

UNIVERSITY OF SOUTHERN QUEENSLAND
FACULTY OF ENGINEERING & SURVEYING

**The Role of Product Design, Manufacturing Systems and Environmental
Uncertainty in the Nigerian Manufacturing Organizations.**

A thesis submitted by

Umar Musa Mustapha

In fulfilment of the requirement of
Engineering Doctorate (Eng D)

Submitted: September, 2010

Abstract

The concept of globalization and technological advancements has created many opportunities as well as threats in the manufacturing sector locally and globally. African countries manufacturing sectors performance are significantly low if compared with the manufacturing sectors of other countries, which is continually linked to multiple internal and external factors. Many research studies were conducted to identify the reasons behind Nigeria's insignificant manufacturing sector economic contribution but very few have adequately addressed the issue at both enterprise and government levels in terms of some specific manufacturing concepts and systems. Hence, this research attempts at identifying barriers to manufacturing performance over the past 25 years in Nigeria, in terms of three selected manufacturing concepts and systems measures - product design; manufacturing systems made up of manufacturing process, strategy and innovation; and environmental uncertainty. Further more, the thesis made a comparative study of Nigerian manufacturing sector with those of China, India and Malaysia, with a view to identifying barriers that are specific to Nigeria's manufacturing sector which hinder its growth and contribution towards the country's economic development.

To accomplish the thesis objectives, the research is focused on answering the central question – to what extent does product design, manufacturing systems and environmental uncertainty impact the performance of Nigerian manufacturing organizations. For this purpose, primary and secondary researches were conducted using mixed methodological approaches that are both quantitative and qualitative in nature. Three-step research process was applied and it is made up of questionnaire survey of 254 manufacturing establishments that employ 50 people and above and has been in existence for at least five years; secondary data analysis which also includes comparative study of Nigerian manufacturing sector with those of China, India and Malaysia; and focus group interview with 10 manufacturing experts.

The research results revealed that the performance of the Nigerian manufacturing sector is significantly low owing to uncertainty in the operating environment. Lack of funds, inadequate infrastructure, less government patronage, non-adaptability to technological advancements, ineffective manufacturing strategy and innovation were also identified as key factors impeding

the sector's growth. The results also revealed huge differences in the performance of the Nigerian manufacturing sector vis-à-vis China, India and Malaysia. The research then made sets of recommendations which include that the Nigerian government should encourage manufacturing investors, develop basic industries, improve infrastructure and implement favourable policies to create a better operating environment. Also it was recommended that manufacturing firms should encourage more research and development, innovations and strategy practices, skills acquisitions from other foreign firms, among other sets of recommendations. It was also suggested that Nigeria should learn more from the patterns of China, India and Malaysia manufacturing sectors with the hope of developing effective and productive manufacturing sector.

Key words: Product design, manufacturing process, innovation, strategy, environmental uncertainty, Africa, Nigeria, China, India and Malaysia

Thesis Contribution to Knowledge

The thesis is aimed at examining the performance of the Nigerian manufacturing sector in terms of Product Design, Manufacturing Systems – Manufacturing Process, Manufacturing Strategy and Manufacturing Innovation - and Environmental Uncertainty. The research is also focused on comparing the performance of Nigerian manufacturing sector with some developing countries such as China, India and Malaysia, in terms of the selected performance measures. The research was conducted with help of a mixed methodological approach which comprised of a secondary analysis of data, statistical survey with 254 manufacturing firms in Nigeria and a focus group interview with 10 experts. Below are the thesis major contributions to new knowledge.

1. The data analysis revealed that inadequate supply of raw materials and energy resources, lack of infrastructural facilities, financial resources, government patronage and skilled workforce, high level of corruption and low salaries and incentives are the major factors impeding the growth and development of Nigerian manufacturing sector. The findings of the statistical survey and the focus group interview had little contradictions with the secondary analysis and agreed that the above mentioned factors are the main limitations faced by the Nigerian manufacturing sector.
2. The research presented an in-depth analysis of the performance of Nigerian manufacturing sector in terms of the selected manufacturing concepts which are used as performance measures, these concepts are product design, manufacturing process, manufacturing strategy and manufacturing innovation. It was found that not much study on these concepts when grouped together has been done. The outcome of the study revealed that the current level of product design, manufacturing process and innovation are low in Nigeria mainly due to non-adaptability to advancements in technology.
3. The results also show that manufacturers in Nigeria need to focus on updating technology which will help them in coming up with innovative ideas in creating new product designs. Again they need to introduce modern tools and techniques within their manufacturing process to compete at the international level. The work also suggested the need for restructuring and reforming the current strategies to capture the attention of new consumers and successfully retain the loyalty of their existing consumers.

4. The results of the research revealed that there is huge gap between the performance of Nigerian manufacturing sector and those of China, India and Malaysia, specifically in terms of the selected performance measures, which was also found missing in the literature. The results revealed that social and economic stability in China, India and Malaysia play an important role in the performance of the manufacturing sectors of these countries which helps them in contributing towards the economic development. China focuses on manufacturing products with innovative and advanced features, with shorter lifecycles and at low prices which has enabled the country to hold a major share in the global manufacturing industry. Adapting to new techniques and modern technology and favourable regulatory reforms were the main factors for improvement in the Indian manufacturing sector. The Malaysian government had allocated high capital and resources to promote the heavy industries which resulted in the economic stability of the country.
5. The study suggested that the Nigerian government should focus on developing the basic infrastructural facilities, encourage foreign investors and implement favourable policies to provide a suitable environment for improving the performance of the Nigerian manufacturing sector. The results also suggested that Nigerian manufacturers should focus on adapting to new technology, improving the skills of the workforce and invest on research and development to become competent in domestic and international market.
6. The mixed methodology selected for conducting this research was rewarding and in summary, the research provided an in depth knowledge about the selected measures and its importance in the success of the manufacturing industry. The research helped in understanding the performance of the manufacturing sectors of Nigeria as well as that of developing countries like China, India and Malaysia. The research also helped in providing the necessary suggestions and recommendation in improving the performance of the Nigerian manufacturing sector. The proposed measures require sufficient financial resources that the sector currently lacks, which calls for further research in identifying different methods of improving the manufacturing sector with the available finances.

Associated Publications

1. Mustapha U. M., Ku H. and Goh S (2010); Literature review of past and present performance of the Nigerian manufacturing sector. *Proceedings of the IMechE, Part B: Journal of Engineering Manufacture*. DOI 10.1243/09544054JEM1818. Online ISSN 2041-2975.
2. Mustapha U. M., Ku H. and Goh S (2009); *Research Design for Investigation of Nigeria Manufacturing Management*. Rough Sets and Knowledge Technology, 4th International Conference, RSKT 2009, Gold Coast, Australia, July 14-16, 2009. Proceedings. Lecture Notes in Computer Science 5589 Springer 2009, ISBN 978-3-642-02961-5.
3. Mustapha U. M., Ku H. and Goh S (2010). The Importance of Product Design in Nigerian Manufacturing Sector. *Competition and Challenge: The journal of global political economy*. Paper under review.
4. Mustapha U. M., Ku H. and Goh S (2010). Are African manufacturing enterprises competitive in terms of manufacturing process? *International Journal of Production Research*. Paper under review.
5. Mustapha U. M., Ku H. and Goh S. (2010). Impacts of Manufacturing Strategy and Innovation in Nigerian Manufacturing Success. Paper has been sent to Proceedings of the Institution of Mechanical Engineers, Part B, *Journal of Engineering Manufacture*. Paper under review.
6. Mustapha U. M., Ku H. and Goh S (2010). Environmental Factors Affecting Nigerian Manufacturing Organizations. *Journal of Engineering and Technology Management*. Paper under review.
7. Mustapha U. M., Ku H. and Goh S (2010). Decline of Manufacturing in Africa: China and India responsible? Or who else. *International Journal of Advanced Manufacturing Technology*. Paper under review.

Certification of Thesis

I certify that the ideas, designs and experimental work, results, analyses and conclusions set out in this thesis are entirely my own effort, except where otherwise indicated and acknowledged.

I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

Umar Musa Mustapha

W0103545

Signature of Candidate

ENDORSEMENT

Signature of Principal Supervisor

Signature of Second Supervisor

Acknowledgements

I would like to acknowledge some assistance and encouragements without which this thesis would not have been possible. The level of cooperation and support I received from my work place, my family and friends have kept me on top of the situation at all times. Also the full understanding I received from Bayero University library management, the leadership of Manufacturers Association of Nigeria (MAN) has enabled me to obtain data that was very useful for my work.

I am also full of appreciation for the consistent guidance I regularly received from my principal supervisor Dr Harry Ku and my second supervisor Steven Goh, both of Faculty of Engineering and Surveying of Southern Queensland University. Dr Harry Ku is a wonderful and highly thorough supervisor. I equally appreciate the prompt support services I received from the administrative staff of the Faculty.

Umar Musa Mustapha

University of Southern Queensland

September, 2010

Table Of Contents

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
	Title Page	i
	Abstract	ii - iii
	Thesis Contribution to Knowledge	iv - v
	Associated Publications	vi
	Certification of Thesis	vii
	Acknowledgement	viii
	Table of Content	ix - xiii
	Appendices	xiv
	List of Tables	xv
	List of Figures	xvi
	List of Graphs	xvii - xix
	Acronyms and Abbreviations	xx - xxi

CHAPTER 1

INTRODUCTION

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
1.1	INTRODUCTION	1
1.2	BACKGROUND OF THE PROBLEM	1
1.3	MOTIVATION FOR THE RESEARCH	4
1.4	RESEARCH FOCUS	4
1.5	CONCEPTUAL FRAMEWORK	5
1.5.1	Research Questions	9
1.6	RESEARCH METHODOLOGY	10
1.6.1	Questionnaire for Survey	11
1.6.2	Secondary Data Analysis	13
1.6.3	Focus Group Interview	14
1.6.4	Summary of Research Methodology	15
1.7	MAIN RESEARCH FINDINGS	16
1.8	EXPECTED CONTRIBUTION OF THE STUDY	19

1.9	THESIS STRUCTURE	20
1.10	TIME SCALE OF THE THESIS	21
1.11	DEFINITION OF TERMS AND CONCEPTS	21

CHAPTER 2

LITERATURE REVIEW OF MANUFACTURING AND MEASURES OF MANUFACTURING PERFORMANCE

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
2.1	INTRODUCTION	23
2.2	MANUFACTURING FROM A GLOBAL PERSPECTIVE	23
2.2.1	Consumer Goods Manufacturing	29
2.2.2	The Impact of Technological Advancements on the Manufacturing Sector	33
2.3	MEASURES OF MANUFACTURING PERFORMANCE	38
2.3.1	Product Design – Importance and Contribution to Manufacturing	39
2.3.2	Manufacturing Process – Importance and Contribution to Manufacturing	46
2.3.3	Manufacturing Strategy – Importance and Contribution to Manufacturing	51
2.3.4	Manufacturing Innovation - Importance and Contributions	57
2.3.5	The Impact of Environmental Uncertainty in Manufacturing	64
2.4	CHAPTER SUMMARY	69

CHAPTER 3

LITERATURE REVIEW OF THE NIGERIAN MANUFACTURING SECTOR

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
3.1	INTRODUCTION	72
3.2	THE NIGERIAN MANUFACTURING SECTOR	72
3.2.1	Nigeria – An Oil-based Economy	73
3.2.2	Historical performance of the Nigerian manufacturing sector	76
3.2.3	The Present Situation of the Nigerian Manufacturing Sector	82
3.2.4	Main Problems and limitations of the Nigerian Manufacturing Sector	85
3.3	MANUFACTURING SECTORS OF SOME DEVELOPING COUNTRIES	90
3.3.1	Chinese Manufacturing Sector Performance	90
3.3.2	Indian Manufacturing Sector Performance	96
3.3.3	Malaysian Manufacturing Sector Performance	102

3.4	CHAPTER SUMMARY	107
-----	-----------------	-----

CHAPTER 4

RESEARCH METHODOLOGY

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
4.1	INTRODUCTION	110
4.2	RESEARCH QUESTIONS	110
4.3	RESEARCH APPROACH	111
4.4	RESEARCH METHODOLOGY	112
4.4.1	Purpose of the research	112
4.4.2	Process of the research	115
4.4.2.1	Secondary Analysis of Data – Significance and Relevance to the Research	118
4.4.2.2	Statistical Survey – Significance and Relevance to the Research	119
4.4.2.3	Focus Group Interview – Significance and Relevance to the Research	121
4.4.3	Outcome of the Study	125
4.5	SOURCES OF DATA COLLECTION	126
4.5.1	Survey Sampling - Criteria for Selecting Respondents and Data Gathering	127
4.5.2	Construction of the Survey Questionnaire	132
4.5.3	Questionnaire Validation	134
4.5.4	Sample Survey Population for the Questionnaire	139
4.5.5	Focus Group Interview - Criteria for Selecting Participants & Data Gathering	140
4.5.6	Construction and Validation of Questionnaire for the Focus Interview	141
4.6	BASIS FOR DATA ANALYSIS AND METHODS FOR RESULTS CALCULATION	142
4.7	ETHICAL CONSIDERATION	143
4.8	CHAPTER SUMMARY	144

CHAPTER 5

RESEARCH FINDINGS

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
5.1	INTRODUCTION	147
5.2	KEY FINDINGS FROM THE QUESTIONNAIRE SURVEY	148
5.2.1	Section I – Information about Respondents and their Organizations	149
5.2.2	Section II – Opinions about Product Design	149

5.2.3	Section III – Opinions about Innovation in Nigerian Manufacturing Sector	157
5.2.4	Section IV – Information about Strategy in Nigerian Manufacturing Sector	163
5.2.5	Section V – Manufacturing Process in Nigerian Manufacturing Sector	169
5.2.6	Section VI –Environmental Uncertainty in Nigerian Manufacturing Sector	174
5.3	KEY FINDINGS OF SECONDARY RESEARCH	179
5.3.1	The Manufacturing Industry – History and Developments	180
5.3.2	Measures of Performance of the Manufacturing Sectors	181
5.3.3	Nigerian Manufacturing sector – Performance and Impact of Oil Dependency	185
5.3.4	Manufacturing Sectors of China, India and Malaysia	187
5.4	KEY FINDINGS FROM THE FOCUS GROUP INTERVIEW	189
5.4.1	Focus Group Interview Participants’ Perception	196
5.4.2	Manufacturing Sectors of China, India and Malaysia as Analysed by FGI	198
5.5	MATCHING THE RESULTS OF PRIMARY AND SECONDARY RESEARCHES	199
5.6	CHAPTER SUMMARY	204

CHAPTER 6

MULTIVARIATE DATA ANALYSIS AND RESEARCH FINDINGS

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
6.1	INTRODUCTION	207
6.2	INTERPRETATION AND ANALYSIS OF RESEARCH FINDINGS	207
6.2.1	Product Design in the Nigerian Manufacturing Sector	209
6.2.2	Manufacturing Process in the Nigerian Manufacturing Sector	211
6.2.3	Manufacturing Strategy in the Nigerian Manufacturing Sector	213
6.2.4	Innovation in the Nigerian Manufacturing Sector	214
6.2.5	Environmental Uncertainty in the Nigerian Manufacturing Sector	216
6.2.6	DISCUSSION OF THE MAIN ISSUE	218
6.2.7	COMPARATIVE ANALYSIS OF MANUFACTURING SECTORS	219
6.3	ANSWERING THE RESEARCH QUESTIONS	226
6.3.1	Sub-question One	227
6.3.2	Sub-question Two	229
6.3.3	Sub-question Three	230

6.3.4	Sub-question Four	231
6.3.5	Sub-question Five	233
6.3.6	Sub-question Six	234
6.4	CHAPTER SUMMARY	236

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

<u>S/N</u>	<u>DESCRIPTION OF CONTENTS</u>	<u>PAGE</u>
7.1	INTRODUCTION	239
7.2	RESEARCH SUMMARY	239
7.3	RECOMMENDATIONS FOR GOVERNMENT AND ORGANISATIONS	245
7.3.1	Suggestions for the Nigerian Government	245
7.3.1.1	Diversification of the Economy	245
7.3.1.2	Trade Liberalization	246
7.3.1.3	Development of Basic Industries	247
7.3.1.4	Improvement of Infrastructure	247
7.3.1.5	Adequate Supply of Energy to the Manufacturing Organizations	247
7.3.1.6	Finance Providers	248
7.3.1.7	Investors Friendly Environment	248
7.3.1.8	Certainty in the Business Environment	249
7.3.2	Recommendations for the Manufacturing Organizations	249
7.3.2.1	Research and Development Work	250
7.3.2.2	Technology Adoptability	250
7.3.2.3	Skill Development and Training of the Workers	251
7.3.2.4	Pay Scales and Incentives for the Workforce	252
7.3.2.5	Restructuring the Manufacturing Process and Strategy	252
7.3.2.6	Focusing on Quality and Cost Reduction Measures	252
7.4	LIMITATIONS OF THE RESEARCH	252
7.5	AREAS OF FURTHER RESEARCH	253
	REFERENCES	255

<u>APPENDICES</u>	<u>PAGE</u>
Appendix A – Group by Group Classification of Manufacturing Companies	270
Appendix B – Classification of manufacturing companies in Nigeria	270
Appendix C – Survey Questionnaire	275
Appendix D – Focus Group Interview – Schedule of Questions	281
Appendix E – Ethical Clearance Letter	283
Appendix F – Associated Publications	I-CXXXIV

List of Tables

<u>TABLE DESCRIPTION</u>	<u>PAGE</u>
Table 1 – Classic Aspect of the Four Realm Design	41
Table 2 – Manufacturing and Macro-Economic Data and Forecasts for Nigeria	80
Table 3 – Causes for Manufacturing Firms' Failure by Source in Africa	87
Table 4 – Changes in Total Factor Productivity in Chinese Industry (1952 – 2005)	94

List of Figures

<u>FIGURE DESCRIPTION</u>	<u>PAGE</u>
Figure 1 – Eco Design Strategy Wheel	39
Figure 2 – Projections of Unification of the study phases	117

List of Graphs

<u>GRAPH DESCRIPTION</u>	<u>PAGE</u>
Graph 1 – The Global Manufacturing Output Between 1990 and 2001	27
Graph 2 – Global Pre-Requisite By Manufacturing Sub-Sector	30
Graph 3 – Period For Realizing Lean Production	47
Graph 4 – Percentages of Share of Output of Foreign Owned Manufacturing Firms in Nigeria	74
Graph 5 – Capacity Utilization In Nigerian Manufacturing Sector (1977 – 2007) / Number of Bi-Cycles Produced Per Annum in Thousands	77
Graph 6 – Perceived Main Problems Facing the Nigerian Manufacturing Sector as at 2006	86
Graph 7 – Manufacturing Exports and Total Exports Between 1980 and 2005	91
Graph 8 – China’s GDP and Exports From 1985 - 2005	93
Graph 9 – Growth Rates of GDP Manufacturing Value Added and Services Value Added	97
Graph 10 – Sector Value Added as a Proportion of GDP	98
Graph 11 – Skills and Technical Capabilities of Nigerian Labour From The Perspective of Maintaining a High Level of Product Design	150
Graph 12 - Level of Nigerian Companies’ Concentration on Product Design in Terms of High Productivity and Revenues	151
Graph 13 - Evaluation of The Products Designed by Nigerian Consumer Goods Manufacturing Companies at an International Level	152
Graph 14 - Potential of The Nigerian Consumer Sectors’ Product Designers to Generate Unique and Competitive Ideas and Concepts for Product Design	153
Graph 15 - Trend Among the Manufacturing Companies to do Adequate Research to Determine the Demands and Expectations	154
Graph 16 - Assistance of Present Product Designs of Nigerian Consumer Products to Compete at the Domestic and International Level	155
Graph 17 - Present Product Design of Consumer Goods Meeting the Expectations and Demands of Nigerian Consumers	157
Graph 18 - Overall Opinion of The Respondents About Product Designing in the Nigerian	157

Manufacturing Sector	
Graph 19 - Impact Of SAP on the Growth and High Productivity of the Nigerian Manufacturing Sector	158
Graph 20 - Need of Training and Skill Developments for the Workers of the Nigerian Manufacturing Companies	159
Graph 21 - Level of Adoption to New Machinery and Methodology by the Nigerian Manufacturing Companies	159
Graph 22 - Skills of Nigerian Manufacturing Sector to Conduct International Level Manufacturing Processes	160
Graph 23 - Need for Restructuring the Manufacturing Process of Nigerian Firms	161
Graph 24 - Effect of Technical Know-How and Machinery Availability on the Performance of the Nigerian Manufacturing Sector	161
Graph 25 - Focus Needed by the Nigerian Manufacturing Firms on Chain, Lean and Agile Manufacturing	162
Graph 26 - Overall Opinion of the Respondents about Manufacturing Processes in the Nigerian Manufacturing Sector	163
Graph 27- Extent to Which the Nigerian Manufacturing Companies Implementing Modern Manufacturing Strategies for the Manufacture of Different Consumer Products	164
Graph 28 - Extent to Which the Manufacturing Strategies Adopted by the Nigerian Manufacturing Companies Meeting International Standards	165
Graph 29 - Ability of the Nigerian Manufacturing Firms to Successfully Capture the Attention and Loyalty of the Consumers Through Adoption of Effective Manufacturing	165
Graph 30 - Weak Infrastructure of the Operating Environment of the Country Hindering the Development and Implementation of Effective Manufacturing Strategy in Nigeria	166
Graph 31 - Perception about Major Flaws in the Manufacturing Strategy of the Nigerian Manufacturing Companies	167
Graph 32 - Need in the Nigerian Firms in the Following the Patterns of Other Developing Countries' Firms to Develop Effective and Productive Manufacturing Strategy	167
Graph 33 - Need for any Major Changes in the Manufacturing Strategies Adopted by the Nigerian Manufacturing Companies	168
Graph 34 - Overall Opinion of the Respondents about Manufacturing Strategy in the Nigerian Manufacturing Sector	169

Graph 35 - Present Level of Technology Usage in Product Designing in the Nigerian Manufacturing Sector	170
Graph 36 - Extent to Which Manufacturing Companies of Nigeria Offer Different Consumer Products With Innovative Features and Benefits	170
Graph 37 - Differences in Features and Benefits of The Present Nigerian Consumer Products as Compared Within the Past 5 -10 Years	171
Graph 38 - Present Level of Technological Innovations by The Nigerian Companies in Products Designing and Manufacturing	172
Graph 39 - Level of Nigerian Manufacturing Sector’s Capabilities in Offering Innovative Consumer Products in the Context of Globalization and High Competition	172
Graph 40- Level of Awareness Among the Nigerian Manufacturing Companies Regarding Adopting Innovative Designs and Manufacturing Techniques	173
Graph 41 - Extent to Which Nigerian Manufacturing Firms Give Importance to Innovations in the Process of Product	173
Graph 42 - Overall Opinion of the Respondents about Innovation in the Nigerian Manufacturing Sector	174
Graph 43 - Current Business Environment and Market Structure of Nigeria in Satisfying and Supporting the Manufacturing Activities	175
Graph 44 - Extent to Which Nigerian Environmental Uncertainty Adversely Affecting the Manufacturing Activities	175
Graph 45 - Non Availability or Difficulties in Getting Finance and Credits Hindering The Growth and High Quality Performance of Nigerian Manufacturing Firms	176
Graph 46 - Extent to Which Socio-Political Environment of Nigeria Supportive of Manufacturing Activities	177
Graph 47 - Extent to Which Some Degree of Improvements Could be Achieved Through Government Support for a Stable and Suitable Environment for the Manufacturing	177
Graph 48 - Influence of Foreign Products Over the Operations of the Nigerian Manufacturing Firms	178
Graph 49 - Extent to Which Nigerian Manufacturing Firms are Open Towards Adopting Rapid Environmental and Technological Advancements	178
Graph 50 - Overall Opinion of the Respondents About Environmental Uncertainty Affecting the Nigerian Manufacturing Sector	179

Acronyms and Abbreviations

ADB	African Development Bank
BPR	Business Process Reengineering
CAD	Computer Aided Design
CAM	Computer-Aided Manufacturing
CBN	Central Bank Nigeria
CEO	Chief Executive Officer
CIM	Computer Integrated Manufacturing
CNC	Computer Numerical Control
CP	Capital Productivity
CPG	Consumer Packaged Goods
EIA	Energy Information Administration
FDI	Foreign Direct Investment
FICCI	Federation of Indian Chambers of Commerce and Industry
FMCG	Fast Moving Consumer Goods
FMS	Flexible Manufacturing Systems
FOF	Factory Of the Future
GDP	Growth Domestic Product
IMF	International Monetary Fund
ISIC	International Standard Industrial Classification
ISO	International Organization for Standardization
JIT	Just-In-Time
MAN	Nigerian Manufacturers Association of Nigerian
MRP	Materials Requirements Planning
NFPEs	Non-Financial Public Enterprises
NGR	Nigeria
NPC	Nigerian Population Commission
OPEC	Organisation of Petroleum Exporting Countries
R&D	Research and Development
SAP	Structural Adjustment Programme

SMEs	Small and Medium Enterprises
TQC	Total Quality Control
TQM	Total Quality Management
UNCTAD	United Nations Conference on Trade and Development.
UNIDO	United Nations Industrial Development Organization (UNIDO),
USA	United States of America
WPR	Wage Productivity Ratio