

You are All Highly Welcome to this presentation on Socio-Economic and Techno-Economic Deficits in Nigeria: A critical Analyses of Mega Construction Projects (MCPs) Performance in Nigeria.

By

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Socio-Economic and Techno-Economic Deficits in Nigeria: A critical Analyses of Mega Construction Projects (MCPs) Performance in Nigeria.



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BEGM Abuja

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PRESENTATION OUTLINE

✚ INTRODUCTION

✚ RESEARCH METHODOLOGY

✚ RELATED THEORIES

✚ LITERATURE REVIEW

✚ ANALYSES

✚ CONCLUSIONS

✚ RECOMMENDATIONS

✚ RESEARCH INNOVATION

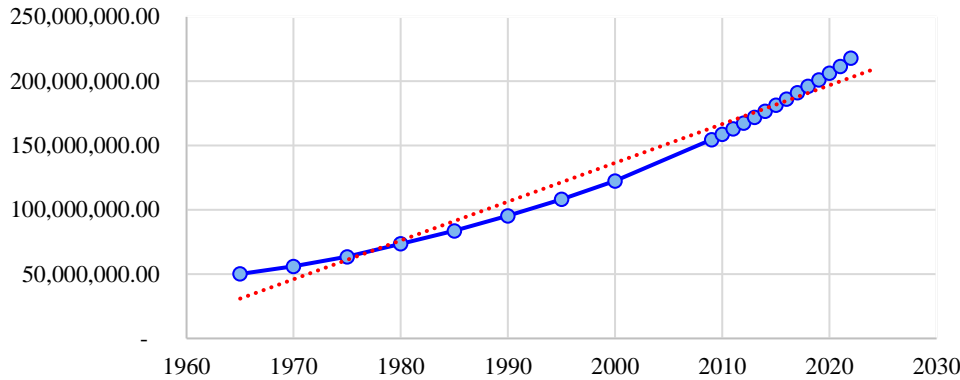
✚ ACKNOWLEDGEMENT

INTRODUCTION - Background to the Study

Nigeria, as the most populous country in Africa, a key player in Africa and the global stage, stands at a critical juncture in its pursuit of sustainable economic growth and development.

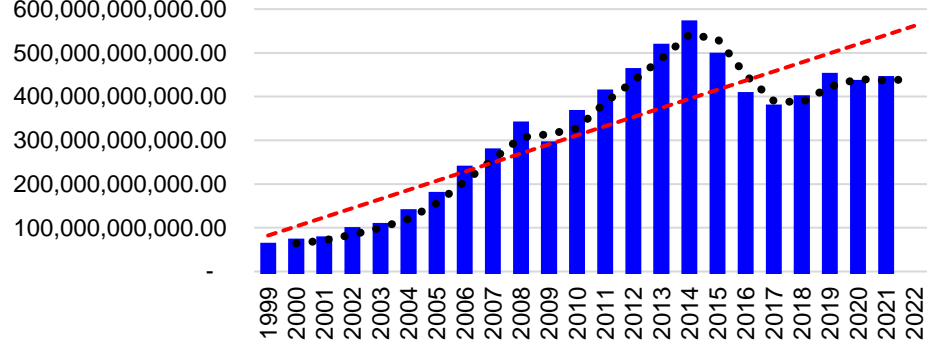
Nigeria's Population Growth

Population Linear (Population)



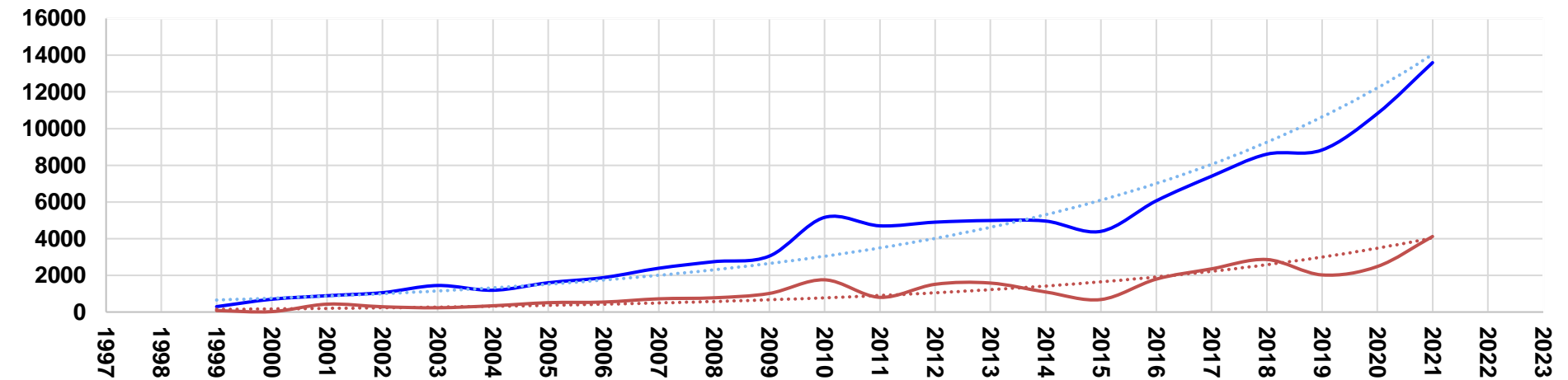
GDP (current US\$) Linear (GDP (current US\$))

GDP (current US\$) Linear (GDP (current US\$))



Nigeria's Annual Budget and The Capital Expenditure for Projects (Billions Naira)

Annual Budget Capital Expenditure Expon. (Annual Budget) Expon. (Capital Expenditure)



INTRODUCTION - Background to the Study

- MCPs are growing larger at an accelerating pace and are multiplying all around the world.

- A global estimate MCPs is about US\$9 trillion per year.

- MCPs importance
 - Political,
 - Economical,
 - Social, and
 - Technological,
 - Environmental impacts etc.

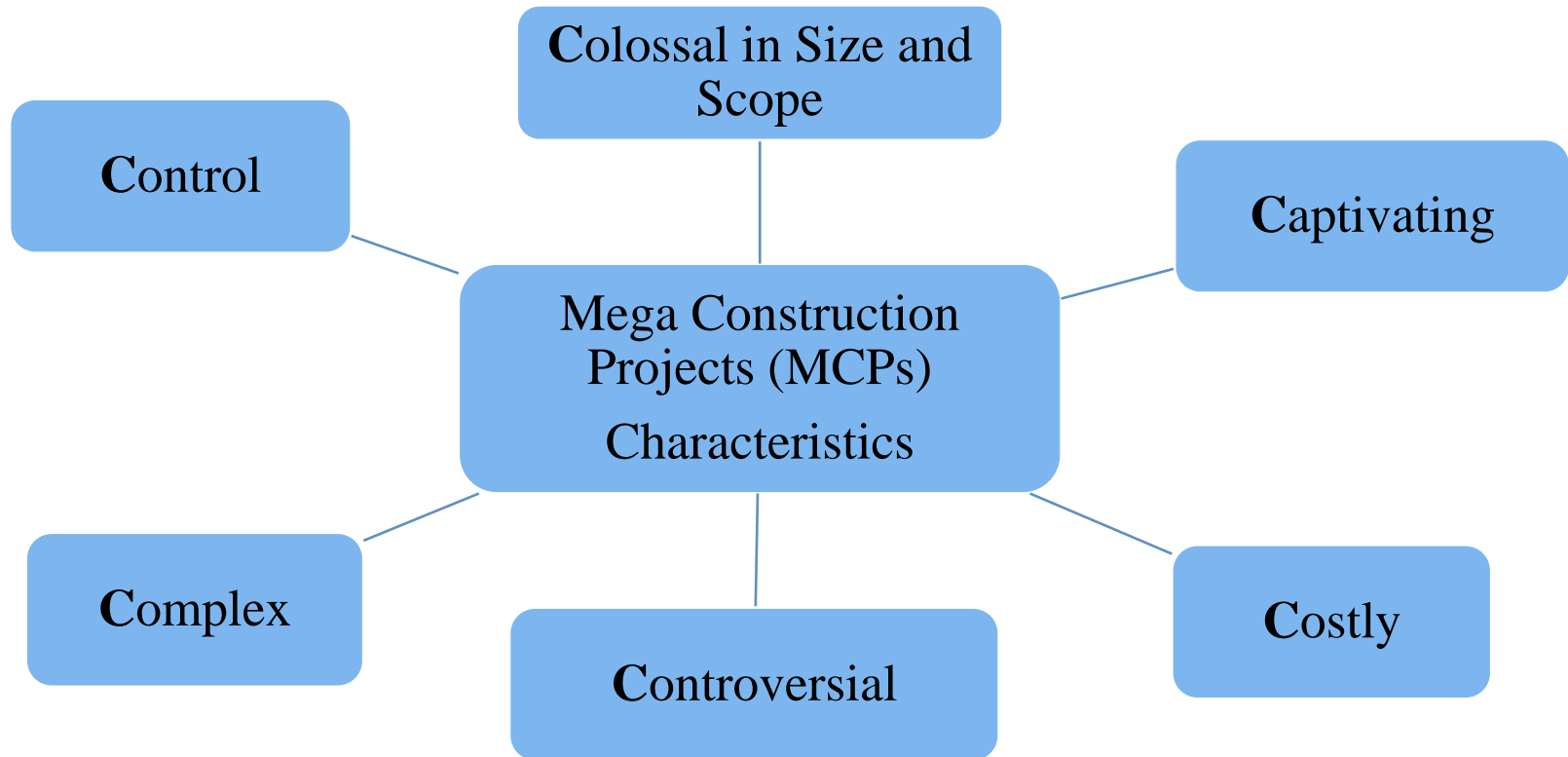


INTRODUCTION - Background to the Study

Such projects include bridges, tunnels, large public transportation projects, seaports, power plants, dams, oil and natural gas extraction projects, large-scale sporting facilities and nuclear power plants etc.



INTRODUCTION

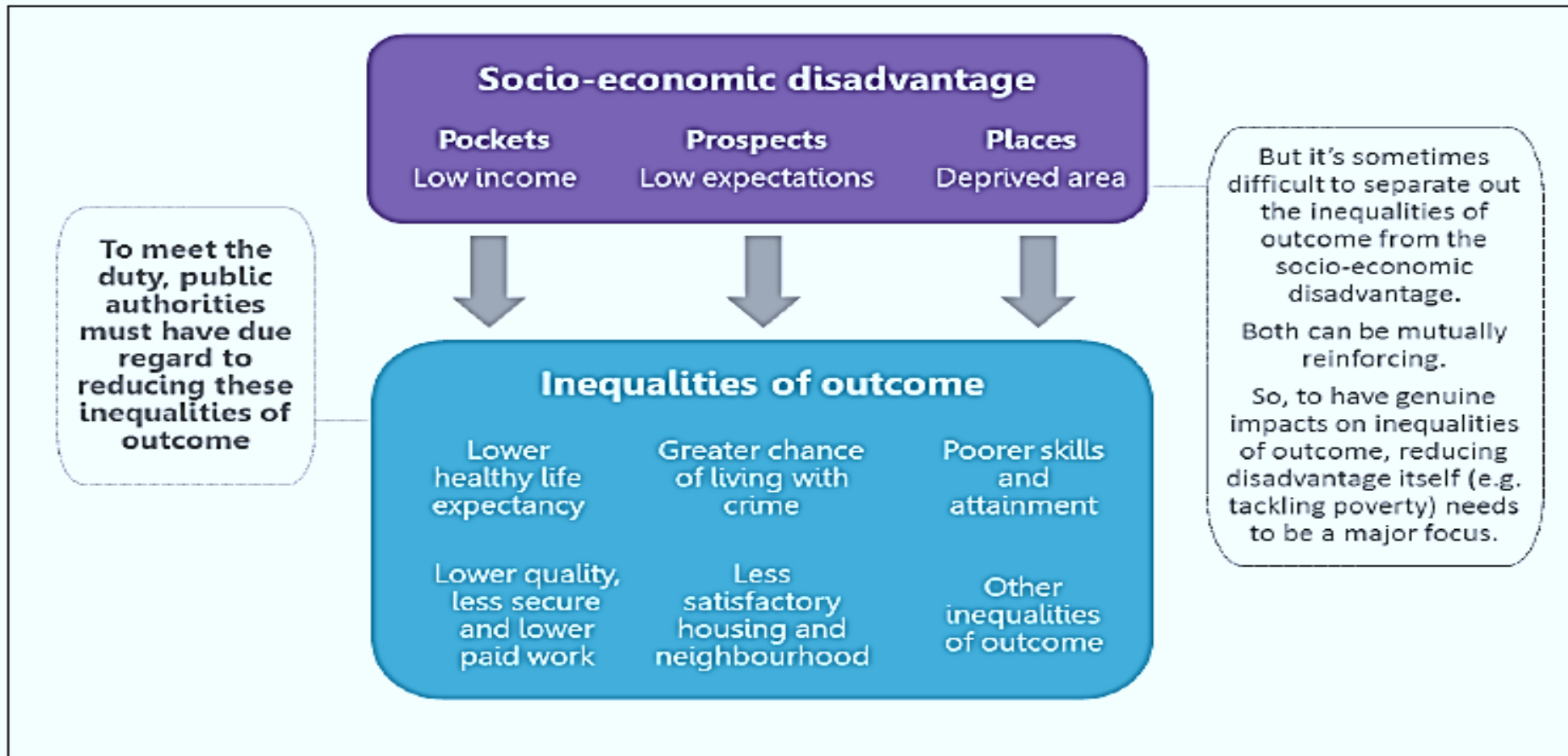


6Cs that Characterizes MCPs

INTRODUCTION - Background to the Study

- ✚ Nigeria, however, has been grappling with several challenges that impede its infrastructural development such as inadequate infrastructure, substandard quality, and unequal distribution, leading to socio-economic deficits / disparities and technological lags (deficits) across different regions.
 - ✚ Socio-economic deficit refers to deficiencies in social and economic aspects, including disparities in income, limited access to education and healthcare, and unequal economic opportunities.
 - ✚ Techno-economic deficit refers to shortcomings or deficiencies in the integration and utilization of technology within economic activities and infrastructural projects.
- ✚ These deficits have persisted due to a myriad of factors, including political instability, insecurity, corruption, mismanagement of resources, and inadequate budgetary allocations for infrastructure projects.

INTRODUCTION - Background to the Study



However, Socio-economic performance signifies positive outcomes and achievements in these areas, showcasing successful policies or projects that contribute to economic growth, poverty alleviation, and improved social well-being.

INTRODUCTION - Background to the Study



Techno-economic performance, signifies successful outcomes and advancements resulting from the integration of technology into economic and infrastructural endeavors.

INTRODUCTION - Research Problem

- ✚ Past and recent studies on mega infrastructural development projects in Nigeria reveals a notable gap in comprehensively understanding the interplay between socio-economic and techno-economic factors.
- ✚ Previous studies, often focusing on isolated aspects, lack the holistic evaluation necessary to unravel the complexities of these deficits.
- ✚ The literature falls short in providing an integrated analysis of the socio-economic disparities and technological constraints influencing the success of mega infrastructure projects, hindering the formulation of effective strategies for sustainable development.
- ✚ The research problem at the heart of this inquiry is the formidable socio-economic and techno-economic deficits in Nigeria that impede the optimal performance of mega infrastructural projects and vice versa.
- ✚ The need to look at mega infrastructure development projects from “SYNERGISTIC VIEW” because its affects many sectors

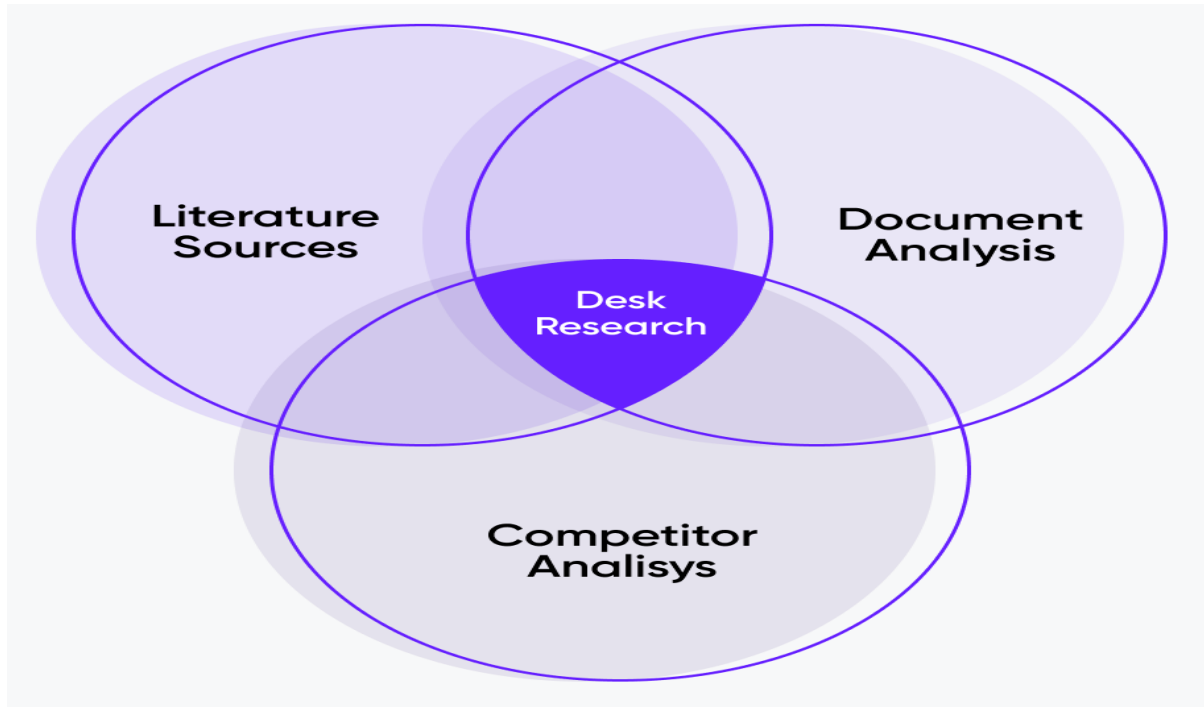
INTRODUCTION

The purpose of this Research work is to



- ✚ Socio-economic deficit (SED)
- ✚ Techno-economic deficit (TED)
- ✚ MIDPs Performance
- ✚ Synergy between SED, TED and MIDP

RESEARCH METHODOLOGY



- ❖ The Desk Study approach begins with an extensive literature review, encompassing scholarly articles, reports, and publications related to mega infrastructural projects in Nigeria.
- ❖ A cross-matrix tabulation is used for analyses. A cross-matrix tabulation, also known as a cross-tab or contingency table, is a statistical method that organizes and presents the relationship between two or more categorical variables.
- ❖ This technique is valuable for analyzing and visualizing patterns or associations between variables, commonly used in social sciences, management research, and other fields.

RELATED THEORIES

- ✦ Theoretical framework for mega infrastructural development in Nigeria integrates key perspectives from:
 - ✦ Modernization Theory,
 - ✦ Theory of Constraints,
 - ✦ New Institutional Economics (NIE),
 - ✦ Resource Dependency Theory, and
 - ✦ Systems Theory.
- ✦ This holistic approach provided a comprehensive understanding of the intricate dynamics involved in mega / large-scale infrastructural projects.
- ✦ These theories collectively offer a comprehensive framework for the analysis and improvement of performance in mega-infrastructure projects.

RELATED THEORIES

- ✦ Modernization theory emphasizes the capacity for transformation.
- ✦ while TOC (Theory of Constraints) focuses on resolving operational obstacles.
- ✦ NIE (New Institutional Economics) navigates the intricacies of institutions,
- ✦ RDT explains how managing these dependencies can mitigate risks and ensure the sustainable development of both socio-economic and techno-economic aspects.
- ✦ Systems theory provides a comprehensive comprehension of the interconnected factors that influence both socio-economic and techno-economic progress.
- ✦ By employing these theories in conjunction, a more sophisticated and deliberate methodology can be adopted for mega-infrastructureal endeavors, thereby promoting sustainable and inclusive growth.

LITERATURE REVIEW

MIDPs

- Mega infrastructural development projects (MIDPs)

SED Vs TED

Development Deficits in Nigeria

- SED
- TED

IMPACTS

Impacts and Performances of MIDPs from the Socio-economic and Techno-economic Perspectives.

LITERATURE REVIEW



**Socio-Economic
Developmental Deficits**

S/N	Socio-economic Developmental Deficits
1	Poverty
2	Unemployment
3	Income Inequality
4	Access to Education
5	Healthcare Disparities
6	Corruption
7	Infrastructure Deficit
8	Rural-Urban Disparities
9	Security Challenges
10	Gender Inequality
11	Limited Industrial Diversification

LITERATURE REVIEW

Techno-Economic Developmental Deficits

Limited Technological Innovation

Digital Divide

Infrastructure Gaps

Insufficient Investment in Research and
Development

Limited Technological Integration in Industries

Skills Gap

Cyber-security Challenges

Inadequate Regulatory Framework

Limited Technological Entrepreneurship

Dependency on Oil

Lack of Technological Education



**Techno-Economic
Developmental Deficits**

LITERATURE REVIEW

Socio-economic Performances of MIDPs



S/N	Socio-economic Performances of MIDPs
1	Economic Growth
2	Employment Generation
3	Income Redistribution
4	Improved Access to Basic Services
5	Enhanced Connectivity
6	Entrepreneurship and Local Businesses
7	Poverty Alleviation
8	Technological Advancement
9	Social Well-being
10	Environmental Sustainability
11	Cultural and Recreational Opportunities
12	Improved Education Facilities

LITERATURE REVIEW

**Techno-economic
Performances of MIDPs**



S/N	Techno-economic Performances of MIDPs
1	Technological Innovation
2	Efficiency Gains
3	Cost-Effectiveness
4	Digital Connectivity
5	Smart Infrastructure
6	Job Creation in the Technology Sector
7	Economic Diversification
8	Long-Term Sustainability
9	Innovation Ecosystem
10	Adaptability to Emerging Technologies
11	Global Competitiveness
12	Resilience to Technological Disruptions

ANALYSES

S/N	Type of Infrastructure	Nature and Summary of Socio-economic Deficits (SED)	Nature and Summary of Techno-Economic Deficits (TED)
1	Transportation Infrastructure	<ul style="list-style-type: none">Inadequate transportation infrastructure exacerbates regional disparities, hindering economic activities and limiting job opportunities. Poor connectivity contributes to socio-economic inequalities, particularly in remote areas.	<ul style="list-style-type: none">Technological lag in transportation systems results in inefficiencies, delays, and increased costs, impeding the development of a modern and efficient transportation network.

ANALYSES

S/N	Type of Infrastructure	Nature and Summary of Socio-economic Deficits (SED)	Nature and Summary of Techno-Economic Deficits (TED)
2	Energy Infrastructure	<ul style="list-style-type: none">• Energy deficits contribute to reduced industrial productivity and hinder economic growth. Insufficient access to reliable energy sources limits economic opportunities and perpetuates poverty.	<ul style="list-style-type: none">• Lack of technological integration in energy infrastructure hampers efficiency, inhibits the adoption of renewable energy sources, and constrains the development of a sustainable and resilient energy sector.

ANALYSES

S/N	Type of Infrastructure	Nature and Summary of Socio-economic Deficits (SED)	Nature and Summary of Techno-Economic Deficits (TED)
3	Water Infrastructure	<ul style="list-style-type: none">Inadequate water infrastructure contributes to health issues, limits agricultural productivity, and perpetuates poverty, particularly in areas with water scarcity.	<ul style="list-style-type: none">Insufficient technological advancements in water infrastructure lead to water wastage, inefficient distribution, and inadequate management of water resources.

ANALYSES

S/N	Type of Infrastructure	Nature and Summary of Socio-economic Deficits (SED)	Nature and Summary of Techno-Economic Deficits (TED)
4	ICT Infrastructure	<ul style="list-style-type: none">The digital divide resulting from inadequate ICT infrastructure widens socio-economic disparities, limiting access to information, education, and economic opportunities.	<ul style="list-style-type: none">Lagging behind in technological advancements in the ICT sector hinders innovation, connectivity, and the country's competitiveness in the global digital economy.

ANALYSES

S/N	Type of Infrastructure	Nature and Summary of Socio-economic Deficits (SED)	Nature and Summary of Techno-Economic Deficits (TED)
5	Social Infrastructure	<ul style="list-style-type: none"> Insufficient social infrastructure, including healthcare and education facilities, contributes to poor health outcomes, limits educational opportunities, and perpetuates social inequalities. 	<ul style="list-style-type: none"> Lack of technological integration in social infrastructure impedes the delivery of quality healthcare and education services, hindering the overall well-being and human capital development.

ANALYSES

S/N	Type of Infrastructure	Nature and Summary of Socio-economic Deficits (SED)	Nature and Summary of Techno-Economic Deficits (TED)
6	Public Utilities	<ul style="list-style-type: none"> Deficiencies in public utility infrastructure, such as inadequate waste management, contribute to environmental degradation, public health issues, and a lower quality of life. 	<ul style="list-style-type: none"> Technological shortcomings in public utility infrastructure hinder efficient waste management, limit the adoption of sustainable practices, and impede the development of eco-friendly solutions.

ANALYSES – Critical / Major Development Deficit (SED and TED) from Various types of Infrastructure

S/N	Socio-economic Deficits	Type of Infrastructure						Techno-economic Deficits	Type of Infrastructure						
		TI	EI	WI	ICTI	SI	PU		TI	EI	WI	ICTI	SI	PU	
1	Poverty	√	*√	√	*√	*√	*√	Limited Technological Innovation	*√	*√	*√	*√	*√	*√	*
2	Unemployment	√	*√	√	*√	*√	*√	Digital Divide	√	*√	√	*√	*√	*√	√
3	Income Inequality	*√	*√	√	*√	√	√	Infrastructure Gaps	*√	*√	*√	*√	*√	*√	*
4	Access to Education	*√	√	√	*√	*√	√	Insufficient Investment in Research and Development	√	*√	*√	*√	√	√	√
5	Healthcare Disparities	*√	*√	*√	*√	*√	*√	Limited Technological Integration in Industries	*√	*√	√	*√	√	√	√
6	Corruption	*√	*√	*√	*√	*√	*√	Skills Gap	√	*√	√	*√	√	√	*
7	Infrastructure Deficit	*√	*√	*√	*√	*√	*√	Cyber-security Challenges	√	√	√	*√	*√	*√	*
8	Rural-Urban Disparities	*√	*√	*√	*√	*√	*√	Inadequate Regulatory Framework	*√	*√	*√	*√	*√	*√	*
9	Security Challenges	*√	√	√	*√	*√	*√	Limited Technological Entrepreneurship	√	√	√	*√	√	√	√
10	Gender Inequality	√	√	√	√	*√	*√	Dependency on Oil	*√	*√	√	√	*√	*√	*
11	Limited Industrial Diversification	√	*√	*√	*√	*√	*√	Lack of Technological Education	√	√	√	*√	√	√	*

*√ Signifies Critical /Major Development Deficit from the type of Infrastructure. √ Signifies Development Deficit

ANALYSES – Socio-economic and Techno-economic Synergistic Performance effects from MIDPS

S/N	Type of Infrastructure	TI	EI	WI	ICTI	SI	PU	Synergistic Effects from Socio-economic (SE) and Techno-economic (TE) Perspectives
1	Transportation Infrastructure (TI)		*√	*√	√	√		<ul style="list-style-type: none"> ◆ Efficient transportation facilitates the movement of people and goods, reducing logistical barriers and enhancing economic activities. Improved accessibility fosters regional development, connects markets, and creates employment opportunities. ◆ Transportation infrastructure aligns with technological advancements through smart transportation systems, incorporating innovations like intelligent traffic management and electric vehicles to enhance efficiency and sustainability
2	Energy Infrastructure (EI)	*√		*√	√	√	√	<ul style="list-style-type: none"> ◆ Reliable energy supports economic activities, powering industries, businesses, and households. Access to energy services is fundamental for enhancing living standards and promoting economic growth. ◆ Energy infrastructure contributes to technological progress by enabling research and development in the energy sector. Integration of renewable energy sources aligns with technological advancements for sustainable development.

- √ Signifies major infrastructural synergy in socio-economic (SE) and techno-economic (TE) aspects.
- √ Signifies normal infrastructural synergy in SE and TE aspects.

ANALYSES – Socio-economic and Techno-economic Synergistic Performance effects from MIDPS

S/N	Type of Infrastructure	TI	EI	W I	ICT I	SI	P U	Synergistic Effects from Socio-economic (SE) and Techno-economic (TE) Perspectives
3	Water Infrastructure (WI)	*√	*√			√	√	<ul style="list-style-type: none"> ◆ Clean water and sanitation infrastructure directly impact public health and well-being, reducing waterborne diseases and improving overall quality of life. Adequate water supply supports agriculture and economic productivity. ◆ Implementation of advanced technologies in water and sanitation, such as smart water management systems, contributes to efficient resource utilization and environmental sustainability.
4	ICT Infrastructure (ICTI)	*√	√			*√	√	<ul style="list-style-type: none"> ◆ ICT infrastructure enhances connectivity, promotes information exchange, and facilitates e-commerce, fostering economic inclusivity. Access to digital resources improves education, healthcare, and overall societal well-being. ◆ ICT infrastructure is a driver of technological innovation, supporting the development of digital solutions, artificial intelligence, and connectivity technologies that propel economic growth.

- √ Signifies major infrastructural synergy in socio-economic (SE) and techno-economic (TE) aspects.
- √ Signifies normal infrastructural synergy in SE and TE aspects.

ANALYSES – Socio-economic and Techno-economic Synergistic Performance effects from MIDPS

S/N	Type of Infrastructure	TI	EI	WI	ICTI	SI	PU	Synergistic Effects from Socio-economic (SE) and Techno-economic (TE) Perspectives
5	Social Infrastructure (SI)	*√	√	√	*√		*√	<ul style="list-style-type: none"> ◆ Educational institutions contribute to human capital development, healthcare facilities enhance public health, and community centers provide spaces for social interaction. These collectively contribute to a skilled workforce and improved societal welfare. ◆ Social infrastructure benefits from technological integration, such as tele-medicine in healthcare and digital learning platforms in education, fostering advancements that align with broader technological trends.
6	Public Utilities (PU)	√	*√	*√	√	√		<ul style="list-style-type: none"> ◆ Reliable public utilities, including electricity, gas, water, and sewage services, are fundamental for creating habitable environments, supporting industries, and enhancing the overall quality of life. ◆ Integration of technology in public utilities, like smart grids and digital water management systems, contributes to efficiency, resource optimization, and sustainable practice.

- √ Signifies major infrastructural synergy in socio-economic (SE) and techno-economic (TE) aspects.
- √ Signifies normal infrastructural synergy in SE and TE aspects.

CONCLUSIONS

- ✚ The exploration of socio-economic performances and impacts from mega infrastructural projects in Nigeria synthesizes multifaceted dynamics, offering a holistic perspective on the transformative potential of infrastructural interventions.
- ✚ The combined effects of socio-economic and techno-economic performances yield a transformative impact on Nigeria's development landscape.
- ✚ Socio-economic impacts contribute to inclusive and equitable development, fostering poverty alleviation, income redistribution, and enhanced living standards.
- ✚ Simultaneously, techno-economic performances drive technological advancement, economic diversification, and global competitiveness.
- ✚ The synergy between these performances creates a development framework addressing multifaceted challenges, fostering human capital development, poverty alleviation, and a more inclusive and sustainable development trajectory. In essence, mega infrastructural projects serve as catalysts for holistic and sustainable development in Nigeria.

RECOMMENDATIONS

- **Practical Recommendations:** Implementing effective stakeholder engagement strategies is crucial for the success of mega infrastructural projects, ensuring the inclusion of diverse perspectives. Establishing comprehensive risk management protocols can enhance project resilience by anticipating and mitigating potential challenges. Additionally, investing in capacity building initiatives for project managers and personnel is essential to equip them with the necessary skills for efficient project planning and execution.
- **Theoretical Recommendations:** Developing and testing integrated theoretical frameworks that combine established theories in economics, sociology, and technology management is vital for a comprehensive understanding of the intricate relationships between socio-economic and techno-economic factors. Conducting longitudinal studies to explore the evolving dynamics of mega infrastructural projects over extended periods can provide valuable insights into their temporal impacts.

RECOMMENDATIONS

- **Empirical Recommendations:** Undertaking cross-sectoral analyses to compare the impacts of mega infrastructural projects across different sectors and initiating benchmarking studies by comparing project performance globally can offer sector-specific patterns and insights into global best practices.
- **Managerial Recommendations:** Fostering inclusive decision-making processes within project management teams is crucial, ensuring representation from various disciplines and stakeholders for more informed and effective managerial decisions. Establishing robust monitoring and evaluation protocols to track socio-economic and techno-economic performance can facilitate proactive adjustments to keep projects aligned with their objectives.
- **Methodological Recommendations:** Employing mixed-methods research approaches that combine quantitative and qualitative methods is recommended for a holistic understanding of the complexities surrounding mega infrastructural projects. Encouraging collaborative research initiatives involving multidisciplinary teams can enrich methodological approaches, bringing together expertise from diverse fields to study these projects comprehensively.

RECOMMENDATIONS

✚ The use of Mathematical Models to Examine the Extent of SE and TE Deficits and Performances

- ✚ Social Return on Investment (SROI) Model
- ✚ Multi-Criteria Decision Analysis (MCDA)
- ✚ Cost-Benefit Analysis (CBA)
- ✚ Technology Readiness Level (TRL) Model
- ✚ Human Development Index (HDI)
- ✚ Innovation Diffusion Theory:
- ✚ Community Impact Assessment (CIA)
- ✚ Dynamic Input-Output Model
- ✚ Use of Hybrid Models (e.g. Integrating two / three models)

RESEARCH INNOVATION

- This research proposes a Performance Evaluation Hybrid Model that can integrate the SED and TED.
- Name of the Proposed Hybrid Model: IDD Model - DEA Model (IDD-DEA Model)
 - IDD Model – Integrated Development Deficiency Model
 - DEA Model – Data Envelopment Analyses Model

RESEARCH INNOVATION

IDD Model – Integrated Development Deficiency Model

- Define the guiding parameters for distinctive identification of the socio-economic and techno-economic Deficiency as Factors, Effects or Impacts.

- **Socio-Economic Deficiency - SED**

- $SED_i \quad SED_J \quad SED_K \quad \dots \dots \dots \quad SED_n$

- $= \sum_{i=1}^n [(SED_i \quad SED_J \quad SED_K \quad \dots \dots \dots \quad SED_n)]$

- **Techno-Economic Deficiency - TED**

- $TED_i \quad TED_J \quad TED_K \quad \dots \dots \dots \quad TED_n$

- $= \sum_{i=1}^n [(TED_i \quad TED_J \quad TED_K \quad \dots \dots \dots \quad TED_n)]$

RESEARCH INNOVATION

IDD Model – Integrated Development Deficiency Model

S /N	Performance Parameters in the IDDM Model	Priority Weights (wi)	Weights in Percentage
1	SED_i	$SED_i w_i$	$SED_i w_i / total w_i$
2	SED_j	$SED_j w_j$	$SED_j w_j / total w_j$
3	SED_K	$SED_k w_i$	$SED_k w_i / total w_k$
.
.
.
.
N	SED_n	$SED_n w_i$	$SED_n w_i // total w_n$

$$\sum_{i=1}^n w_i = 1$$

$$IDDM_{SED} = \sum_{i=1}^n w_{i-n} \left[\frac{(SED_i, SED_j, SED_K \dots \dots \dots SED_n)}{N} \right]$$

RESEARCH INNOVATION

IDD Model – Integrated Development Deficiency Model

S /N	Performance Parameters in the IDDM Model	Priority Weights (wi)	Weights in Percentage
1	TED_i	$TED_i w_i$	$TED_i w_i / total w_i$
2	TED_j	$TED_j w_j$	$TED_j w_j / total w_j$
3	TED_K	$TED_K w_k$	$TED_K w_k / total w_k$
.
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N	TED_n	$TED_n w_n$	$TED_n w_n // total w_n$

$$\sum_{i=1}^n w_i = 1$$

$$IDDM_{TED} = \sum_{i=1}^n w_{i-n} \left[\frac{(TED_i, TED_j, TED_K \dots \dots \dots TED_n)}{N} \right]$$

RESEARCH INNOVATION

IDEA Model – IMPRECISE DATA ENVELOPMENT ANALYSES MODEL

Using the 3points, 4points, or 5points Likert scale to evaluate the size of a phenomena or problem typifies instances in which pure ordinal data or a combination of ordinal and numerical data is included and utilized to make performance measurement computations.

The ordinal data problem can be a set of N number of DMUs, $K=1, \dots, N$ is to be evaluated in terms of R_1 numerical outputs, R_2 ordinal outputs, I_1 numerical inputs, and I_2 ordinal inputs.

- Let $Y_k^1 = (Y_{rk}^1)$, $Y_k^2 = (Y_{rk}^2)$ Denote the R_1 -dimensional and R_2 -dimensional vectors of technical outputs, respectively.
- Similarly, let $X_k^1 = (X_{ik}^1)$, $X_k^2 = (X_{ik}^2)$ be the I_1 -dimensional and I_2 - Dimensional vectors of input data, respectively.

RESEARCH INNOVATION

IDEA Model – IMPRECISE DATA ENVELOPMENT ANALYSES MODEL

Adopting Banker et al. (1984)'s general variable returns to scale (VRS) model and expressing it in ratio form, the efficiency of DMUs under examination derives from the model's solution below based on:

$$e_o = \max \left(\mu + \sum_{r \in R_1} \mu_r^1 y_{ro}^1 + \sum_{r \in R_2} \mu_r^2 y_{ro}^2 \right) / \left(\sum_{i \in I_1} v_i^1 x_{io}^1 + \sum_{i \in I_2} v_i^2 x_{io}^2 \right)$$
$$\text{s. t.} \quad \left(\mu_o + \sum_{r \in R_1} \mu_r^1 y_{rk}^1 + \sum_{r \in R_2} \mu_r^2 y_{rk}^2 \right) / \left(\sum_{i \in I_1} v_i^1 x_{ik}^1 + \sum_{i \in I_2} v_i^2 x_{ik}^2 \right) \leq 1, \text{ all } k$$
$$\mu_r^1, \mu_r^2, v_i^1, v_i^2 \geq \varepsilon, \text{ all } r, i$$

Where $\varepsilon > 0$ is the “non-Archimedean infinitesimal,” Each ordinal factor is assumed to be ($r \in R_2, i \in I_2$), Every DMU k is assigned to one of L rank positions, where $L \leq N$, Example For a 5point Likert Scale, $L=5$.

This study structured the following for the application of the IDEA model:

- (1) Socio-Economic Development Deficiencies
- (2) Techno-Economic Development Deficiencies

RESEARCH INNOVATION

$$e_o = \max \left(\mu + \sum_{r \in R_1} SED_i y_{ro}^1 + \sum_{r \in R_2} SED_j y_{ro}^2 + \dots \dots \sum_{r \in R_n} SED_n y_{ro}^n \right) / \left(\sum_{i \in I_1} SED_i x_{io}^1 + \sum_{i \in I_2} SED_j x_{io}^2 \right. \\ \left. + \dots \dots \sum_{i \in I_n} SED_n x_{io}^n \right)$$

Subject to:

$$\left(\mu_o + \sum_{r \in R_1} SED_i y_{rk}^1 + \sum_{r \in R_2} SED_j y_{rk}^2 + \dots \sum_{r \in R_n} SED_n y_{rk}^n \right) / \left(\sum_{i \in I_1} SED_i x_{ik}^1 + \sum_{i \in I_2} SED_j x_{ik}^2 + \dots \sum_{i \in I_n} SED_n x_{ik}^n \right) \leq 1$$

Where:

$SED_{i,j,k,\dots,n}$ represents any defined External Performance Factors for MCPs such as the following:

$SED_{i,j,k,\dots,n}$ for all Socio-Economic Deficiencies

$TED_{i,j,k,\dots,n}$ for all Techno-Economic Deficiencies

RESEARCH INNOVATION

- This hybrid evaluation method to measure the SED and TED external performance of MIDPs, is conducive to integrating the social, economic, technological performance of MIDPs in developing countries, and achieve performance synergy in social, economic, technical aspects of the MIDPs.
- The quantitative analyses of the external performances such as the socio-economic performance factors, the techno-economic performance factors, project determinant performance factors and project performances metrics can also evaluated using the Integrated model with DEA model.

While, also letting:

$Y_k^1 = (Y_{rk}^1), Y_k^2 = (Y_{rk}^2)$ represent technical outputs vector components, and

$X_k^1 = (X_{ik}^1), X_k^2 = (X_{ik}^2)$ represent technical inputs vector components.

For all MIDP Project Performances Internally and Externally

ACKNOWLEDGEMENT

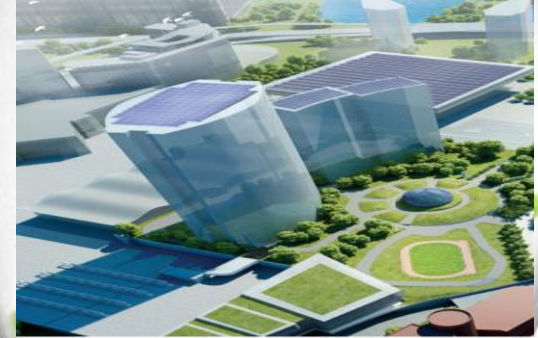
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**THANK
YOU,
MIYETTI**

**SALISU
GIDADO
DALIBI**

- **COMMENTS**
- **QUESTIONS**

**MEGA PROJECTS ARE
THE FUTURE OF ANY
DEVELOPING COUNTRY
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MEGA PROJECTS