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The Impact of Cost of Production on Return on Capital in Dispersed and Concentrated Manufacturing Firms in Nigeria

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Abstract

In Nigeria, production firms amidst of challenging forces struggle to maintain their going-concern as against earnings and invested capital. The manufacturing sector of the economy are at risk because of the increase in economic downturn, inflation, demand and supply fluctuation, high cost of raw material, epileptic power supply that resulted to high cost of over head in running the production processes, and poor patronage of local products as against imported ones. Because of these militating factors warrant the manufacturing firms to struggle for their survival and to manage their resources (capital) judiciously in order to satisfy themselves and the interest of their investors. Hence this study is motivated by this background to investigate the impact of cost of production on return on capital of dispersed and concentrated manufacturing firms in Nigeria from 1998 to 2007. This study adopt two - variable linear regression model and we discovered that for dispersed firms examined there was a positive non-significant impact of cost of production rate (CPR) on return on capital (ROC), therefore, an increase in cost of production rate as to enhance the return on capital of dispersed firms will increase, though not significantly. The concentrated firms examined, there was a positive non-significant impact of cost of production rate (CPR) on return on capital (ROC). Hence, with dispersed firms, cost of production rate increases return on capital of Firms as well increases return on capital for concentrated firms. The study recommends that the government should provide basic social capital that is highly efficient so that industrialist could be saved from very high overhead costs. Also the government should facilitate power supply, create an enabling environment for the firms, ensure basic incentives of support for local content, tax holidays and provision of subsidy to firms in order to boost the economy.

Keywords: Cost of Production, Return on Capital, Dispersed firms, Concentrated firms.

1.0 Introduction

As production firms struggle to maintain their going-concern in their business activities, the effort showcase the essence of contrasting the earnings with the invested capital as two-way flow to sustain their survival. The advent of multilateral approach to manufacturing have now made it glaringly clear that firms need not operate any longer at local frontier but should cross beyond global boundary. All one need to do is to queue – up his efficiency and effectiveness in satisfying an aspect of the demand. Fung (2005) argues that the modern global production system is essential to economic efficiency and consumer welfare. He went further to submit that it benefits consumers by improving efficiency and reducing cost. Further he submits that the global production system has enabled consumers to get higher quality, greater quality, and lower price than they would get other from the entire world as a production base. According to him, for developed countries, the global production system facilitates the development of the "knowledge economy". It enables them to focus on design, branding, understanding the needs of consumers and specialized activities that are knowledge- intensive (Boselie and Boon, 2005),

Dispersed manufacturing elicit even greater segmentation of the global production system in the future. Every firm that is foresighted is either moving into the world stage or planning seriously to do so. Sequel to dispersed manufacturing firm and their embedded challenge are comparable with the concentrated manufacturing firm in term of capital adequacy to inadequacy, management competence to incompetence, effective production processes to ineffective one before return on capital can judged profitable or loss. Then, additional market or wider market share can provide incentives to develop new products, services, technologies, or even take up the production of more component parts of a particular product. But whichever way it turns out dispersed manufacture connotes performance of all the functions of management to its very dregs and these functions include Planning, Control, Organizing, Directing, Staffing, Coordinating, Reporting and Budgeting Adebayo, (1981). This paper attempt to investigate the impact of cost of production on return on capital of dispersed and concentrated manufacturing firms in Nigeria from 1998 to 2007. The paper is organized into five sections. The section on contains the introduction, the

section two presents the review of the related literature, the section three contains the methodology, and while the section four and five comprise of the results/analysis, conclusion and recommendations respectively.

2.0 Review of Related Literature

However, the use of conventional financial ratios, as input into parametric test procedures intended to highlight changes in manufacturing performance, may limit the extent of the analysis, and assumes the ratios are constructed from multivariate normal distributions. In order to improve the greater operational flexibility, improved quality, and lead time reductions, the JIT and lean manufacturing systems focus on allowing the customer to "pull" material through the process, only replenishing inventories upon receipt of an order, the impact of such systems should be manifest in the inventory and asset turnover metrics. If the reduction in assets and improved efficiency reduces overall costs, then there should be a subsequent increase in the firm's return on assets. As resources are freed by the elimination of non value- added activities, productivity is expected to rise, as should labor utilization. It is reasonable to expect that reductions in accounts receivable and inventory, along with increases in productivity, will also positively impact cash flow from operations, making the firm a more efficient converter of resources to cash. Great is the volume of studies that have been performed to assess the effect of lean systems on the financial health and productivity of various industries, and varied are both the analytical approaches taken and the results obtained.

Balakrishnan et al. (1996), testing the significance of changes in median ROA, for pre adoption vs. post-adoption JIT and non-treatment control firms, found that the ROA actually decreased after inventory management systems were implemented, as did the ROA of control firms. Testing the magnitude of the ROA decrease for treatment versus non-treatment firms yielded no significant differences. However, the ROA decrease was significantly less for firms with non concentrated customer bases, i.e., those not required to pass on JIT-related savings to their customers. Furthermore, firms that showed higher depreciation-to-cost ratios upon lean implementation, indicating a larger investment in JIT, did not exhibit a significant dilution of the savings from lean manufacturing adoption by the higher committed costs. Kinney and Wempe (2002) re-examine the effect of JIT adoption on operational and financial performance, using a larger sample size than Balakrishnan et al. (1996). They found that adopters of lean systems produced increases in inventory turnover (ITO) that were six to eight times greater than their non-adopting counterparts, with a corresponding decrease in inventory-to total- assets. The ROA response for JIT adopters improved, on average, more than non-adopters, and no significant difference in ROA was found between firms of varying customer base concentration. They explored the ROA response further by assessing the effect of lean implementation on both the profit margin and asset turnover (ATO) measures. The data revealed a stronger association between increases in profit margin and ROA, indicating that the removal of non-value-added costs is a greater boon than the mere increase in asset turns due to inventory reductions.

Fernandez-Castro and Smith (1994) highlight the four problems with the nature of financial ratios. First, when comparing firms using ratios, one assumes strict proportionality between the numerator and denominator. If they are related in any other way, such as by an intercept term, an interaction term, or in a nonlinear fashion, a simple ratio cannot supply all the information embodied in the two variables. However, in the case of ROA, for example, it is clear that, regardless of the proportionality, a high value is preferable to a low value. Second, because of the proliferation of an unlimited number of ratios from corporate financial statements, there is the problem of choosing which ratios to examine in a given analysis. Predictive studies that incorporate an excess of ratios into the analyses may produce information that is redundant or difficult to interpret, while normative use requires the choice of ratios applicable to the targets upon which policy is based. Therefore, the choice of ratios as univariate indicators of performance often neglects consideration of possible conflicts or interdependencies between the metrics chosen, furthering the difficulties of both the omission of variables and the creation of unmanageable redundant information. Third, financial ratios, especially when used in normative applications, are not considered in aggregate form, and combining them for predictive purposes requires assessment of their relative contributions to the prediction. Furthermore, although regression-based techniques can be used to generate predictive information, the statistical assumptions underlying the regression approach are often violated.

Kallunki et al. (1996) examine the proportionality of financial ratios, including return on investment (ROI), return on equity (ROE), current ratio and quick ratio, among others. Because of the heteroscedasticity of regression models of ratio outputs on their respective inputs, transformation to more homoscedastic models was performed, and the resulting coefficients were tested for proportionality. Deviations from proportionality were found in 10% of the

cases. From their results they conclude that, from a proportionality standpoint, the use of ratios is valid in financial statement analysis, but care should be taken to assess normality prior to using ratios for decision making.

Enterprise input–output (EIO) accounts are useful to complement the managerial and financial accounting systems currently used extensively by firms, and in the recent decades, extensive work on enterprise input-output accounts and models has been done (Filipic, 1985, Lin and Polenske, 1998; Polenske and McMichael; Marangoni and Fezzi, 2002.). In particular, Lin and Polenske (1998) built a specific input–output model, input-output process-flow model (IOPM), for a steel plant, which was based on production processes rather than on products or branches. The model comprised issues of sustainability by focusing on economics-energy-environment interactions. For a given final product, the model computes output, materials, energy and waste (pollution) flows, thus providing a measure of the environmental impact of production processes. Changes either in the demand for the final product, or in the technologies adopted by each production process, could be covered and their effects on both the production network that characterized the industrial district and on the environment could be analyzed (Fullerton and McWatters, 2001)

Methodology

This paper adopted the *ex-post facto* research design. The adoption of this research design centres on the study relies on historic accounting data obtained from the financial statements and accounts of the ten (10) manufacturing firms. Also the ex-post facto research design makes use of secondary data (Onwumere, 2005). The data used for this study was extracted from the published financial statements and accounts for the period of 1998 to 2007. The firms were, Flour Mills Nig Plc, Chemical and Allied Products Plc, Benue Cement Company Plc, Guinness Nigerian Plc, United Nigerian Textiles Plc, Alumaco, BETA Glass, Longman Plc, Aluminum Extrusion Industries and Vono Foams. Flour Mills Nigeria Plc, Chemical and Allied Products Plc, Benue Cement Company Plc, Guinness Nigerian Plc, United Nigerian Textiles Plc were categorized as concentrated firms (as these had over 75% of raw materials in-house for production) and Alumaco, BETA Glass, Longman Plc, Aluminum Extrusion Industries and Vono Foams were categorized as dispersed firms (as these that had to source for over 75% of the raw materials).

3.1 Model Specification

The study adopted the two-variable regression model and the general form is;

$y = a + bx + \mu$ ..... (i)

where

y = Dependent variable
a = Constant
b = Coefficient of the Independent variable
x = Independent Variable and
μ = Error Term

However, in writing the model equation for the stated hypotheses, the following symbols were used to denote their respective variables; these are;

CPR = Cost of Production Rate
ROC = Return on Capital

Therefore rewriting the model in line with equation 1 above, we have:

$ROC = a + b\,CPR + \mu$ ..... (ii)

3.2 Explanatory Variables

Variables of the model are explained as follows:

Independent Variable - Cost of Production Rate

In companies CPR focus on flow with an emphasis on operational speed and variability reduction outperform companies emphasizing other goals. This conclusion is consistent with the principles of operations management. Thus, using cost of production rate as measure of efficiency in use of raw materials in dispersed (where raw

materials are produced at different location) and concentrated (where raw materials are produced in house firms). The measure was represented as in line with Schmenner (2001), as;

Cost of Production rate = Cost of Goods Sold/Turnover…… (iii)

Dependent Variables - Return on Capital

Return on Capital (ROC) is a measure that indicates how well the firm has uses the resources of owners. The earnings of a satisfactory return are the most desirable objectives of a business. This ratio reflects how well this objective has been achieved. In this study we adopted this measure as a performance measure and is estimated by the ratio of profit before tax or net income to equity (Pandey, 2005). Thus it is represented as;

ROC = PAT/Equity…… (iv)

The aggregate data of dispersed and concentrated firms as used in this study are presented in this section.

Table 3.1: Summary of Aggregate for Dispersed Firms

Year	CPR for Dispersed Firms (%)	CPR for Concentrated Firms (%)	ROC for Dispersed Firms(%)	ROC for Concentrated Firms (%)
1998	1.465594	2.892014	0.973661	1.330229
1999	1.397926	3.002365	0.693647	0.946683
2000	1.477825	3.125885	0.963548	0.994383
2001	0.926684	3.373725	0.635396	0.836065
2002	1.251571	3.261195	1.076595	0.94924
2003	1.374614	3.302187	0.744909	1.421593
2004	1.289441	3.295712	0.515921	1.333972
2005	1.334236	3.554139	0.786994	1.387472
2006	1.418382	3.310598	0.806766	1.101251
2007	1.381637	3.261366	0.669844	0.570425

Source: Appendix

The table above indicates that cost of production rate was represented in percentage. This ratio indicates how the firms have managed effectively and efficiently the raw materials utilized, thus it had a direct bearing on their cost of production. On aggregate basis, the highest rate was observed in 2000 where the costs of production rate the firms that had dispersed manufacturing system, it was 1.4778% while the lowest rate was observed in 2001 when it was 0.93%. Sustainability is the ability of firms to continue to exist and growth measure the ability of manufacturing firms to continually increase earnings attributable to share holders in the long run. As observed from the table for dispersed manufacturing firms, the highest was recorded in 2005 where it was 15% while the least rate was observed in 2004. Return on Capital (ROC) measure that indicates how well the firm has uses the resources of owners. The earnings of a satisfactory return are the most desirable objectives of a business. This ratio reflects how well this

objective has been achieved. As observed from the table above, the highest return is observed in 2002 while the least return was observed in 2004 for dispersed manufacturing firms.

4.0 Result/Analysis

Table 4.1 below contains the summary of the estimated results of our model.

Table 4.1: Summary of SPSS Results for Dispersed and Concentrated Firms

Hypothesis	R	R^2	Beta	t-value	F	D.W
Dispersed Firms	0.418[a]	0.175	0.386	1.030	0.425	1.638
Concentrated Firms	0.480[a]	0.230	0.266	0.695	0.597	1.238

Source : Appendix

Model Equation for Dispersed firms **CPR = 1.028 + 0.353ROC+μ**

Model Equation for Concentrated firms **CPR = 1.660+ 0.180ROC +μ**

As shown from table 4.1, the impact of cost of production on dispersed manufacturing firms was positive and non-significant as (t = 1.030, coefficient of cost of production rate (CPR) = 0.353 for dispersed firms). The coefficient of determination as indicated by R^2 17.5% indicating that other variables apart from cost of production have an impact on return on capital (ROC) of dispersed firms in Nigeria. As also depicted from table 4.1, impact of cost of production on return on capital (ROC) was a positive non-significant (t = 0.695, coefficient of cost of production = 0.180). The coefficient of determination R^2 of 23% indicates that other factors not captured in the model have impacted on return on capital (ROC) of concentrated firms in Nigeria for the period.

5.0 Summary, Conclusion and Recommendations

The result observed that, for dispersed firms examined there was a positive non-significant impact of cost of production rate (CPR) on return on capital (ROC), therefore, an increase in cost of production rate as to enhance the return on capital of dispersed firms will increase, though not significantly. For concentrated firms, as observed from the hypothesis tested, for concentrated firms examined, there was a positive non-significant impact of cost of production rate (CPR) on return on capital (ROC). Hence, with dispersed firms, cost of production rate increases return on capital of Firms as well increases return on capital for concentrated firms. Therefore, whether the firm is dispersed or concentrated, the cost reduction effect of having to source raw material in separate places or concentrated places does not matter as return on capital of Firms in Nigeria. On aggregate basis for Dispersed firms in Nigeria, there was a positive non-significant impact of cost of production rate (CPR) on return on capital (ROC) and for concentrated firms, the result indicates that there was a positive non-significant impact of cost of production rate (CPR) on return on capital (ROC).

Since the concentration of firms in a certain area attracts all the advantages of external economies of scale while it greatly strengthens internal economies, many companies would see reasons to liaise with others. No company likes to operate alone in wide vicinity as the observation of many has shown. There are some that; however, prefer to produce in a secluded area. The issue of industrialization of remote areas means that sometimes some companies blaze the trial of establishing their firms in the rural areas. It pays as it attracts development to the rural areas.

It is obvious that the firm would spend much putting so many logistic on ground. To avert this, the government usually puts all social capital on ground in the industrialized layouts so that the firms spend less establishing in the estates or layouts. It is not, however overheads that only hinder establishment of firms in dispersed areas, but also patronage and transportation. Concentrated manufacturing firms have to plan to overcome capital squeeze in order to operate alone. Many firms find this aspect very difficult, so, dispersal of firms paves way for improved firms only if the management has enough financial strength to do most of the things alone, this is where concentration of firms comes to play. Also since the return on capital is higher in dispersed manufacturing firms, interested investors would want to be part of the stakeholders thereby increasing the market share, having greater turn over and increases profit earnings.

Thus, concentrated firms should exploit the merits of concentration of firms to their advantages (control cost and reduce some overhead cost), because when firms are situated close together, similar services are rendered to one

another which reduces transport cost as well as service charges due to neighborliness. The government should provide basic social capital that is highly efficient so that industrialist could be saved from very high overhead costs. As was discussed earlier, capital is one of the problems that lead some manufacturers to choose dispersed manufacturing system. The study suggests that government should create industrial estates with efficient infrastructure to encourage growth of conurbation thereby reducing cost and increasing earnings. It is believed that when companies are situated together, some cost will be avoided. Such cost include transportation, warehousing and even labour cost.

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