

FORECASTING AND ORGANIZATIONAL PERFORMANCE: THE NIGERIAN MANUFACTURING SECTOR EXPERIENCE

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Abstract

Improved productivity and enhanced performances are desires of all organizations. To achieve this, lot of scholarly efforts have been undertaken with abundant literature on the subject of organizational performance. Those extant literatures and what seems to be espoused theories did not give adequate attention neither did it consider forecasting techniques as any key determinant especially within the Nigerian manufacturing work setting. Given the complex nature of manufacturing firms and turbulent business environment they operate in Nigeria that pose a unique challenge and efforts undertaken to give it accelerated growth even in the face of those challenges and aggressive competition, this work was designed to examine forecasting and organizational performance from the Nigerian manufacturing sector experience. To put the study in perspective, seven hypotheses were drawn from reviewed literature and dimensions and measures of the subject therein. These hypotheses were analysed using Kendall Tau B statistics. The findings reveal that significant relationship exists between all measures of forecasting and dimension of organizational performance. Thus, organizational performance can be manipulated through the regulation of the dimension of organizational performance. Consequent on those findings, recommendations were made.

Keywords: Organizational Performance, Market Share, Output, Forecasting Techniques, Time Series Analysis, Causal Method, Delfi Method, Kendall Tau b Correlation Statistics.

Introduction

Organization desire enhanced performance because they are efficiency seeking entity (Pfeffer, 1982). This is because better performance translates into increased output, enhanced patronage and growth in sales and growth in profit. Consequent on the attendance benefit that streams from enhanced performance, lot of scholarly works have been undertaken to make performance of the organization better: innovation (Tabatabae, 2000), administrative approach (Henri Fayol, 1930), behavioural approach (Mayo, 1953), understanding personality trait and type (McGregor, 1950), motivation (Maslow, 1960; Herzberg 1987; Skinner 1971; Vroom 1964; Adams 1960) work-life-balance of employee (Armstrong, 2001; Bartoli & Blatrix, 2015), information compliance and integration (Block & Hire, 1978), employees voice and participation (Blundell et al., 1995). Yet other scholars like Leonard and Milton (1963), Bunn and Taylor (2001) and Chann (2000) suggested increased use of automation, and significant organizational changes in response to new manufacturing (Corradi & Swanson, 2006).

Manufacturing sector is a critical growth driver for any economy. The sector is regarded as a basis for determining a nation's economic efficiency (Amakom, 2012). However, despite the country's wealth and relative improvement in GDP growth rate, poverty is widespread. This is as result of gross underperformance of the real sector, particularly manufacturing (Jamodu, President of Manufacturers Association of Nigeria - www.thisdaylive.com). From these studies, one of the subject least discussed as it pertains to performance is from the perspective of forecasting technique. The philosophical substance or position of these studies is an examination of organizational performance from forecasting techniques perspective.

Every organization or manager seeks to know the nature of future events to plan and take necessary action before time. The effectiveness of this plan depends upon the level of accuracy with which future events are known. Nevertheless, every organization plans whether or not future events are exactly known. That implies that organization does make forecast and calculate future events to the best of their Abilities, Judgment and Experience (Armstrong, 1985). Virtually all management decisions depend on forecasts. Managers make forecast on sales, working capital needs, the size of the work force, inventory levels, the scheduling of production runs, the location of facilities, the amount of advertising and sales promotion, the need to change prices, etc. It is equally required in all situations (Armstrong, 1985; Makridakis & Hibon, 2000)

Forecasting is required in many situations because it is an important aid in effective and efficient planning. Some things are easier to forecast than others. Good forecasts are major inputs in all aspects of manufacturing operations decisions (Fildes & Makridakis, 1995). Dalrymple (1987) and David (2013) assert that forecasting is the number one area of applications in corporations. DeSanctis (1984) positioned forecasting as the driving force behind all forward planning activities in firms. Accurate forecasts help companies prepare for short and long term changes in market conditions and improve operating performance (Gardner, 1990). When the accuracy of

forecasts declines, decisions based on the forecasts lead to operational miss-steps (Aviv, 2003; Gardner, 1990)

Literature Review

Concept of Organizational Performance

There are a variety of definitions attributed to the concept of performance due to its subjective nature. In the literature there are many articles or studies that define the concept of performance from several perspectives. Didier Noyé (2002) believes that performance consists of "achieving the goals that were given to you in convergence of enterprise orientations". In his opinion, performance is not a mere finding of an outcome, but rather it is the result of a comparison between the outcome and the objective. Unlike other authors, Didier Noyé considers that this concept is actually a comparison of the outcome and the objective.

In the research of performance in business, the definition of performance has led Folan (2007) to highlight three priorities or objectives of governance of performance: firstly, performance should be analyzed by each entity within the limits of the environment in which they decide to operate. For example, a company's performance needs to be analyzed in the markets in which it operates and not those that are not relevant to its operations. Secondly, performance is always linked to one or several objectives set by the entity whose performance is analyzed. Therefore, a company measures its performance against objectives and targets established and accepted internally rather than on those used by external bodies. Thirdly, performance is reduced to the relevant and recognizable features (Dorenbosch et al., 2005). Thus, Folan theorise, performance is influenced by the environment, the objectives to be achieved and the relevant and recognizable features. Folan uses several definitions for the concept of performance as it should be analyzed and quantified from several points of view (Fleisher, 2003).

Neely, Adams & Kennerley (2002) believe that performance should consider quantifying the efficiency and effectiveness of actions. This quantification can be expressed both qualitatively and quantitatively. The implication of this definition is that performance is closely related to efficiency and effectiveness. Franks and Broyles (1979) argue that the performance is "something that a person leaves behind and which exists outside the said purpose". Griffith and Wellman (1979) points out that "performance should be defined as the sum of the effects of work, because they provide the strongest relationship with the organization's strategic objectives, the customer's satisfaction and the economic contributions". Thus, performance must take into account both inputs (the effort put in) and outputs (the result of the effort put in). This definition equates performance with the "sum of the effects of work". Performance is achieved when all efforts are focused towards achieving the set objectives and meeting customer's satisfaction.

Heckerman (1991) states that: "Performance in the enterprise is what contributes to improving cost-value couple and not just what helps to reduce the cost or increase the value". The first stage of the "translation" of the cost value couple in concrete "pilotable" elements is to describe in global terms how the enterprise creates and will create value. It is, therefore, about defining

"value" in the view of future developments. To design the value of tomorrow is to define a strategy. The first stage is therefore to translate the cost-value couple in strategic objectives. The above definition of performance can be translated into another equivalent definition: "Performance in the enterprise represents all that contributes to the achievement of strategic objectives". For the enterprise, performance is only what improves the cost-value couple, which is what contributes to value creation. A company is efficient if it has the ability to create economic value added (Hibon & Evgeniou, 2005).

Bates and Holton (1995) define the concept of performance as "a multidimensional abstract concept whose measurement depends on a variety of factors". Performance may refer to enterprise "organizational performance" and an activity of a department, a manager or a performer. The authors say it is important to determine whether the measurement objective is to assess the effects of performance or the performing behaviour. Yet others have seen it from how efficient, effective and the extent it can contribute to economic growth (3Es) or how it can result to efficiency, effectiveness, equity and contributing to the economy and the environment (5Es) - Chai, (2009). In the context of this study, the extent to which an organization performs can be assessed or measured from market share and output level (Makridakis & Winkler, 1983; Van derHeijden, 1997; Verboncu & Purcaru, 2009).

Market Share

This is the share of the market commanded by a firm's product (or brand)." Market shares mean shares of the actual sales (either in quantity sold or expressed in monetary terms) for a product in a given period and in a given geographical area. Without going into the rigour of the professional market discuss of what actually constitute market share, I in the context of this study will limit my analysis of market share only defined I the context of market commanded by a firm's product. The higher the market share of the firm the more the firm is rated to be performing.

Output

Output is the end outcome of productivity. It may be goods or services. It is the outcome of a conversion from input. It defines the amount of energy, work, goods or services produced by a machine, factory, company, or an individual in a period. It is a specified amount of something produced by a person, machine or industry (<https://en.ditorddictionary.com>; www.businessdictionary.com). It is the quantity of goods or savings produced in a given time period by an individual, firm, industry or country whether consumed or used for further product (<https://en.m.wikipedia.org>). The higher the output level the more an organization is rated to be performing.

Concept of Forecasting Technique

Forecasting is basically concerned with making predictions about the future. Firms must anticipate and plan for future demand so that they can react immediately to customer orders as they occur. The ability to accurately forecast demand enables the firm to control costs through

leveling its production quantities, rationalizing its transportation and planning for efficient logistics operations. Accurate demand forecasts lead to efficient operations and high levels of customer service (Adam & Ebert, 2001). For new manufacturing facilities demand needs to be forecasted many years into the future since the facility will serve the firm for many years to come. Forecasting remains essential for decision making, unless insurance or hedging is selected to deal with the future (Armstrong, 1988). Good forecasts are a major input in all aspects of manufacturing operations decisions (Heizer & Render, 1991). Holland (1986) asserts that forecasting is the number one area of applications in corporations. Accurate forecasts help companies prepare for short and long term changes in market conditions and improve operating performance. When the accuracy of forecasts declines, decisions based on the forecasts lead to operational miss-steps (Aviv, 2003; Ghodrati & Kumar, 2005; Nachiappan, 2005; Hyndman & Koehler, 2006).

Time Series Analysis

A time series is a sequential set of data points, measured typically over successive times. It is mathematically defined as a set of vectors $x(t)$, $t = 0, 1, 2, \dots$ where t represents the time elapsed (John, 1997; Hipel & McLeod 1994; and Raicharoen, Lursinsap, & Sanguanbhoki, 2003). The variable $x(t)$ is treated as a random variable. The measurements taken during an event in a time series are arranged in a proper chronological order. A time series containing records of a single variable is termed as univariate. But if records of more than one variable are considered, it is termed as multivariate. A time series can be continuous or discrete. A time series is generally affected by four main components: Trend, Cyclical, Seasonal and Irregular components. In time series forecasting, past observations are collected and analyzed to develop a suitable mathematical model which captures the underlying data generating process for the series (Intriligator, 2001; Janssen, 2000; Kanter, 1998; Zhang, 2007, 2003). The future events are then predicted using the model. This approach is particularly useful when there is not much knowledge about the statistical pattern followed by the successive observations or when there is a lack of a satisfactory explanatory model. Time series forecasting has important applications in various fields. Often valuable strategic decisions and precautionary measures are taken based on the forecast results (Kaplan & Norton, 2001; Larrick & Soll, 2003; Lyon & Slovic, 1976; Maheshwari, 1981).

Causal Method

The causal methods search for reasons for demand, and are preferred when a set of variables affecting the situation are available (Armstrong, 2012). Among the models of this category, multiple linear regressions use a predictive causal model that identifies the causal relationships between the predictive (forecast) variable and a set of predictors (causal factors). For example, the customer demand can be predicted through a set of causal factors such as product price, advertising costs, sales promotion, seasonality, etc. (Chase, 1997; Seshadri, 2008; Sherman, 1980; Tversky & Kahneman, 1983; Tyebjee, 1987; Van de Ven, 1986). It talks about the causation/effect relationship. It attempts to study what causes relationship between two or more

variables and the likely impact of it. Causal Models are appropriate for domains in which many modeled events can be conceptualized as processes causing other events which in turn trigger other processes.

Delfi Method (Qualitative)

In some situations, forecasters rely solely on judgment and opinion to make forecasts. If management must have a forecast quickly, there may not be enough time to gather and analyze quantitative data. At other times, especially when political and economic conditions are changing, available data may be obsolete and more up-to-date information might not yet be available. Similarly, the introduction of new products and the redesign of existing products or packaging suffer from the absence of historical data that would be useful in forecasting. In such instances, forecasts are based on personal judgement, opinions, intuitions and past experiences. The statement of a higher person with abundance of experience may be used to make forecast about a given situation. From the relevant literature reviewed the following hypotheses were drawn:

- Ho₁: There is no significant relationship between time series analysis and market share.*
- Ho₂: There is no significant relationship between time series analysis and output level.*
- Ho₃: There is no significant relationship between causal method and market share.*
- Ho₄: There is no significant relationship between causal method and output level.*
- Ho₅: There is no significant relationship between delfi method and market share.*
- Ho₆: There is no significant relationship between delfi method and output level.*
- Ho₇: There is no significant relationship between quantitative method and organizational performance.*

Methodology

In this investigative research, quasi-experimental design using cross sectional survey was adopted. The study is at the macro level. My investigation was on the management staff at different strata at the chosen privately owned firms. The study area or geographical location is Nigeria. The population of study is 10 manufacturing firms with accessible time series data in operation for well over 10 years selected from four sub-sector of food and beverages, cement, rubber and oil and gas with an operational office in the six geo-political zones of Nigeria with a total of 250 management staff. The sample size was determined using Krejcie & Morgan (2013) table and a total of 152 management staff was derived. Simple random technique was used in the choice of the sample elements. The Cronbach' alpha return values using the statistical package for social sciences (SPSS) version 20.1 is 0.75. The results show a very high degree of reliability of the measures and instruments. Details of the chosen representative firms, the number of management staff is shown below:

Table 1: Companies and Number of Management Staff

S/No	Companies	Manager I	Manager II	Total
A	Cement/Limestone			
1	Dangote Cement	5	8	13
2	Larfarge Cements	4	8	12
B	Noodles/Foods			
1	Dufil Prima Foods	5	8	13
2	Dangote Pasta	4	8	12
C	Drinks			
1	Nigerian Bottling Company	6	14	20
2	Nigerian Breweries	6	13	19
D	Textile/Fabrics			
1	African Textile Man Coy	4	9	13
2	Da Viva Textile	4	9	13
E	Cosmetics/Beverages			
1	Nestle Nigeria	5	12	17
2	Unilivers	6	14	20
	Total	49	103	152

DATA PRESENTATION, ANALYSIS AND FINDINGS

Below is a tabular display of questionnaire administration.

Table: 2 Questionnaire response rate

S/No	Companies	Manager I	Manager II	Total	Retrieval Rate	% of Retrieval
A	Cement/Limestone					
1	Dangote Cement	5	8	13	11	
2	Larfarge Cements	4	8	12	10	
B	Noodles/Foods					
1	Dufil Prima Foods	5	8	13	12	
2	Dangote Pasta	4	8	12	12	
C	Drinks					
1	Nigerian Bottling Company	6	14	20	18	
2	Nigerian Breweries	6	13	19	18	
D	Textile/Fabrics					
1	African Textile Man Coy	4	9	13	12	
2	Da Viva Textile	4	9	13	11	
E	Cosmetics/Beverages					
1	Nestle Nigeria	5	12	17	16	
2	Unilivers	6	14	20	18	
	Total	49	103	152	138	

A total of one hundred and fifty-two (152) copies of questionnaire were distributed to the different chosen manufacturing firms. Out of this lot number of questionnaires distributed in this study, one hundred and thirty eight (138) copies were adequately filled and returned, thus, they are valid. This represent 90.8% rate of return. This valid number of questionnaire form basis for decision and analysis. The formulated hypotheses are tested using Kendall' Tau b correlation statistics through the Statistical package for social sciences (SPSS) version 20.

H₀₁: There is no significant relationship between time series analysis and market share.

Table 3: Correlation analysis on the relationship between time series analysis and market share

Correlations				
			Time Series Analysis	Market Share
Kendall's tau_b	Time Series Analysis	Correlation Coefficient	1.000	.811**
		Sig. (2-tailed)	.	.000
	Market Share	N	138	138
		Correlation Coefficient	.811**	1.000
		Sig. (2-tailed)	.000	.
		N	138	138

** . Correlation is significant at the 0.05 level (2-tailed).

From the result of the above table, the correlation coefficient ($r = 0.811$) between time series analysis and increased market share is strong and positive. The coefficient of determination ($r^2 = 0.66$) indicates that 66% change in market share can be explained by time series analysis. The p value of 0.000 ($p < 0.05$) reveals a significant relationship. Based on that, the null hypothesis was rejected. Therefore, I hold that there is a significant relationship between time series analysis and market share.

Ho₂: There is no significant relationship between time series analysis and output level.

Table 4: Correlation analysis on the relationship between time series analysis and output level

Correlations				
			Time Series Analysis	Output Level
Kendall's tau_b	Time Series Analysis	Correlation Coefficient	1.000	.786**
		Sig. (2-tailed)	.	.012
		N	138	138
	Output Level	Correlation Coefficient	.786**	1.000
		Sig. (2-tailed)	.012	.
		N	138	138

** . Correlation is significant at the 0.05 level (2-tailed).

From the result of the above table, the correlation coefficient ($r = 0.786$) between time series analysis and higher productivity is strong and positive. The coefficient of determination ($r^2 = 0.62$) indicates that 62% change in output level can be explained by time series analysis. The p value of 0.012 ($p < 0.05$) reveals a significant relationship. Based on that, the null hypothesis was rejected. Therefore, I am obliged to hold here that there is a significant relationship between time series analysis and output level.

H₀₃: There is no significant relationship between causal method and increased market share.

Table 5: Correlation analysis on the relationship between casual method and increased market share

Correlations				
			Casual Method	Market Share
Kendall's tau_b	Casual Method	Correlation Coefficient	1.000	.851**
		Sig. (2-tailed)	.	.002
		N	138	138
	Increased Market Share	Correlation Coefficient	.851**	1.000
		Sig. (2-tailed)	.002	.
		N	138	138
**. Correlation is significant at the 0.05 level (2-tailed).				

From the result of the above table, the correlation coefficient ($r = 0.851$) between causal method and market share is strong and positive. The coefficient of determination ($r^2 = 0.72$) indicates that 72% change in market share can be explained by causal method. The p value of 0.002 ($p < 0.05$) reveals a significant relationship. Based on that, the null hypothesis was rejected, and alternative hypothesis accepted. Thus, I hold that there is a significant relationship between causal method and market share.

Ho₄: There is no significant relationship between causal method and output level.

Table 6: Correlation analysis on the relationship between causal method and output level.

Correlations				
			Causal Method	Output Level
Kendall's tau_b	Causal Method	Correlation Coefficient	1.000	.887**
		Sig. (2-tailed)	.	.009
		N	138	138
	Output Level	Correlation Coefficient	.887**	1.000
		Sig. (2-tailed)	.009	.
		N	138	138

** . Correlation is significant at the 0.05 level (2-tailed).

From the result of the above table, the correlation coefficient ($r = 0.887$) between causal method and output level is strong and positive. The coefficient of determination ($r^2 = 0.79$) indicates that 79% change in higher productivity can be explained by causal method. The p value of 0.009 ($p < 0.05$) reveals a significant relationship. Based on that, the null hypothesis was rejected, and alternative hypothesis accepted. I am inclined therefore to state that there is a significant relationship between causal method and output level.

H₀₅: There is no significant relationship between delfi method and market share.

Table 7: Correlation analysis on the relationship between delfi method and market share

Correlations				
			Delfi Method	Market Share
Kendall's tau_b	Delfi Method	Correlation Coefficient	1.000	.789**
		Sig. (2-tailed)	.	.002
		N	138	138
	Market Share	Correlation Coefficient	.789**	1.000
		Sig. (2-tailed)	.002	.
		N	138	138

** . Correlation is significant at the 0.05 level (2-tailed).

From the result of the above table, the correlation coefficient ($r = 0.789$) between Delfi (qualitative) method and market share is strong and positive. The coefficient of determination ($r^2 = 0.62$) indicates that 62% change in market share can be explained by Delfi (qualitative) method. The significant value of 0.002 ($p < 0.05$) reveals a significant relationship. Based on that, the null hypothesis was rejected. I am inclined to hold here that there is a significant relationship between Delfi (qualitative) method and market share.

H₀₆: There is no significant relationship between delfi method and output level.

Table 8: Correlation analysis on the relationship between Delfi qualitative method and Output Level

Correlations				
			Delfi Method	Output Level
Kendall's tau_b	Delfi Method	Correlation Coefficient	1.000	.908**
		Sig. (2-tailed)	.	.015
		N	138	138
	Output Level	Correlation Coefficient	.908**	1.000
		Sig. (2-tailed)	.015	.
		N	138	138
**. Correlation is significant at the 0.05 level (2-tailed).				

From the result of the above table, the correlation coefficient ($r = 0.908$) between delfi (qualitative) method and higher productivity is strong and positive. The coefficient of determination ($r^2 = 0.82$) indicates that 82% change in higher productivity can be explained by delfi (qualitative) method. The p value of 0.015 ($p < 0.05$) reveals a significant relationship. Based on that, the null hypothesis was rejected and alternative accepted. Therefore, there is a significant relationship between delfi (qualitative) method and output level.

Ho7: There is no significant relationship between quantitative method and organizational performance.

Table 9: Correlation analysis on the relationship between quantitative method and organizational performance.

Correlations				
			Quantitative Method	Organizational performance
Kendall's tau_b	Quantitative Method	Correlation Coefficient	1.000	.921**
		Sig. (2-tailed)	.	.000
		N	138	138
	Organizational Performance	Correlation Coefficient	.921**	1.000
		Sig. (2-tailed)	.000	.
		N	138	138

** . Correlation is significant at the 0.05 level (2-tailed).

From the result of the above table, the correlation coefficient ($r = 0.921$) between quantitative method and innovative work system is strong and positive. The coefficient of determination ($r^2 = 0.85$) indicates that 85% change in organizational performance can be explained by quantitative method. The p value of 0.000 ($p < 0.05$) reveals a significant relationship. Based on that, the null hypothesis was rejected. Therefore, I hold that there is a significant relationship between quantitative method and organizational performance.

Table 10: Summary of Hypotheses findings

Hypotheses	R	R ²	P value	Decision
HO ₁	0.811	0.66	0.000	Reject
HO ₂	0.786	0.62	0.012	Reject
HO ₃	0.851	0.72	0.002	Reject
HO ₄	0.887	0.79	0.009	Reject
HO ₅	0.789	0.62	0.002	Reject
HO ₆	0.908	0.82	0.015	Reject
HO ₇	0.921	0.85	0.00	Reject

Conclusion, Discussion and Recommendation

Organization being an efficiency seeking entity has always desired enhanced performance. Better organizational performance guarantees commitment, increased output and enhanced patronage, increased sales and profit and other attendant benefits. In the light of this importance, lots of scholarly efforts have been made on how to enhance the level of performance of organization. From the literature review efforts, one of the issues least discussed in management literature as it borders on organizational performance was from the perspective of forecasting especially within the Nigerian manufacturing sector work settings. Thus, this work was structured to examine forecasting techniques on organizational performance in the Nigerian manufacturing sector. Findings from the study reveal that a significant relationship exists between Time Series Analysis, Causal Method and Delfi Method (Measures of forecasting technique) and Market share and Output (dimension of organizational performance). Thus, it is observed that organizational performance can be regulated using measures of forecasting techniques. A large percentage of changes in the dimensions of organizational performance is explained by changes in the measures of forecasting. The findings of this study collaborated the positions of the study of Matei (2006) and Park et al. (2013). Though conducted in different context and on different subject, their study emphasizes the importance of accuracy of the forecasting techniques and its importance in planning and analysis which are elements of organizational performance. Further collaborating the findings of the study is the work of Zhang (2007) and Chase (1997) who toeing the same position as observed here have summarily advised that organization should develop a suitable mathematical model which captures the underlying data generating process for the series which simply enhances organizations performance and regulate forecasting method through an internal locus of causal factors to impact substantially work productivity and increases performance level. Consequent on these findings the following recommendations are made:

- Effort should be made at the organization to ensure accuracy of forecast as possible since inaccurate forecast can lead to misleading results.
- Planning in the organization should be based on the analysis of forecast outcome.
- All transactions in the organization should be documented as it may serve as a time series record and subsequent inputs for forecasting in the future.

- Given the importance of this very subject or issue to the organization, all department and functional area should be involved in forecasting efforts. Inputs should be generated from all department and functional area since it has an overriding bearing on the entire organization.
- Considering the importance of the accuracy of forecasted results to organizational planning and growth, it is recommended that experts should be contacted, consulted and used in forecasting efforts.
- All causal factors and subjects relating to the forecast efforts should be considered in the computation.

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