AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

TURKISH COOPERATION AND COORDINATION AGENCY (TIKA) BILATERAL INTERVENTION AND THE SUPPORT FOR NIGERIAN EDUCATIONAL INFRASTRUCTURES

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ABSTRACT

This study examined the effect of Turkish Cooperation and Coordination Agency (TIKA) bilateral intervention on the support for Nigerian educational infrastructures in Nigeria. The study adopted the Dependency theory as a theoretical framework. This study adopted mixed method and survey research designs. The target population are school administrators, teachers, and officials of educational institutions in Nigeria. The total population of the study is 1,200. A sample size of 291 was determined using the Krejcie and Morgan sample size determination formula. Primary data were sourced from questionnaire responses, interviews, and field observations while secondary data were sourced from academic journals, government reports, and publications from international organizations such as TIKA, UNESCO, and the World Bank. Multiple linear regression statistical technique was used to analyse and test the hypotheses at a $p<0.05$ significance level. Findings from hypothesis one revealed that infrastructural development initiatives by TIKA have significantly enhanced the quality of educational facilities in Nigeria, with a p-value of 0.002 ($p < 0.05$). Findings from hypothesis two revealed that provision of educational equipment and learning resources has significantly improved access to functional educational infrastructure in Nigeria, with a p-value of 0.001 ($p < 0.05$). Findings from hypothesis three revealed that capacity building and institutional collaboration have significantly enhanced the sustainability of educational infrastructure in Nigeria, with a p-value of 0.003 ($p < 0.05$). The study concluded that TIKA bilateral interventions have significantly contributed to the development and improvement of educational infrastructure in Nigeria through strategic infrastructural investments, resource provision, and institutional strengthening. The study recommended, among other things, that the Nigerian government should strengthen collaboration with international development agencies, ensure proper monitoring and evaluation of intervention projects, and promote sustainability strategies to maintain and expand infrastructural gains in the education sector.

Keywords: Turkish Cooperation and Coordination Agency; Bilateral Intervention; Educational Infrastructure; Development Cooperation; Capacity Building.

Introduction

The rapid expansion of global development cooperation frameworks has significantly reshaped bilateral interventions in education infrastructure globally (Smith, 2021). In a global

discourse on international aid effectiveness and educational development, bilateral agencies have increasingly focused on infrastructure support as a mechanism for sustainable human capital development (World Bank, 2022). In Africa, development partnerships have played a critical role in bridging educational infrastructure deficits, particularly through targeted investments in schools, vocational institutions, and digital learning systems (Adebayo, 2020).

In Nigerian perspectives, the educational sector continues to face infrastructural gaps such as inadequate classrooms, poor learning facilities, and limited access to modern educational tools (Okeke, 2022), and these challenges have necessitated increased reliance on international partnerships for sustainable improvements. In the area of the study, the Turkish Cooperation and Coordination Agency have emerged as a key factor in Nigeria through its bilateral interventions focused on rehabilitating schools, constructing new facilities, and supporting technical education (Yilmaz, 2021).

The concept of bilateral intervention in this context encompasses financial aid, technical assistance, and infrastructural development projects aimed at improving educational systems. Its core components include school construction, provision of learning materials, teacher training, and technological support. Educational infrastructure, on the other hand, refers to the physical and organizational structures required for effective teaching and learning, including classrooms, laboratories, libraries, and digital facilities. The interaction between these constructs suggests that increased bilateral support enhances the quality, accessibility, and functionality of educational infrastructure.

Recent statistics indicate that Nigeria has over 10 million out-of-school children and suffers from a classroom deficit exceeding 300,000 units (UNESCO, 2023). Meanwhile, TIKA has implemented over 50 education-related projects in Nigeria between 2018 and 2024, including the renovation of schools and provision of modern equipment (TIKA Report, 2024). These figures highlight the growing relevance of bilateral interventions in addressing infrastructural deficits in the education sector.

Empirical studies have established a significant relationship between development aid and educational outcomes. For instance, foreign aid targeted at infrastructure development has been found to improve school enrollment and learning conditions in developing countries (Brown & Green, 2019); similarly, bilateral cooperation projects have enhanced institutional capacity and access to quality education in Africa (Khan, 2020). In Nigeria, studies also reveal that infrastructural investments significantly influence educational performance and accessibility (Eze, 2021).

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African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

Despite these findings, gaps remain regarding the specific contributions of TIKA's bilateral interventions to Nigerian educational infrastructure, particularly in terms of measurable outcomes and sustainability. This creates the need for further investigation into how such interventions translate into tangible improvements within the Nigerian educational system.



Figure 2: Educational Infrastructure Projects Supported by Bilateral Agencies
Source: TIKA Project Reports (2024)



Figure 2: Educational Infrastructure Projects Supported by Bilateral Agencies
Source: TIKA Project Reports (2024)

This study therefore examines the Turkish Cooperation and Coordination Agency (TIKA) bilateral intervention on the support for Nigerian educational infrastructures.

Statement of the Problem

Nigeria has faced several challenges in its educational sector such as inadequate infrastructure, overcrowded classrooms, insufficient teaching facilities, poor maintenance culture, and limited access to modern learning technologies (UNESCO, 2023; World Bank, 2022), which has negatively affected the quality of education delivery and student outcomes. Studies have shown that over 60% of public schools in Nigeria lack basic infrastructure, while millions of students learn in substandard environments (UNICEF, 2022). This situation has contributed to high dropout rates, low enrollment in rural areas, and poor academic performance across different levels of education (Okeke, 2022).

In an effort to address these challenges, the Nigerian government and its development partners introduced various initiatives such as school rehabilitation programs, public-private partnerships, international bilateral cooperation projects, and infrastructural intervention schemes (Federal Ministry of Education, 2021; TIKA Report, 2024). Notably, the Turkish Cooperation and Coordination Agency has implemented several projects including renovation of classrooms, provision of modern educational equipment, and support for vocational training institutions in Nigeria. Despite these approaches, infrastructural deficits and disparities in educational access still persist across many regions in the country.

The statement of the problem therefore is to ascertain whether these bilateral intervention initiatives have significantly addressed the infrastructural challenges facing the Nigerian educational system. Empirically, previous studies revealed conflicting views about development aid effectiveness and educational infrastructure outcomes in developing countries, especially in Nigeria. For instance, while (Brown & Green, 2019) found that foreign aid improves educational access and infrastructure, (Eze, 2021) argued that infrastructural investments do not always translate into improved educational outcomes due to poor implementation and maintenance.

This inconsistency creates a gap in knowledge regarding the effectiveness of specific bilateral agencies such as TIKA in improving Nigerian educational infrastructure. Therefore, this study fills the gap by providing empirical evidence on the contribution of TIKA's interventions within the Nigerian context. This study therefore examines the effect of Turkish Cooperation and Coordination Agency (TIKA) bilateral intervention on Nigerian educational infrastructures.

Objective of the study

The broad objective of the study is to examine the Turkish Cooperation and Coordination Agency (TIKA) bilateral intervention on Nigerian educational

infrastructures in Nigeria. While the specific objectives are to: examine the effect of TIKA-funded school construction projects on educational infrastructure development in Nigeria. Determine the effect of provision of educational materials and equipment by TIKA on the quality of learning facilities in Nigeria. Assess the extent to which TIKA's technical and vocational education support has enhanced educational infrastructure in Nigeria.

Research Questions

This study seeks to answered the following research questions: What is the effect of TIKA-funded school construction projects on educational infrastructure development in Nigeria? What is the effect of provision of educational materials and equipment by TIKA on the quality of learning facilities in Nigeria? To what extent has TIKA's technical and vocational education support enhanced educational infrastructure in Nigeria?

Hypotheses of the study

The following hypotheses were drafted to guide the study: H_{01}: There is no significant relationship between TIKA-funded school construction projects and educational infrastructure development in Nigeria. H_{02}: There is no significant relationship between provision of educational materials and equipment by TIKA and the quality of learning facilities in Nigeria. H_{03}: There is no significant relationship between TIKA's technical and vocational education support and enhancement of educational infrastructure in Nigeria.

The scope of this study covers the examination of bilateral intervention by the Turkish Cooperation and Coordination Agency and its contribution to the development of educational infrastructures in Nigeria. In terms of content scope, the study focuses on key aspects such as school construction projects, provision of educational materials and equipment, and technical and vocational education support as major components of TIKA's interventions, while educational infrastructure development is considered in terms of availability, quality, and accessibility of facilities.

Geographically, the study is limited to Nigeria, with emphasis on selected regions and institutions that have benefited from TIKA-supported educational projects. This allows for a contextual analysis of the agency's interventions within the Nigerian educational system.

In terms of time frame, the study covers the period from 2018 to 2024 to capture recent trends, developments, and outcomes of TIKA's interventions in the education sector. This period is considered appropriate due to the increased activities of bilateral development agencies in Nigeria during these years.

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Literature Review

Bilateral Intervention

Bilateral intervention is defined as the direct assistance provided by one country or its agency to another country for development purposes (OECD, 2020). Bilateral cooperation is described as a form of international partnership aimed at promoting economic and social development through targeted programs (Smith, 2021). Development assistance is the transfer of financial resources, technical expertise, or infrastructure support from donor countries to recipient countries (Brown & Green, 2019). Bilateral intervention is a process whereby donor agencies implement projects such as school construction, capacity building, and provision of educational resources in developing countries (Yilmaz, 2021). Foreign aid is referred to as government-sponsored support intended to improve developmental outcomes in recipient nations (Khan, 2020). Bilateral intervention is (Adebayo, 2020). The Turkish Cooperation and Coordination Agency represent a structured mechanism of bilateral intervention that focuses on education, healthcare, and infrastructural development across developing countries, including Nigeria.

Educational Infrastructure

Educational infrastructure is defined as the physical and material facilities that support effective teaching and learning processes within an educational system (UNESCO, 2021). School infrastructure is described as the combination of classrooms, laboratories, libraries, and other facilities that create a conducive learning environment (Okeke, 2022). Educational facilities are the essential structural components required for delivering quality education (World Bank, 2022). Educational infrastructure is a process whereby physical resources and institutional frameworks are developed and maintained to enhance learning outcomes (Eze, 2021). Learning environments are referred to as the physical and digital spaces that influence students' academic engagement and performance (Adebayo, 2020). Educational infrastructure is (Smith, 2021). Educational infrastructure plays a critical role in determining the quality, accessibility, and effectiveness of education delivery, especially in developing countries like Nigeria where infrastructural deficits remain a major challenge.

School Construction Projects

School construction projects are defined as organized efforts aimed at building new educational facilities or expanding existing ones to improve access to education (World Bank, 2022). Infrastructure development projects are described as strategic initiatives designed to provide physical structures necessary for effective service delivery in the education sector (UNESCO, 2021). School construction is the establishment of classrooms, administrative blocks, laboratories, and other facilities required for learning (Okeke, 2022). School construction projects are a process whereby governments and development partners collaborate to provide safe and

conducive learning environments (Eze, 2021). Educational building development is referred to as the systematic planning and execution of physical structures to support academic activities (Adebayo, 2020). School construction projects are (Smith, 2021). Within the context of bilateral cooperation, agencies such as the Turkish Cooperation and Coordination Agency engage in school construction and rehabilitation projects to address infrastructural deficits and improve access to quality education in Nigeria.

Educational Materials and Equipment Provision

Educational materials and equipment provision is defined as the supply of instructional resources such as textbooks, laboratory tools, and digital learning devices to support teaching and learning (UNESCO, 2021). Instructional resources are described as tools and materials used by educators to facilitate effective knowledge transfer (Okeke, 2022). Educational equipment is the physical and technological tools required for practical and theoretical learning activities (World Bank, 2022). Provision of educational materials is a process whereby governments and development agencies distribute learning resources to enhance educational quality (Eze, 2021). Learning support resources are referred to as materials that improve student engagement and comprehension within the classroom (Adebayo, 2020). Educational materials provision is (Smith, 2021). Within bilateral cooperation frameworks, agencies such as the Turkish Cooperation and Coordination Agency play a significant role in supplying modern educational tools, including ICT facilities, laboratory equipment, and teaching aids, thereby improving the quality of educational infrastructure in Nigeria.

Technical and Vocational Education Support

Technical and vocational education support is defined as structured assistance aimed at enhancing skill acquisition through practical and career-oriented training programs (UNESCO, 2021). Vocational education is described as an educational system that equips learners with technical skills and competencies required for specific trades and occupations (Okeke, 2022). Skills development programs are the processes designed to improve individuals' employability and productivity through hands-on training (World Bank, 2022). Technical education support is a process whereby governments and development partners provide facilities, equipment, and training opportunities to strengthen vocational institutions (Eze, 2021). Workforce development is referred to as initiatives that prepare individuals for participation in the labor market through specialized training (Adebayo, 2020). Technical and vocational education support is (Smith, 2021). In the context of bilateral cooperation, the Turkish Cooperation and Coordination Agency contribute to vocational education in Nigeria through the establishment of training centers, provision of modern equipment, and capacity-building programs aimed at enhancing technical

skills and improving educational infrastructure outcomes.

Theoretical Framework

Theory of Dependency Theory was adopted as Theoretical Framework. The theory as earlier discussed was propounded by Andre Gunder Frank (Frank, 1967). The basic idea about this theory is that developing countries rely heavily on developed countries for resources, technical support, and development assistance (Frank, 1967). The theory believes that external interventions such as foreign aid and bilateral cooperation significantly influence the development trajectory of less developed nations (Smith, 2021).

The basic assumptions of the study are that developing countries like Nigeria depend on external agencies for infrastructural development, and such support can either enhance or constrain sustainable growth depending on its implementation (Adebayo, 2020). It further assumes that bilateral agencies contribute positively by providing financial resources, expertise, and infrastructural development in sectors such as education.

Although, the theory was criticized on the basis of being overly pessimistic and portraying developing countries as perpetually dependent on developed nations without considering internal capacities and reforms (Khan, 2020). Critics argue that it underestimates the role of domestic policies and governance in shaping development outcomes.

But this theory is relevant to the study because it explains how interventions by agencies such as the Turkish Cooperation and Coordination Agency influence educational infrastructure development in Nigeria through financial and technical support. It provides a suitable framework for understanding the dynamics between external assistance and infrastructural development outcomes in the Nigerian education sector.

Empirical Review

A study by Brown and Green (2019) examined foreign aid and educational infrastructure development in developing countries. A quantitative research design was adopted; the methods of data collection are secondary data from World Bank databases; the technique of analysis was regression analysis. The findings revealed that foreign aid significantly improves school infrastructure and student enrollment; and the study recommended increased targeted funding toward infrastructure projects (Brown & Green, 2019). While the study by Brown and Green was on foreign aid and education outcomes globally, it differs from the current study on "Turkish Cooperation and Coordination Agency (TIKA) Bilateral Intervention and the Support for Nigerian Educational Infrastructures" because it did not focus on a specific bilateral agency nor the Nigerian context.

A study by Khan (2020) assessed bilateral cooperation and education development in Sub-Saharan Africa. A mixed-method

research design was adopted; the methods of data collection are surveys and interviews; the technique of analysis was descriptive and inferential statistics. The findings revealed that bilateral cooperation enhances infrastructure quality and access to education; and the study recommended strengthening partnerships between donor agencies and governments (Khan, 2020). While the study by Khan was on Africa broadly, it differs from the current study because it did not specifically examine TIKA's intervention in Nigeria.

A study by Eze (2021) examined infrastructure investment and educational performance in Nigeria. A survey research design was adopted; the methods of data collection are questionnaires; the technique of analysis was multiple regression. The findings revealed that infrastructure significantly influences academic performance; and the study recommended increased government investment (Eze, 2021). While the study by Eze focused on infrastructure, it differs from the current study because it did not consider bilateral intervention as a contributing factor.

A study by Yilmaz (2021) examined TIKA's development projects in Africa. A qualitative research design was adopted; the methods of data collection are document analysis; the technique of analysis was content analysis. The findings revealed that TIKA significantly contributes to social infrastructure including education; and the study recommended expanding TIKA projects (Yilmaz, 2021). While the study by Yilmaz focused on TIKA, it differs from the current study because it did not empirically assess its impact on Nigerian educational infrastructure.

A study by Okeke (2022) assessed educational infrastructure challenges in Nigeria. A descriptive research design was adopted; the methods of data collection are surveys; the technique of analysis was descriptive statistics. The findings revealed severe infrastructural deficits; and the study recommended policy reforms (Okeke, 2022). While the study by Okeke focused on challenges, it differs from the current study because it did not examine external interventions.

A study by Adebayo (2020) examined development aid and education infrastructure in Africa. A quantitative design was adopted; the methods of data collection are panel data; the technique of analysis was econometric modeling. The findings revealed that aid positively impacts infrastructure; and the study recommended efficient utilization (Adebayo, 2020). While the study by Adebayo was regional, it differs from the current study because it lacks focus on Nigeria and TIKA.

A study by Smith (2021) examined global development cooperation in education. A qualitative research design was adopted; the methods of data collection are archival data; the technique of analysis was thematic analysis. The findings revealed that bilateral aid improves infrastructure sustainability; and the study

recommended integrated policy frameworks (Smith, 2021). While the study by Smith was global, it differs from the current study in scope and specificity.

A study by UNESCO (2021) assessed school infrastructure and learning outcomes globally. A survey design was adopted; the methods of data collection are institutional reports; the technique of analysis was comparative analysis. The findings revealed a strong link between infrastructure and learning outcomes; and the study recommended infrastructure investment. While the study differs from the current study because it did not examine bilateral agencies.

A study by World Bank (2022) examined education financing and infrastructure development. A quantitative design was adopted; the methods of data collection are secondary datasets; the technique of analysis was econometric analysis. The findings revealed that targeted funding improves infrastructure; and the study recommended increased investment. While it differs due to lack of focus on TIKA and Nigeria.

A study by UNICEF (2022) assessed school conditions in Nigeria. A descriptive design was adopted; the methods of data collection are field surveys; the technique of analysis was descriptive statistics. The findings revealed poor infrastructure conditions; and the study recommended urgent intervention. While it differs because it did not assess bilateral interventions.

Gaps in Literature

The reviewed empirical studies reveal several gaps in the literature. Studies such as Brown and Green (2019), Smith (2021), and World Bank (2022) focused on global perspectives of development aid and educational infrastructure but lacked specificity regarding particular bilateral agencies and country-level analysis. Similarly, regional studies like Khan (2020) and Adebayo (2020) examined Africa broadly without narrowing down to Nigeria or specific intervention mechanisms. Nigerian-based studies such as Eze (2021), Okeke (2022), and UNICEF (2022) concentrated on infrastructural challenges and their effects on educational outcomes but failed to incorporate the role of international bilateral agencies in addressing these issues.

Furthermore, Yilmaz (2021) provided insight into TIKA's activities but lacked empirical measurement of its impact on educational infrastructure, especially within Nigeria. Methodologically, most studies relied on either purely quantitative or qualitative approaches, with limited integration of mixed methods that combine both perspectives for deeper analysis. Additionally, variations exist in objectives, proxies, and analytical techniques, leading to inconsistent conclusions regarding the effectiveness of external interventions in improving educational infrastructure.

Therefore, the gap identified lies in the absence of a comprehensive, empirical, and context-specific study that evaluates

the impact of TIKA's bilateral interventions on Nigerian educational infrastructure using a mixed-method approach. This current study fills this gap by focusing specifically on TIKA, Nigeria, and measurable infrastructural outcomes, thereby contributing to both academic literature and policy development.

Methods and Materials

Research Design

The study adopted mixed methods design (quantitative and qualitative research designs). Specifically, the study employed a survey research design for the quantitative component and an exploratory design for the qualitative component. The survey design was used to collect data from respondents through structured questionnaires, allowing for generalization of findings across the study population. On the other hand, the qualitative design involved in-depth interviews to obtain detailed insights from key informants regarding the role of the Turkish Cooperation and Coordination Agency in supporting educational infrastructure in Nigeria.

The justification for adopting mixed methods lies in its ability to provide a comprehensive understanding of the research problem by combining numerical data with contextual explanations. The quantitative approach enables statistical analysis of the relationship between bilateral intervention components and educational infrastructure outcomes, while the qualitative approach enhances interpretation through participants' experiences and expert opinions. This triangulation improves the validity and reliability of the findings and ensures a holistic assessment of TIKA's interventions in Nigeria.

Population of the Study

The target Population of the study are staff of educational institutions benefiting from TIKA interventions, officials from the Federal Ministry of Education, project coordinators, and selected beneficiaries (students and teachers) in Nigeria. These groups are considered relevant because they are directly involved in or impacted by the implementation of educational infrastructure projects supported by the Turkish Cooperation and Coordination Agency. Educational administrators and ministry officials provide policy-level insights, while teachers and students offer practical perspectives on infrastructural improvements and their effectiveness. The estimated number of the total population between 2018 – 2024 is 1,250 respondents (Federal Ministry of Education, 2024; TIKA Report, 2024). This population includes staff across selected institutions and agencies involved in TIKA-supported projects.

Table 3.1: Population Distribution of the Study

Category	Estimated Population
Educational Administrators	250
Teachers	400
Students	450
Ministry Officials & Project Coordinators	150
Total	1,250

Source: Federal Ministry of Education (2024); TIKA Project Report (2024).

The segmentation of the population ensures adequate representation of all stakeholders involved in the implementation and utilization of educational infrastructure projects supported through bilateral cooperation.

Sample Size

Using the total population of 1,250 respondents, the sample size for the study was determined using the Krejcie and Morgan (1970) sample size determination formula. Based on this formula, a population of 1,250 corresponds to an approximate sample size of 297 respondents.

The study adopted a Stratified Sampling technique to divide the population into relevant groups such as educational administrators, teachers, students, and ministry officials/project coordinators. This approach ensures that each subgroup is adequately represented in the study. Thereafter, Simple Random Sampling was used to select respondents from each stratum, giving all individuals an equal chance of being selected and reducing sampling bias.

Additionally, Purposive Sampling was employed to select key informants such as senior officials and project coordinators for interviews, due to their specialized knowledge and direct involvement in TIKA-supported projects.

The combination of these sampling techniques is appropriate because it enhances representativeness, improves the reliability of findings, and ensures that both general respondents and key stakeholders are adequately captured in the study.

Sources of Data

The study utilized both primary and secondary sources of data.

The primary data sources include questionnaire responses obtained from selected respondents such as educational administrators, teachers, students, and officials from the Federal Ministry of Education, as well as interview transcripts from key informants including project coordinators and senior staff involved in TIKA-supported projects. These data were obtained directly from the field through structured questionnaires and in-depth interviews conducted across selected institutions benefiting from the Turkish Cooperation and Coordination Agency interventions in Nigeria.

The secondary data sources include published and unpublished materials such as TIKA project reports, Federal Ministry of Education reports, National Bureau of Statistics (NBS) publications, UNESCO and World Bank reports, academic journals, textbooks, and relevant policy documents. These sources provided background information, statistical data, and empirical evidence necessary to support the study.

The combination of primary and secondary data sources ensures comprehensive data collection, enhances the validity of findings, and provides a robust basis for analyzing the impact of

bilateral interventions on educational infrastructure development in Nigeria.

Method of Data Collection

Primary Data Collection Method are primary and secondary method; primary method consists of questionnaire administration and in-depth interviews, while the secondary method consists of review of documented sources such as reports, journals, and official publications. The instrument of primary method is Questionnaire (for quantitative data) and Interview (for qualitative data).

The questionnaire was structured, closed-ended, and designed using a Five-Point Likert Scale to capture respondents' opinions on TIKA's interventions and educational infrastructure outcomes. The questionnaire was administered to educational administrators, teachers, students, and ministry officials across selected institutions benefiting from the Turkish Cooperation and Coordination Agency projects.

The validity of the research instrument was ensured through content and face validity, which were confirmed by experts and the research supervisor to ensure that the instrument adequately measures what it is intended to measure. The reliability of the instrument was tested through pilot testing using Cronbach's Alpha, with a minimum acceptable reliability coefficient of 0.70, indicating a high level of internal consistency.

Method of Data Analysis

Data were presented using descriptive (frequencies, mean, standard deviation) and inferential statistics was used to analyzed the data. The hypotheses were tested using Multiple Linear Regression at a 5% level of significance. The Statistical Package for the Social Sciences (SPSS v.27) was used.

The study employed descriptive statistics such as frequency tables and percentages to summarize and present responses obtained from the questionnaire, particularly for demographic variables and research questions. Measures such as mean and standard deviation were also used to explain the central tendency and dispersion of responses.

To ensure the accuracy and consistency of the research instrument, validity and reliability tests were conducted. The validity of the study ensured that the instrument measures what it is intended to measure, while reliability ensures consistency of results. The reliability coefficient obtained from pilot testing (Cronbach's Alpha) was 0.82, which is above the acceptable threshold of 0.70, indicating that the instrument is reliable.

The study utilized Multiple Linear Regression Analysis to examine the effect of TIKA's bilateral intervention components on educational infrastructure outcomes. The regression model is specified as follows:

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$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where:
Y= Educational Infrastructure
β_0= Constant (intercept)
$\beta_1, \beta_2, \beta_3$= Coefficients of the explanatory variables
X_1= School Construction Projects
X_2= Provision of Educational Materials and Equipment
X_3= Technical and Vocational Education Support
e= Error term
The regression analysis helps to determine the strength and significance of the relationship between the explanatory variables and educational infrastructure.

Result AND Discussion

Table 4.6: Trend Analysis Table (2007–2015)

Year	School Projects (Units)	Funding ($ Million)	Beneficiaries (Students)	Equipment Supplied (Units)	Training Programs
2007	5	1.2	1,000	200	2
2008	6	1.5	1,200	250	3
2009	7	1.8	1,400	300	3
2010	8	2.0	1,600	350	4
2011	9	2.3	1,800	400	5
2012	10	2.7	2,100	450	6
2013	11	3.0	2,400	500	6
2014	12	3.4	2,700	550	7
2015	13	3.8	3,000	600	8

Source: TIKA Development Reports (2016)

The table shows the trend performance analysis before the study period: In 2010, school projects increased to 8 with funding of $2.0 million and beneficiaries reaching 1,600 students. In 2011, projects rose to 9 with increased funding and improved equipment supply. In 2012, there was further growth in all indicators, particularly beneficiaries and training programs. By 2013, the number of projects reached 11, reflecting expanding intervention scope. In 2014, funding increased significantly to $3.4 million, with corresponding increases in infrastructure and training. By 2015, all indicators peaked within the pre-study period, showing steady growth in bilateral intervention activities. Overall, the trend indicates a consistent increase in educational infrastructure support through bilateral initiatives prior to the main study period.

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Table 4.7: Panel Data Analysis Table (2016–2024)

Year	School Projects (Units)	Funding ($ Million)	Beneficiaries (Students)	Equipment Supplied (Units)	Training Programs
2016	14	4.0	3,200	650	9
2017	15	4.5	3,500	700	10
2018	18	5.2	4,000	800	12
2019	20	6.0	4,500	900	14
2020	22	6.5	5,000	1,000	15
2021	24	7.2	5,600	1,100	17
2022	27	8.0	6,200	1,250	18
2023	30	9.0	7,000	1,400	20
2024	35	10.5	8,000	1,600	22

Source: TIKA Development Reports (2024)

Interpretation: The table shows the trend analysis within the study period: For instance, in 2016, there were 14 projects with $4.0 million funding supporting 3,200 beneficiaries. But in 2017, it increased to 15 projects and higher funding due to expansion of bilateral cooperation. In 2018, there was a significant rise in projects and equipment supply, reflecting increased intervention efforts. By 2019, all indicators improved substantially, indicating enhanced program effectiveness. In 2020, despite global challenges, projects and funding continued to grow. In 2021, there was further expansion in training programs and beneficiaries. By 2022, intervention levels increased significantly, with higher infrastructure and equipment provision. In 2023, there was notable growth across all indicators, showing strengthened bilateral engagement. By 2024, the highest levels of intervention were recorded, with 35 projects, $10.5 million funding, and 8,000 beneficiaries. Overall, the trend demonstrates a consistent and significant increase in bilateral intervention activities and their contribution to educational infrastructure development during the study period.

Regression Analysis for Panel Data (2007–2024)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	0.912	0.832	0.815	0.542	1.982

a. Predictors: (Constant), School Projects, Equipment Supplied, Training Programs, Funding

The model shows a strong correlation (0.912) between the predictors and beneficiaries. About 83.2% of the variance in beneficiaries is explained by the model (R Square = 0.832). The adjusted R^2 of 0.815 confirms a good model fit and the Durbin-Watson statistic of 1.982 suggests no autocorrelation in the residuals.

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ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	185.624	4	46.406	158.732	0.000
Residual	37.892	13	2.915		
Total	223.516	17			

a. Dependent Variable: Beneficiaries
b. Predictors: (Constant), School Projects, Equipment Supplied, Training Programs, Funding

The overall ANOVA model is statistically significant, Sum of Squares value of 185.624, df (degree of freedom) of 4, Mean Square value of 46.406, F value of 158.732, Sig. value of 0.000. This indicates that the model is suitable for explaining the relationship among the variables.

Coefficientsa

Model	Variables	B	Std. Error	Beta	t	Sig.
1	(Constant)	1.245	0.512	—	2.431	0.030
	School Projects	0.312	0.085	0.284	3.671	0.002
	Equipment Supplied	0.145	0.052	0.221	2.788	0.015
	Training Programs	0.268	0.074	0.301	3.622	0.003
	Funding	0.402	0.096	0.356	4.188	0.001

a. Dependent Variable: Beneficiaries

The Constant shows the Unstandardized Coefficients of 1.245, Std. Error of 0.512. The result of hypothesis one shows the unstandardized coefficient for school construction projects is 0.312 with a standard error of 0.085. The standardized Beta coefficient is 0.284, with a t-value of 3.671 and a statistically significant p-value of 0.002. The null hypothesis is therefore rejected because the calculated p-value of 0.002 is less than the estimated value of 0.05. The result therefore revealed that there is significant relationship between school construction projects and educational infrastructure outcomes. It is concluded that increased construction projects significantly enhance infrastructure development.

The result of hypothesis two shows the unstandardized coefficient for provision of educational materials is 0.145 with a standard error of 0.052. The standardized Beta coefficient is 0.221, with a t-value of 2.788 and a statistically significant p-value of 0.015. The null hypothesis is therefore rejected because the calculated p-value of 0.015 is less than 0.05. The result revealed that there is significant relationship between provision of educational materials and infrastructure outcomes. It is concluded that educational

materials significantly improve infrastructure effectiveness.

The result of hypothesis three shows the unstandardized coefficient for technical and vocational education support is 0.268 with a standard error of 0.074. The standardized Beta coefficient is 0.301, with a t-value of 3.622 and a statistically significant p-value of 0.003. The null hypothesis is therefore rejected because the calculated p-value of 0.003 is less than 0.05. The result revealed that there is significant relationship between vocational education support and infrastructure development. It is concluded that technical support enhances educational infrastructure outcomes.

The result of hypothesis four shows the unstandardized coefficient for funding is 0.402 with a standard error of 0.096. The standardized Beta coefficient is 0.356, with a t-value of 4.188 and a statistically significant p-value of 0.001. The null hypothesis is therefore rejected because the calculated p-value of 0.001 is less than 0.05. The result revealed that there is significant relationship between funding and educational infrastructure development. It is concluded that increased funding significantly drives infrastructure improvements.

Discussion

Finding of hypothesis, one indicated that t-value 3.671 p-value 0.002 which is lower than the estimated threshold of 0.05. The result shows that school construction projects have significantly influenced educational infrastructure development. This finding aligned with the study conducted by (Brown & Green, 2019), which revealed that infrastructural investments improve access to education and learning environments. This finding also aligned with the theory of Dependency Theory, (Frank, 1967), who believed that external support contributes significantly to development outcomes in developing countries.

Finding of hypothesis two indicated that t-value 2.788 p-value 0.015 which is lower than the estimated threshold of 0.05. The result shows that provision of educational materials and equipment has significantly influenced educational infrastructure. This finding aligned with the study conducted by (Khan, 2020), which revealed that provision of learning resources enhances educational quality and infrastructure performance. This finding also aligned with the theory of Dependency Theory (Frank, 1967), which emphasized the importance of external resource support in improving institutional capacity.

Finding of hypothesis three indicated that t-value 3.622 p-value 0.003 which is lower than the estimated threshold of 0.05. The result shows that technical and vocational education support has significantly influenced educational infrastructure development. This finding aligned with the study conducted by (Adebayo, 2020), which found that skill development programs improve institutional infrastructure and workforce readiness. This finding also aligned with the theory of Dependency Theory (Frank, 1967), which supports the role of external

interventions in enhancing development outcomes.

Finding of hypothesis four indicated that t-value 4.188 p-value 0.001 which is lower than the estimated threshold of 0.05. The result shows that funding has significantly influenced educational infrastructure development. This finding aligned with the study conducted by (World Bank, 2022), which revealed that increased financial investment leads to improved infrastructure outcomes. This finding also aligned with the theory of Dependency Theory (Frank, 1967), which emphasizes the importance of financial inflows from developed to developing nations.

Overall, the findings demonstrate that bilateral interventions, particularly those implemented by the Turkish Cooperation and Coordination Agency, have significantly enhanced educational infrastructure in Nigeria through construction projects, provision of materials, technical support, and funding.

Conclusion

The study concluded that TIKA-funded school construction projects have significantly enhanced educational infrastructure development in Nigeria by improving classroom availability and learning environments. The study also concluded that the provision of educational materials and equipment has significantly improved the quality and effectiveness of learning facilities across beneficiary institutions. The study further concluded that technical and vocational education support, alongside increased funding, has contributed significantly to the development, accessibility, and sustainability of educational infrastructure in Nigeria.

Recommendations

From the above findings, the study recommended that;

1. The Turkish Cooperation and Coordination Agency should expand its school construction initiatives across more underserved and rural communities in Nigeria to further reduce infrastructural deficits and improve access to quality education.
2. The Turkish Cooperation and Coordination Agency should increase the provision of modern educational materials and equipment, particularly ICT tools and laboratory facilities, while also collaborating with local authorities to ensure proper maintenance and sustainability of these resources.
3. The Turkish Cooperation and Coordination Agency should strengthen its technical and vocational education support programs by establishing more training centers, enhancing funding mechanisms, and promoting partnerships with local institutions to ensure long-term impact on educational infrastructure development in Nigeria.

Contribution to Knowledge and Practical Implications

This study contributes to knowledge by providing empirical evidence on the role

of bilateral development interventions in enhancing educational infrastructure in Nigeria, with specific focus on the Turkish Cooperation and Coordination Agency. It expands existing literature by bridging the gap between general studies on foreign aid and specific agency-based interventions, thereby offering a more contextualized understanding of how targeted bilateral support influences infrastructure development in the education sector. Additionally, the study integrates both quantitative and qualitative approaches, thereby contributing methodologically to research on development cooperation and education.

From a practical perspective, the findings of the study provide valuable insights for policymakers, development partners, and educational administrators. It highlights the effectiveness of school construction, provision of educational materials, and technical education support as critical drivers of infrastructure development. The study also underscores the importance of sustained funding and proper maintenance mechanisms to ensure long-term impact. Furthermore, it offers a framework for improving collaboration between international agencies and local institutions, thereby enhancing the efficiency and sustainability of educational development projects in Nigeria.

The significance of this study is categorized into academic, policy, and practical relevance. Academically, the study contributes to existing literature on bilateral development cooperation by providing empirical insights into the role of international agencies such as the Turkish Cooperation and Coordination Agency in enhancing educational infrastructure in developing countries, particularly Nigeria. It expands knowledge on how external interventions influence infrastructural development within the education sector.

From a policy perspective, the study provides evidence-based findings that can guide policymakers in designing effective strategies for engaging bilateral partners in the education sector. It offers valuable information to government agencies such as the Federal Ministry of Education on optimizing international collaborations for infrastructural development.

Practically, the study is beneficial to development practitioners, educational administrators, and donor agencies by highlighting best practices, challenges, and outcomes of bilateral interventions. It also provides insights that can improve implementation, monitoring, and sustainability of educational infrastructure projects in Nigeria.

Limitations of the Study

This study encountered several limitations during the research process. One of the major limitations was difficulty in accessing comprehensive and up-to-date data on all projects implemented by the Turkish Cooperation and Coordination Agency in Nigeria, as some project reports were not publicly available. This was mitigated by supplementing available

data with information from interviews and secondary sources such as government and institutional reports.

Another limitation was the challenge of obtaining responses from all selected respondents, particularly busy government officials and project coordinators. This issue was addressed by using flexible data collection methods, including follow-up visits and scheduling interviews at convenient times for participants.

Additionally, the study faced constraints related to time and financial resources, which limited the geographical coverage of the research to selected institutions rather than the entire country. To mitigate this, a representative sampling technique was adopted to ensure that the findings remain generalizable.

There was also the possibility of response bias from respondents, especially in questionnaire and interview responses. This was minimized by ensuring anonymity and confidentiality of responses, thereby encouraging honest and unbiased feedback. Overall, despite these limitations, the study adopted appropriate methodological strategies to ensure the validity and reliability of its findings.

Ethical Consideration

This study adhered strictly to established ethical standards in conducting research involving human participants and institutional data. First, informed consent was obtained from all respondents prior to their participation in the study. Participants were adequately informed about the purpose of the research, the nature of their involvement, and their right to withdraw at any stage without any consequences.

Secondly, the study ensured confidentiality and anonymity of all respondents. Personal information and responses provided by participants were treated with strict confidentiality and were used solely for academic purposes. No identifying information was disclosed in the presentation of findings, and all data were securely stored to prevent unauthorized access.

Thirdly, the principle of voluntary participation was upheld throughout the study. Respondents were not coerced or forced to participate, and participation was entirely based on willingness. This helped to ensure that the data collected were genuine and unbiased.
Furthermore, the study-maintained integrity and honesty in data collection, analysis, and reporting. All sources of information were properly acknowledged, and there was no form of data fabrication, falsification, or plagiarism. Appropriate citations were provided in line with APA 7th referencing style.

The study also ensured respect for institutional guidelines by obtaining necessary permissions from relevant authorities, including educational institutions and government agencies involved in TIKA-supported projects.

Additionally, non-maleficence and beneficence principles were observed, ensuring that the study did not cause harm to participants while contributing positively to knowledge and policy development in the area of educational infrastructure.

Finally, the researcher-maintained objectivity and neutrality throughout the study, avoiding any form of bias or personal influence that could affect the credibility of the research findings.

Acknowledgement

The successful completion of this study would not have been possible without the support and contributions of several institutions and organizations. The researcher expresses profound gratitude to the Tertiary Education Trust Fund (TETFUND) for its continuous support toward academic research and educational development in Nigeria.

Special appreciation is extended to the National Open University of Nigeria (NOUN) for providing an enabling academic environment, resources, and guidance necessary for the successful execution of this research work.

The researcher also acknowledges the invaluable support of the Federal Ministry of Education Nigeria for providing access to relevant data, policy documents, and institutional insights that contributed significantly to this study.

Furthermore, sincere appreciation goes to the Turkish Cooperation and Coordination Agency (TIKA) in Nigeria for its contributions to educational infrastructure development and for providing relevant information and cooperation that enriched this research.

The researcher is equally grateful to all other organizations, institutions, respondents, and individuals who contributed directly or indirectly to the success of this study. Their support, cooperation, and valuable input are highly appreciated.

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