



Assessing the Effectiveness of Infrastructure Public-Private Partnerships

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List of acronyms

AfDB	African Development Bank
APIX	National Agency for the Promotion of Investments
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
BTO	Build-Transfer-Operate
DBFO	Design-Build-Finance-Operate
DBSA	Development Bank of Southern Africa
DFI	Development Finance Institution
GDP	Gross Domestic Product
GMA	Gautrain Management Agency
GTAC	Government Technical Advisory Centre
IPTL	Independent Power Tanzania Limited
MPDC	Maputo Port Development Company
MW	Mega-Watt
NBI	National Business Initiative
NDP	National Development Plan
PPP	Private-Public Partnership
SAICE	South African Institution of Civil Engineering
SALGA	South African Local Government Association
SENAC	Société Eiffage de la Nouvelle Autoroute Concédée
TANESCO	Tanzania Electric Supply Company Ltd
TRAC	Trans African Concessions

Abstract

The objective of this study is to assess whether public-private partnerships are effective as infrastructure development strategies. This was examined through the use of a unique PPP Equilibrium Framework which assesses the effectiveness of PPPs based on their ability to generate outcomes which balance the interests of society, the state, and private entities for desired success. Findings from the analysis of different case studies show that the PPP Equilibrium Framework can serve as both a guide for structuring PPP projects and a tool for assessing their potential effectiveness in infrastructure development. PPPs whose outcomes satisfied the interests of society, the state, and the private sector, were evidently highly successful in infrastructure development and overall economic growth. PPPs that have failed are those that have unbalanced or biased interests and are unable to satisfy the interests of all relevant stakeholders. This study redefines the success of PPP projects away from the number of transactions made or overall project value and focuses on the economic and social outcomes of the PPP projects. The DBSA has a clear role to play in the PPP area by providing funding in PPP projects where availability of long-term financing is limited or improvement of bankability of projects is required. The DBSA also has a role to play in providing technical assistance to PPP projects in terms of structuring them to ensure outcomes that are in the best interests of the society, private sector, and the state.

1. Introduction

A public-private partnership (PPP) is defined as a contract between a public sector institution and a private sector party, where the private party performs a function that is usually provided by the public sector and/or uses state property in terms of the PPP agreement. PPPs involve the private party delivering public goods and services for a fee paid for by the public sector, while most of the technical, financial, and operational risk is transferred to the private party. In a traditional government project, the public sector will deliver the public goods and services while also paying for the capital and operating costs and carrying the risks of cost overruns and late delivery (National Treasury, 2021).

The objectives of this paper are to assess whether public-private partnerships in general are effective as infrastructure development strategies and whether they balance the interests of society, the state, and private entities for the desired success. The focus of the study is on South Africa and the role that the Development Bank of Southern Africa (DBSA) can play within the PPP area. Reference will also be made regarding the effectiveness of public-private partnerships in other countries across the world. This study focuses on public infrastructure PPPs where the public sector pays for a full set of services, including new infrastructure, maintenance, and facilities management through monthly or annual payments while most of the project risk is transferred to the private party.

Key characteristics of a PPP include contracts that are typically 5 to 30 years in duration where the private sector is involved with design, construction, financing, and implementation. Payment to the private party occurs based on agreed outputs related to the provision of services and/or infrastructure (NBI, 2019). PPPs are not simply the outsourcing of functions, or a donation by a private party for a public good, or privatization of state assets and/or liabilities. They are a way to allow the public sector to spread payments for large projects over the project's lifetime by making annual or monthly payments to the private sector.

In the developed world, PPPs have been significant in the development and delivery of infrastructure. In the United Kingdom for instance, their private finance initiative which started in 1992 has facilitated the delivery of almost 800 projects ranging from car parks to tolled highways, power plants and schools which were valued at more than £56 billion (Garvin & Bosso, 2008). In the developing world, where financially struggling public institutions look to crowd in private capital for infrastructure delivery, the PPP strategy has become common practice. In South Africa, the PPP strategy for infrastructure delivery has faced several challenges over the years but has been relatively successful with 35 PPP projects having been completed from 1998 to 2022 with an overall value of R91,4 billion (National Treasury, 2022). Regardless of this relative success, new PPP transactions in South Africa have been declining overtime, due to these projects being perceived as involving high costs (National Treasury, 2021).

2. Methodology

The methodology has followed three approaches. Firstly, qualitative data was collected through a systematic review of existing literature on the effectiveness of public-private partnerships as infrastructure development strategies. Secondly, quantitative data was collected through case studies to make use of the Public-Private Partnership Equilibrium Framework to assess the effectiveness of public-private partnerships as infrastructure development strategies. The case study selection was based on the availability of data and the case studies included were the Gautrain Rapid Rail Link, the Tanesco Power Purchasing Agreement, the Dakar-Diamniadio Toll Road, and the Maputo Port. The assessment of each case study was based on their impact on society, the state, and the private sector. Qualitative data was also collected through interviews with key informants within the PPP area, as part of the information gathering process to support the literature review and case study analysis.

3. Literature review

3.1 The Evolution of Public-Private Partnership Projects

3.1.1 The History of PPP Projects

The origins of PPP projects globally are attributable to the increasing levels of public debt in the 1970s and 1980s which prompted governments to seek private sector investment into infrastructure (SALGA, 2020). In South Africa, the SANRAL N4 East Toll Road was the first PPP project, which was concluded in 1998 (National Treasury, 2021). The National Treasury followed the global trend of the popularity of PPPs by establishing the PPP unit in 1999. The main function of the PPP unit is to provide technical assistance to institutions conducting PPP projects throughout the project cycle. This ensures that PPP projects maintain quality standards and comply with Treasury Regulation 16 (GTAC, 2005). During the various phases of a PPP project cycle, the PPP unit also recommends to the National Treasury whether it should grant or decline approval. The unit also develops and disseminates PPP policies, sectorial toolkits, and manuals. The unit disseminates accurate and current data on PPP projects while also building capacity, confidence, and integrity in South Africa's PPP market.

3.1.2 Types of PPP Model Contracts

There are many different types of PPP model contracts depending on a variety of aspects such as the level of risk transfer, the type of project, desired results, and investment level. Jonga (2021) highlighted the following types of PPP contracts that exist:

- **Build-Own-Operate (BOO):** BOO projects are similar to the privatization of a facility as there is no provision of transfer of ownership to the public agency. At the end of a BOO

concession agreement, the original agreement may be renegotiated for a further concession period (similar to BOT but private entity owns the facility).

- **Build-Operate-Transfer (BOT):** The private entity builds the facility to meet the public agency's requirement. The private entity provides design, construction, financing, operation, and maintenance during the concession period. The BOT entity collects the revenue generated during the concession period and returns the project to the public agency at the end of the contract period for little or no additional compensation.
- **Build-Own-Operate-Transfer (BOOT):** Ownership of the facility rests with the private entity until the end of the concession period, at which point ownership and operating rights are transferred to the public agent at no cost.
- **Build-Transfer-Operate (BTO):** The private entity finances a facility and upon completion, transfers legal ownership to the public agent. The agent then leases the facility back to the private entity under a long-term lease to operate the facility.
- **Design-Build-Finance-Operate (DBFO):** The private entity partner finances the project and is granted a long-term right of access of about 30 years. The DBFO partner is given specified service payments during the life of the project.

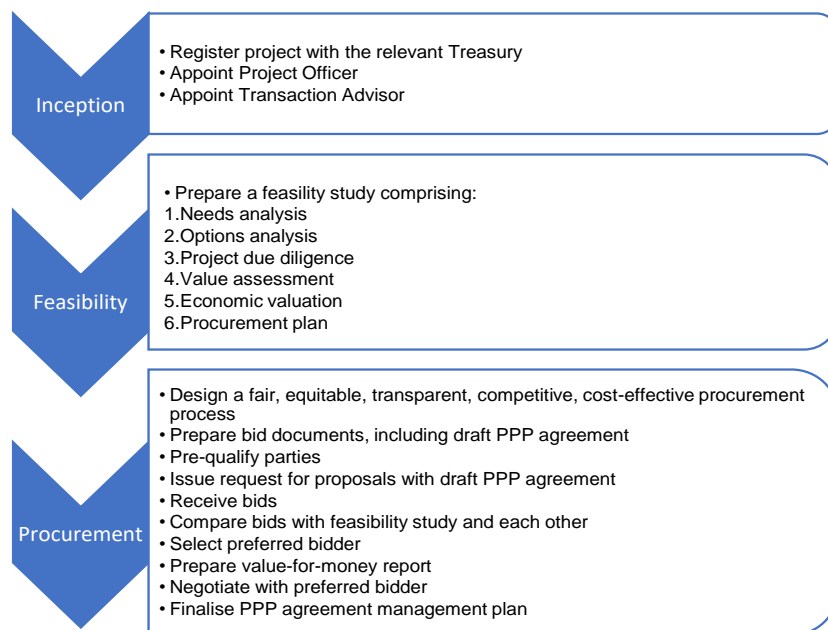
3.2 Public-Private Partnership Project Life Cycle For Infrastructure Development

The PPP project cycle is a road map of the PPP process, which covers two periods of a PPP: the preparation period and the project term. The preparation period includes the inception, feasibility study and procurement processes. As shown in Figure 1, the inception is the first phase of the PPP project cycle in the South African context which includes registering the project with the relevant Treasury (either National or Provincial Treasuries) and appointing a project officer and transaction advisor. The feasibility study is the second phase which determines if the traditional public sector procurement or a PPP is the best choice for the proposed project. The third phase is the procurement process which involves negotiations, financial closure, and finalization of the PPP agreement.

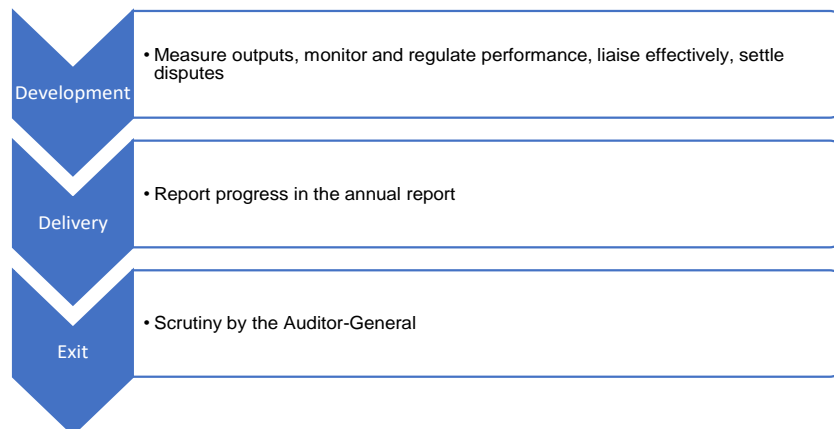
The fourth phase of the project cycle involves the project term, which intends to assist the institution in managing the PPP agreement once signed and ensuring the implementation of the PPP agreement. This phase is aimed at the project officer who is responsible for preparing and implementing the PPP management plan. The phase also includes auditing of PPPs which is a function of the Auditor-General intended to institute the internal auditing of PPP projects.

Figure 1 Overview of the generic PPP project cycle in South Africa

Project Preparation Period



Project Term: PPP agreement signed



Source: GTAC (2015)

3.3 Advantages And Shortcomings of Public-Private Partnerships in Infrastructure Development

Table 1 Advantages of Public Private Partnerships

Increased effectiveness and efficiency	Private sector has access to better skills and management capacity and therefore should deliver better outcomes
Increase financial resources	The private sector has access to financial resources that allow it to have the capacity to accelerate the implementation of such projects. This allows the state to channel resources to other aspects of the economy and potentially reduce public debt
Vast experience in infrastructure projects	The private sector has extensive experience in large complex projects
Improved risk management	Based on the type of PPP contract, different degrees of risk are transferred from the public agent to the private one. The private agent takes on certain risks related to project delivery that are appropriate to them
Increased innovation	The partnership between the private and public sector has also been found to increase innovation
Increased infrastructure related expenditure	PPP projects allow for increased expenditures for refurbishing, maintaining and operating public assets.
Increased transparency and accountability	PPP projects increase transparency and accountability between the private and public entities which improves the participation of civil society and business in local affairs.
Budgetary certainty	PPPs deliver budgetary certainty as payments due to the private agent over the project lifetime are known in advance
Payments based on the quality of service delivered	In PPPs, the public sector has the benefit of only paying the private party based on the quality of the services being provided. If the services are not to the satisfaction of the public sector or are not in line with the PPP agreement, the private party may also be liable to pay penalties
Greater value for money	PPPs have the potential to deliver greater value for money. This results in reduced costs achieved over the lifetime of a project employing a PPP approach in comparison to other options. Preliminary value for money is determined by whether the risk-adjusted PPP reference case is affordable relative to a risk-adjusted public sector comparator
Enhance people's human dignity	PPPs have the potential to enhance people's human dignity in terms of services they receive. For example, patients in Inkosi Albert Luthuli Central Hospital received patient care that is superior to that of private hospitals

Sources: SALGA (2020); Roehrich, et al. (2014); NBI (2019)

Table 2 Shortcomings of Public Private Partnerships

The development, bidding, and ongoing costs of PPP projects	The development, bidding and ongoing costs of PPP projects are likely to be greater than traditional government procurement processes. As such, the government will have to determine if the greater costs involved are justified
Debt Costs	There is also a cost attached to debt as even though the private sector easily accesses financial resources, the finance will only be accessible where the operating cashflows of the project company are expected to provide a return on investment. The cost will be either borne by customers or the government
Excessive 'red tape' and regulations	The excessive 'red tape' and regulations which govern PPPs can slow projects down and add considerably to the costs
Lack of capacity of municipal officials	PPP partnerships also run the risk of breaking down due to lack of capacity of municipal officials who may be committed to other responsibilities
Poor senior management support	There is poor senior management support and lack of project interest in PPP projects, which also lack political support due to a misunderstanding of the PPP model in the view of a GTAC informant)
Inappropriate risk management	As stated, PPPs allow for better risk management, but a potential disadvantage arises when the risk is not transferred/shared properly, and the government retains most of the risk. The appropriate allocation of risk between the government and the private partner is important to ensure the success of the PPP. The private entity will be cautious about accepting major risk beyond their control and if they do have to bear these risks, then their price for the service will reflect this (World Bank, 2022)

Source: World Bank (2022); SALGA (2020)

3.4 Public-Private Partnership regulatory frameworks in South Africa

3.4.1 Municipal Systems Act 32 of 2000

The Municipal Systems Act allows for municipalities to provide a municipal service through an external mechanism as per section 76 of the Act. This external mechanism can be PPPs and it is required as per section 77 of the Act that a review of the mechanism to provide the service is conducted. The municipality must assess whether the service can be provided internally and if not, then it can explore the use of the external

mechanism. If a municipality elects to use an external mechanism, section 78 of the Act states that the municipality must assess different service delivery options, conduct feasibility studies, and give notice to the local community (MSA, 2000).

3.4.2 Municipal Finance Management Act 56 of 2003

As per chapter 8, part 1 of the Municipal Finance Management Act, municipalities are required to provide value for money services and if a municipality is unable to undertake provisions of a service internally, then the municipality must ensure that the selected method to provide the service is the most efficient. This is one of the tests any proposed PPP must undergo. Chapter 11 of the Act also addresses supply chain management in part 1 and PPPs in part 2 (MFMA, 2003).

3.4.3 Treasury Regulation 16 issued in terms of the Public Finance Management Act, 1999

Treasury Regulation 16 of the Public Finance Management Act provides precise and detailed instructions for PPPs. Treasury Regulation 16 defines a PPP and sets out the phases and examinations it will have to go through. Treasury Regulation 16 examines PPPs on affordability, value for money and appropriate risk transfer. The PPP project cycle, which is set out in Regulation 16 includes the inception, feasibility, procurement, and PPP agreement management phases. Treasury Regulation 16 requires that the relevant Treasury give various approvals at certain phases which ensure that the examinations have been passed and that the PPP project cycle has been complied with (GTAC, 2005).

3.5 The National Treasury PPP Regulatory Framework Review

The National Treasury initiated a review of the PPP regulatory framework in 2019, which was completed in 2022, and made recommendations to the framework to improve its effectiveness and encourage private-sector participation. The review findings indicated that certain aspects of the PPP regulatory framework compare well with international benchmarks. Nonetheless, there are critical gaps and challenges that need to be addressed to improve the operational environment. The review recommended legislative changes to improve the selection, prioritization, planning, financing support mechanisms, procurement, implementation, and monitoring of PPPs. These changes will enhance application and practice to improve the reliability of results and raise confidence in the overall PPP framework (National Treasury, 2022). The recommendations can be found in Table 3.

Table 3 Recommendations of Public Private Partnership framework review

Finding	Recommendations on amendments to National Treasury Regulation 16
Policy	
<ul style="list-style-type: none"> • No overarching infrastructure policy framework that mainstreams PPPs as part of fiscally prudent planning processes 	<ul style="list-style-type: none"> • Develop an integrated public investment management system and PPP policy • Define roles of key institutions
PPP legal and regulatory framework and guidelines	
<ul style="list-style-type: none"> • Multiple and time-consuming approvals • Lack of accountability for procuring institutions • Lack of clarity on the treatment of unsolicited proposals • Dwindling private-sector capacity and poor public engagement 	<ul style="list-style-type: none"> • Exempt low-value projects (R1 billion and below) from procurement approvals • Set a clear time frame for approvals by regulator • Make it mandatory to continue PPP once feasibility study shows value for money, risk transfer and affordability • Provide guidance on treatment and incentives for unsolicited proposals • Clarify roles of different entities in managing fiscal commitments and contingent liabilities • Develop financing support mechanism to enhance bankability of PPP projects • Revise exemption clause to enable monitoring of exempt PPP projects • Adjust the BEE requirements for PPPs
Inadequate institutional arrangements	
<ul style="list-style-type: none"> • No centralised approach to identifying and screening PPPs • No capacitated PPP regulator and no defined guidelines to perform functions • Lack of capacity and skills in procuring institutions at provincial and national levels and PPP Unit • Dwindling private-sector capacity and poor public engagement 	<ul style="list-style-type: none"> • Centralise the identification of PPP projects • Establish function to screen and prioritise all infrastructure proposals, including PPPs with a screening tool for public investments • Explore feasibility of provincial infrastructure funding agencies • Establish full-time capacitated PPP regulatory unit with operating guidelines • Develop guidelines, tools, and methodologies to monitor and report on fiscal commitments and contingent liabilities • Promote collaboration and coordination with private sector through PPP forums, policy, and public consultations as part of PPP project cycle
Shortcomings in the PPP project life cycle	
<ul style="list-style-type: none"> • Lengthy, rigid, and costly feasibility studies with some projects proving unfeasible after the process • Slow pace of implementation of PPP projects, in particular delays in the procurement process • Lack of sector focus and customized approach for key sectors • Poor contract management – prone to delays • Lack of preparedness at exit management stage 	<ul style="list-style-type: none"> • Make pre-feasibility studies mandatory for high-value projects at inception • Review and calibrate requirements for value for money and public-sector comparator requirements based on project size, nature, and complexity • Require non-negotiable draft PPP agreement with request for proposals • Amend PPP manual to calibrate project preparation requirements according to size, sector, and complexity and define where a one-stage bidding process would be allowed • Engage transaction advisors throughout PPP project cycle

Source: National Treasury (2022)

4. Analysis of the Public-Private Partnership Equilibrium Framework

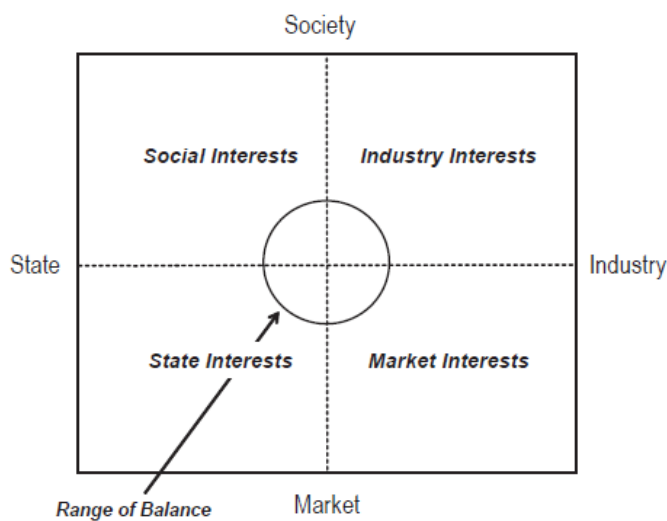
Garvin and Bosso (2008) proposed a PPP Equilibrium framework which can be used to assess the effectiveness of PPPs as well as promote structured thinking about PPP arrangements (Figure 2). The PPP equilibrium framework is more focused on the outcomes of PPP projects and not the regulatory and legal framework of PPPs. Garvin and Bosso (2008) stated that the objective of a PPP program is to develop and sustain the PPP market through establishing an equilibrium amongst the interests of the society, state, industry and market. The range of balance, which is a measure that assesses the effectiveness of PPPs through their ability to maintain the interests of the society, state, industry, and markets, can also be seen at the center of Figure 2. The rationale behind the range of balance is that each PPP project should equally satisfy the interests of society, states, markets and industry. If one aspect (say the state) has its interests satisfied more than the other aspects (society, industry and markets) then the range will be out of balance (distorted) and skewed towards the state interest quadrant.

In the PPP Equilibrium framework, the state is the elected body governing a jurisdiction. Society is the citizens employed and living within the jurisdiction. Industry is the businesses that provide services and goods to the state and society within the jurisdiction. The market is the financial system that allows investors to exchange wealth and risk through time (Garvin & Bosso, 2008). The PPP program must satisfy all the aspects of the equilibrium framework as otherwise the program will suffer from bias towards a particular quadrant or from instability if no interest is observed at all.

Performance measurement theorists believe that outcomes are more important than output as the output is not necessarily an indication of the effectiveness of the PPP program. As infrastructure is often a public good, the public has a right to expect satisfactory service at a reasonable price, where benefits are shared equally. The state and society demand more than an economic premium for granting the private sector the right to develop and operate public goods (Garvin & Bosso, 2008). The private sector has

the expertise, agility and incentive to provide higher quality services at an affordable price, at a faster rate, which is also environmentally friendly. If the private entity is unable to meet these expectations then the risks of transferring these responsibilities to the entity could be too great. The PPP Equilibrium framework suggests that PPP projects should have improvements in areas such as quality of service, price/cost of service, time of service availability, level of environmental impacts and equitable distribution of social benefits in comparison to traditional infrastructure delivery methods.

Figure 2 PPP Equilibrium Framework



Source: Garvin & Bosso (2008)

The review in this study takes a different approach to that of others as this review uses a revised PPP Equilibrium framework to assess the effectiveness of PPP projects. This provides a different perspective to assess PPP projects by analysing their ability to maintain the interests of the state, the private sector (markets and industry interests) and society. To measure the impact of the PPP projects on the interests of society, the state and the private sector, this study makes use of data for each of the following indicators listed in Table 4. It is worth noting that some of the measured indicators can serve the interests of more than one party (for example GDP benefits the interest of society, the state and the private sector). For the purpose of this study, the impact is only limited to one party (for example the private sector). A major limitation to this approach is the lack

of available data on indicators for the outcomes of PPP projects. To overcome this approach, only case studies with relevant data were selected.

Table 4 Adopted Public Private Partnership Equilibrium Framework

PPP Equilibrium Framework	Measured Indicator
The State	<ul style="list-style-type: none"> • Fiscal Impact (contributions to Government Revenue) • Gross Fixed Capital Formation Impact
The Private Sector	<ul style="list-style-type: none"> • GDP (value added to the national or provincial economy) • Quality of service • Cost of Service
The Society	<ul style="list-style-type: none"> • Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities • Impact on Household income • Climate change impact • Quality of service • Cost of Service

Source: Author's own

Each sector (state, private and society) has a varying number of measured indicators, due to data constraints. As such, only documented measurement indicators are included. It is worth noting that some indicators (such as GDP) can fall into all three sectors, as they have an impact on all three sectors. For purposes of this study however, such indicators will be constrained to two sectors at most. For the state, the measured indicators are fiscal impact and gross fixed capital formation impact. Fiscal impact measures the increased state revenue through taxes and tolls, as a result of the PPP project. Gross fixed capital formation measures the increase in capital formation as a result of construction activities due the PPP project. For the private sector, the measured indicators are GDP, quality of service and cost of service. The GDP measures the value added to national or provincial economy due to the PPP project which improves the ease of doing business for the private sector. The quality of service measures improvements (due to the PPP project) of the offered services utilised by the private sector. The cost of services measures the affordability (due to the PPP project) of the services utilised by the private sector.

Quality of service and the cost of service also apply to the society, as they measure the improved quality of service and the affordability of the service being utilised by the society as a result of the PPP project. Other measures for the society include climate change impacts, impacts on household income and employment creation. Climate impacts measure any estimated reduction in green house gas emissions due to the PPP project as emissions have an impact on societal health. Impact on household income measures increased earnings for households due to the PPP projects. Employment creation measures the number of job opportunities created and utilised by members of the society, due to the PPP project.

5. Case Studies Analysis¹

5.1 Gautrain Rapid Rail Link in South Africa

Table 5 Gautrain PPP Data

Project name	Government institution	Type	Date of close	Duration	Financing structure	Project value \$ million	Form of payment
Gautrain Rapid Rail Link	Gauteng Department of Public Transport, Roads, and Works	Design, Finance, Build, Operate and Transfer	Sep-06	20 years	Debt 11% Equity: 2% Govt: 87%	~ 3 400	User Charges and Patronage Guarantee

Source: National Treasury (2022); Global Infrastructure Hub (2021)

5.1.1 Background

The Gautrain Rapid Rail Link project is an 80km rail project between Johannesburg and Pretoria, intended to ease traffic congestion and facilitate travel (GMA, 2019). This project included the construction of 15km of tunnelling and various viaducts, stations, parking bays and depots. In addition to the rail, the project company also provides bus links to the

¹ Interviews with key informants from GTAC and TRAC

train stations to facilitate access to the rail network from people's residential areas. The project was completed in two phases with the first delivery date being 8 June 2010 and the second delivery being 7 June 2012 (Global Infrastructure Hub, 2021).

The procuring authority was the Gautrain Management Agency, and the private company was Bombela Concession Company (Pty) Ltd. This resulted in the Gautrain Management Agency providing financing in the form of a \$3 billion grant while Bombela Concession Company raised \$360 million in debt, and \$70 million in equity (Global Infrastructure Hub, 2021). Government support was the main source of funding as it was agreed that the required capital was far greater than what the private sector could invest and recover from user fees.

The procuring authority committed most of the funding for the PPP project and as such, much of the risk, including land acquisition risks, was retained by the Gautrain Management Agency. However, the cost of relocation of the utilities and road improvements around the stations was transferred to the private entity. The services provided by Bombela Concession Company and the operations contractor met and exceeded targets of availability and punctuality for all trips scheduled. Safety, security, and cleanliness targets have were also met and exceeded, which resulted in customer confidence in the Gautrain.

5.1.2 PPP Equilibrium Framework Project Outcomes Analysis: Gautrain Rapid Rail Link

Table 6 PPP Equilibrium Framework Project Outcomes Analysis: Gautrain Rapid Rail Link

	State	Society	Private Entities
GDP (value added to the provincial economy)			R20 billion
Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities		366, 000	
Climate change impact		Energy use by rail is 3 to 5 times more efficient than cars per person kilometer	
Capital formation Impact	R46 million (through property development)		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive -)		- Relatively Expensive	
Impact on Household income		R3,2 billion	
Check for satisfying the interests of each criterion (✓ or ✗)	✓	✓	✓

Source: Gautrain Management Agency (2019)

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

The Gautrain PPP has documented data on the outcomes of the PPP project. The Gautrain had a positive impact on rejuvenating several inner cities in Johannesburg and Tshwane. The Gautrain PPP project resulted in 34 000 direct jobs created during the construction phase and about 87 000 indirect jobs. A further 245,000 jobs were created as a result of property development induced by the Gautrain.

The PPP project also resulted in R20 billion total GDP impact added to the provincial economy during the construction phase and for each year of the Gautrain's operations R1.7 billion has been added to the provincial economy (GMA, 2019). The Gautrain improved the quality and reliability of public transport, which has always been widely available in South Africa, but has not always met the required standards. It resulted in the easing of traffic congestion within the Johannesburg-Tshwane corridor, which has allowed for efficient transportation and facilitated the movement of people.

The use of the Gautrain has also had positive implications for the environment as carbon emissions from the Gautrain are considerably lower per passenger transported than for private vehicles. Energy use by rail is three to five times more efficient than cars per person per kilometer based on full capacity and as such, the Gautrain reduces the contribution to climate change. The use of the Gautrain also results in a significant reduction in the number of road accidents, fatalities, and injuries (GMA, 2019). With all its success, the Gautrain service has also attracted criticism from society, as the service is more expensive than other means of public transport, which creates inequality, as the services are now only available to members of society that can afford them.

5.2 Maputo Port in Mozambique

Table 7 Maputo Port PPP Data

Project Name	Government Institution	Type	Date of Operationalization	Duration	Ownership Structure	Project Value \$ million	Form of Payment
Maputo Port	Mozambican National Ports and Rail Authority	Finance, Reinstate, Operate and Upgrade	Apr-03	15 years	Gringrod and DP World 51% Mozambican government and CFM 49%	~ 1 400	User Charges

Source: Conningarth Economists, (2022); Fischer & Nhabinde (2012); Farlam (2005)

5.2.1 Background

The Mozambican national ports and rail authority, CFM (Portos e Caminhos de Ferro de Moçambique) entered a joint venture with a private consortium led by the British Mersey Docks and Harbour Company to upgrade the port of Maputo (Porto De Maputo, 2019). The consortium took control of the port which included the Maputo cargo terminals and the Matola bulk terminals in April 2003. The consortium includes a Swedish construction company Skanska, a Portuguese terminals operator Lisont, and a Mozambican company Gestores.

The agreement is for a 15-year concession to finance, reinstate, operate, and upgrade the port of Maputo (Farlam, 2005). The consortium owned 51 percent of the Maputo Port Development Company (MPDC), while the Mozambican government and CFM owned the other 49 percent. The financiers of the project include Standard Corporate and Merchant Bank, the DBSA, the DFIs of the Netherlands and Sweden as well as the Nordic Development Fund and Finland's Finnfund.

The PPP agreement stipulated that the MPDC provide all marine services within the Maputo Bay Port jurisdiction area. The concession includes the designated port areas for international shipping within Maputo and the coal terminal of Matola port. An investment of \$70 million was made by the consortium to rehabilitate and develop the port by modernizing port equipment, quays and transport connections by road and rail to neighbouring countries. Due to difficulties during the protracted contract negotiations, which led to a strained relationship between CFM and Mersey Docks and Harbour Company, the 51 percent ownership changed to Gringrod and DP World (Fischer & Nhabinde, 2012).

5.2.2 PPP Equilibrium Framework Project Outcomes Analysis: Maputo Port

Table 8 PPP Equilibrium Framework Project Outcomes Analysis: Maputo Port

	State	Society	Private Entities
GDP (value added to the national economy)			US\$345 million
Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities		33 815	
Capital formation Impact	US\$1,0 billion		
Fiscal Impact (contributions to Government Revenue)	US\$79 million		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive -)			+ Reduced logistics costs
Impact on Household income		US\$193 million	
Check for satisfying the interests of each criterion (✓ or ✗)	✓	✓	✓

Source: Conningarth Economists (2022): The average per annum impact outcomes resulting from the upgrading and expansion of the Port.

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

The upgrading and expansion of the port contributes annually on average GDP of USD 345 million (in constant 2018 prices). The upgrading and expansion of the port generated 33 815 employment opportunities and led annually to further capital formation of USD 1.04 billion. These impacts include the construction effect, operational effect, and reinvestment effect of saving that are generated by the project. It is important to note that if the broader impact is considered (including the impact on international trade), the total

impact of the upgrading and expanding of the port will be seven times bigger than that of the port only (Conningarth Economists, 2022). The Government revenue consists of US\$ 79 million from taxes related to the project (directly and indirectly) and the total fiscal impact (including the direct, indirect, and induced impact) amount to approximately US\$ 605 million in nominal values on average over the period of the project.

The concession has increased efficiency and handling volumes at the Maputo harbour, while container movements per hour are improving and tending to international standards. Truck turn-around times have also improved as it has been reported that it was less than 25 minutes in April 2011, which was below the target time (Fischer & Nhabinde, 2012). Cargo through the port, such as sugar and coal has also increased. The rehabilitation work on this terminal had significantly increased fruit export volumes, with fresh produce terminals recording increases in the amount of first-class citrus passing through the port.

It is estimated that 60 percent of all the freight traffic of the Maputo Logistics Corridor is destined to and generated by the Maputo Port. The Port of Maputo has also developed a training center, which provides training in several operational areas such as machine operators, tellers, and cargo storage (Porto De Maputo, 2019).

The improved services at the port have resulted in not only increased trade, but also increased productivity, competitiveness and reduction in delays, congestion, and logistical costs (Conningarth Economists, 2022). Reduced logistics costs result in reduced costs of production for businesses, which is in their best interest. The increased trade also affects the balance of payments for Mozambique, which then affects its foreign exchange market. The Maputo Port also has a fiscal impact, as government revenue consists of \$79 million from taxes directly and indirectly related to the project, plus an additional \$526 million which consists of government revenue from taxes related to the increase of economic activities due to the expansion of the port. This has allowed the state to invest in education and health, which increases the overall welfare of society (Conningarth Economists, 2022).

5.3 Tanesco Power Purchasing Agreement in Tanzania

Table 9 Tanesco Power Purchasing Agreement PPP Data

Project Name	Government Institution	Type	Date of Agreement Finalisation	Duration	Project Value \$ million	Form of Payment
Tanesco Power Purchasing Agreement	Tanzania Electric Supply Company Ltd	Power Purchasing Agreement	1997	20 years	~ 127.2	User Charges

Source: Cooksey (2002); Farlam (2005); Mundi (2010)

5.3.1 Background

The Tanzanian state-owned electricity entity, Tanzania Electric Supply Company Ltd (Tanesco) and a private company Independent Power Tanzania Limited (IPTL) entered into a power purchasing agreement to build and run a 100 megawatt slow-speed diesel power plant at Tegeta, Dar es Salaam at a cost of \$163.5 million, including an Engineering Procurement and Construction contract price of \$126.39, and with a 'reference tariff' of \$4.2 million per month plus 3.25 US cents per kWh of electricity actually produced. The final tariff will depend on actual costs incurred (Cooksey, 2002).

IPTL was a joint venture between a Malaysian company (Mechmar Corporation of Malaysia) and a local investor, VIP Engineering and Management Ltd (Farlam, 2005). The contract between Tanesco and IPTL was finalized in 1997, but was soon marred by allegations of impropriety, negligence, and corruption as it had not been an open tender (Eberhard & Kapika, 2013). Without consulting Tanesco, IPTL deviated from the agreement terms and built a cheaper medium-speed diesel plant. This resulted in Tanesco serving IPTL with a notice of default and an intention to terminate their agreement (Cooksey, 2002).

The World Bank's International Centre for Settlement of Investment Disputes ruled that the agreement should not be terminated but the capacity charge (which are payments that IPTL received based on how many MW of electricity they make available whether

they are used or not) should be lowered to reflect the actual costs (Eberhard & Kapika, 2013). The plant was commissioned in 2000, without actually reducing the capacity charge and it was found that the power from the IPTL plant was very expensive relative to other plants in Sub-Saharan Africa at the time (Gratwick, et al., 2007).

IPTL started supplying power to the national grid in 2002 and in 2007, IPTL was embroiled in another dispute between its local and foreign sponsors due to allegations of misappropriation of the proceeds from power sales. Due to this conflict, the IPTL plant was hardly operational around 2007 and later sued Tanesco USD 70 million for unpaid capacity charges (Eberhard & Kapika, 2013).

5.3.2 PPP Equilibrium Framework Project Outcomes Analysis: Tanesco Power Purchasing Agreement

Table 10 PPP Equilibrium Framework Project Outcomes Analysis: Tanesco Power Purchasing Agreement

	State	Society	Private Entities
GDP (value added to the national economy)			- US\$2 billion
Fiscal Impact (contributions to Government Revenue)	- US\$3.2 million Capacity payments per month (average)		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive -)		-12 US cents per unit (relatively expensive)	
Quality of service			< 10 % generation capacity
Impact on Household income		-5 US cents per unit (Households paying 5 US cents per unit more than usual for electricity)	
Check for satisfying the interests of each criterion (✓ or ✗)	✗	✗	✗

Source: Farlam (2005); Africa Research Institute (2017); Ghanadan & Eberhard (2007)

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

The Tanzanian government agreed to pay for the power capacity regardless of whether it was actually needed, which resulted in IPTL receiving \$40 million in capacity payments in the first year, while operating at less than 10 percent capacity in that year (SAIIA, 2008). In addition, IPTL charged Tanesco \$3 million in statutory costs monthly and in 2007, IPTL also sued Tanesco USD 70 million for unpaid capacity charges (Eberhard & Kapika, 2013).

A study by the World Bank estimated that the cost of power outages to the Tanzanian economy in 2005 – a single year – was 4 percent of GDP, or nearly US\$2 billion (Africa Research Institute, 2017). Due to the inability of IPTL to solve the power issues in Tanzania and actually adding more to the financial burden of the country, the US\$2 billion value is estimated as a negative impact of the project on GDP in Tanzania. The Africa Research Institute (2017) has reported that the availability and cost of electricity is a major constraint to doing business in Tanzania. Around 88 percent of firms in the country have reported inadequate electricity as a key hindrance to their operations, which has negative impacts on the country's economic growth (Africa Research Institute, 2017).

The state company Tanesco purchased electricity from IPTL for over 12 US cents per unit. This was significantly higher than the electricity which Tanesco produced itself, which was between 7 and 9 US cents per unit (Farlam, 2005). As such, society was paying more for electricity with IPTL than they would have paid with Tanesco alone. This led to society questioning the need for IPTL, and as such it was discovered that no feasibility study was conducted to justify the need for the Independent Power Producer. If the feasibility study had been conducted, it would have been determined that the problem in Tanesco was not insufficient generating capacity but rather a lack of gridlines (Farlam, 2005). This PPP project was evidently marred by corruption, as there was no proper bidding processes and the project was approved by a few government officials without consulting the necessary stakeholders.

5.4 Dakar-Diamniadio Toll Road in Senegal

Table 11 Dakar-Diamniadio Toll Road Data

Project Name	Government Institution	Type	Date of Agreement Finalisation	Duration	Financing Structure	Project value \$ million	Form of Payment
Dakar Diamniadio Toll Highway	Government of Senegal and The National Agency for the Promotion of Investments	Build, Finance, Operate and Maintain	Jul-09	30 years	Equity and Debt: 42% Govt: 58%	~ 531.40	User charges

Source: AfDB, (2023); World Bank (2010); Jonga (2021)

5.4.1 Background

The Dakar Diamniadio Toll Highway project consists of the construction, servicing, and maintenance of a toll highway between Dakar and Diamniadio (34 km), also serving the new international airport located 42 km from Dakar (AfDB, 2023). The project was intended to improve mobility between Dakar and Diamniadio and provide communities affected by the construction of the highway access to basic social and economic services (World Bank, 2021). The project was expected to expand the densely populated capital city and integrate it with the rest of the country and sub-region which will directly benefit the society, businesses, and the overall economy. The project was also expected to reduce congestion and travel time by more than half (Jonga, 2021).

The PPP component of the road consisted of the 20.4 km Pikine–Diamniadio section, which was concessioned to Société Eiffage de la Nouvelle Autoroute Conçédée (SENAC), which is a Senegalese special purpose company owned by the Eiffage Group (a leading construction group internationally) (World Bank, 2010). The Government of Senegal signed the concession contract with SENAC in 2009, and the preparation of the concession was facilitated by The National Agency for the Promotion of Investments (APIX). APIX was expected to consolidate the institutional framework and develop

contractual arrangements for the Dakar–Diamniadio Toll Highway project and was supported by the Public-Private Infrastructure Advisory Facility.

The Government of Senegal was highly committed to the project as the President was the first person to drive on the road and pay the toll fees. The Government also held stakeholder engagements with members of the society to discuss the structural options for the road and socio-economic drivers of the willingness to pay. The public sector component of the road which consisted of 20.4 km of the road segment Pikine-Patte d'Oie was financed by the Government together with the African Development Bank and the World Bank (Jonga, 2021).

5.4.2 PPP Equilibrium Framework Project Outcomes Analysis: Dakar-Diamniadio Toll Road

Table 12 PPP Equilibrium Framework Project Outcomes Analysis: Dakar-Diamniadio Toll Road

	State	Society	Private Entities
GDP (value saved to the national economy)			~ US\$205 million (per year)
Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities		930	
Climate change impact		+Less pollution due to reduced travel time	
Capital formation Impact	~ US\$448 million		
Quality of service		+Human mobility increased by 1.34 %	+Travel time reduced from 1.5 hours to between 15 – 30 minutes
Fiscal Impact (contributions to Government Revenue)	~US\$100,000 per day		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive -)			+Relatively Affordable Toll Fees Motorcycles (~US\$1.5) Cars (~US\$2.5) Lorries (~US\$5)
Check for satisfying the interests of each criterion (✓ or ✗)	✓	✓	✓

Source: Centre for Public Impact (2018); Fetzer (2015)

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

The Dakar-Diamniadio Toll Road resulted in the creation of 800 jobs during the construction phase and a further 130 jobs after the launch phase (Centre for Public Impact, 2018). This created positive economic impacts for the local population. Human

mobility has also increased by 1.34 percent, as a result more people have access to security, transport, administrative, health and education services in Dakar City Centre (Fetzer, 2015).

It had been reported by the World Bank that Dakar's traffic troubles were costing Senegal at least 0.64 percent of their 2008 GDP which amounts to approximately USD 86 million per year (Gainer, 2016). Senegal's APIX reported that the losses were actually more than twice as large at approximately US\$ 205 million per year (Africa Research Institute, 2017). Therefore, the estimated positive impact of the Dakar-Diamniadio Toll Road on GDP in Senegal can amount to US\$ 205 million in savings due to the improved road infrastructure.

As one result of the project, vehicle travel time has also sharply decreased from one and a half hours to between 15 to 30 minutes. Tolls revenue also generates approximately USD 100,000 per day for the Senegalese government. The lower travel time also results in less vehicle air pollution, a positive environmental impact.

6. Findings and Discussion

6.1 Lessons Learnt on Outcome-based Assessment of Public-Private Partnerships

The success of PPP projects has historically been based on the number of PPP transactions and overall project value. Not enough data has been collected on the socio-economic outcomes of PPP projects. The case study analysis has shown that successful PPP projects are those that have direct or indirect positive impacts on the society, the state, and the private sector. These were the Maputo Port, the Gautrain, and the Dakar-Diamniadio Toll Road. A failed PPP project was that which had negative direct or indirect impacts on the society, the state and the private sector. This was the Tanesco Power Purchasing Agreement project.

Therefore, regardless of how much spending has been allocated to a PPP project, what should matter more is the impact which the PPP project has had on the interests of society, the state, and the private sector. This was evident in the Tanesco Power Purchasing Agreement, where large sums of money were spent on the project, yet the services provided were poor and expensive. This study suggested the following measures regarding assessing the likely impact of a PPP project on society, the state and the private sector:

1. The State

- The fiscal impact of the PPP project, which entails increased revenue for the Government either from taxes or tolls fees.
- Capital formation as a direct result of the PPP project, which has been known to have positive impacts on economic growth (Pasara & Garidzirai, 2020).

2. The Society

- Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) during the construction phase of the PPP and after.
- Following from employment creation, an analysis of the impact of the PPP on household income. Directly because of employment due to the PPP project, or indirectly through positive externalities of the PPP project.
- Climate change impact of the PPP, through reduced greenhouse gas emissions, pollution, or energy usage.
- Improved quality of service being utilized by individuals due to the PPP project.
- Affordability of the services generated by the PPP, to avoid unintended inequalities in terms of access to the service.

3. The Private Sector

- Positive contribution to the gross domestic product due to the PPP project. Economic growth has been known to improve the ease of doing business in Sub-Saharan Africa, which subsequently creates private sector growth (Muhanika, 2021)
- Improved quality of service being utilized by businesses due to the PPP project.
- Affordability of the services generated by the PPP, to avoid unintended inequalities in terms of access to the service.

6.2 Public-Private Partnership Lessons Learnt Based on The Four Analyzed Case Studies

- Political Commitment

Government commitment and support to a PPP project contributes to the overall success of the PPP project. This has been evident in the Maputo Port, Gautrain and Dakar-Diamniadio projects. The government provides support with regards to financial and technical assistance as well as oversight of the project. In the Tanesco and IPTL projects, disputes between the private entity and the state-owned entity contributed to the project's ultimate failure.

- Stakeholder Engagement

Stakeholder engagement is critical in ensuring that the PPP project meets the needs and expectations of the society and the private sector. This was evident in the Dakar-Diamniadio Toll Road project where the society was engaged, and their inputs taken into consideration especially regarding the relatively low toll fees which rendered the service affordable. Lack of consultation on the ground resulted in high service costs regarding the Gautrain and the Tanesco Power Purchasing Agreement which created unintended consequences of unequal access to the services.

- Experienced, Ethical and Capable Concessionaire

The private sector entity in the PPP agreement must have the necessary experience and capabilities to undertake the project. Otherwise, the services provided will be of sub-standard quality. Bombela Concession Company (Pty) Ltd, Gringrod and DP World and SENAC all had the necessary expertise and capabilities to deliver high quality services. IPTL, on the other hand, delivered very sub-standard quality and had unethical practices, due to its lack of capability and experience.

- Strong involvement of development institutions in both public and private financing

Projects like the Maputo Port and the Dakar-Diamniadio attracted financing from development finance institutions such as the DBSA, the African Development Bank, the Agence Francaise de Developpement and the World Bank. Development Finance Institution participation in PPP projects brings not only the much-needed finance but technical support as well as their vast knowledge and expertise in infrastructure delivery.

- Clear and visible benefits

This goes back to the outcomes of PPP projects. Successful PPP projects have clearly identified benefits, whether it is improved and affordable services, employment creation or increased household income. Visible benefits ensure community participation, admiration, and support.

7. Limitations

The study faced limitations as sourcing data with regards to the outcomes of PPP projects has proven to be a difficult task as most PPP projects do not have a social and economic impact analysis component. This limited the number of case studies that were available to use in this study, which ultimately confined the analysis to case studies with sufficient outcome-based data. Also, the case studies included could not be examined comprehensively as analysis could only be confined to the available data.

8. Role of DBSA

As has been seen in case studies such as the Maputo port, the DBSA, as a development finance institution, has a role to play in financing PPP projects where availability of long-term financing is limited or improvement of bankability of projects is required. Based on its superior knowledge and expertise, the DBSA also has a role to play in providing technical assistance to PPP projects. The technical assistance should include structuring PPP projects in a way that the outcomes of the project are in the best interests of the society, the private sector, and the state. An outcome-based analysis of the socio-economic impacts of the PPP projects is required as this study has shown that successful PPP projects tend to be in the best interests of society, the state, and the private sector, as such success should not only be measured by the value and output of the project, but by the outcomes of the project.

9. Conclusion

The objectives of this study were to assess whether public-private partnerships are effective as infrastructure development strategies and whether they balance the interests of society, the state, and the private sector for the desired success. The focus of the study was primarily on the African PPP market. In assessing the effectiveness of PPPs on infrastructure development, this study employed the unique approach of the PPP Equilibrium Framework. The study has shown that PPP projects should be structured in a way that the outcomes of the project are in the best interests of the society, the private sector, and the state.

The case studies used in this study have shown that successful PPP projects are those that satisfy the interests of society, the private sector, and the state through the measured indicators. PPPs that fail are those that have imbalanced or biased interests and are unable to create social compacting by not satisfying the interests of all relevant stakeholders. The study also highlighted the role the DBSA can play in the PPP area

through the funding of PPP projects where availability of long-term financing is limited or improvement of bankability of projects is required. The DBSA also has a role to play in providing technical assistance to PPP projects in terms of structuring such projects to consider their impact on the interests of society, the private sector, and the state.

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