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Production Improvement Function and Equity Capital of Firms in the Nigerian Manufacturing Industry

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Abstract
This paper investigates the extent to which Production Improvement Function, had affected the Equity Capital of firms in the Nigerian manufacturing industry. Three hypotheses were formulated and copies of questionnaire were distributed to eighty respondents in the eighty sampled manufacturing firms from the one hundred in the industry, that are quoted in the Stock Exchange(Fact Book 2009). Sixty two copies of the questionnaire were retrieved. These with the financial statements of the firms were used for the analysis. From its findings, the study revealed that production planning and control have significant impacts in enhancing the equity capital of firms in Nigerian manufacturing industry; while production scheduling has an insignificant influence on equity capital alone. This finding implies that production improvement function significantly affects the equity capital of firms and therefore provides evidence for the claims of Olusegun and Adegbuyi(2010); Olarenwaju(2010); Poterba(2006); and Ikan(2003). Based on these, the study recommends among others, that the Nigerian manufacturing industry should efficiently and effectively operationalize the all embracing production improvement function, especially in the area of production scheduling, in order to restore the industry as the base of all investment and hence development.
Keywords: Production Improvement Function, Enhanced Equity Capital, production scheduling.

1.0 Introduction

Since the advent of the Industrial Revolution, the world has seen a remarkable growth in the size and complexity of organizations. An integral part of this revolutionary change has been a tremendous increase in the division of labour and segmentation of management responsibilities in these organizations. The results have been spectacular. However, along with its blessings, this increasing specialization has created new problems and problems that are still occurring in many organizations. One problem is a tendency for the many components of an organization to grow into relatively autonomous empires with their own goals and value systems, thereby losing sight of how their activities and objectives could blend with those of the overall organization. In other words, it could mean that what is best for one component frequently is detrimental to another, so the components may end up working at cross purposes. A related problem is that as the complexity and specialization in an organization increase, it becomes more and more difficult to allocate the available resources to the various activities in a way that is most effective for the organization as a whole. These kinds of problems and the need to find a better way to solve them provide the impetus for the use of operational research techniques such as production planning and control. This technique is robust and flexible to accommodate variations in economic cycles of economies, while still achieving the objectives of organizations in the long and very long-runs.

The European, American and Asian economies found this technique as indispensable in any operation, irrespective of size and complexity. This very literature is hardly mentioned in any Nigerian operations and if mentioned it lacked the sincerity behind the philosophy; or else the results could not have been negative while it is positive in the other countries. For instance, the nation's yearly budgets and development plans should have given the economy the necessary lead towards achieving stated targets, given the huge resources the economy has. Instead the economy battles with sunk costs in trying to bailout organizations.

Equity is invested money that, in contrast to debt capital, is not repaid to the investors in the normal course of business. It represents the risk capital staked by the owners through purchase of a company's common stock (ordinary shares).

The value of equity capital is computed by estimating the current market value of everything owned by the company from which the total of all liabilities is subtracted. On the balance sheet of the company, equity capital is listed as stockholders' equity or owners' equity. It is also called equity financing or share capital.

The book value of equity will change in the case of changes in the firm's assets relative to its liabilities. For example, a profitable firm receives more cash for its products than the cost at which it produced these goods, and so in the act of making a profit, it is increasing its retained earnings, therefore its shareholders' equity

(Ezirim, 2005;Weston and Brigham, 2005). This has shown that profitability (productivity) which, according to Jain and Aggarwal (2008), is the measurement of the economic soundness of the means, can be optimized using the **PIF.**

In Jain and Aggarwal (2008), ***PIF*** problem requires two major types of decisions. One that relates to the design of the systems and the other that relates to the operation and control of the system; the relative balance of the emphasis is on such factors as cost, services, reliability of both functional and time performance which depend on the basic purpose of the enterprise or institution and the general nature of goods or services being produced. The problem of this research therefore is to investigate the effect of the application of ***PIF*** as a technique in its entirety on the productivity and hence equity enhancement of manufacturing firms in Nigeria. Selected manufacturing firms are surveyed to determine and establish empirically the extent and variability of this application.

It does appear that one of the greatest challenges facing the Nigerian manufacturing sector therefore, is how it can, like its counterparts in the industrially advanced economies through its ***PIF*** turnout quality products for customers and which can compete favourably, thereby enhancing the productivity and equity potentials in the Nigerian Manufacturing Industry. It is against this backdrop that, we are compelled to empirically examine the place of ***PIF*** in explaining enhanced equity capital in Nigeria that can assist the economy to achieve positive results as is the case in advanced economies.

Thinking along the reasoning of Fowge (1997), it is our belief that interest in ***PIF*** and enhanced equity capital has spurred curiosity beyond the capacity of scholars to keep pace with it either theoretically or methodologically. This seems to us to be the case in Nigeria as we do not find sufficient evidence of empirical studies on ***PIF*** and its impact on equity capital in the Nigerian Manufacturing Industry. Correspondingly empirical studies on ***PIF*** and enhanced equity capital specific-research in Nigeria are scanty (Chinweizu, 1979; Agbadudu, 1996) although Chase *et al* (2001) while acknowledging that the models of ***PIF*** and enhanced equity capital have been developed and tested in western countries, advocates that there is a need for more systematic research to determine whether these models apply elsewhere. It is upon this premise that this study sets out to examine the impact of ***PIF*** on enhanced equity capital ***(EEC)***in the Nigerian Manufacturing Industry with a view to enhancing organizational effectiveness and competitive advantage.

2.0 Theoretical Foundation.

Two key variables were important to the focus of this study and they were the Criterion Variable – ***EEC*** which depends on the Predictor Variable – ***PIF***. We defined ***EEC*** as a measure of productivity. In the same way, ***PIF*** has its dimensions as production planning, scheduling and control. It was assumed that the practices of ***PIF*** will trigger enhanced equity capital through its dimensional effects on productivity.

The objectives and the research questions for the study were drawn from the hypothesized relationships between the predictor and criterion variables. The framework assumes a straight line relationship between the predictor variables and the criterion variables. The conceptual framework, which is unidirectional, indicates that ***EEC*** is a function of ***PIF***. This is represented in the following mathematical model:

$$EEC = f(PIF)$$

Where:

EEC = Enhanced equity capital
PIF = Production Improvement Function

From the conceptual framework, ***EEC*** is a measure of productivity. The framework also shows the dimension of ***PIF*** as production planning, scheduling and control. Consequently our mathematical model can be expanded thus:

$$EEC = f(p, s, c)$$

Where:

p = planning
s = scheduling
c = control

3.0 Methodology.

The cross sectional survey design is considered most appropriate because what is being investigated is experiences (Anwuluorah, 1987). Again the range of issues and inter-relations are numerous and diverse. The study is also a causal study that is intended to identify the effect of the application of ***PIF*** on ***EEC*** in the manufacturing industry. The design is expected to reveal the relationship between ***PIF*** and ***EEC.*** The purpose of a cross-sectional survey therefore is to generate a body of data in connection with two or more variables, and to

examine and identify patterns of association (Nachimias, and Nachimias, 1981). This design meets our purpose and enables us to generalize from the result of our sample for the entire population. Furthermore, the causal investigation is adopted in this study and is built around the purpose of hypothesis testing in which we examined the causal relationship between ***PIF*** and ***EEC*** in a non-contrived setting.

3.1 Population of the Study

The population consists of those manufacturing companies quoted in the Nigerian Stock Exchange (NSE) Factbook of 2009. A total of one hundred (100) manufacturing companies were identified, but a sample of eighty(80) was drawn for the study using stratified random sampling method. In this case, the proportional allocation approach was used firstly to determine the number of companies in each stratum (sector) as classified by the Nigerian Stock Exchange (NSE) Factbook of 2009. Thereafter a simple random sampling technique was used to select members of the sample frame from each stratum (sector).

3.2 Data Collection Methods

Primary and secondary sources of data collection were explored for this study. The primary data were gathered through the administration of questionnaire designed using Five-Point Likert-Scale. While the secondary data were sourced from the companys' financial statements as reported in the Nigerian Stock Exchange Factbook of 2009.

The structured questionnaire containing questions relating to ***PIF*** with dimensions such as production planning, scheduling and control as it affects ***EEC*** of firms in the Nigerian manufacturing industry were served on chief executives or senior managers in the production and operations department. The copies of the questionnaire were administered personally and online (where applicable) by the researcher to the respondents. Sixty two (62) copies of the questionnaire were retrieved and analyzed.

To generate the qualitative data, we adopted an in-depth personal interview through the use of open ended questions designed to clarify certain issues and obtain further intricate details about the phenomena under investigation which were difficult to capture through the structured questionnaire. Sometimes, since the interviews were conducted after the copies of the questionnaire with their responses have been retrieved, the interview was also used as a confirmatory test of some of the responses especially those that were not clear.

We observed the operations in the study units. Here, we adopted the socio-technical systems model (Susman and Evered, 1978). In this respect, the system's framework guided the collection of facts so that they were organized into an integrated whole about boundaries, transformation of inputs into outputs and the climate of the operations environment. Secondary data were generated from textbooks, journals, company bulletins, annual reports of firms and professional bodies. These materials were reviewed to obtain relevant information about the organisations and the phenomena we have studied.

3.3 Research Hypotheses

In undertaking this study, we were guided by the following hypotheses:

Ho_1 There is no significant relationship between production planning and enhanced equity capital in the Nigerian Manufacturing Industry.

Ho_2 There is no significant relationship between production scheduling and enhanced equity capital in the Nigerian Manufacturing Industry.

Ho_3 There is no significant relationship between production control and enhanced equity capital in the Nigerian Manufacturing Industry.

4.0 Guide to Decision.

This section provides a verification of the hypotheses that were stated earlier using the simple linear regression analysis.

H_{01}: Production planning has no significant impact on enhanced equity capital in the Nigerian manufacturing industry.

In testing this hypothesis, enhanced equity capital as the variable measure for productivity of the selected companies was regressed with the percentage responses of the influence of plan for production activities on enhanced equity capital. The result obtained is presented in the table below;

Table 4.1: The Impact of Production Planning on Equity Capital

Statement Variables	Values
Co-efficient of correlation	0.652
Co-efficient of determination	0.423
t-statistic	3.175
p-value	0.02
Intercept	123997.494
Partial Regression Co-efficient	40466.853

Source; SPSS Version 16 Window Output

The table shows an R-value of 0.652, which suggests a strong impact of production planning on equity capital. The analysis shows that changes in production planning accounts for about 42.3% variation in equity capital, hence the model is of moderate fit. Therefore, the null hypothesis that production planning has no significant impact on equity capital in the Nigerian manufacturing industry was rejected.

H_{02}: Production scheduling has no significant influence on enhanced equity capital in Nigerian manufacturing industry.

In testing this hypothesis, enhanced equity capital as the variable measure for productivity of the selected companies was regressed with the percentage responses of the influence of schedule for production activities on cost minimization performance. The result obtained is presented in the table below;

Table 4.2: The Influence of Production Scheduling on Equity Capital

Statement Variables	Values
Co-efficient of correlation	0.151
Co-efficient of determination	0.023
t-statistic	1.175
p-value	0.245
Intercept	1.851
Partial Regression Co-efficient	.003

Source; SPSS Version 16 Window Output

The table shows an R-value of 0.151, which suggests a weak influence of production scheduling on equity capital. The analysis shows that changes in production scheduling accounts for about 2.3% variation in equity capital, hence the model is not a good fit. Therefore, the null hypothesis that production scheduling has no significant impact on equity capital in Nigerian manufacturing industry, was accepted.

H_{03}: There is no significant relationship between production control and enhanced equity capital in the Nigerian manufacturing industry.

In testing this hypothesis, enhanced equity capital as the variable measure for productivity of the selected companies was regressed with the percentage responses of the influence of production control on equity capital. The result obtained is presented in the table below;

Table 4.3: The Relationship between Production Control and Equity Capital

Statement Variables	Values
Co-efficient of correlation	0.701
Co-efficient of determination	0.49
t-statistic	2.777
p-value	0.000
Intercept	6.30036
Partial Regression Co-efficient	40516.012

Source; SPSS Version 16 Window Output

The table shows an R-value of 0.701, which suggests a strong relationship between production control and equity capital. The analysis shows that changes in production control account for about 49% variation in equity capital, hence the model is a moderate fit. Therefore, the null hypothesis was rejected.

The following findings were therefore drawn;

1) Plan for production activities enhances equity capital of the firm.
2) Schedule for production activities does not enhance equity capital of the firm.
3) Control of production activities enhances equity capital of the firm.

5.0 Discussion of Findings

The logical question one may ask at this point is "what do the research findings entail"? Therefore, this section of the study is focused on a detailed discussion of the research findings by relating them one after the other to previous studies.

5.1 Production Planning and Enhanced Equity Capital.

The key measure of the success of a firm is its productivity performance; hence business executives work assiduously to actualize this objective. One of the major means of doing this is through enhanced equity capital.

In this study, we observed that production planning has a fair significant impact on equity capital and hence profitability of manufacturing companies in Nigeria. An increase in production planning activity is responsible for about 42.3% increase in equity capital. These findings do not differ significantly from prior studies such as Olusegun and Adegbuyi (2010); Everette (2006), Higgins (2001) and Weimer (1999). Olusegun and Adegbuyi in their study revealed that a significant relationship exist between production planning operations and organizational output. Everette (2006) reported that forecasting future demand of a firm's product helps to eliminate any form of disruption to meet expected demand, which consequently enhances profitability and shareholders worth of the business. Higgins (2001) observed that firms with effective production planning system outperform those with an adhoc approach to production operations in around performance measures. Weimer (1999) revealed that equity capital is significantly low when there is lack of production planning operations which may result from wastages, error in product design and rework. This implies that productivity as well as equity capital is enhanced with adequate production planning operations.

5.2 Production Scheduling and Enhanced Equity Capital.

Production scheduling serves to boost production planning and control. It brings about smooth flow of work throughout the production cycle, prevents conflicts and delays in the use of productive resources and determines the expected time for the arrival of supplies and the shipping of finished products at minimum costs.

In this research work, it was gathered that production scheduling has a low influence on equity capital of Nigerian manufacturing firms. Increasing the scheduling of production activity results in 2.3% increases in equity capital. The absence of a significant influence of production scheduling, could be attributed to lack of adequate attention given to production scheduling by production managers. Scheduling is not an end in itself but a means to an end. It boosts production planning and control for improved performance.

Our findings in this study offer support to Olarenwaju (2010) and Poterba (2006). Olarenwaju (2010) affirms that in order to enhance productivity in Nigerian public service, adequate attention must be given to proper work scheduling by public administrators. This is equally applicable to private sector organizations. More so, Poterba (2006), had asserted that the end result of undermining work schedule in business organization is inefficient operations, low sales revenue and lack of business growth.

5.3 Production Control and Enhanced Equity Capital.

With production control, a firm can meet customer requests for delivery times when feasible, meet the present goals for inventory levels, and minimize per unit cost of production. We observed in this study that production control is a veritable weapon for improved productivity performance in Nigerian manufacturing firms. It was gathered that an increase in controlling production operations leads to 49% increase in equity capital. A detailed analysis of these findings revealed that even in most organizations where there are no formal planning, efforts are always made in controlling operations by ensuring that actual output conforms to expected output.

The outcome of this study aligns with previous studies. Ikan (2003) reported that production control aids managers in responding to the resulting threats and opportunities. It detects changes that affect the organization's products and services, thereby promoting corporate growth. Matsushita (2001), indicated that customers' demand for improved design, quality or delivering time from shareholders and management wealth maximization are mere illusions without effective production control. Abrahamson and Pickle (1990), reported that value-added to a product or service so that customers will favour the firm's products as against competitors offer takes the form of above-average quality, which is usually achieved through control procedures.

6.0 Recommendations

Based on the findings of study, the following recommendations were suggested;

1) Since production improvement function enhances equity capital and hence from productivity performance, Nigerian manufacturing firms must with seriousness be involved in effective and formal planning and control of production activity, irrespective of the size and age of the firm.
2) Nigerian manufacturing firms should embrace the application of advanced manufacturing technology, such as automated production technology, computer assisted design and manufacturing (CAD/CAM), robotics and flexible, manufacturing systems.

3) To ensure effective application of advanced manufacturing technology in the Nigerian manufacturing industry, professionals with high technical knowhow should be hired by the organization and effective training programmes should be organized for the organizational members who are to be affected by the technological advancement.
4) It is evident from our findings that production scheduling, which is a component part of production improvement function is generally de-emphasized in most of the companies studied and therefore hinders the smooth flow of work throughout the production cycle which accounts for its insignificant influence in enhancing equity capital. It is therefore recommended that adequate attention should be given to production scheduling by production managers.
5) There should be a formal relationship between the Nigerian manufacturing sector and the tertiary institutions. This will go a long way to make research activities and findings efficient and effective.

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