

Recycling Cost Formation and Profitability of Foods and Beverages Firm: Evidence from Flour Milling Industries of Nigeria PLC (1991-2021)

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Abstract:

Recycling is one of the most viable options to reuse the end of the product in the closed-loop supply chain (CLSC) management. The major focus of this study is to examine the influence of product recycling costs on the profitability of food and beverage firms. This study relied solely on secondary data sourced which was subjected to a mathematical model using regression analysis. It was observed that the dependent and the independent variables have a strong positive relationship with $r=0.741$. The coefficient of determination $r^2=0.549$ shows that 54.9% of the variation in profit can be explained by production cost at a 95% level of significance while in the flour mills Nigeria plc, the dependent and the independent variables have a weak positive relationship with $r=0.363$. The coefficient of determination $r^2=0.132$ shows that 13.2% of the variation in profit can be explained by the production cost at a 95% level of significance. Finally in Dangote Nigeria plc, the dependent and the independent variables have a weak positive relationship with $r=0.174$. The coefficient of determination $r^2=0.030$ shows that 03.0% of the variation in profit can be explained by the production cost at a 95% level of significance.

Keywords:

End of life; production process; profitability; terotechnology.

I. Introduction

The dynamism of the business environment has made it more imperative for production firms to understand and put into practice the total life cycle cost formation in the production processes as a result of effective management and positive influence in critical strategic factors such as operators' safety, product quality, and speed of innovation, product prices, profitability, cost minimization, organizational productivity and reliable delivery (Theanachor, Umukoro & David-west, 2021). Since the middle of the 1980s, another type of product life cycle concept has emerged and has been rigorously reviewed by many authors since its inception. This life cycle concept does not solely focus on the market life of the product; instead, it examines the real and complete life of a single product from product conception, through design, production, sale, customer use, and service, to finally, decommissioning (Cao & Folan, 2011). The emergence of this model which continues to use much of the same terminology that was initially introduced by the original product life cycle concept (although very much in its way) is a direct result of continued interest in a biologically inspired 'life' ideology for the product under consideration which changed is the focus of the model and its application (Cao & Folan, 2011). The principal activities of these firms include the production, packaging and sales of foods and beverages with keen competition to expand and retain the market (Gao, Porter, Wang, Fang, Zhang, Wang & Huang, 2013). Life cycle cost analysis (LCCA) is a technique used to evaluate all relevant expenses of a project, product, or measure over time (Barahmand & Eikeland, 2022). LCC can be viewed from the

perspective of the supplier or the client (the contracting authority) from the client's point of view; the only costs considered are those that are incurred by him. In the procurement phase, these are initially the procurement costs, which generally correspond to the sales price. This includes all costs that the supplier previously incurred in the context of research and development, as well as production (Lindholm & Suomala, 2007 in Barahmand & Eikeland, 2022). In the usage phase, the operating, maintenance, and repair costs are particularly relevant for the client. In the recovery phase, there are also dismantling and disposal costs (Iraldo, Nucci & Giacomo, 2016; Korpi, & Ala-Risku, 2008; Akselsson & Burström, 1994, in Gaus, Wehking, Glas & EBig, 2022). The use of end-of-life products has become a vital business issue today. It provides a major economic opportunity for the manufacturers (Sinha & Modak, 2021).

The increase in production costs has always imposed hardship on manufacturers in Nigeria. Flour Mills of Nigeria Plc (Producer of Golden Penny Flour, Golden Penny Pasta, Gooden Penny Noodles, Golden Penny Semovita), Dangote Flour Mills Plc (Producer of Dangote Flour, Dangote Pasta and Dangote Noodles), Honeywell Flour Mills Plc (Producer of Honeywell Flour, Honeywell Pasta and Honeywell Noodles), have jointly continued to grapple with operating environment problems ranging from high exchange rate to high production cost as well as the above problems. Though the ingredients and production of beverages vary, generally the characteristics of those employed in this industry have many commonalities. The process of harvesting raw materials, whether they are coffee beans, barley, hops or grapes, employs low-income, unskilled individuals or families. In addition to being their main source of income, the harvest determines a large part of their culture and lifestyle (Mesfin Haile & Won Hee Kang, 2019).

II. Review of Literature

2.1. Statement of the Problem

The contemporary issue facing the food and beverage firms today is the fact that the life cycles of many new products are fast declining simply because of rapid technological changes and high levels of imitators who are also out there waiting for new products and copying stereotypes. The situation becomes worrisome and moves for assurance that the entire product cost to incur up to when customer service is withdrawn can be fully recovered before imitators bring out their identical products, it will not be worthwhile to invest in the proposed product. In the face of such threats, food and beverage industries without proper production and costing policies may find it difficult to accomplish organizational goals and thus may even be forced out of the market by competitors. Most of these suspected factors that hamper the performance of food and beverage firms arise from the business environmental factor which is an embodiment of economic, social, technological, international, socio-cultural, regulatory and legal/political problems confronting the food and beverage manufacturers. Furthermore, F&B firms in Nigeria, are experiencing slow sales growth, a rising cost-income ratio (that is driven by rising interest expenses on the company's large borrowings) high cost of operations which results in a reduction of improved profit. The increase in production costs has also imposed hardship on manufacturers of food and beverage industries. This is because even in the face of rising production costs, they do not have the luxury of increasing their prices due to the reduced purchasing power of the consumers. Given these problems, the objective of the studies is not farfetched

2.2 Objective of the Study

The broad objective of this study is to examine the recycling cost formation and profitability of foods and beverages firms: Evidence from flour milling industries in Nigeria Plc. The main objective of this study is to examine the influence of product recycling costs on the profitability of food and beverage firms.

2.3 Hypothesis

H1: There is a significant influence of product recycling cost on the profitability of food and beverage firms.

2.4 Concept of Product Life Cycle Cost Formation

Holistically, the production process is associated with the reduction of waste materials as much as possible. This helps reduce all necessary expenses and increase productivity and efficiency. The highest production efficiency is obtained by manufacturing the required quantity of product and required quality at the required time by the best and cheapest method (Buffa, 2011). In the case of Japanese Management, life cycle costing also had a positive effect on production processes. The Japanese did not have raw materials but had the technology, so they imported raw materials and transformed them through the production process to finish goods like electronic products and the Toyota brand of cars. The transformation consisted of different machines, methods and maintenance and the application of life cycle costing was very relevant in carrying out the operations (Koontz, O'Donnel & Weihrich, 2012). Manufacturing firms in Nigeria cannot be left out of this global connectivity in terms of technologies, ideals, policies and procedures for achieving business effectiveness and efficiency. In such a competitive environment, efficient maintenance methods can mean the difference between a thriving profitable firm and one that loses money and sales. To invest in any product development project or any new product production, the company has to find out its technology stage in the life cycle. The application of life cycle cost methods informs the management if the entire cost to be incurred on a product or project can be fully recovered and at when due with a substantial profit to be realized (Iwarere, 2009). When the company is implementing any new technology, platform or even new product based on new technology should recognise if the technology is growing or disappearing to other trade-offs by technology future (Gao, Porter, Wang, Fang, Zhang, Wang & Huang, 2013), mostly the S-curve of the technology life cycle is based on Technology performance over time or cumulative development activities (Gao et al., 2013).

The production process is associated with (the acquisition, time of usage, and quantity) of the resources required to perform these transformation steps, to satisfy the customers most efficiently or economically (Ahuja, 2004). In other words, the production decisions are typically taken by looking at the best trade-off between financial objectives and customer service or satisfaction objectives. Research on the distribution of LCC is to divide the LCC into research and development cost, production cost, and use and guarantee cost while another cost generally does not exceed 5% of LCC. In all, Research and Development costs can only account for 10-15% of the LCC, production costs account for 30-40%, use and guarantee costs account for 50-60%, and the proportion of other costs generally does not exceed 5% of LCC (Chang, Zhao, Li, Bai, Gao & Zhao, 2022). Generally, the relentless pursuit of eliminating waste, the essence is to eliminate waste and wasteful practices that are hidden.

2.5 Operational Cost of Product Recycling

According to the law, recycling is understood as material recycling or raw material recycling, except energy recycling (Karwasz, Dostatni, Diakun, Grajewski, Wichniarek &

Stachura, 2016). Recycling is the most important way to promote sustainability and circular economy to consumers (Xie, Hong, Zeng, Dai & Wagner, 2021). Recycling is one of the most viable options for reusing the end of the product in the closed-loop supply chain (CLSC) management (Yao & Askin, 2019). Economy emphasizes zero waste methodology by innovation and rethinking design to increase product life cycle for better use and less frequent waste, reusability, and recyclability in all ways possible so that the waste would not end up in landfills or marine litter (Balwada, Samaiya & Mishra, 2021). Recycling-oriented product assessment provides information on the estimated product recycling cost (Karwasz, 2016).

Industrialisation and mass production have created a culture of manufacturing, consumption and disposal without consideration for the rapid increases in virgin material extraction, the introduction of excess products into the market, the rapid obsolescence of old products, increased volumes of industrial waste and other concerns related to global sustainability, emission generation, resource capacity and waste generation (Shahbazi, 2015). The generation of industrial waste is another critical cause for concern given its impact on both sustainability and the environment (Macarthur, 2012). Most extracted resources and materials and the majority of products eventually become waste, a journey known as the cradle-to-grave process (Shahbazi, 2015). Government regulations that apply to waste management are expected to assist in creating recycling awareness and helping most firms to acquire recycling machines as such policy not only increases the life of waste products but also achieves the maximum utilization of energy and the maximum saving of carbon emissions (Xie, et al, 2021). It reduces environmental deterioration, creates business opportunities, eradicates the unemployment problem by introducing a third party for screening the parts obtained from End of Life (EOL) products and overall minimises the production cost by utilising those parts. Above all, the success of the recycling process of different sectors depends on the awareness of the manufacturers and end users (Sinha & Modak, 2021). The requirements of environmental responsibility and circular economy should be fully respected as it can be seen that the promulgation of the policy has prompted the whole industry towards a clear direction in recycling while improving consumers' awareness of recycling (Xie, et al, 2021).

2.6 Theoretical Discourse

Dynamic capabilities theory proposed by Teece and Pisano (1994) is the extension of the resource-based view (RBV) of the firm (Barney, 1986, 1991). Dynamic capabilities depend on an adopted evolutionary path and may differ not only between industries but also between firms within an industry resulting in the creation of isolating mechanisms (Wernerfelt, 1984). The essence of an organization's capabilities is a combination of the resource base in the way that assures the criteria of value, rareness, inimitability and non-substitutability or in other words a competitive barrier. Some scholars treat capabilities as a special type of resource, i.e., "systemic" or "high-order" (Black & Boal, 1994; Miller & Shamsie, 1996; Grewal & Slotegraaf, 2007), used to bind other resources, enabling their allocation in a profitable way for a company (Day, 1994). Based on the aforementioned, it can be asserted that an organizational resource base can be transformed (renewed) by ambiguous events that may blur Hall's distinction. Nevertheless, intense criticisms have been levelled against the theory, such as the nature of the term itself and difficulties in determining the merits of the outcomes of the theory (Zahra, Sapienza & Davidson, 2006), difficulty in understanding the nature of DCs and the absence of clear models to measure these capabilities and how they affect the performance of organizations (Zott, 2003). The theory has also been criticized for being repetitive (Zollo & Winter, 2002) and ineffective in providing a complete answer regarding DCs and how they operate (Schreyögg & Kliesch-Eberl, 2007). DC theory has also suffered from a lack of clarity about what constitutes its core concepts (Ambrosini & Bowman, 2009). Despite the intense

growth of studies discussing the idea of DCs the progress of the theory still requires further collective efforts from researchers to illustrate concepts related to the theory and how to link them to empirical practices within organizations (Wang & Ahmed, 2007). Capabilities independent of human activity, intertwined with those developed based on competencies, generate a new type of capabilities that is harder to copy by competitors.

2.7 Empirical Review

S/N	Researcher(s)	Year	Topic	Location	Methodology	Major Findings
1.	Iveson, Hultman, & Davvetas	2022	The Product Life Cycle: An Updated Review and Future Research Agenda	United Kingdom	Citation analysis of marketing research papers and textbooks was used to ascertain PLC usage.	Findings reviewed that a new stream of PLC literature is emerging which takes a consumer-centric perspective to the PLC and has seen more success at modelling lifecycles in various industries.
2.	Barahmand & Eikeland	2022	Techno-Economic and Life Cycle Cost Analysis through the Lens of Uncertainty: A Scoping Review	Norway	Possibility approaches such as the Monte Carlo methodology were the most frequently used tool.	The results indicate that the uncertainty associated with economic factors and model uncertainties were the main sources of uncertainty in Techno-Economic Analysis (TEA) and

						Life Cycle Cost Analysis (LCCA).
3.	Viscuso, Monticelli, Ahmadnia & Zanelli	2022	Integration of life cycle assessment and life cycle costing within a BIM-based environment	Italy	Digital methods and informative building models which were scored through the analysis of variants and their weighted comparison.	Findings reviewed that the evaluation of methodology predicts the full life cycle cost of a project, including the acquisition, design, construction, operation, maintenance, and disposal phase costs.
4.	Gautam & Singh	2022	A Life-Cycle Cost Analysis for Automobile Purchase	United States of America	The six-step process of engineering economic analysis was adopted for the research.	The analysis indicated that the lowest possible down payment appeared to be the economically most attractive investment strategy for any option. A detailed analysis methodology is developed and presented.
5.	Gaus, Wehking, Glas, & Eßig	2022	Economic Sustainability by Using Life Cycle Cost	Germany	Decisions are made by councils (buying	The analysis integrates two theoretical

			Information in the Buying Center: Insights from the Public Sector		centres), and groups of people with different backgrounds which must be informed with ES LCC information.	perspectives and provides strong indications that LCC is a promising instrument to link decision-making with sustainability rationale.
6.	Ebekozien, Samsuriyam, Aigbavboa & Awo-Osagie	2022	Developing a framework for building maintenance: a case study of Malaysia's low-cost housing via soft system methodology.	Malaysia	Soft system methodology (SSM) and Virtual interviews using experts.	The Major findings show that apart from the poor state of low-cost housing maintenance, there is the absence of a framework to improve maintenance practices, especially in low-cost housing (LCH) across Malaysia's cities.
7.	Chang, Zhao, Li, Bai, Gao & Zhao	2022	Cost-Effectiveness of Life Cycle Cost Theory-Based Large Medical Equipment	China	The analysis model of the cost-benefit of large medical equipment is established, and the cost-effectiveness of 4 large medical equipment in 2019-2021 is	Major findings review that there is a lack of quality control and preventive maintenance of most equipment during use and too high

					investigated and analyzed quantitatively and evaluated.	hospital warranty cost reflects the weak maintenance strength of hospital engineering technicians.
8.	Yadollahi, Saryazdi, Shafaat & Hafezi	2022	Life cycle cost analysis of near-zero energy buildings benefited from earth-sheltering	Iran	Design Builder® software was used to validate the method and to evaluate the sensitivity of the results; Latin hypercube sampling (LHS) simulation was used.	The result shows that reducing energy consumption by earth sheltering is significant. Net present value (NPV) is statistically significantly positive and forms are meaningfully influential. Results show highest NPV is obtained when the depth of the building is seven meters.

III. Research Method

3.1 Model of the Study

Variables adapted to conceptualize this work include technology, operating budget, turnover/ sale, exchange rate, current assets, and fixed assets which decompose the independent variable (Terotechnology) and proxy the dependent variable (Profitability).

3.2 Analytical Methodology and Related Statistics

This study relied solely on secondary data sourced from financial reviews, journals, the Central Bank of Nigeria statistical bulletin, the Nigerian Stock Exchange fact book, and

Nigeria Breweries PLC publications from 1991 to 2021. The data gathered was subjected to a mathematical model using regression analysis.

3.3 Model Specification

The Simple Linear Regression Model is one of the common statistical tools that will be used for analyzing quantitative data. For this study, the dependent variable is profitability, while the independent variable is production cost.

The Ordinary least square (OLS) model is mathematically expressed as Profitability = f (Production Cost)... equ (1).

The above model is further modified by introducing the error term, to capture the errors of miss specification in the model. Thus, the econometric model is stated as:

$$\text{Profitability} = \beta_0 + \beta_1 \text{PRDCOST} + \epsilon_v \dots \text{equ (2)}$$

$$\text{Profitability} = \beta_0 + \beta_1 X_1 + \epsilon_v \dots \text{equ (3)}$$

$$\text{Profitability}_{\text{hat}} = \beta_0 + \beta_1 X_1 \dots \text{equ (4)}$$

3.4 Interpretation of Regression Coefficients

Profitability: The dependent variable. **Profitability_{hat}:** this stands for the estimated Profit

β_0 : this is the value of Profitability when the independent variable is zero. It is also called the intercept. β_1 , Measures the average change in the dependent variable (Profitability) in every unit change in independent variables, this is called the slope X_1 , this is the independent variable μ ; this is the error term associated with the distribution or white noise.

The need for this is to formulate a model and to ascertain whether there is an existing relationship between Profitability (Dependent variable) and the Independent variable.

3.5 Assumptions for Regression Analysis

Linearity: The relationship should be linear between predictors and outcomes.

Normality: normally distributed errors

Homogeneity: error of variance should be counted

Independence: no correlation between errors

Model specification: The model should be properly specified to make sure there is no violation of the above-stated assumptions:

Honeywell
Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-174075.995		-.660	.515		
	PRODUCTION COST	.861	.741	5.947	.000	1.000	1.000

a. Dependent Variable: PROFITABILITY

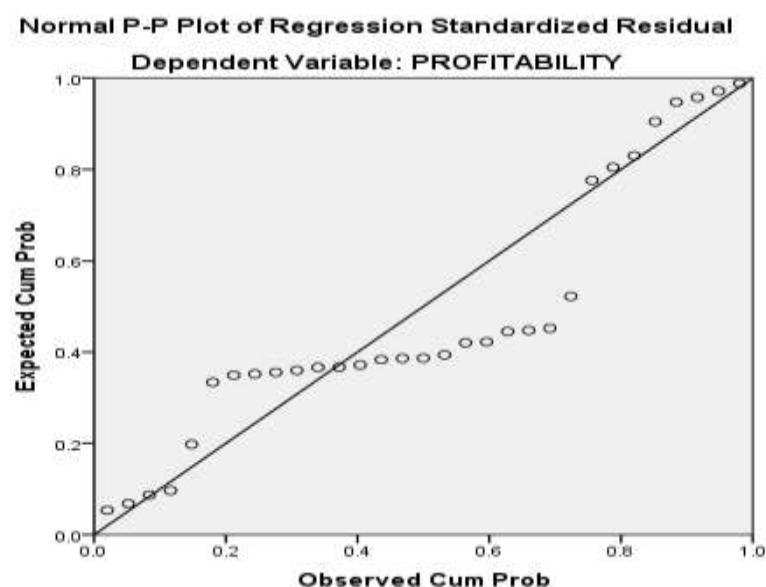
$$\text{PRF} = -174075 + 0.861 X_1$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.741 ^a	.549	.534	925759.86059

a. Predictors: (Constant), PRODUCTION COST

b. Dependent Variable: PROFITABILITY



Flour Mills of Nigeria PLC

Year	Profitability #'000	Production Cost #'000	Investme nt #'000	Operatin g Budget #'000	Capaci ty Utilizat ion	Turnove r/ Sales #'000	Technolo gy
1991	109823	843643	206192	399578	45.2	1199144	0
1992	129237	1097723	268643	521170	45.3	3181699	1
1993	145304	1433206	349932	677565	46.1	415732	2
1994	183425	1859964	455998	885945	50	5387776	3
1995	200119	2439654	593798	1146751	47.1	7084189	4
1996	235794	3140238	774195	1511085	48.2	9079137	5
1997	275794	4178724	1007200	1929167	46.3	1217343 1	6
1998	327565	5241991	1315385	2604089	47.3	1506398 1	7
1999	379816	7286896	1706214	3183411	50.1	2145631 2	8
2000	602878	8439076	2239942	4628855	49.3	2373563 3	9
2001	390828	13421614	2878700	4355615	47.4	3092290 2	10
2002	1537104	11895615	3841126	5500059	48.2	4330651 1	11
2003	254995	28369226	4794974	6295028	44.3	4225002 9	12
2004	1370485	28369226	6728404	7130930	46.2	5356321 1	13
2005	1027108	7,317,620	5525509	1780866	47.3	4001729	14

						0	
2006	1304675	7,790,058	7954274	1891483	48.1	5098584 2	15
2007	3015210	13146833	12899963	1789423	47.3	6486423 5	16
2008	4324760	15599805	11887898	2935534	50.1	1040513 79	17
2009	2469512	18773815	14924094	2360692	49.3	1473883 31	18
2010	13370731	25964192	20739600	6430716	51.4	1570948 63	19
2011	10095752	28483098	22024084	5153698	51.1	1617962 84	20
2012	-12339687	29310102	23260224	5475251	51.3	1834027 10	21
2013	8440528	38052227	28787944	5340605	51.3	2256297 47	22
2014	11113370	45709382	40992727	5606309	51.3	2457013 66	23
2015	9416938	55084305	45371104	5463062	51.3	3087565 26	24
2016	10425786	5399587	41716386	5300173	51.3	2478765 04	25
2017	9829046	14275123	53597078	5948911	51.4	3752252 84	26
2018	1415983	15815570	35384783	6284977	51.1	3893978 36	27
2019	3440415	17016014	42063788	5941484	51.3	2884762 58	28
2020	2429817	18553083	49495468	3632428	51.3	3738114 79	29
2021	3281986	20605248	56437654	6165916	51.3	8328105 61	30

SOURCE: Nigeria Stock Exchange, Fact Book (Various issues)

Flour Mill Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			Tolerance
1 (Constant)	1415464.5 20	1679188.7 95		.843	.406	

PRODUCTION COST	.169	.081	.363	2.100	.045	1.000
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a. Dependent Variable: PROFITABILITY

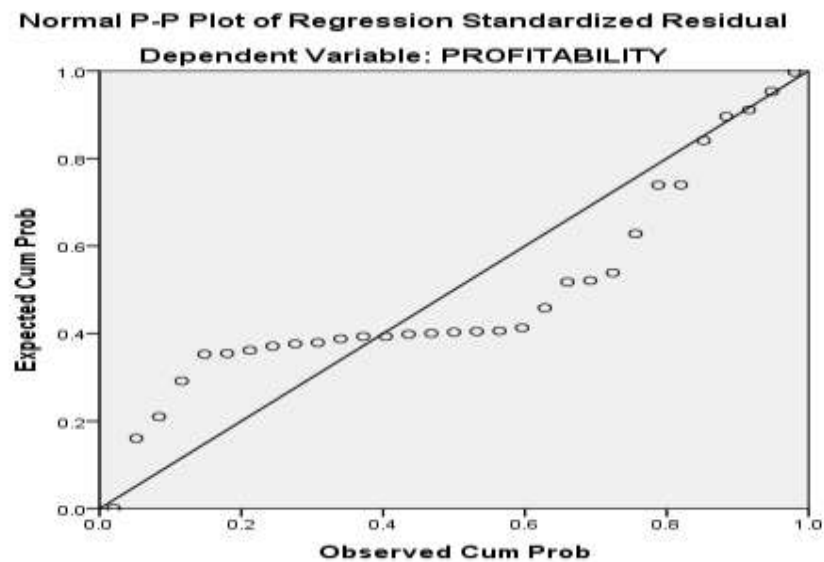
$$PFT=1415464.520+0.169X1$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.363 ^a	.132	.102	6009549.69458	1.364

a. Predictors: (Constant), PRODUCTION COST

b. Dependent Variable: PROFITABILITY



Dangote Flour Mills PLC

Year	Profitability #'000	Production Cost #'000	Investment #'000	Operating Budget #'000	Capacity Utilization	Turnover/ Sales #'000	Technology
1991	332087	775304	423148	1168655	44.3	2186756	0
1992	431327	877791	551389	1523855	46.2	2814623	1
1993	564933	1448121	718054	1982111	47.3	3745645	2
1994	729049	1185251	936116	2589454	48.1	4698223	3
1995	965750	3159111	1218046	3356878	47.3	6238707	4
1996	1221396	3966643	1590301	4411485	50.1	7855980	5
1997	1675853	5510689	2063837	5659149	49.3	10860141	6

1998	1988334	6389239	2707065	7575305	51.4	12707801	7
1999	3039225	10142828	3484447	9402143	51.1	19872622	8
2000	2925778	9024888	4636748	13323772	51.3	18250781	9
2001	3152671	11260768	5816593	14882658	51.3	21494464	10
2002	2698885	6789007	8093651	25088658	51.3	15007097	11
2003	3606456	15732529	9356129	32433102	51.3	27981831	12
2004	2235977	18571245	13861857	46686687	51.3	39623810	13
2005	740685	19311930	27374757	46686687	51.4	45399901	14
2006	721983	14153520	59841510	51264394	51.1	35672696	15
2007	290335	21907492	1094309	23001803	51.3	31303845	16
2008	1704092	23157859	263950	23489809	51.3	30109610	17
2009	5359861	26749581	463695	27210276	51.3	41839919	18
2010	3753248	26489154	2829608	29318762	50.1	42695383	19
2011	920383	31199169	2472543	27267763	49.3	38679844	20
2012	-3138119	36916232	9613645	57832629	51.4	29859976	21
2013	-7217001	36744670	24768875	51925552	51.1	14050996	22
2014	-6119400	36830451	20923122	32965300	51.3	41265972	23
2015	-14078794	13691988	27615605	- 33089466	51.3	36094021	24
2016	12110356	16337767	54217226	58120572	51.3	83671078	25
2017	12577722	21964195	104233776	81149128	51.3	108086289	26
2018	-1053422	26062905	92246781	88460626	51.3	96865832	27
2019	1476853	24004356	91254024	86754378	51.4	85648765	28
2020	2123223	21409435	95467977	87564967	51.1	85674564	29
2021	3326543	25572234	93457634	82354398	51.3	87446587	30

SOURCE: Nigeria Stock Exchange, Fact Book (Various issues)

Dangote

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1							
(Constant)	2391802.689	1550836.028		1.542	.134		
PRODUCTION COST	-.074	.078	-.174	-.949	.350	1.000	1.000

a. Dependent Variable: PROFITABILITY

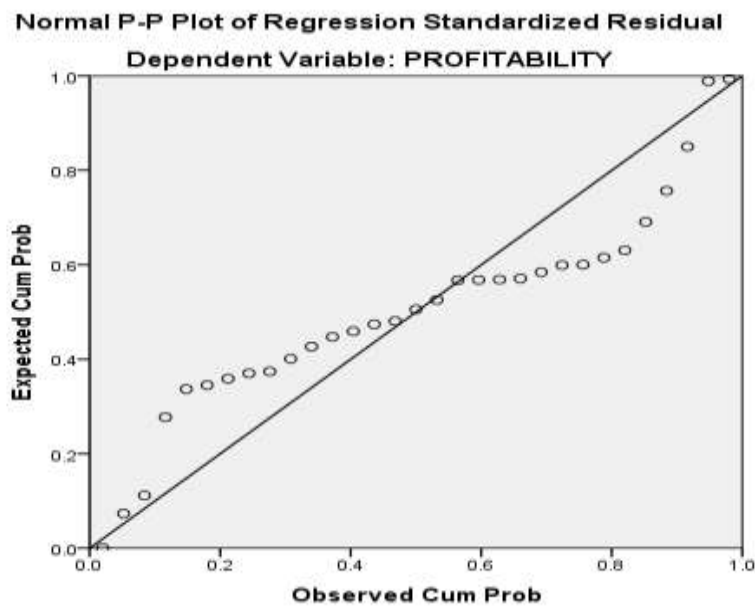
$$PFT = 2391802.689 - 0.074X_1$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.174 ^a	.030	-.003	4761362.36871

a. Predictors: (Constant), PRODUCTION COST

b. Dependent Variable: PROFITABILITY



Honeywell Flour Mills PLC

Year	Profitability #'000	Production Cost #'000	Investment #'000	Operating Budget #'000	Capacity Utilization	Turnover/ Sales #'000	Technology
1991	21893	643775	399578	138773	49.3	1097723	0
1992	28414	643603	521170	180797	47.4	1433206	1
1993	37265	644296	677565	235523	48.2	1859964	2

1994	47978	643426	885945	306867	44.3	2439654	3
1995	63817	643086	1146751	399701	46.2	3140238	4
1996	80115	646376	1511085	520900	47.3	4178724	5
1997	111337	640817	1929167	678202	48.1	5241991	6
1998	129009	642066	2604089	884499	47.3	7286896	7
1999	205001	656246	3183411	1150106	50.1	8439076	8
2000	182027	624140	4628855	1503392	49.3	13421614	9
2001	432977	645813	4355615	1946926	51.4	11895615	10
2002	113106	698785	5500059	2563249	51.1	28369226	11
2003	168827	527821	6295028	3277530	51.3	28369226	12
2004	170492	710834	7130930	4412216	51.3	7,317,620	13
2005	167161	857699	17830866	5420372	51.3	7,790,058	14
2006	722557	14930	12891483	7816277	51.3	13146833	15
2007	636343	1259873	17289423	8444840	51.3	15599805	16
2008	816452	1298293	29395534	12640469	51.4	18773815	17
2009	209107	1842346	23660692	12865953	51.1	25964192	18
2010	1948396	1648321	64307716	32141154	51.3	28483098	19
2011	2412769	1596320	54153698	35293612	51.3	29310102	20
2012	2787775	1695662	84475251	64946292	51.3	38052227	21
2013	2843520	1646768	13405605	73990561	51.1	45709382	22
2014	3351564	1646250	90606309	84435687	51.3	55084305	23
2015	3023852	1662893	8463062	41553977	51.3	49057511	24
2016	1120267	2415183	4300173	46522386	51.3	50883780	25
2017	4304955	5343592	29948911	40809423	50.1	53227891	26
2018	3026978	4420217	29284977	55784321	49.3	71476319	27
2019	2323510	1845243	12941484	63282104	51.4	74409113	28
2020	3504932	2690310	14632428	66588559	51.1	80450397	29
2021	4125864	2970982	32165916	9397545	51.3	10959473	30

SOURCE: Nigeria Stock Exchange, Fact Book (Various issues)

IV. Result and Discussion

In Honeywell Nigeria plc, it was discovered that profitability and the independent variable have a strong positive relationship with $r=0.741$. The coefficient of determination $r^2=0.549$ shows that 54.9% of the variation in profit can be explained by production cost at a 95% level of significance. The p-values show that production cost is statistically significant (p-value <0.05) and it has a positive slope with an increase in profitability in every unit (#1) increase in production cost. It was discovered in Flour Mills Nigeria plc that profitability and the independent variable have a weak positive relationship with $r=0.363$. The coefficient of determination $r^2=0.132$ shows that 13.2% of the variation in profit can be explained by the production cost at a 95% level of significance. This explained variation by the production cost is very poor for this company's profitability. It shows that other variations cannot be explained by production cost; hence other variables do that. The p-values show that production cost is statistically significant (p-value <0.05) and it has a positive slope with an increase in profitability in every unit (#1) increase in production cost while it was also discovered in

Dangote Nigeria plc that profitability and the independent variable has a weak positive relationship with $r=0.174$. The coefficient of determination $r^2=0.030$ shows that 03.0% of the variation in profit can be explained by the production cost at a 95% level of significance. This shows that other major variables are playing a better role in the profitability of this firm than Production cost. This is due to the poor percentage of explained variation in the profit. The relationship between the independent variable and production cost is very weak. The p-values show that production cost is statistically insignificant ($p\text{-value} < 0.05$) and it has a negative slope with a decrease in profitability in every unit (#1) increase in the production cost.

V. Conclusion

This study relied solely on secondary data sourced which was subjected to a mathematical model using regression analysis. It was observed that the dependent and the independent variables have a strong positive relationship with $r=0.741$. The coefficient of determination $r^2=0.549$ shows that 54.9% of the variation in profit can be explained by production cost at a 95% level of significance while in the flour mills Nigeria plc, the dependent and the independent variables have a weak positive relationship with $r=0.363$. The coefficient of determination $r^2=0.132$ shows that 13.2% of the variation in profit can be explained by the production cost at a 95% level of significance. Finally in Dangote Nigeria plc, the dependent and the independent variables have a weak positive relationship with $r=0.174$. The coefficient of determination $r^2=0.030$ shows that 03.0% of the variation in profit can be explained by the production cost at a 95% level of significance.

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