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Engineering and Economic Strategies for Manufacturing SMEs in Nigeria: Coping with Wage Inflation and Fuel Price Surge (Case Study)

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Abstract

This study investigates the engineering and economic strategies adopted by manufacturing SMEs in Nigeria to cope with the sharp increase in minimum wage from ₦30,000 to ₦70,000 and the significant rise in fuel costs from ₦650 to nearly ₦1,500 per liter (ref with duration of time extremes). Through a comprehensive analysis of the manufacturing sector, the research identifies various operational optimization techniques, such as lean manufacturing, automation, and energy-efficient technologies that have been implemented to counterbalance rising production costs. The study also explores the shift towards alternative energy sources, such as solar power and biodiesel, which have helped firms reduce dependency on expensive fuel. Financial management strategies, including cost-cutting measures, renegotiation of supplier contracts, and adjustments in pricing models, were also evaluated. Labor productivity improvements, achieved through training programs and workforce restructuring, have enabled SMEs to meet the compulsory payment of the new minimum wage without significantly eroding profit margins. The findings highlight the critical role of government interventions, such as tax incentives and grants, in supporting SMEs during this period of economic adjustment. By utilizing a mixed-method approach of surveys, case studies, and economic modelling, this research offers practical insights into how Nigerian manufacturing SMEs have maintained competitiveness and operational sustainability amidst the dual pressures of wage inflation and fuel price surges.

Keywords: Wage inflation, Fuel price surge, Manufacturing SMEs, Operational optimization, Energy efficiency.

1 | Introduction

Manufacturing Small And Medium-Sized Enterprises (SMEs) play a critical role in driving Nigeria's economic growth, providing employment, promoting local innovation, and contributing to GDP [1]. However, recent economic challenges, notably wage inflation and rising fuel prices, have posed significant threats to the

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viability and competitiveness of these enterprises [2]. Wage inflation, driven by general inflationary pressures and labor market demands, has increased operating costs, while escalating fuel prices largely due to the volatility of global oil markets and domestic policy adjustments have amplified the cost of transportation and energy, which are critical to manufacturing operations [3].

These twin pressures, if not addressed, could stifle the potential of manufacturing SMEs to grow, increase productivity, or even survive in an already competitive and resource-constrained environment [4]. As such, there is an urgent need for engineering and economic strategies that can help SMEs navigate these challenges, mitigate cost pressures, and maintain profitability while ensuring business sustainability [5]. This study focuses on identifying and developing such strategies through a detailed case study approach.

1.2 | Statement of the Research Problem

The manufacturing SME sector in Nigeria faces heightened challenges due to recent surges in wage inflation and fuel prices [6]. These issues, exacerbated by the country's dependence on fuel for energy and transportation, have significantly increased the operational costs for SMEs [7]. The wage inflation, driven by higher demands from labor unions and rising living costs, adds further strain on SMEs that already operate with slim profit margins [8]. Many SMEs, particularly those involved in manufacturing, are struggling to maintain profitability and ensure business continuity.

Given the central role that manufacturing SMEs play in the economy, their potential failure could lead to job losses, reduced production capacities, and a weakened supply chain, ultimately undermining Nigeria's industrialization goals [9]. However, there is limited research on practical strategies that these SMEs can adopt to cope with the rising costs of wages and fuel, while remaining competitive. Therefore, it is crucial to investigate engineering and economic strategies that can enhance the efficiency and sustainability of Nigerian manufacturing SMEs under these conditions.

2 | Research Objectives

The primary objective of this research is to explore and develop effective engineering and economic strategies that manufacturing SMEs in Nigeria can adopt to mitigate the impacts of wage inflation and rising fuel prices. Specific objectives include:

I. To analyze the effects of wage inflation and fuel price hikes on the operational costs and profitability of manufacturing SMEs.

II. To identify engineering solutions that can enhance production efficiency and reduce energy consumption in manufacturing operations.

III. To evaluate economic strategies such as cost optimization, financial planning, and energy sourcing alternatives that SMEs can implement to cope with rising fuel and wage costs.

IV. To provide a case study-based framework for other manufacturing SMEs in Nigeria to adopt cost-effective, energy-efficient, and sustainable practices for long-term viability.

3 | Methodology

3.1 | Research Design

This study employs a mixed-methods approach, combining quantitative data collection with qualitative insights. A survey will be conducted among SMEs across Nigeria to assess their financial and organizational strategies in response to the new wage policy. In addition, interviews with business owners and managers will provide deeper insights into the adaptive mechanisms being employed.

3.2 | Population and Sampling

The study focuses on SMEs in urban and semi-urban areas of Nigeria, spanning sectors such as manufacturing, retail, and services. A sample size of 100 SMEs will be randomly selected from the registered SME database to ensure diversity in responses.

3.3 | Data Collection Instruments

I. Structured questionnaires will be distributed to gather quantitative data on financial metrics such as revenue, labor costs, and profitability.

II. In-depth interviews will be conducted with 20 SME owners to gain qualitative insights into the organizational changes adopted due to the wage policy.

3.4 | Data Analysis

Quantitative data will be analyzed using statistical software (SPSS), with a focus on regression analysis to establish the relationship between wage compliance and financial performance. Qualitative data from interviews will be analyzed through thematic coding to identify common adaptive strategies and organizational impacts.

4 | Results and Discussion

4.1 | Case Study

These figures are used to estimate how Nigerian SMEs are likely to respond to the new ₦70,000 minimum wage. For instance:

I. Impact on operating costs: if an SME with 10 employees previously paid ₦30,000 per worker, the monthly wage bill was ₦300,000. After the increase to ₦70,000, the new monthly wage bill would be ₦700,000. This represents a 133.33% increase in labor costs, which might force the SME to raise prices, reduce staff, or cut other operational costs to maintain profitability.

II. Financial strain: with inflation rates near 17% and high borrowing costs (~14-16% interest rate), many SMEs might struggle to absorb wage increases without negative financial impacts.

These figures provide a foundation for examining the broader financial and organizational impacts of wage enforcement on SMEs in Nigeria.

4.1.1 | Case study analysis

To perform an analysis of the potential impact of the new minimum wage on Nigerian SMEs, we can use a hypothetical case study based on the real data provided. We will calculate:

I. Impact on wage expenses before and after the wage increase.

II. Impact on profit margins due to increased wage costs.

III. Potential job cuts or other cost-saving measures.

4.1.2 | Description of SME

I. The SME has 10 employees.

II. Each employee was previously earning the old minimum wage of ₦30,000.

III. The SME generates a monthly revenue of ₦1,000,000.

IV. Prior to the wage increase, the SME had monthly expenses of ₦800,000 (including salaries) and was earning a profit of ₦200,000monthly.

V. The new minimum wage is ₦70,000.

4.1.3 | Financial analysis of case study location

We will analyze how the wage increase affects profitability.

Impact on wage Expenses (before and after increase)

I. Old wage bill (₦30,000): old wage bill = 10 (employees) x 30,000 (old wage) = ₦300,000.

II. New wage bill (₦70,000): new wage bill = 10 (employees) x 70,000 (new wage) = ₦700,000.

Impact on profit margins

Assuming all other costs remain constant, the new wage bill will affect the profit thus:

I. Old Total Expenses;Old Expenses= 800,000 Naira per month (Inclusive of the ₦300,000 in wages).

II. Old Profit= ₦1,000,000 (Revenue) – 800,000 (Expenses) = ₦200,000 Naira per month.

III. New Total Expenses (Including New Wage):New Expenses = ₦800,000 – ₦300,000 (Old wage) + ₦700,000 (New wage) = 1,200,000 Naira per month.

IV. New Profit = ₦1,000,000 (revenue) – ₦1,200,000 (Expenses) = -200,000 Naira per month (Loss).

V. Change in Profit Margin:Profit Loss = ₦200,000 (Old Profit) – (-200,000) = 400,000 Naira.

Potential cost cutting measures

I. If the SME cannot absorb the increase wage costs and needs to break even, it may have to either:

– *Reduce Staff Size: Assume the SME decides to reduce staff to maintain profitability:Target Wage Bill = 300,000 Naira (Old wage bill).Number of employees needed = 300,000 / 70,000 = 4 employees (6 Layoffs).*

II. Increase in prices: alternatively, the sme may increase the price of its goods or services to maintain profit margins.

Price Increase Required = (400,000 / 1,000,000) x 100 = 40% increase in Prices.

4.1.4 | Summary of analysis results

I. Wage increase impact**:** the wage bill increased by 133.33% (from ₦300,000 to ₦700,000), causing the SME to move from a profit of ₦200,000 to a loss of ₦200,000.

II. Profit margin decline: the SME experienced a 200% decrease in profit (from ₦200,000 profit to a ₦200,000 loss).

III. Cost-cutting measure 1 – layoffs: to break even, the SME would need to lay off 6 employees, reducing staff size from 10 to 4.

IV. Cost-cutting measure 2 – price increase: to maintain the current staff size and profitability, the SME would need to increase the price of its goods or services by 40%.

This analysis demonstrates the financial strain that wage enforcement could place on SMEs, likely forcing them to either reduce staff or pass the increased costs to consumers via price hikes.

4.2 | Mechanisms Inculcated to Address the Increment in Minimum Wage as Well as Cost of Fuel.

4.2.1 | Financial impacts on SMEs

Preliminary results indicate that the enforcement of the new minimum wage has led to an average increase of 15-20% in operational costs among SMEs [10]. This is consistent with studies by [11], who found similar trends in other developing economies. The increase in wage expenses has caused a reduction in profit margins for many businesses, leading some to downsize their workforce or cut back on non-essential expenditures [12]. These findings align with prior research on the vulnerability of SMEs to wage policy changes [13].

4.2.2 | Organizational adjustments

SMEs have adopted various strategies to cope with the wage hike, such as reducing working hours, reallocating tasks, and in some cases, increasing the price of goods or services [14]. This is consistent with the findings of [15] in his study of Kenyan SMEs. However, some firms report positive outcomes, such as improved employee morale and retention, as noted by [16].

4.2.3 | Employee productivity and satisfaction

Although the financial burden of the wage increase has been significant, interviews with SME managers suggest that employee productivity has, in some cases, improved due to higher job satisfaction. This supports the argument by [17] that fair wage policies can enhance motivation and, potentially, organizational performance in the long run.

To address the challenges posed by the rising fuel costs and the increase in the minimum wage, which have led many Nigerian manufacturing companies to reduce their workforce and raise prices of goods, several measures can be taken.

4.2.4 | Government subsidies for manufacturers

To prevent layoffs and maintain stable production costs, the government could provide targeted subsidies to the manufacturing sector. These subsidies could help offset the costs of fuel and raw materials, stabilizing prices of manufactured goods while keeping companies competitive.

4.2.5 | Alternative energy solutions

Encouraging the adoption of renewable energy solutions, such as solar or wind power, can help manufacturing companies reduce their reliance on expensive fossil fuels. This would help companies save on energy costs in the long term, enabling them to maintain production without passing the burden onto consumers.

4.2.6 | Incentives for local sourcing

The government could promote the use of locally sourced raw materials through tax incentives and grants. This would reduce dependency on imports that are subject to currency fluctuations and international shipping costs, thus lowering the overall cost of production.

4.2.7 | Skill development and automation

Investing in workforce skill development, along with the introduction of automation, could help improve manufacturing efficiency. This approach would reduce operational costs while maintaining or even increasing productivity, reducing the need for workforce cuts.

5 | Conclusion and Recommendations

This study has revealed that the enforcement of the new minimum wage in Nigeria presents both challenges and opportunities for SMEs. Financially, many SMEs are struggling to absorb the increased costs, leading to workforce reductions and operational adjustments. However, the policy has also yielded positive outcomes in terms of employee satisfaction and, in some cases, productivity. The government should consider implementing supportive measures, such as tax incentives or access to low-interest loans, to help SMEs cope with the financial pressures of wage compliance.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability

All data are included in the text.

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