

Governance Environment and Manufacturing Sector Performance in Nigeria

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Abstract

A well-functioning Manufacturing sector is key to economic growth and development. Studies on the governance environment and technical efficiency of the Manufacturing sector is crucial to achieving Nigeria's industrialization objective. There are several studies on innovation and efficiency of firms, but limited studies have examined the effect of the governance environment on technical efficiency of firms in Nigeria's Manufacturing sector. The latest available World Bank Enterprise Survey data (2014/2015) was used. Data was analysed using descriptive statistics, composite score and stochastic frontier analysis. Empirical results revealed the low technical efficiency of firms in the sector. The technical efficiency of firms decreases when they operate in poor governance environment. Specifically, corruption and regulatory quality were positively related to technical inefficiency. The coefficient of the rule of law was also positive but not statistically significant. Therefore, it concludes that policy reforms focused on industrial development are more likely to generate efficiency gains if the governance environment is improved by fighting corruption and enhancing regulatory quality.

Introduction

A well-functioning Manufacturing sector is key to economic growth and development. The African Continental Free Trade Area (AfCFTA) is a policy drive to re-awaken the sector in achieving industrialisation, a significant development objective of the Nigerian State. Evidence on structural transformation through manufacturing sector-led industrialisation. Examples are the United States, United Kingdom, France, Japan, Germany, and more recently, China (one of the fastest-growing economies). However, the case is not so with Nigeria and other African nations. Despite the potential and prospects of the sector, the country, like other African nations, has been deficient in factories (Signe and Johnson, 2018). This has further affected the nation's achievement of economic transformation and employment. The increasingly important role of the sector has become evident to the Nigerian government as reflected through the Medium term National Development Plan (2021-2025), with the primary objective of accelerating the build-up of industrial capacity within Nigeria. There is also the Agenda 2063 of the African Union, where governments in Africa are to seek new and innovative ways to transform the sector. This study, therefore, contributes to this effort and quest in Nigeria by examining how conditions of the governance environment affect manufacturing firms' technical efficiency.

Firms in the Manufacturing sector are critical to growth and technological catch-up. The same does not hold for firms in developing countries, more specifically, Nigeria, as inefficiency prevails (Sleuwaegen and Goedhuys, 2003). In addition to operating below the frontier, poor management and production expertise prevail (Goedhuys and Sleuwaegen, 2010). Adeoti and Adeoti (2013) reported that it had been increasingly challenging for manufacturing firms in the country to increase efficiency levels, and this has negatively affected improvement in firm-level output per input utilised. The country remains a laggard in its industrialisation quest. The un-competitive nature of locally produced goods as against imported products reflects the efficiency-related challenges of the sector. As aforementioned, the export of manufactures remains limited. It is established that only efficient manufacturing firms can compete effectively in modern economies. For the country to achieve economic diversification and structural transformation, the technical efficiency of firms in the Manufacturing sector cannot be undermined.

Alvarez and Barney (2014) documented that developing countries have made efforts to improve the governance environment, however, they are still faced from time to time with obstacles

and policy shifts that affect their innovation capacity (Bradley et al., 2012; Adeoti et al., 2019) and this has limited performance, and this is true of firms in Nigeria. Adeoti et al. (2019) provided evidence of the conditions of the governance environment in Nigeria. They include poor tax rates and administration, business licensing and permit restrictions, corruption, and customs and trade regulation. The issues of poor governance (Tybout, 2000) and weak institutions further constrain the upholding of the rule of law, regulatory quality, corruption, all which has limited the performance of the sector over the years (Alence, 2004; Adeoti et al., 2019). This study provides empirical evidence on the effect of the governance environment on technical efficiency of firms in Nigeria's Manufacturing sector. The study further contributes to evidence in the design of policies that are suitable and evidence-based to improve the governance environment and assist Nigeria's economic development. It aligns with the medium-term National Development Plan (2021-2025) of accelerating the build-up of industrial capacity within Nigeria. Globally, it aligns with Goal 9 of the Sustainable Development Goals (SDGs) since Goal 9 focuses on building resilient infrastructure, promoting inclusive and sustainable industrialisation and fostering innovation.

Against this background, the study seeks to answer the following research questions: What are the conditions of the governance environment of manufacturing firms in Nigeria? How technically efficient are these firms? How does the governance environment affect technical efficiency of firms?

Objectives

The main objective of this study is to explore the effect of the governance environment on the technical efficiency of firms in Nigeria's manufacturing sector. The specific objectives are to:

1. Examine the conditions of the governance environment of manufacturing firms in Nigeria.
2. Estimate the technical efficiency of manufacturing firms.
3. Determine the effect of the governance environment on the technical efficiency of manufacturing firms.

Methodology

The data was sourced from the 2014/2015 Enterprise Survey data by the World Bank. The data provides information on firm characteristics, the governance environment and efficiency-related variables as it relates to the manufacturing sector. Objective one was analysed using descriptive statistics and the composite score method. Objectives two and three were achieved using the stochastic frontier analysis (see Appendix). The variables used in the analysis are shown in Table A1 in the Appendix. The efficiency variables used were output (sales in the previous fiscal year), capital (value of fixed assets such as vehicles, machinery and equipment), labour (number of full-time workers). The choice of inefficiency variables draws mainly from the work of Yang (2016).

Results and Discussion

Governance Environment

In describing the governance environment, the study adapted the measures of institutional quality, corruption, the rule of law and regulatory quality. These measures were used to describe the governance environment conditions in Nigeria using the composite score method as employed by Chadee and Roxas (2013). The results are presented in Table 1. Findings revealed that corruption is most problematic for firms in the manufacturing sector, with an index of 0.48. This is reflected through the perception of the court system as fair, impartial and uncorrupted and the degree of perception of corruption as constraints to firm operations. This is followed by poor regulatory quality.

The regulatory quality index was 0.29. The rule of law was the least, with score of 0.22. There is no disparity across sub-sectors in all measures considered. Overall, the business environment score was 0.32. This reflects weak institutions negatively affecting business operations in the Manufacturing sector. Essentially, this study emphasizes the importance of a better governance environment for improved technical efficiency in Nigeria's Manufacturing sector.

Table 1: Governance Environment in Nigeria's Manufacturing Sector

Manufacturing subsector	Corruption	Rule of law	Regulatory quality	Business environment
	Mean \pm SD	Mean \pm SD	Mean \pm SD	Mean \pm SD
Garments	0.49 \pm 0.19	0.25 \pm 0.15	0.27 \pm 0.17	0.34 \pm 0.14
Food and Beverages	0.50 \pm 0.20	0.21 \pm 0.14	0.25 \pm 0.15	0.31 \pm 0.12
Metals and machinery	0.48 \pm 0.21	0.23 \pm 0.13	0.28 \pm 0.16	0.32 \pm 0.14
Manufacturing Panel	0.45 \pm 0.21	0.20 \pm 0.15	0.25 \pm 0.16	0.30 \pm 0.14
Wood and furniture	0.50 \pm 0.19	0.20 \pm 0.14	0.24 \pm 0.15	0.31 \pm 0.13
Non-metallic and plastic materials	0.51 \pm 0.23	0.24 \pm 0.18	0.24 \pm 0.17	0.33 \pm 0.17
Other manufacturing	0.50 \pm 0.23	0.23 \pm 0.16	0.29 \pm 0.18	0.34 \pm 0.17
All	0.48 \pm 0.21	0.22 \pm 0.15	0.26 \pm 0.16	0.32 \pm 0.15

Source: Author's computation using data from the World Bank Enterprise Survey (2014/2015)

Technical Efficiency of Manufacturing Firms

Table 2 shows the technical efficiency scores of firms. The technical efficiency index, on average, was 0.31. This revealed that technical efficiency is typically poor. This might indicate that firms still produce less than their potential output at the current input level. This could also mean that firms can still make substantial improvements as it is potentially feasible for firms in Nigeria's Manufacturing sector to reduce inputs without necessarily reducing output.

Table 2: Technical Efficiency Scores of Manufacturing Firms

Technical efficiency scores	Frequency	Percentage
0.1-0.29	719	63.8
0.3-0.59	269	23.9
0.60-0.89	89	7.9
0.90-0.99	50	4.4
Total	1127	100
Mean	0.31	-
Minimum	0.02	-
Maximum	0.99	-

Source: Authors' computation using data from the World Bank Enterprise Survey (2014/2015)

Effect of Governance Environment on Technical Efficiency of Manufacturing Firms

Table 3 presents the effect of the governance environment on the technical efficiency of manufacturing firms in Nigeria. Results showed that corruption and regulatory quality were positively related to technical inefficiency and statistically significant at 1 percent and 5 percent, respectively. The coefficient of the rule of law was also positive but not statistically significant. This implies that as the level of corruption increases, technical inefficiency increases. In a similar vein, a poor regulatory quality further increases technical inefficiency. Paunov (2016) reported that corruption lowers firms' capital investments and the adoption of quality certificates. Consistent with this finding are the studies of Abrate et al. (2013); Yang (2016) that firms in more corrupt environments will be more inefficient. This emphasizes the debilitating effects of these governance environment measures on the technical efficiency of firms in Nigeria. It is suggested that policy reforms that will strengthen good governance and ease firm operations be put in place so that value addition from input use will lead to improved technical efficiency of firms. Other variables that affect firm technical inefficiency are the age of firms, capacity utilization, ICT infrastructure and years of experience of the top manager.

Table 3: Governance Environment and Technical Efficiency

Variables	Coefficient	Standard Error	z	P> z
Efficiency				
Log of <i>capital</i>	0.0972	0.0992	0.98	0.327
Log of <i>labour</i>	0.6037***	0.0917	6.59	0.000
Constant	13.7176***	1.9177	7.15	0.000
Inefficiency				
Corruption	1.4314***	0.4999	2.86	0.004
Rule of law	0.0014	0.8563	0.00	0.999
Regulatory quality	1.4687**	0.7145	2.06	0.040
Control variables				
Age of firms	-0.2974*	0.1650	-1.80	0.071
Foreign Ownership	0.4023	0.2876	1.40	0.162
Capacity utilization	-0.0102**	0.0045	-2.25	0.024
ICT infrastructure	-0.9229***	0.2373	-3.89	0.000
Years of experience of top manager	0.0214*	0.0116	1.85	0.065
Constant	1.9248***	0.6738	2.86	0.004
Wald chi2(2) = 45.20	Log likelihood = -2882.6785		Prob > chi2 = 0.0000	

Note: ***, **, * represent 1 percent, 5 percent and 10 percent levels of significance respectively.

Source: Author's computation using data from the World Bank Enterprise Survey (2014/2015)

Conclusion and Policy Recommendations

Nigeria is currently aspiring to be a major industrial economy as part of the Medium term National Development Plan 2021-2025 envisioned to unlock the country's potential in all sectors of the economy for a sustainable, holistic, and inclusive national development. The findings of this study revealed that the governance environment score was low, implying that weak institutions negatively affect business operations in the Manufacturing sector. The technical efficiency of firms was generally poor and none of the firms operated at perfect efficiency level. The mean technical efficiency was 0.31. This suggests that firms are still producing less than their maximum capacity at the current input level. This is apparently worsened by the poor governance environment which has become a frequent complaint of Manufacturers in the country.

In order to improve firms' technical efficiency, and thus stimulate industrial competitiveness, the findings of the study suggest that firms in Nigeria's manufacturing sector are found to be hindered by poor governance environment (corruption and regulatory impediments) and this has hindered growth. Essentially, this study emphasizes the importance of a better governance environment for improved technical efficiency in Nigeria's manufacturing sector. It, therefore, recommends that corruption should be curbed through the assistance of anti-corruption agencies in the country and enhancing regulatory quality with efforts from NAFDAC, MAN, NESREA, SON and other relevant agencies and stakeholders. Also, human capital should be developed to expedite research and development within firms.

References

- Abrate, G., Boffa, F., Erbetta, F., Vannoni, D. (2013). Corruption, accountability and efficiency. An application to municipal solid waste services. Carlo Alberto Notebooks. Available from: <http://www.carloalberto.org/assets/working-papers/no.316.pdf>.
- Adeoti, J. O. and Adeoti, A. I. (2013). Characteristics and Efficiency of Manufacturing Firms in Nigeria. *European Journal of Social Sciences*, 37(1): 121-138.
- Adeoti, J. O., Adeyinka, F. M., Alamu, A. S., Popoola, O. A., Quadri, F. U., Abodunde, T. and Leo, J. G. (2019). Learning to Compete in the Nigerian Manufacturing Sector: Empirical Analysis with Illustrative Case Studies, Nigerian Institute of Social and Economic Research (NISER), Ibadan, Nigeria.
- Alence, R., (2004). Political Institutions and Developmental Governance in Sub-Saharan.
- Alvarez, S. A. and Barney, J. B., (2014). Entrepreneurial opportunities and poverty alleviation. *Entrepreneur. Theory Practice*, 38 (1): 159–184.
- Barasa, L., Vermeulen, P., Knobens, J., Kinyanjui, B. and Kimuyu, P. (2019). Innovation inputs and efficiency: manufacturing firms in Sub-Saharan Africa. *European Journal of Innovation Management*, 22(1): 59-83.
- Bradley, S.W., McMullen, J.S., Artz, K., Simiyu, E.M., (2012). Capital is not enough: innovation in developing economies. *Journal of Management Studies*, 49 (4): 684–717.

Chadee, D., and Roxas, B., (2013). Institutional environment, innovation capacity and firm performance in Russia. *Critical Perspectives and International Business*, 9(1): 19–39.

Faria, A., Fenn, P. and Bruce, A. (2001). Production Technologies and Technical Efficiency: Evidence from Portuguese Manufacturing Industry, Seminar paper published online, Department of Economics, University of Minho, Braga, Portugal and Nottingham University Business School, Nottingham University, United Kingdom.

Goedhuys, M., and Sleuwaegen, L., (2010). High-growth entrepreneurial firms in Africa: a quantile regression approach. *Small Business Economics*, 34(1): 31–51.

Meeusen, W. and van den Broeck, J. (1977). Efficiency estimation from Cobb-Douglas production functions with composed error. *International Economic Review*, 18:435-444.

Paunov, C. (2016). Corruption's asymmetric impacts on firm innovation. *Journal of Development Economics*, 118: 216–231.

Signé L. and Johnson, C. (2018). The potential of manufacturing and industrialization in Africa: Trends, opportunities, and strategies. Africa Growth Initiative, Brookings Institution.

Sleuwaegen, L. and Goedhuys, M. (2003). Technical efficiency, market share and profitability of manufacturing firms in Cote d'Ivoire: the technology trap. *Cambridge Journal of Economics*, 27(6): 851-866.

Tybout, J. R. (2000). Manufacturing firms in developing countries: how well do they do, and why? *Journal of Economic Literature*, 38(1): 11-44.

World Bank (2014). Enterprise Surveys Indicator Descriptions. <http://www.enterprisesurveys.org/>
www.enterprisesurveys.org. Enterprise Surveys

Yang, J. S. (2016). The governance environment and innovative SMEs. World Bank.

Appendix

Table A1: Variable description

Variables
<i>Efficiency variables</i>
Output - Annual sales in the previous financial year; Capital-Net book value of fixed assets (vehicles, machinery and equipment), and Labour - number of full-time permanent workers
<i>Governance environment variables</i>
Regulatory quality - Perception of the following as constraints to firm operations (tax rate and administration; business permits and licensing, and customs and trade regulations)
Corruption - Fair or unfair court system and Corruption
The rule of law - Theft and disorder, and political instability and crime
<i>Control variables</i>
Age of firm (years); Educational attainment – the proportion of full-time employees with secondary education; Managerial experience; Capacity utilization (percent); ICT infrastructure - whether the firm owns a website

Source: Barasa et al. (2019) and Yang (2016)

The stochastic frontier analysis

The stochastic frontier analysis is a parametric method of estimating technical efficiency (Meeusen and van Den Broeck, 1977). The stochastic frontier analysis gives superior efficiency estimates and allows for random disturbances in an environment characterized by “noise”. The method helps to test for hypothesis copes with measurement error by differentiating between inefficiency and “noise”. The stochastic production frontier framework, as reported by Faria et al. (2001); Barasa et al. (2019), was employed for the study. The stochastic production frontier analysis is presented as follows:

For a firm using n inputs (x_1, x_2, \dots, x_n) to produce a single output, there is an assumption of technical inefficiency, which is given as:

$$Y_i = f(x_i, \beta) \exp(v_i - u_i) \quad (1)$$

Where $i = 1, 2, \dots, n$

$$\begin{aligned} TE &= \frac{Y_i}{Y_i^*} \\ &= f(x_i, \beta) \exp(v_i - u_i) / f(x_i, \beta) \exp(v_i) \\ &= \exp(-u_i) \end{aligned} \quad (2)$$

Where Y_i is the observed output and Y_i^* is the frontier output;

Assuming a Cobb-Douglas production, following Adeoti and Adeoti (2013), the empirical model was defined as:

$$\ln Y_i = \beta_0 + \beta_1 \ln(K)_i + \beta_2 \ln(L)_i + (v_i - u_i) \quad (3)$$

Where $i = 1, 2, \dots, n$; Y = Sales revenue from firm i , K = Net book value of machinery and equipment for firm i , L = size of employees for firm i , v_i = random errors, u_i = inefficiency effects for as captured by the independent and control variables.