit after tax is positively impacted by the break-even analysis of the listed non-financial firm in term of selling price and sale volume. Thus, cost of production reported negative effect on profit after tax. The study concluded that break-even analysis has positive effect on decision making of non-financial firms in Nigeria, especially when measured in term of profit after tax. Based on the findings, it was recommended that management of non-financial firms in Nigeria needs to put all possible strategies in order to lower the production cost to maximizing profit.

Keywords: Break-even analysis; Profit after tax; Non-financial firms; Nigeria

JEL Classification: P34

1. Introduction

The ability of a business to generate a profit is absolutely necessary to ensure its continued existence in the long run. This is something, in a corporate environment that is highly competitive, can only be accomplished if the owner of the firm offers the necessary financial control. Perhaps, management has to have the ability to effectively and efficiently plan for the company's financial performance. In order to accomplish this goal, management has to devise and put into action a wide range of different instruments. One of these approaches is known as the break-even analysis. The measurement of whether a firm has broken even is one of the most significant approaches for measuring how profitable a company

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is. The point at which total revenue and total expenses are equal is known as the break-even point, and it is at this moment that there is neither a profit nor a loss (Garrison, 2012). As soon as the phrase break-even analysis is stated, the first thing that comes to mind is a simple cross-over chart that displays the total of the company's revenue and costs.

The determination of the volume level at which income is equal to the cost of production is just one part of a break-even analysis. A break-even analysis encompasses a great deal more. Instead, it shows how several factors, including price, costs, and volume, influence profit. On the other hands, non-financial firm goals include prioritizing financial performance and professional advancement. In particular, the maximizing of profits is the major concern of business owners. Interestedly, companies in Nigeria have seen an unexpectedly large settlement, which has led to a loss of revenue in recent years (Siyanbola, 2013). Despite what seems to be increasing attention and aid from institutions in Nigeria to the running of firms, the performance of enterprises is below what is expected (Adebayo, 2018). Companies have to keep expenses under tight control and look for opportunities to save money wherever they can in order to avoid going over their budgets and suffering losses while yet maintaining high quality standards (Lawal, 2017).

Due to great significance of break-even analysis in decision making, since any healthy business depends on good decision and this is the focal point of any serious minded management, therefore, this study focused on effect of break-even analysis in decision making of some selected non-financial firms in Nigeria. Specifically, the study determine the effect of selling price; evaluate the effect of cost of production; and ascertain the effect of sales volume on profit after tax of the selected non-financial firms in Nigeria.

2. Literature Review

2.1. Break-Even Point

A company must reach a certain level of sales or income before it can be deemed financially viable. This threshold must be reached before the company's costs can be judged to have been balanced (Wikipedia, 2014). Break- even point is a point in a business cycle when a business reached in its operations where it is no longer turning a profit or a loss? For managers, especially when it comes to defining their point of break-even, break-even analysis may be of immense assistance. A break-even analysis is a method that may be used to assess whether or not the revenue produced by a product or service is sufficient to cover the expenses connected with its production. This can be accomplished by comparing the amount of revenue generated to the amount of expenditures incurred. This information may be put to use in a variety of ways by managers, some of which include the establishment of pricing, the preparation of bids in competition with other businesses, and the filing of applications for loans (Manishranalkar, 2012).

2.2. Profitability

Every owner of a business has the goal of making a profit, but before that can happen, management has to ensure that the firm can cover its operating expenses. When developing a product or providing a service, if a firm spends more money than it brings in, it runs the risk of quickly depleting its available

capital. There are instances when firms may be able to afford to operate at a loss for a period of time; nevertheless, management should at the very least be aware of the areas in which losses are occurring and have a strategy in place for getting the company back into profit as soon as possible.

Oyerogba, Olaleye and Solomon (2014) asserted that the survival triplets for any firm today are ability to manage price, packaging and quality. In order to run a profitable business, management has to be aware of the point at which the company's revenues cover the expenses of not just each individual product and service but also the business as a whole. The customers are continuously demanding high quality and better performance services. Any firm that aims to be profitable, the firm must not only earn revenues, but also control costs. If costs are too high, profit margins will be too low, making it difficult for a firm to succeed against its competitors. Profitability is a cardinal determinant of firm performance for wealth maximization. Firm that is not profitable cannot survive in the long run. Therefore, the intensity of competitive environment has made running a successful business a function of its ability to be cost effective, because the goal of a non-financial firm is to earn enough profit to ensure sustainability in prevailing market conditions, (Adebayo & Onyeiwu, 2018).

2.3. Theoretical Framework

2.3.1. Fundamental Theory

The study is grounded upon the fundamental theory. The fundamental theory propounded by Graham and Dodd (2015) surmises that, an individual security has an intrinsic value and this intrinsic value can be determined through careful scrutiny of the company production process, taking into consideration the cost of production, selling price till the final production process. Also, the intrinsic value of the sale volume is a function of some fundamental variables impacting decision making in general. This theory posits that at any break-even point in time, an individual security has an intrinsic or true value, which is the present value of the future receipts accruing to the production

2.3.2. Empirical Review

The study by Ihemeje, Okereafor, and Bashir (2015) studied the influence of cost-volume profit analysis on the choice-making of manufacturing firms. It included survey research and longitudinal research methodology. Data of two different kinds—primary and secondary—were gathered. Regression and correlation approaches were used in the analysis. According to research, there is a direct relationship between a product's pricing and its production volume as well as between its manufacturing costs and its net profit. The reorder and economic order amounts were also used to evaluate the decision-making possibilities. Based on the findings of the study, the researcher recommends that manufacturing organizations consistently employ cost-volume profit analysis in their decision-making. The study uses general manufacturing industries rather than specific sectors.

The effects of using the break-even point in planning, management, and decision-making in industrial Jordanian enterprises were also studied by Alnasser, Shaban, and Al-Zubi (2018). The study examined the impact of breakeven point on the planning, controlling, and decision-making procedures of Jordanian industrial enterprises. The accounting departments of Jordanian industrial businesses polled a total of 54 employees. The research's conclusions show a statistically significant relationship between the use of the break-even point in planning, controlling, and decision-making by Jordanian industrial businesses

and efficient planning, control, and decision-making in Jordanian industrial enterprises. The research's conclusions indicate that because of its impact, effectiveness, and accuracy, enterprises should make breakeven point their key tool for decision-making and planning oversight.

According to study by Kenneth, Sunday, Nwajiuba, Osanebi, and Ezemoyih, (2019).the issues were caused by textile manufacturers' make-or-buy choices and organizational shutdown. We polled 714 members of the management teams of 12 active textile businesses using a descriptive survey methodology. The 403 workers of the six textile mills comprised half of the whole population. The validity and reliability of the instrument were established. The original data set was submitted to descriptive and regression analysis at a level of significance of 5%. The result shows that the independent sub-variables of cost, capacity, and quality control significantly influence the closure of textile plants in Nigeria. There are four correlations that may be considered statistically significant: R =.776; R2 =.721; R =.702; R2 = 683; R =.658; and R2 = 635. The paper suggests that rather than fully ceasing operations, managers of textile mills should have sought out outside suppliers in order to satisfy customer demand, retain their staff, protect investors' money, and support the economy.

Oanh, Thuan, and Cong also looked at how public universities in Vietnam apply cost-volume-profit (SVP) analyses (2020). For the study samples, public universities in Vietnam were polled in 2018 and 2019. Data is cleaned and analyzed using SPSS software and techniques including frequency statistics, price statistics, and means following data collection. In order to reduce costs, increase income, and provide the best service to students, public universities in Vietnam must strengthen their governance. Given the circumstances in Vietnam right now, this is essential. Making the best decisions may be aided by flexible use of the SVP analysis by administrators of Vietnamese public universities.

Zanna, Lateef & Samuel (2022) evaluated the effect of breakeven point (BEP) analysis in decision making in some selected block industries within Kaduna Metropolis. Breakeven point was proxied with selling price, sales volume and cost, while decision making was proxied with profit. The sample for the study was drawn from 42 block factories within Kaduna Metropolis. The study collected data through questionnaires. The study employed multiple regression analytical tools. The study found that cost has negative significant effect on Profit at 1% level of significance, while sales volume has positive significance effect on profit of block factories within Kaduna at 5% level of significance. However, sales have positive insignificant impact on profit. The study concluded that cost and sales volume have significant impact, while selling price has insignificant impact on profit. The study recommended that, block industries should use breakeven point analysis as a main tool for profit planning because of its impact.

Based on the above empirical review, there is little work on break-even analysis and decision making of firms in Nigeria, Therefore, this study investigated the effect of selling price, cost of production, and sale volume on profit after tax of non-financial firms in Nigeria.

3. Methodology

3.1. Sample and Data Collection

Ex post facto research methods were utilized in the study since the essential information was already available. Five (5) out of the fifteen (15) industrial enterprises listed on the Nigerian Exchange Group were included in the sample population. A total of 67 percent of the population was represented by the sample size for the study, which was drawn from African Textile Ltd, Da Viva Fashion Ltd, United Textile Plc, Sunflag Group Nigeria Ltd, and Haffar Industrial Company Ltd. The study covered 10 years (2010 to 2020). The study employed secondary data. The data were collated from annual reports of the selected listed non-financial firms in Nigeria. The study examined the nature of the link between the dependent and independent variables using panel data and multiple regression analysis. The regression method was used to identify the coefficient of the linear equation that most accurately predicted the value of the dependent variation. The significance of the regression model was evaluated using the F-statistics, and the significance of the regression coefficients was evaluated using the t-statistics. Both the t-statistic and the F-statistic were evaluated at a 95% level of confidence. In order to better understand the relationship between break even and decision-making traits, a correlation matrix was also employed.

3.2. Measurement of Variables

This section describes the measurement of the variables of the study, as shown in Table 2.

Table 2. Measurements of Proxies for Variables of the Study

S/N	VARIABLES	SYMBOL	MEASUREMENT	PREVIOUS STUDIES
	Dependent Variable			
1	Profit After Tax	PAT	Net Profit after Tax/ Total Assets	Zanna et al (2022)
	Independent Variables			
1	Selling Price	SP	Cost Price + Profit Margin	Ihemeje, (2015)
2	Cost of Production	CP	Fixed Cost +Variable Cost/Number of Units	Nwajiuba, Osanebi and Ezemoyih (2019)
3	Sale volume	SV	Total Fixed Cost +Variable Cost	Oanh et al, (2020)

Source: Authors compilation, (2022).

3.3. Research Model

This study model was adapted from the work of Zanna et al,(2022) as shown below:

$$PAT=\beta_0+\beta_1.SPit+\beta_2.CPit+\beta_3.SVit+Ɛ \quad (3.1)$$

Where: **PAT**= Profit after Tax, **SP**= Selling Price, **CP**= Cost of Production, **SV**= Sale volume,

β_0 = Constant, β_1, β_2, β_3= Slope Coefficient, **YEAR**= Dummy variable of the time under study, **Ɛ**= Error Term.

4. Results and Discussion

4.1. Descriptive Statistic

Table 3 presented descriptive statistic values of variables used such as their mean, standard deviation, minimum and maximum value respectively, As reported in Table 3 average profit after tax over the years covered and across the selected non-financial firms selected stood at 5.23, average selling price of 5.27, average cost of production of -2.06 and average sale volume of 0.09 respectively. The result reported in Table 3, also showed minimum and maximum value of 1.81 and -4.37 for profit after tax, 9.82 and 1.53 for selling price, 202.90 and -312.06 for production cost, 0.59 and -0.94 for sale volume respectively. In addition, reported standard deviation for variables used in the study stood at 0.41, 7.32, 0.14 and 10.21 for the profit after tax, selling price, production cost and sale volume respectively. The series' distribution's skewness, which gauges asymmetry in it around the mean, was 1.62. The SP, CP, and SV all have long right tails and affect PAT in the same manner because PAT has a long right tail. Kurtosis, a further indicator of the peak or flatness of a series, was found to be 4.02 rather than the expected 3.0 for normally distributed data. PAT was peaked relative to normal. Table 3 also revealed the kurtosis value which stood at 4.02 for profit after tax, 2.02 for selling price, 11.66 for cost of production and 79.97 for cost of volume. This implied that all be variables used for the study were highly picked and were positively skewed.

Table 3. Descriptive Statistics of Variables

Variables	Maximum	Minimum	Mean	SD	Kurtosis	Skewness
PAT	1.81	-4.37	5.23	0.41	4.02	1.62
SP	9.82	1.53	5.27	7.32	2.02	0.19
CP	202.90	-312.06	-2.06	0.14	11.66	1.12
SV	0.59	-0.94	0.09	10.21	79.97	27.77

Note: **PAT**= Profit after Tax, **SP**= Selling Price, **CP**= Cost of Production, **SV**= Cost of Volume

Source: Authors computation, (2022).

4.2. Correlation Analysis

Table 4 presented correlation coefficient for pairs of variables included in the model estimated in the study. Correlation result showed the direction and magnitude of relationship between pairs of variables employed in the study. The result showed that there was positive relationship between profit after tax and other variables including selling price and sale volume with reported correlation coefficient of 0.006 and 0.515 respectively. Table 4, also revealed negative relationship between profit after tax and cost of production with reported correlation coefficient of -0.007. In addition, Table 4 presented correlation coefficients of 0.004 for selling price and cost of production, 0.047 for selling price and sale volume, 0.060 for cost of production and sale volume.

Overview of the reported correlation coefficient in the Table 4 revealed that there was no likelihood of the presence of multi-collinearity amidst the explanatory variables as reflected by the weak magnitude for the interrelationship between majority pairs of variables included in the estimated model of the study.

Table 4. Pearson Correlation Coefficient Matrix

Variables	PAT	SP	CP	SV
PAT	1.000			
SP	0.006	1.000		
CP	-0.007	0.004	1.000	
SV	0.515	0.047	0.060	1.000

Note: **PAT**=Profit after Tax, **SP**= Selling Price, **CP**= Cost of Production **SV**=Sale volume
Source: Authors computation, (2022).

4.3. Robustness Test

Results of the Variance Inflation Factor are shown in Table 5. (VIF). SP had the greatest VIF of 1.25, while the average across all variables was 1.13. Indicators of multicollinearity may be seen in VIF values between 5 and 10. This shows that there is no substantial concern with multicollinearity across the research model variables since all VIF values were considerably below the threshold of 5.

Table 5. Variance Inflation Factor

Variables	VIF	Tolerance
SP	1.25	0.802432
CP	1.16	0.859906
SV	1.16	0.861157
MEAN	**1.13**	

Note: **SP**= Selling Price, **CP**= Cost of Production, **SV**= Sale volume
Source: Authors computation, (2022).

4.4. Panel Unit Root Test of the Variables

Using the Levin, Lin and Chu test, Table 6 indicates that all variables exhibit stationarity at the 5% level of significance, which is a strong test (Westerlund & Breitung, 2009). The study cannot rule out the possibility of homogeneity indicating stationarity in the data generation process after rejecting the null hypothesis of the test.

Table 6. Panel Unit Root test of the Variables

Variable	Statistic	P-Value
PAT	-3.0738	0.0011
SP	-2.9385	0.0016
CP	-9.1848	0.0000
SV	-7.9547	0.0000

Note: **PAT**= Profit after Tax, **SP**= Selling Price, **CP**= Cost of Production, **SV**=Sale volume,
Source: Authors computation, (2022).

4.5. Discussion of Findings and Implications

The study assessed break-even analysis and decision making of listed non-financial firms in Nigeria. This was achieved by analyzing the effect of selling price, cost of production, and sale volume on profit after tax of listed non-financial firms in Nigeria. The study employed secondary data and the data were collated from the annual reports of 5 listed non-financial firms, over a period of 10 years spanning from 2010-2020. Data were analyzed using descriptive statistics, correlation analysis and panel regression as well as post estimation test. The estimation results revealed that all variables used in the study such as

selling price and sale volume has positive correlation with profit after tax. Thus, cost of production has negative correlation with profit after tax. This discovery was in line with the findings of Zanna, Lateef & Samuel (2022) which studied the effect of break-even point analysis in decision making in some selected block industries within Kaduna Metropolis. By implication, this discovery reflected that increasing selling price and sale volume of non-financial firms in Nigeria led to a substantial increase in profit after tax. Hence, that non-financial firms needs to be highly sensitive when setting the procedure for break-even point so as not to erode their profitability.

5. Conclusion and Recommendations

The study was able to provide empirical evidence on the link between break-even point analysis and decision making of listed non-financial enterprises in Nigeria, by using a robust set of statistical techniques, the estimation results revealed that in relation to the effect of break-even point analysis variables on profit after tax, selling price and sale volume has the significant and positive effect on decision making of listed non-financial firms in Nigeria, while cost of production has negative effect on decision making, especially when measured terms of profit after tax. This suggested that increase in selling price and sale volume has the capacity to positively improve the profit after tax of non-financial firms. Therefore, the study provided evidence that break-even variable indicators such as, selling price, sale volume and production cost has a significant effect on decision making of non-financial firms in Nigeria, especially when measured in terms of profit after tax. Hence, the study recommended that management of non-financial firms in Nigeria needs to put all possible strategies in order to lower the production cost to maximizing profit.

5.1. Suggestion for Further Studies

Further empirical studies in the field of break-even point analysis in relationship to decision making of firms in Nigeria, should focus on tracking the static interrelationship that exist between break-even variables and decision making, this will further verify and/or validate the static influence of break-even on firms decision making established in this study and other related studies.

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