Effects of Public- Private Participation in Infrastructure of Electricity Sector on The Electricity Access in Sub Saharan Africa for The Period 2000-2021

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A R T I C L E   I N F O

A B S T R A C T

investigate the geographic & sectorial disruption of private participation in infrastructure electricity projects in Sub Saharan with measuring the impact of private participation in infrastructure electricity projects on Access to electricity (% of population) same region for period 2000-2021. using model are to measure the effect Private participation in infrastructure of electricity sector on Access to electricity(% of population) and in Sub Saharan Africa countries for period 2000-2021 achieving of electricity sector is 55% from total because representing main of development process .also resulted appositive and significant between Access to electricity is the percentage of population (ACE) with Private Participate infrastructure project in electricity on sub-Saharan Africa-(PPIE), and (GDP, Total population, foreign direct investment).recommend necessity participation and integration of sub-Saharan African countries together in partnership on Private Participate infrastructure project in the electricity sector to joint infrastructure projects strengthens the process of common development. Emphasis on provision of facilities and guarantees for the private sector to access in electricity sector and renewable electricity sector because of its high potential for investment also with an attempt to overcome obstacles by providing customs and tax reliefs also required an appropriate environment by strengthening the investment base to participate in projects by providing a legal structure, rules, procedures, and unifying them with economic stability

1. Introduction

The most important elements of the development process are spending on the build, operation, Rehabilitate of infrastructure in public service sectors, water, electricity, telecommunications, transport, road and information sectors, an important criterion for measuring the progress of countries. Public and private sector partnership is dominant phenomenon over the past ten years due to insufficient investment and increasing pressure on government budgets, as well concern about the inefficiency of services provided by Governmental institutions, public–private partnership (PPP) is a cooperative arrangement between two or more public and private sectors, typically of a long-term nature However, the late 20th century and early 21st century when have seen a clear trend towards governments across the globe making greater use of various PPP arrangements(Hodge, G. A and Grave, C. 2007). mainly economic infrastructure (such as telecommunications, energy, water and roads). These kind of services were mainly provided by the public sector, because require large fund, in economic terms, takes a long time before they start to give a return. The desire for better more efficient services, as well need for additional sources of funding.

Sub-Saharan Africa is, geographically, the area and regions of the continent of Africa that lies south of the Sahara. These include West Africa, East Africa, Central Africa, and Southern Africa African countries and territories that are

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situated fully in that specified region, the term may also include polities that only have part of their territory located in that region, per the definition of the United Nations (UN).1(Political definition :UN)

Objective: paper seeking to explore and investigate the following: Define the geographic & sectorial disruption of private participation in infrastructure electricity projects in Sub Saharan Africa region and popular types was used. Also measuring the impact of private participation in infrastructure electricity projects on Access to electricity (% of population) same region for period 2000-2021.

The Problem: The competitiveness imposed by globalization and international trade requires continuous improvement and measurement of the management of public services as well as of Public- Private Participation in infrastructure. Sub-Saharan African countries are among the most experienced new countries in this field, especially in the electricity sector. The research question represents what is the impact of the of Public- Private Participation in infrastructure on the electricity sector and the annual percentage of access to electricity from the total population?

The hypotheses: **First** hypothesis is there is an increase in investment in infrastructure with the of Public- Private Participation in infrastructure, concentrated in sectors characterized by fast easy and clear ways to recover their revenues. Also second hypothesis is of Public- Private Participation in infrastructure positively affects the access to electricity (%population)

Empirical analysis & Research Methodology: Analysis a model are used to measure the effect Private participation in infrastructure in Access to electricity(% of population) in Sub Saharan Africa countries for period 2000-2021 .

Data and Justification of Selection of Cases Studies Research uses the descriptive, comparative and quantitative methods of analysis and use a combination of the most suitable primary (qualitative) and secondary (quantitative) Data. The Secondary data was used for the quantitative analysis and obtained from local Institutions (e.g. World Bank data, governmental institutions reports…, Etc.).

Literature:

Study Azolibe, C. B., & Okonkwo, J. J. (2020). examine whether the state of infrastructure development in Sub-Saharan Africa actually stimulates industrial sector productivity, used panel least square estimation technique to examine the relationship between the variables. The result of the study indicates that the major factor that influences industrial sector productivity in Sub-Saharan Africa is their quantity and quality of telecommunication infrastructure. Analysis shows that the relatively low level of industrial sector productivity in Sub-Saharan Africa is largely due to their poor electricity and transport infrastructure and underutilization of water supply and sanitation infrastructure.

study of Estache and Saussier (2014) argue that the available empirical evidence confirms that PPI can lead to improvements in efficiency, but do not necessarily do so. The econometric evaluation of various types of PPI experiences indeed shows that the careful choice of control variables, the proper framing of the institutional and sectorial context and the careful avoidance of selection biases in sample choices matter to the conclusions reached by empirical tests. Based on an empirical analysis using time series data (1995-2006) in 32 countries of LACconclude that there is a positive and significant impact of private sector participation in the coverage, quality of service and labor productivity of the analyzed utilities, especially when regulation is strong. The report does not distinguish among management and lease contracts concessions, Greenfield projects, and divestitures. The terms "private participation in infrastructure" and "privatization" are used interchangeably to cover all four types of private sector participation (PSP). In this report, the author used information on 181 firms in electricity distribution, telecommunication and water distribution that went through privatization in the 1990s as well as the LAC electricity-benchmarking database (World Bank, 2008) which contains annual information of 250 private and state-owned utilities.

Study of Richaud, C. Sekkat, K. & Varoudakis, A. (1999) paper presented proofs on growth spillovers across African economies and examines the specific role of infrastructure in their transmission. The results proposed that enhance infrastructure in a given country raises the profitability of domestic and foreign investment, therefore raising investment ratios and boosting growth in per capita income. Expansion in one country raises the profitability of investment in neighboring countries, as it creates a wider market and improves opportunities for export. This, in turn, feeds back and further enhances growth in the initially expanding economy. Owing to such externalities, investment in infrastructure carried out at the national level is likely to be sub-optimal. These results suggest that external aid, aimed at financing infrastructure in Africa, might be better provided at a regional than at a national level. This would help better internalize the benefits accruing to individual countries and would lead to a better allocation of investment outlays.

Study of Saghir, J. (2017). Discussed issues affecting sustainable infrastructure development in Sub-Saharan Africa (SSA) countries including challenges, opportunities, and investment options facing SSA countries. Results Governments in SSA are not investing enough in sustainable infrastructure where there are tremendous needs.

Investment is currently at 2%-3% of GDP. Under-investment in infrastructure will have a negative impact on potential economic growth, living standards, and private sector development. At the same time, the private sector has not been able to fill the investment gap. The private sector continues to be a very important contributor to SSA infrastructure development. In addition, new modalities of private investment—especially from local and, international neighboring country investors, local currency financial intermediaries, and investment and pension funds—are emerging. In general, private sector discipline and financing have had a positive impact on infrastructure service delivery in SSA, and much more is needed to sustain economic growth.

Public-Private Partnership (PPP) can be broadly defined as a contractual agreement between the Government and a private firm targeted towards financing, designing, implementing and operating infrastructure facilities and services that were traditionally provided by the public sector. It embodies optimal risk allocation between the parties – minimizing cost while realizing project developmental objectives. Thus, the project is to be structured in such a way that the private sector gets a reasonable rate of return on its investment. (PPPC, 2019), also public–private partnership (PPP, 3P or P3) is a cooperative arrangement between two or more public and private sectors, typically of a long-term nature. Governments have used such a mix of public and private endeavors throughout history. However, the late 20th century and early 21st century[when?] have seen a clear trend towards governments across the globe making greater use of various PPP arrangements.(Hodge, G. A and Greve, C. 2007)

PPPs are best seen as a special kind of contract involved in infrastructure provision, such as the building and equipping of schools, hospitals, transport systems, water and sewerage systems .(Bovaird, Tony.2015)

Although concession contracts have been used for many centuries, notably in Europe, the first reference to the term "Public-Private Partnership" dates from the 1950s in the United States and was originally applied to joint ventures between the public sector and not-forprofit organizations in educational and urban renewal programs ,The term PPP found wider application in 1997 under the new Labor government in the UK ,also Other terms are being used internationally to represent the partnership between the public and private sectors embodied in the PPP approach. Related terms include: (PPIAF,2009)

• Private Participation in Infrastructure (PPI), used by the World Bank (data base) and within the development-financing sector; also adopted for the South Korean PPI program.

• Private-Sector Participation (PSP), also used within the development-financing sector.

• P3, used in North America.

• Privately-Financed Projects (PFP), used in Australia.

• P-P Partnership (to avoid confusion with the term "purchasing power parity", a method of comparing currency exchange rates, and also referred to as(PPP).

  • Private Finance Initiative (PFI), originating in UK but now also used in Japan and Malaysia.

1. Types of public-private partnership:

There are several different types of public-private partnership contracts (often known as PPPs and P3s), or in the UK, Private Finance Initiative, or PFIs) depending on the type of project (for example, a road or a prison), level of risk transfer, investment level and the desired outcome:.(SWG,2019)

• **Build – Operate – Transfer (BOT)** :A BOT model is generally used to develop a discrete asset rather than a whole network, for example a toll road. This simple structure provides the most freedom for the private sector partner during construction and the public sector bears the equity risk.

• **Build – Own – Operate (BOO)**: This is a similar structure to BOOT (below), but the facility is not transferred to the public sector partner. A BOO transaction may qualify for tax exempt status and is often used for water treatment or power plants.

• **Build – Own – Operate – Transfer (BOOT)** : The private sector builds and owns the facility for the duration of the contract, with the primary goal of recouping construction costs (and more) during the operational phase. At the end of the contract the facility is handed back to the government. This structure is suitable when the government has a large infrastructure financing gap as the equity and commercial risk stays with the private sector for the length of the contract. This model is often used for school and hospital contracts.

• **Design – Build**: The contract is awarded to a private partner to both design and build a facility or a piece of infrastructure that delivers the performance specification in the PPP contract. This type of partnership can reduce time, save money, provide stronger guarantees (as the work is with a single entity rather than a consortium) and allocate additional project risk to the private sector

• **Design – Build – Finance**: The private sector constructs an asset and finances the capital cost during the construction period only.

• **Design – Build – Finance – Operate (DBFO)**

• **Design – Build – Finance – Maintain (DBFM)**

• **Design – Build – Finance – Maintain – Operate (DBMFO)** : Similar to BOOT, DBFO (and its variations) is more used in the UK for PFI (Private Finance Initiative) projects. The private sector designs, builds, finances, operates an asset, then leases it back to the government, typically over a 25 – 30 year period. Public sector long-term risk is reduced and the regular payments make it an attractive option to the private sector.

• **Design – Construct – Maintain – Finance (DCMF)**: Design, Construct, Maintain and Finance is very similar to DBFM. The private entity creates the facility based on specifications from the government body and leases it back to them. This is generally the convention for PPP prison projects.

• **O & M (Operation & Maintenance)** : In an O&M contract, a private operator operates and maintains the asset for the public partner, usually to an agreed level with specified obligations. The work is often sub-contracted to specialist maintenance companies. The payment for this contract is either via a fixed fee, where a lump sum is given to the private partner, or more commonly a performance-based fee. In this situation, performance is incentivized using a pain share / gain share mechanism, which rewards the private partner for over-performance (according to the agreed SLAs) or induces a penalty payment for work which has fallen short.
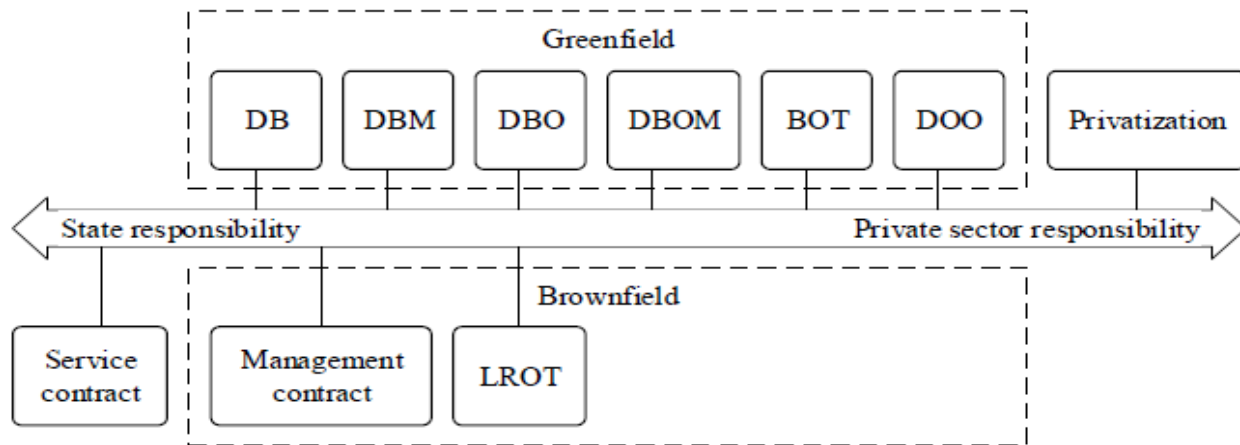

Figure 1. Models of interaction in the framework of public–private partnership (PPP).

The most important advantages of PPP projects for the state are (Valdimarsson,2007):
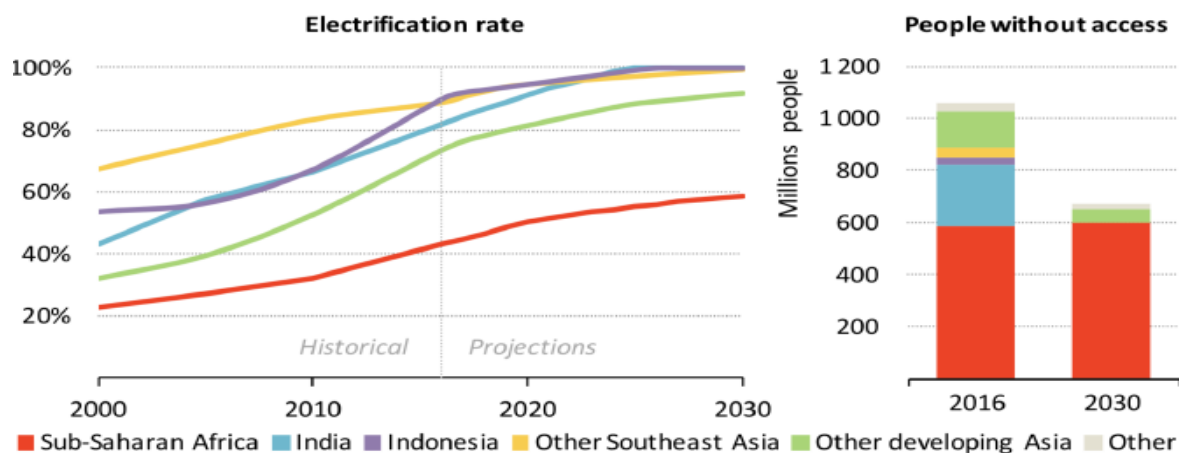
Table 1: Advantages and risks of PPP

Advantages	Risks
Possibility for smaller investments	Limited influence of public authority over the investment
Possibility for conducting other public investments	Increase of the prices charged to the users of the infrastructure
Savings to the budget	Reduction of bargaining position of public authorities
Transfer of new technologies	High transaction costs
Sharing the risk	Poorer quality of the services
More competition on market	Limited accessibility to services
More competition on market	Decrease of employment in the public sector
Guarantee of the services for a longer term	Financial risk for public partner
Decrease of the political influence in economy	Opportunity risk for public partner
More transparency in the economy	Political risk for private partner
Possibility for smaller investments	Limited influence of public authority over the investment
Possibility for conducting other public investments	Increase of the prices charged to the users of the infrastructure
Savings to the budget	Reduction of bargaining position of public authorities

Source: Brzozowska, 2006, p. 24

Access to electricity (% of population) - Sub-Saharan Africa: Access to electricity is the percentage of population with access to electricity. Electrification data are collected from industry, national surveys and international sources.

Electricity Access by region

Electrification rate

People without access

■ Sub-Saharan Africa ■ India ■ Indonesia ■ Other Southeast Asia ■ Other developing Asia ■ Other

✓ China achieved universal electricity access in 2015.
✓ In India, half a billion people gained access to electricity since 2000.
✓ In Sub-Saharan Africa, **48% of the population have access to electricity as of 2019.**
✓ By 2030, **nine-out-of-ten people without access will be in Sub-Saharan Africa.**
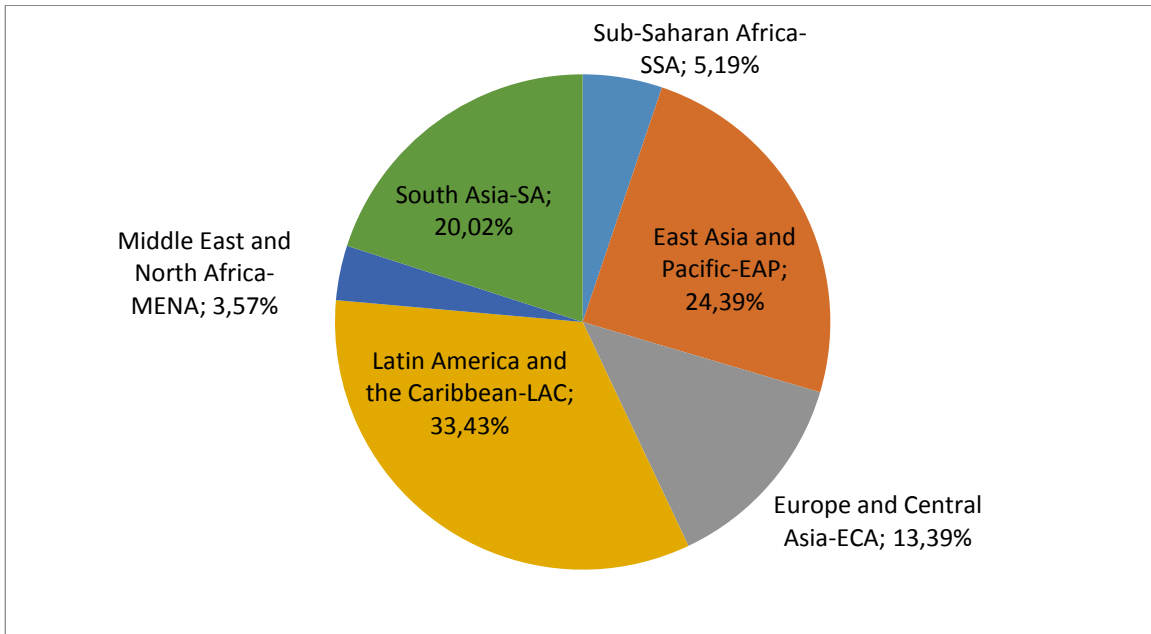
Source: WEO 2017, Special Report on Energy Access, IEA

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Investment of Private Participation in Infrastructure (PPI) on Electricity sector by reign in the world 2021:
Table 2 Total Investment of Private Participation in Infrastructure (PPI) on Electricity sector by reign in the world 2021(billion U.S Dollar)

Reign	Total investment	% Total
Sub-Saharan Africa-SSA	**50.685**	5.19%
East Asia and Pacific-EAP	**238.12**	24.39%
Europe and Central Asia-ECA	**130.69**	13.39%
Latin America and the Caribbean-LAC	**326.29**	33.43%
Middle East and North Africa-MENA	**34.875**	3.57%
South Asia-SA	**195.43**	20.02%
Total	**976.088**	

Source: visualization: PPI.worldbank.org

Figure 1 Total Investment of Private Participation in Infrastructure (PPI) on Electricity sector by reign in the world 2021(billion U.S Dollar)
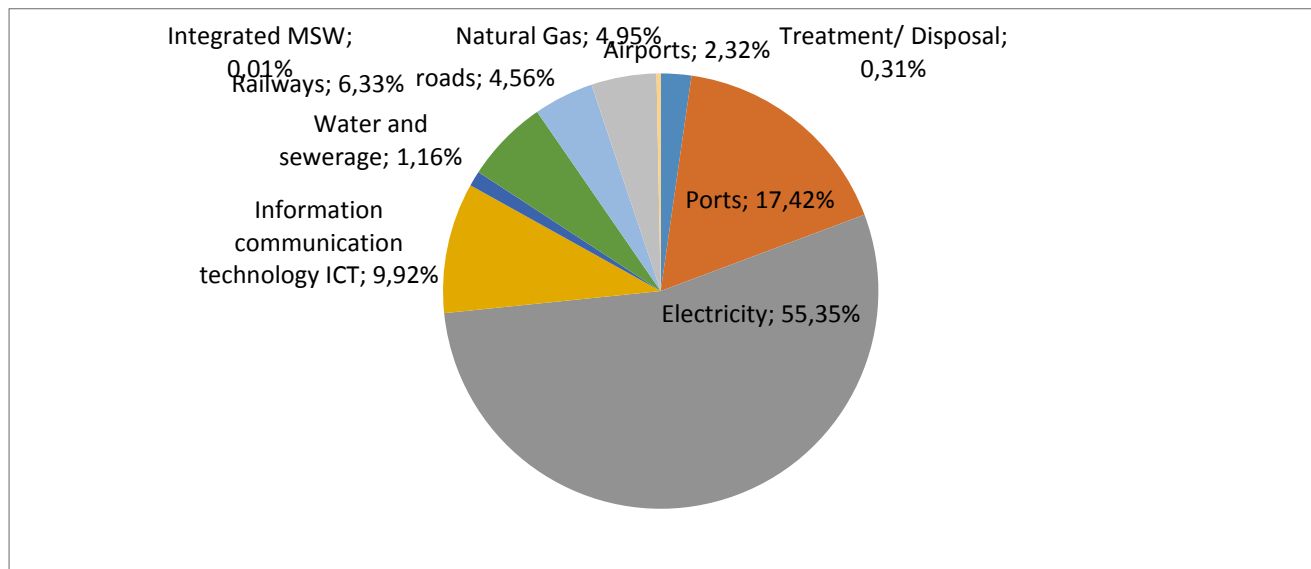
Source: visualization: PPI.worldbank.org

From previous table and figure show the total amount Total Investment of Private Participation in Infrastructure (PPI) on Electricity sector by reign 2021, which is total amount 976.088 billion dollars, the biggest area on electricity investment its Latin America and the Caribbean by 326.29 billion dollars which is 33.4% from total investment. second area its East Asia and Pacific by **238.12** billion dollars which is 24.3%, also South Asia by **195.43** billion dollars which is 20%, Europe and Central Asia by **130.69** billion dollars which is 13.3% ,and finely Sub-Saharan Africa **50.685** billion dollars which is 5.19% .

Table 3 Sectorial Investment of Private Participation in Infrastructure (PPI) on Electricity on Sub-Saharan Africa:(U.S dollar)

Reign	amount	%total
Airports	**2,120,000,000.0**	**2.32%**
Ports	**15,950,000,000.0**	**17.42%**
Electricity	**50,685,000,000.0**	**55.35%**
Information communication technology ICT	**9,083,000,000.0**	**9.92%**
Water and sewerage	**1,064,000,000.0**	**1.16%**
Railways	**5,795,000,000.0**	**6.33%**
roads	**4,173,000,000.0**	**4.56%**
Integrated MSW	**7,000,000.0**	**0.01%**
Natural Gas	**4,533,000,000.0**	**4.95%**
Treatment/ Disposal	**284,596,000.0**	**0.31%**
TOTAL	**93,694,596,000.0**	

Source: visualization: PPI.worldbank.org

Figure 2 Sectorial Investment of Private Participation in Infrastructure (PPI) on Electricity on Sub-Saharan Africa

- **Electricity Sector:**. It is the largest sector that has been invested by 50.950 billion dollar represents 55.3% of total investment. Because sector characteristic clarity of recover the costs and revenue also development progress need at first energy dependent on electricity to increasing any production process.
- **Ports sector:** The second highest sector was invested with the participation of the private sector with 15.9 billion dollars, representing 17.4% of the total investments. This is due to important sectors on development its always plays a strong role on interaction with other countries.

Information communication technology ICT: The third highest sector was invested with 9.08 billion dollars, representing 9.9% of the total investments.
- **Railway Sector::** invested with 5.79 billion dollars, representing 6.3% of the total investments
 Natural gas sector: worth to 4.5 billion, represent of 4.9% of total investments.
- **Roads sector:** Investment reached to 4.1 billion dollars, represent of 4.5% of total investments.
- **Airport sector:** reached to 2.1 billion dollars, represent of 2.3% of total investments.
- **Water and Sanitation Sector:** Investment reached to 1.06 billion dollars, represent o 1.16% of total investments.
- **Treatment/ Disposal Sector::** invested with 284 million dollars, representing 0.31% of the total investments
- **Integrated MSW Sector::** invested with 7 million dollars, representing 0.01% of the total investments.

Determining Variables of the model: - The researcher used to determine the variables of the standard model on several sources(Tariq Al-Rasheed and Samia,p5-2010): The study is based on the measurement of Public- Private Participation in infrastructure on Access to electricity sectore in Sub-Saharan Africa for the period 2000-2021. Therefore, the dependent variable in this study represents Access to electricity is the percentage of population, the independent variable: Private Participation in Infrastructure project on electricity in Sub-Saharan Africa, GDP, FDI, POP all data collected from world bank and IMF The researcher relied on the method of experimentation and dissemination. As follows:

Table 4 Access to electricity of Private Participation in Infrastructure on electricity, GDP, population, Forging direct investment (PPI) on Electricity on Sub-Saharan Africa 200-2021:

year	Access to electricity is the % of population	Million	Million USD		
	ACE	POP	GDP	PPI	FDI
2000	25.6	671.0	423,073	2,469	15,429
2001	26.1	689.0	404,717	3,127	10,872
2002	27.3	707.0	440,947	3,610	13,817
2003	29.5	726.0	555,991	3,674	12,633
2004	29.4	746.0	690,876	3,729	19,612
2005	29.3	766.0	820,839	4,157	16,436

2006	30.8	788.0	970,372	4,832	29,152
2007	32.4	810.0	1,124,243	6,378	38,800
2008	32.3	832.0	1,274,492	7,047	36,644
2009	32.5	855.0	1,225,844	7,992	32,809
2010	33.3	879.0	1,457,130	8,464	42,039
2011	35.8	904.0	1,644,294	9,912	45,549
2012	36.7	929.0	1,708,393	18,201	40,691
2013	37.9	955.0	1,815,689	23,972	44,279
2014	38.2	981.0	1,896,265	26,816	44,417
2015	39.0	1,008.0	1,691,480	32,721	30,569
2016	43.7	1,036.0	1,573,266	34,392	27,697
2017	43.6	1,063.0	1,704,866	35,784	29,083
2018	46.3	1,092.0	1,773,600	42,648	27,372
2019	47.0	1,121.0	1,795,736	45,056	23,362
2020	48.2	1,151.0	1,712,284	4,753	72,014
2021	-	1,181.0	1,920,898	50,685	-

Source: data, worldbank.org-ppi, worldbank.org

AE = f (PPIE,POP,GDP,FDI)

AE= (B1)C +(B2)PPIE+ (B3)POP +(B4)GDP +(B5)FDI + U

- **AE** = Access to electricity is the percentage of population with access to electricity. Electrification data are collected from industry, national surveys and international sources.
- **GDP**= Gross domestic product (GDP) is a monetary measure of the market value of all the final goods and services produced in a period of time, often annually.(Finance & Development,2019)
- **PPIE**= Private Participation in Infrastructure project in electricity Sub-Saharan Africa
- **POP** = Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.
- **FDI** = Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy. Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. Data are in current U.S. dollars.
- **C = constant variable**
-

Prepositions of the parameters: In this step, theoretical predictions of the signal and size of the parameters of the model are specified Based on what is provided by economic theory or previous sources of information. According to the standard models proposed in the This study predicts the prior sign by the nature of the relationship between the dependent variables (Access to electricity is the percentage of population) & independent variables (Private Participation in Infrastructure project in electricity Sub-Saharan Africa, GDP, Total population, Foreign direct investment) as follows: -

- GDP coefficient reference In relation to Private Access to electricity is the percentage of population is expected to be a positive sign due to the existence of a relationship between the GDP and Access to electricity is the percentage of population ,
- also The reference coefficient, privet public Participation in Infrastructure project in electricity -Sub-Saharan Africa coefficient reference In relation to Access to electricity is the percentage of population is expected to be a positive sign due to the existence of a relationship between the Participation in Infrastructure project in electricity Sub-Saharan Africa and Access to electricity is the percentage of population .

- Total population coefficient reference In relation to Access to electricity is the percentage of population is expected to be a positive sign due to the existence of a relationship between the Total population and Access to electricity is the percentage of population.
- Foreign direct investment coefficient reference In relation to Access to electricity is the percentage of population is expected to be a positive sign due to the existence of a relationship between the Foreign direct investment and Access to electricity is the percentage of population.

Table 5 Regression results between Access to electricity of Private Participation in Infrastructure on electricity and GDP, POP, FDI on Sub-Saharan Africa 200-2021:

		Coefficient value	T value	Probability value	F	F- Probability value	R2
Dependent variable	ACE						
Independent variables	POP	5.62	5.36	0.00	*319.20*	*0.00*	*0.98*
	GDP	2.8	2.15	0.04			
	PPIE	3.4	**3.05**	0.05			
	FDI	7.4	**6.3**	0.04			
	C	-10.17	-1.61	0.127			

Source: from STATA program results

3.EMPIRICAL STUDY

3.1 Economic Estimates:
- The criterion of economic theory: (C) consent is (-10.17) is negative sign representing the value of the dependent variable (ACE) when the values of all independent variables in the model are zero, it is value of the ACE, without any linked to the changes in the C.
- The (POP) coefficient is (**5.62**) is appositive sign representing the value of the dependent variable (ACE) is positive and this result indicates that there is an absolute correlation between the changes POP and ACE, according with economic theory.
- The (GDP) coefficient is (**2.81**) is appositive sign representing the value of the dependent variable (ACE) is positive and this result indicates that there is an absolute correlation between the changes GDP and ACE, according with economic theory
- The (PPIE) coefficient is (**3.4**) is appositive sign representing the value of the dependent variable (ACE) is positive and this result indicates that there is an absolute correlation between the changes PPIE and ACE, according with economic theory
- The (FDI) coefficient is (**7.4**) is appositive sign representing the value of the dependent variable (ACE) is positive and this result indicates that there is an absolute correlation between the changes FDI and ACE, according with economic theory

3.2 Statistical Estimates:

T-test used to test the significance of the estimated parameters to determine the effect of the independent variables on the dependent variable. If The probability value is measured (test for the estimated parameter with 5% if the probability is bigger than 0.05) The Zero Hypothesis is accepted and therefore the parameter is statistically insignificant , but if the probability value is less than 0.05, well rejected the Zero Hypothesis and accepted the alternative hypothesis, the result is a statistically significant relationship between the independent variable and the dependent variable results estimate as follows:
(A) Clarity non-significance of the constant **C** at the level of significance of 5%, where it is observed from the table that the probability value (P.Value of the estimated parameter 0.12) .
(B). The significance of the coefficient of **POP** is evident from the table, which shows that the probability value of the POP coefficient (P.Value) is 0.0000 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ACE and POP in sub-Saharan Africa..

(C) The significance of the coefficient of **GDP** is evident from the table, which shows that the probability value of the GDP coefficient (P.Value) is 0.04 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ACE and GDP in sub-Saharan Africa..

(D) The significance of the coefficient of **PPIE** is evident from the table, which shows that the probability value of the PPIE coefficient (P.Value) is 0.05 less than the significance level of 5%. This result indicates a relationship with statistical significance between the ACE and PPIE in sub-Saharan Africa..

(E) The significance of the coefficient of **FDI** is evident from the table, which shows that the probability value of the FDI coefficient (P.Value) is 0.04 less than the significance level of 5%. This result indicates relationship with statistical significance between the ACE and FDI in sub-Saharan Africa..

(F) Significance of a complete model determined by the value of F, where the probability value (Prob = 0.0001) is less than the significance level (5%).

Third: Model Match Quality Test: The interpretation of the model or the model's ability to interpret is defined as R2, and the interpretation is stronger when it is closer to number (1) in the model. From the estimation results table, R2 shows that about (98%) of the changes in ACE were explained by changes in(POP,GDP,FDI,PPIE), also (2%) of the changes are due to the variables not included in the model. This indicates the good quality of the model.

The impact of the Privet Participate infrastructure project in electricity on sub-Saharan Africa-(PPIE)on Access to electricity is the percentage of population (ACE), therefore can express the relationship to mathematical function as fellow:

AE= (-10.1)C +(3.4)PPIE+ (5.6)POP +(2.8)GDP +(7.4)FDI + U

4. Conclusion

The electricity sector generally considered the most important priorities of the development process. With good Investment in these sector alone is second only to it because it is fully privatized and thus offers the possibility of high flexibility in controlling risk reduction and profitability. This is presenting of the unit equivalent to 55% of investments on PPI for sub-Saharan Africa region . There is a strong positive and statistically significant relationship between Access to electricity is the percentage of population (ACE), with Private Participate infrastructure project in electricity on sub-Saharan Africa-(PPIE), so increase or decrease in the value of Private Participate infrastructure project in electricity on sub-Saharan Africa-(PPIE) leads to the same trend in the value of Access to electricity is the percentage of population (ACE) Also, the same positive effect with the other variables (GDP, PPP, FDI) on Access to electricity is the percentage of population.

Results
1. Infrastructure projects with the participation of the private sector are in direct harmony with the development process and are increasing their strength due to globalization, privatization policies and the requirements of development at a time when government resources are unable to meet all development needs.
2. achieving of electricity sector is 55% from total because representing main of development process in the of sub-Saharan Africa economies.
3. Strong positive and significant statistically relationship between Access to electricity is the percentage of population (ACE) with Private Participate infrastructure project in electricity on sub-Saharan Africa-(PPIE).
4. Strong positive and significant statistically relationship between Access to electricity is the percentage of population (ACE) with (GDP, Total population, foreign direct investment) on sub-Saharan Africa.

Recommendations

1. The necessity for the participation and integration of sub-Saharan African countries together in partnership on Private Participate infrastructure project in the electricity sector to joint infrastructure projects strengthens the process of common development.
2. Emphasis on provision of facilities and guarantees for the private sector to access in electricity sector and renewable electricity sector because of its high potential for investment also with an attempt to overcome obstacles by providing customs and tax reliefs.
3. required an appropriate environment by strengthening the investment base to participate in projects by providing a legal structure, rules, procedures, and unifying them with economic stability**.**

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Appendix 1 Results of the STATA Program

Cor ACE POP GDP PPI FDI

```
|   ACE    POP    GDP    PPI    FDI
-------------+--------------------------------------------
ACE |  1.0000
POP |  0.9894  1.0000
GDP |  0.8586  0.9072  1.0000
PPI |  0.9684  0.9587  0.7820  1.0000
FDI |  0.5472  0.5964  0.7019  0.4437  1.0000
```

reg ACE POP GDP PPI FDI

```
Source |    SS        df     MS       Number of obs  =     21
-------------+---------------------------------    F(4, 16)      =   319.20
Model | 976.930109      4  244.232527  Prob > F      =   0.0000
Residual | 12.2424188     16 .765151174   R-square      =   0.9876
-------------+---------------------------------    Adj R-squared =   0.9845
Total | 989.172528      20 49.4586264  Root MSE      =  .87473
```

```
ACE |   Coef.    Std. Err.   t    P>|t|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
POP | 5.62e-08  1.05e-08  5.36  0.000   3.40e-08    7.85e-08
GDP | 2.81e-12  1.31e-12  2.15  0.047   5.58e-12    3.87e-14
PPI | 3.40e-12  6.79e-11  3.05  0.051   1.47e-10    1.40e-10
FDI | 7.46e-12  2.03e-11  6.37  0.048   5.04e-11    3.55e-11
_cons | -10.79339 6.704303  -1.61  0.127  -25.00588   3.419094
```