

**COST ENGINEERING IN THE MANUFACTURING SECTOR
OF THE ECONOMY THE NIGERIAN EXPERIENCE**

BY

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Presented at the

**3rd ANNUAL TECHNICAL CONFERENCE, ABUJA, NIGERIA
INSTITUTE OF APPRAISERS AND COST ENGINEERS A DIVISION
OF
THE NIGERIAN SOCIETY OF ENGINEERS**

JUNE 2012

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Introduction

The Manufacturers Association of Nigeria (MAN) through the President Chief Kola Jamodu (May 2011) lamented the high cost of providing independent power to factories by MAN members, stressing that Electrical Power Supply accounts for 40% of production cost in Nigeria, compared to 5 - 10% in countries with more stable electricity supply.

“It cost twice to manufacture a product in Nigeria than in China”, he claimed, noting that “Nigerian firms are going through hard times”.

Jamodu said manufacturers had continued to fight against the government’s policy inconsistency, erratic power supply, multiplicity of taxes and levies, high cost of funds, bureaucratic bottlenecks and insecurity.

Manufacturers Association of Nigeria (MAN) disclosed that between 2000 and 2008 about 820 manufacturing companies have closed down or temporarily suspended production and urged the Federal Government to take pragmatic steps to save the Sector from imminent total collapse.

Aggregate statistics for the Nigerian macroeconomy and its manufacturing sector show that the 1990s was a relatively static period. The end of the decade witnessed moderate economic recovery and growth in the manufacturing sector despite a certain degree of macroeconomic instability. At the end of the 1990s Nigeria per capita value-added in manufacturing was very low at approximately USD 13 which corresponds to about 10 per cent of the level of Botswana and less than 50 per cent of that Ghana and Kenya.

Over the period from 1975 to 1999, Nigeria per capita exports halved, while for Botswana and Mauritius, the African success stories, they doubled. In 1999 Nigerian the per capita value of manufacturing exports was less than USD 1, by far the lowest number in the sample of countries reviewed.

On road infrastructure, less than half of the firms have a tarmac road in good condition in its immediate vicinity, and the road close to large firms tend to be poorer than average.

Nigeria's manufacturing industry has suffered set back due to erratic power supply and poor infrastructure which forced some companies to relocate to neighbouring countries.

Potentials of Exporting Nigeria Manufactured Products

The Nigerian Export Promotion Council (NEPC, 2001) booklet identified some Nigeria Products with prospect of export marketing. The products include, aluminium African prints, Arabic gum, biscuits, beverage, beer, bolts, nails cashew nuts, mango juice, Cocoa based beverages, Chillers, hooves, horn bones, handicrafts, household utensils, paper products, wire wood products, yam flour, vegetable and tropical fruits.

Sectoral Groups

Manufacturers Association of Nigeria (MAN) has eleven Sectoral Groups, seventy-two Sub-Sectoral Groups, MAN Secretariat provides membership services to these groups on daily basis. The ELEVEN Sectoral groups are:

- Food, Beverages & Tobacco
- Chemical & Pharmaceuticals
- Domestic & Industrial Plastic, Rubber and Form
- Basic Metal, Iron & Steel and Fabricated Metal Products
- Pulp Paper & Paper Products, Printing, Publishing and Packaging
- Electrical & Electronics
- Textiles, Wearing Apparels, Carpet, Leather/Leather Footwear
- Wood and Wood Product Including Furniture
- Non Metallic Mineral Products
- Motor Vehicle & Miscellaneous Assembly
- MAN Export Group

The Sectoral Groups are represented on the National Council by their respective Chairmen.

Services:

Services offered by the Secretariat include the following:

- Public Policy Advocacy
- Monitoring and analysis of government policies
- Economic research and analysis
- Preparation of memoranda on topical industrial and economic issues

- Information dissemination
- Liaison activities
- Capacity building and manpower development
- Promotion and organization of trade missions and exhibitions
- Promotion of Made-in-Nigeria products
- Reconciliation and harmonization of divers interests of members – Secretal and Sub-sectoral
- Specific intervention on members/Sectoral problems
- Business Consultancy

Manufacturing Overview

Manufacturing is the process of adding value to raw materials by turning them into products. Recently some manufacturing industries in Nigeria have been characterised by declining employment and productivity. A major challenge has also come from inadequate electricity supply to power the industry. The global economic slowdown and rising energy and materials costs have also affected manufacturing.

Over the past decade, manufacturing has become increasingly hi-tech, resulting in more standardised working hours and better conditions of service for employees.

Types of Manufacturing includes but not limited to:

- **Aerospace** – manufacture maintenance, repair and overhaul of aircraft and spacecraft.
- **Automotive** – manufacture of bodies (coachwork) and accessories for motor vehicles engines, boats components and trailers.
- **Arms and Ammunition**
- **Biotechnology** – concerned with the application of knowledge about living organisms and their components to industrial products and processes.
- **Chemicals** – manufacture of pharmaceuticals, paints, toiletries, varnishes, plastics, synthetic rubber and industrial gases.
- **Clothing and footwear** - production of materials such as leather and textiles, product design, manufacture of clothes and footwear.
- **Electrical equipment** – manufacture of wide range of products for everyday use, including office machinery, computer equipment, TV and radio receivers, control apparatus and electricity distribution.
- **Electronics** – creation, design, production and sales of electronic systems, components and equipment.
- **Electronics Toys**
- **Food and drink** – manufacture of all beverages and food including bakery, meat and poultry.

- **Marine** – production, maintenance and repair of ships, submarine, boats and marine equipment.
- **Metals and engineered metal products** – production, processing and distribution of ferrous and no-ferrous metals, including and recycling of the materials at the end of their useful life.
- **Pharmaceuticals** – development and production of products for the prevention and treatment of illness and disease.
- **Polymers** – four discrete process areas: plastics processing; rubber processing; polymer composite processing; and sign making.
- **Process manufacturing** – production of building products, coatings, extractives, glass, printing and paper and furniture.
- **Arms and toys**

Cost Engineering Application in the Manufacturing Sector

In a globally competitive market place, Total Cost Engineering Application and planning from initial conception to final stages, makes for efficient and cost effective way to provide marketing edge for the finished product.

It is important to involve Cost Engineers in the process of manufacturing from planning, costing and packaging of the finished product for thorough application and optimization of engineering economic in manufacturing.

Is vital to note that some of the challenges in the Nigerian Manufacturing Sector aside the erratic power supply are the way and manner the industries were planned / managed.

Manufacturing / Cost Engineers works include but not limited to the followings:

- Cost optimisation(s)/Reduction(s) Strong analytical Skills
- Work with tool such as robots
- Programmable and numerical controllers
- Packaging
- Shipping Facilities
- Examine flow process of Manufacturing
- Look for ways to streamline production
- Improve turnaround

Manufacturing Engineers – guided by Cost Engineers

Manufacturing engineers - guided by Cost Engineers have a high level of technical expertise and skills, which they use to plan, design, setup, modify, optimise and monitor manufacturing processes. Since the basic principles of manufacturing engineering apply to all industries they can work in numerous sectors including food and drinks oil, plastic and pharmaceuticals.

They work to produce high quality goods efficiently using the most cost-effective methods and engineering economics with a view to reducing the impact of production on the environment.

Manufacturing engineers are designers, as well as analytical and creative thinkers. They can operate on their own initiative but also contribute as a team member working with cost engineers and engineers from various disciplines. Manufacturing engineers also work with other professionals, in areas such as finance and health and safety.

Responsibilities may also include: maintaining records, purchasing and managing staff and budgets.

Typical manufacturing engineering works include:

- Designing new systems and processes for the introduction of new products or for the improvement of existing ones;
- Working with other engineers, such as chemical engineers, mechanical engineers, electrical engineers, to ensure all product and system requirements are taken into account from the initial product concept conception to the finished result;
- Working with other professionals, such as accountants and human resources personnel, to manage budgets and the recruitment of junior engineers;
- Working with other professionals, such as accountant and human resources personnel, to manage budgets and the recruitment of junior engineers;
- Examining and tendering for new equipment to ensure the highest quality at the best price;
- Supervising junior engineers and sub-contractors and ensuring effective communication in order to avoid errors;
- Organising plant start-up and shut-down schedules to ensure minimum loss of production time and profits;

- Liaising with the research and development department to ensure the company is at the forefront of ground-breaking research;
- Keeping up to date with current and developing trends in the manufacturing industry, at a national and international level.
- Attending training courses and conferences – the engineer should always participate in CPD (continuous professional development) programmes affiliated to their professional body.

Manufacturing Engineering – Life Cycle Costing

The 21st Century manufacturing design concept is now based on the economic life cycle cost, in preference to the cheapest possible manufacturing / operational concepts, hence Cost Engineers must give careful consideration to the under listed three 'Rs'.

- Running cost
- Repair cost
- Replacement cost

Engineering Industrial Economics

Cost engineering is a profession that uses the science and art of estimating and forecasting the cost of a product (including software) development and manufacture.

Engineering remains an important part of manufacturing sector of the economy.

Engineering economy is an important part of industrial and business economics

Topics in Engineering economic includes but not limited to the

Following:

- Selection
- Analysing
- Optimizing
- Options
- Inflation
- Time value of money
- Uncertainty
- Depreciation
- Taxes
- Tax credits

Affordability engineering

Affordability engineering is a process that enables companies to reduce cost and improve value through the whole life cycle of a product by the use of thorough cost estimating techniques and risk assessment, especially at the preliminary / conceptual design stage.

Product Costs

Each manufactured product must include the cost of the following:

1. Direct material
2. Director labour
3. Manufacturing (or factory) overhead

Manufacturing Overhead Costs

Manufacturing overhead cost includes but not limited to the following :

1. Electricity, natural gas, water, and sewer for operating the manufacturing facilities and equipment.
2. Computer and communication systems for the manufacturing function.
3. Repair parts for the manufacturing equipment and facilities.
4. Supplies for operating the manufacturing process.
5. Depreciation on the manufacturing equipment and facilities.
6. Insurance and property taxes on the manufacturing equipment and facilities.
7. Safety and environmental costs.
8. Staff salaries
9. Workmen Compensation Insurance
10. Pensions or retirement scheme.
11. Seminars and training.
12. Adverts and marketing.

13. Material handlers (forklift operators who move materials and units)
14. People who set up the manufacturing equipment to the required specifications.
15. People who inspect products as they are being produced.
16. People who perform maintenance on the equipment
17. People who clean the manufacturing area.
18. People who perform record keeping for the manufacturing processes.
19. Factory management team.

It is important to note that product's profitability is a function of how these costs are assigned to the product.

Cost of Manufacturing in Nigeria

Generally speaking, manufacturing cost in Nigeria is very high. In the first instance, there is low capacity for production of certain raw materials like cement, which has compelled importation of some raw materials for same. Even the much produced locally are very expensive, as the nations cement manufactures are also groaning under present condition of high production costs.

The situation has therefore brought into focus the need to improve on the infrastructural facilities in the country, to bring down the cost of local production.

Recommendations

Utilize the services of competent Industrial Engineers and Cost Engineers from initial (Manufacturing Engineering) conception to final production stages to ensure thorough cost planning / production, cost saving concepts, engineering economics and Total Cost Engineering Management (TCEM).

Thorough planning, appropriate prioritisation of the essential processes, resources and effective monitoring and control are crucial to the ability to deliver profitable manufactured products.

Federal Government of Nigeria, must as far as is reasonably practicable, improve and eradicate the erratic power supply situation in the country, inadequate road infrastructure, multiplicity of taxes and levies, high cost of funds, bureaucratic bottlenecks and insecurity.

THANK YOU ALL AND GOD BLESS YOU ALL!

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