The Journal of Accounting and Management

Institutional Quality and Sustainable Public-Private Investment in Zimbabwe's Sanitation and Water Infrastructure

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Abstract: Zimbabwe lags in PPPs for WSS financing. Limited scholarly work has been conducted on institutional quality and WSS PPPs in Zimbabwe. The current study covers this gap by analysing whether institutional variables impact WSS PPPs closure. Poisson regression analysis is applied on data collected between 1996 to 2021. The study concluded that WSS PPPs response to control of corruption. The relationship is inverse. Counter-intuitively, government effectiveness, lawfulness and freedom of expression relates negatively to the number of PPPs that reached financial closure. Chinese soft diplomacy on Zimbabwe explains the finding. Government of Zimbabwe should strengthen its anti-corruption drive to enhance the attractiveness of WSS investments. Moreso, to attract institutionally elastic Western investors, the government of Zimbabwe must put in place strategies that enhance the country's rule of law, voice and accountability and government effectiveness ranking. Other than institutional variables, evidence is provided that gross domestic product, the level of foreign direct investment, stock market capitalisation, bank credit to deposit ratio and the level on non-performing loans influences water and sanitation PPP investments. Policy design should thus seek to stabilise Zimbabwe's macroeconomic environment and foster bank and capital market development.

Keywords: Infrastructure finance; Sustainable development; Quality of governance

JEL Classification: H24, H55, H31, H53, H20S

1. Introduction

Zimbabwe has vast natural water resources such as rivers, inland lakes, aquifers and swamps (African Development Bank [AfDB], 2018). Unfortunately, having been neglected for long, most of the country's urban water sources are heavily polluted (Matandare & Matandare, 2018). Water resources are essential to achieve the Sustainable Development Goals [SDGs], in particular SDG 6 that is premised on inclusive and sustainable administration of water and sanitation services (WSS) (Nhamo, Nhemachena & Nhamo, 2019). According to Mara and Evans (2018), Herrera (2019), SDG 6 is complementary to the International Drinking Water Supply and Sanitation Decade [IDWSSD] (1981

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to 1990), The Safe Water 2000 and the Millenium Development Goals [MDG] water target. SDG 6 stretches the scope of these preceding global water and sanitation initiatives by extending the spectrum of targets to be achieved as well as expanding the number of stakeholders that facilitates the attainment of the targets. Academics and practitioners have described SDG 6 as an enabler goal that directly or indirectly influences attainment of other SDG targets (Kamau, Chasek & Connor, 2018; Herera, 2019). The goal is linked to the SDGs on health (SDG 3), sustainable cities (SDG 11) and education (SDG 4). Though not specifically stated here, additional linkages between SDG 6 and other SDGs can still be mapped. In view of these linkages, it can be argued that attaining SDG 6 targets has capacity to positively shape Zimbabwe's developmental trajectory. In fact, the conception of WSS in development discourse is not merely intuitive. Empirically, the Global Water Practice [GWP], Organisation for Economic Cooperation and Development [OECD] and the World Bank [WB] have positioned WSS at the center of socio-economic development (Sadoff, Hall, Grey, Aerts, Ait-Kadi, Brown et al., 2015). Symbiotic linkages exist between development processes and water resources.

Accomplishing the WSS targets in Zimbabwe is a huge task impeded by diverse challenges that includes and not limited to technological inadequacies, the infrastructure stock and finance (Herrera, 2019; Mundonde & Makoni, 2024). The water and sanitation sector has struggled to attract fresh capital and resultantly, services coverage has significantly deteriorated. Frequently, sewage reticulation systems suffer large-scale breakdowns, together with the insufficiency of operational chemicals has resulted in unprocessed waste being discharged into major water sources like Darwin-dale dam and Lake-Chivero. According to Hoko, Nhongo and Kugara (2018), Zimbabwe's water treatment plants have outlived their economic life. WSS challenges in Zimbabwe are further exacerbated by the incapacity of the Zimbabwe Electricity Supply Authority [ZESA] to satisfy electricity demand. WSS systems are dependent on availability of electricity to function optimally.

Cases from the African continent provide evidence that well-structured public private partnerships [PPP] can mitigate water and sanitation infrastructure financing challenges (AfDB, 2018). A prime example being the 250 000 cubic meters per day wastewater treatment plant for the newly developed Cairo City in Egypt (Salvador, Trillas, Ricart and Planas, 2016). Structured with expertise from the International Finance Cooperation [IFC], the project attracted USD$200 million worth of investment finance.

Nonetheless, Pérez-D'Oleo, Castro and Herraiz (2015) stated that for developing countries, an underlying challenge in the successful execution of PPP policy is the weakness in the country specific institutional environment. Which is why, relative to China, private investment in WSS PPPs is not as much in Africa. Pérez-D'Oleo et al., (2015), AfDB (2019) stated that attracting private investors in the WSS requires fair, efficient, independent and competent institutions such as regulators, courts and government ministries. Institutions are essential for creating a conducive investment climate where prices are market determined, competence is feasible and the project payback period is shortened (Pérez-D'Oleo et al., 2015). Private investment in public infrastructure is dependent on high level of public corporate governance, control of corruption, law enforcement, transparency and regulatory quality (Pérez-D'Oleo et al., 2015; AfDB, 2019).

The study seeks to examine whether the governance environment determines WSS PPPs financially closed in Zimbabwe. This is important, given the observation that the PPP market in Zimbabwe is under-researched. Since 2012, only 16 peer reviewed articles can be identified. Where the water sector has been identified in Zimbabwe's PPP literature, the institutional environment hasn't been at the core of the study. This is despite the relevance of institutions to PPP financing. The current study intends cover this gap through applying econometric modelling to establish if the governance quality has a bearing on WSS PPP investment in Zimbabwe. Most of the studies on Zimbabwe's PPP market have largely been qualitative in nature (Dube & Chigumira, 2012; Zinyama & Nhema, 2015).

The rest of the study is structured as follows: section two reviews the literature, section three presents the methodology aspects, section four discusses the findings and section five concludes the paper.

2. Literature Review

The PPP governance framework in Zimbabwe is guided by the Zimbabwe Investment and Development Agency [ZIDA] Act of 2020. The Act recognizes a PPP to be an "*agreement between a contracting authority and a counterparty in terms of which the counterparty undertakes to perform a contracting authority's function on behalf of the contacting authority for a specified period of time with the counterparty receiving a benefit for performing the function and assumption of the risks arising thereof"* (ZIDA Act, 2020). In line with PPP international best practices (World Bank [WB], 2024), the ZIDA Act recognizes the establishment of a PPP/Joint Venture Unit [JVU] domiciled within the Ministry of Finance and Economic development [MFED]. The primary functions of the JVU entails and not limited to evaluating infrastructure development proposals against value for money, technological transfer, socio-economic and environmental sustainability metrics (ZIDA Act, 2020). Furthermore, the JVU seeks to establish whether PPP proposals allow for optimal risk transfer between the counterparty and the public representative. A parliamentary committee: the Public Private Partnership Committee [PPPC] that comprises of senior officials from the MFED, industry, transport, energy and power development, justice, economic planning, local government provides oversight to the JVU (ZIDA ACT, 2020). According to the statute, PPPC is mandated to assist with formulating guidelines for PPP agreements, ensure that PPP proposals are in sync with national priorities specified in the National Development Strategy [NDS]. A PPP project is implemented subject to PPPC recommendations.

Principally, PPP proposals are generated either as solicitated or unsolicited bids. Solicitated proposals originate from Government departments or parastatals. Whereas unsolicited bids are a product of private sector innovativeness (ZIDA ACT, 2020). Public or private originating proposals can be modelled as concession contracts the variants of which according to ZIDA Act (2020) are: Built and Transfer [BT], Built Lease and Transfer [BLT], Built Operate and Transfer [BOT], Built Own and Operate [BOO], Built Own, Operate and Transfer [BOOT], Built Transfer Operate [BTO], Contract Add and Operate [CAO], Develop Operate and Transfer [DOT], Rehabilitate Operate and Transfer [ROT], Rehabilitate Own and Operate [ROO] and Build Own Operate and Maintain [BOOM]. Short- and medium-term PPP contracts are permissible under the ZIDA Act (2020). These can be modelled as lease contracts, management contracts and service contracts.

The models specified in the ZIDA ACT (2020) have had varying degrees of implementation in water and sanitation PPPs Africa. Figure 1 depicts the lease contract as having the widest adoption rate (43% of contracts signed). Nwangwu (2018) suggests that, unlike concession contracts lease contracts have moderately low risk profile since the contract duration tends to range between 10 and 15 years. Management contracts accounts for 38% of the contracts that reached financial closure. On average the contract period ranges from 2 to 4 years. Mali and Gabon have used management contacts as pre cursor to award long-term concession contracts (Internation Bank od Reconstruction and Development [IBRD]; Lengwe 2014). Relative to other parts of the world, Africa still lags in using lease and management contracts to ameliorate water and sanitation challenges. The World Bank [WB] PPP database reports more contracts having been closed in Europe, North America and Asia that in Africa.

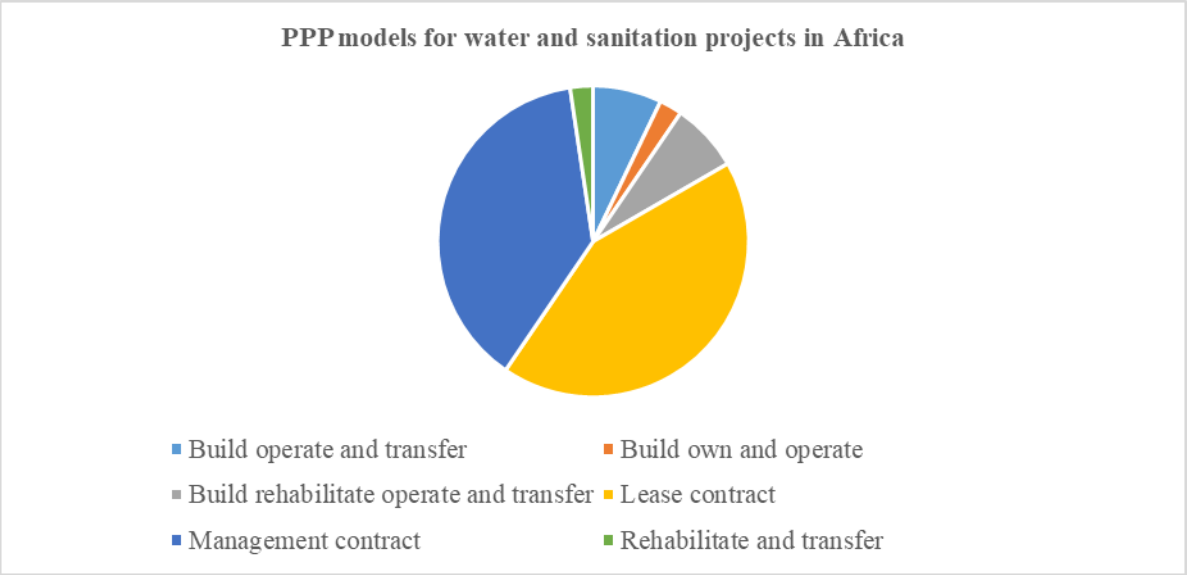

Figure 1. PPP Models for Water and Sanitation Projects in Africa

Regarding concession contracts, Figure 1 shows that BROT, BOT, ROT and BOO accounts for 7%, 7%, 2% and 2% respectively of the water and sanitation contracts reported by the WB PPP database. Concession contracts have been signed in Ghana, Nigeria, South Africa and Rwanda (Ameyaw & Chan, 2017). On average the contracts tenure is 20 years even though some contracts were awarded for 30 years.

Table 1. Water PPP Financing

Country	PPP Models	Investment Value (Million)	Sources of Finance
Rwanda	Build, operate, and transfer	US$60.00	Infrastructure fund and AfDB Loan
South Africa	Build, operate, and transfer	US$11.90	Commercial and Development bank loans
Ghana	Build, own, and operate	US$126.00	Commercial and Development bank loans
Mozambique	Lease contract	US$25.50	IDA and AfDB loans
Mozambique	Lease contract	-	AfDB and IDA loans
Namibia	Lease contract	-	European Investment Bank Loan
Niger	Lease contract	US$3.4	IDA Loan
Senegal	Lease contract	US$20.00	IDA Loan
Ghana	Management contract	-	IBRD Loan
Kenya	Management contract	US$16.00	Donor Funds
Mauritius	Management contract	-	AfDB and EU
Mozambique	Management contract	US$47.00	IDA and AFDB loans
Zambia	Management contract	-	IDA Loan

Source: Author Conceptualization from WB-Private Investment in Infrastructure database

Table 1 summarises the finance sources for selected WSS PPPs in Africa. Both the Transnational Development Organisations [TDO] and private institutions are crucial sources of investment finance. Rwanda's Kigali Water plant is a prime model of a BOT type PPP venture developed through blended finance. The AfDB and the Emerging Africa Infrastructure Fund [EAIF], syndicated the USD40

million loan facility whilst the International Finance Corporation [IFC] along with other fanciers extended the balance (World Bank, 2015). Other projects are financed from private sources, the respect of which commercial banks plays an active role. Approximately 75% of the invested capital was commercial loans from Standard Bank Group (Water Technology, 2013; Multilateral Investment Guarantee Agency [MIGA], 2021). The European Investment Bank [EIB], IBRD and the International Development Association [IDA] are among the major financiers of WSS PPP projects in Africa. For instance, Namibia's USD$15 million Goreangab Water Plant was financed by the EIB. On the other hand, projects in Zambia, Mozambique and Senegal were predominantly financed by IDA loans.

Empirically, the link between institutional environment and PPP investment has been of interest to researchers (Bowen, Edwards and Cartell, 2012; Dithebe, Aigbavboa, Thwala and Oke 2019). Institutional variables are often quantified as eminent determinants of PPP infrastructure development and the findings regarding the impact of institutions are mixed (Pérez-D'Oleo, Castro & Herraiz, 2015). Al-hmoud, and Edwards (2004) adopted a hydro-sanitary approach to investigate whether demographic, economic and political variables determine a conducive environment for private participation in PPP projects for 39 developing nations over the period 1996-2001. The political environment was defined by the six governance pointers reported by the World Governance Indicator [WGI] database. The study concluded that the likelihood of PPP financial closure is not dependent on the political environment but rather the economic environment. The finding can be taken to indicate that the weakness in the institutional environment can be offset by the stability of the economic environment.

Using a much wider, Jensen and Blanc-Brude (2005) evaluated the impact that institutions have on private financing of WSS PPPs in 79 developing countries using Poisson and Negative binomial regression models. Data was collected between 1990 and 2005 and WDI database provided the institutional variables. The study concluded that political stability (PS), control of corruption (CC), rule of law (RL), and government effectiveness (GE) positively and significantly influences PPP investments. The observation is not counter-intuitive given that, according to Ameyaw and Chan (2017), in developing countries, strong institutions safeguard PPP investments from arbitrary nationalization. Moreso, commercial disputes are professionally arbitrated where there is rule of law.

Banerjee, Oetzel and Ranganathan (2006), using Negative binomial regression reported that the more corrupt a country is, the higher the likelihood of attracting private investment in infrastructure. Holding everything else constant, a unit increase in effort to weed out corruption is associated with a 17% decline in the mean of private investment. The Authors argued that it is impossible at times for international companies to circumvent corruption as location and first mover advantages may precisely be associated with corrupt countries. The finding should however be conservatively generalized to Africa given that the continent is weakly represented in the projects that were analysed. On the other hand, rule of law was reported to be positive and significantly associated with private investment in infrastructure.

Percoco (2014) provided evidence that high quality institutions are central to private companies to assume greater risk in PPP projects. The study adopted a developing country perspective and the WDI database provided the institutional variables. The findings of the study are that civil rights and an appropriate project environment in terms of regulation are essentials for attracting private investors in public-private projects. In the same lights as Banerjee, Oetzel and Ranganathan (2006), the study established that control of corruption negatively relates with private investment in PPPs.

Moszoro, Marian; Araya, Gonzalo; Ruiz-Nuñez, Fernanda; Schwartz, Jordan (2015), used a sample of 130 developing countries over the period 1990 to 2010 to investigate among other factors the impact institutions have on PPP investments. The study reported that when PPP infrastructure sectors are analysed collectively, PPP finance is highly responsive to the quality of institutions: GE, CC and RL. However, disaggregating infrastructure investments into subsectors revealed that institutional quality measures are not very significant determinants of investments.

In their analysis of determinants of infrastructure investments, Taguchi and Sinouchi (2019), decomposed infrastructure into brown and greenfield investments and applied Tobit and Negative binomial regression on developing and middle-income countries. The study period was between 2002 and 2017, and the institutional environment was measured by the six institutional measures reported by the World Bank. Both the Tobit and Negative binomial models provided evidence that institutional variables are critical determinants and positively related to private investment in infrastructure. Furthermore, the study reported asymmetric impact of institutional variables between brown and greenfield investments with the impact being higher on green field projects relative to brownfield projects. This implies that institutional risk is higher on the former than the latter.

Rather strikingly, Fleta-Asin and Munoz (2020), reported a significant and inverse association between PS and public-private infrastructure investments. This finding is contrary to Morrissey and Udomkerdmongkol (2012), who emphasised the importance of PS as precursor to drawing private investment in public infrastructure. The inverse relationship between PPP investment and political instability can be explained through the citizen demand for quality infrastructure expressed through public unrest. In which case the government can respond to citizen demand through opening public infrastructure markets to private players. However, VA, GE, RQ, RL and CC are reported in Fleta-Asin and Munoz (2020) as positively related to PPP investments.

Having shown the mixed findings reported in literature regarding the impact of institutional variables on PPP investments, the subsequent section addresses the methodological aspects adopted in the study to ascertain whether institutional variables identified in literature have influence on WSS PPPs in Zimbabwe.

3. Methodology: Data, Variables and Sample

The objective of the study is to ascertain whether governance environment impact WSS PPP investment in Zimbabwe. The measures of institutional environment have been taken form the WGI data bank. Period wise, the study is from 1996 to 2021. The period interval is justified on the grounds that the PPP market in Zimbabwe is still emerging, and it was during 1990s that the first PPP reached financial closure. WDI indicators have been used in previous studies as measures of institutional quality (Percoco 2014; Fleta-Asin and Munoz, 2020). The aggregate indicators consolidate information from 32 independent sources that collate the perceptions of citizens, public and private specialists, nongovernmental organisations, business community about different aspects of a country's governance environment (Pérez-D'Oleo et al., 2015). A non-observed components model is applied to combine the individual data sources to produce the WDI governance indicators. According to the WDI database, the indicators use qualitative data because the actions of corporates and citizens are driven by perceptions and viewpoints regarding governance environment.

Guided by literature, the researcher recorgnises other variables that have a bearing on WSS PPP projects. The factors include gross domestic product per capita (Rao, 2020), reserves to import metric (Kumar, 2019), inflation measured (Kumar, 2019), ratio of foreign direct investment to gross domestic product (Chikaza & Simatele, 2021), equity market capitalization (Ba, Gasmi & Noumba, 2017), bank lending (Hyun, Park, and Tian, 2018) and non-performing loans (Rao, 2020). Data on these variables is obtained from the development indicator database by the World Bank [WDI] and the financial inclusion database [WFI]. The primary source for WSS PPP projects is the Private Participation in Infrastructure [PPPI] data bank maintained by the World Bank. As per the PPPI data bank, WSS projects are composed of water distribution and generation together with water sewage collection and treatment. PPPI data is supplemented with domestic data banks form Zimbabwe Treasury, Central statistics Office [CSO] and the Central Bank of Zimbabwe. Jansen and Blanc-Brude (2005); Jansen and Blanc-Brude (2006) observed that the PPPI data bank does not offer complete coverage of small and medium WSS projects. Table 2 summarises the list of variables underpinning the study.

Table 2. Explanatory Variables

Variable	Indicator	Source of data	Reference
GDPP	Gross domestic product per capita	World development Indicator databank	Wang, Liu, Xiong and Zhu (2019); Yurdakul and Kamasak (2020)
IRIMP	Imports to international reserves ratio	World development Indicator databank	Mundonde and Makoni (2023); Mundonde and Makoni (2024)
INF	Consumer price index	World development Indicator databank	Canamary, Cooper, and Kiymaz (2024)
FDI	Ratio of Net FDI to GDP (%)	World development Indicator databank	Nicholas, M. and Lieberman (2023)
SMC	Value of equity market to GDP (%)	World development Indicator databank	Ba,Gasmi and Noumba (2017) Hyun, Park, and Tian (2018); Mundonde and Makoni (2023)
DBC	Local bank lending credit to GDP (%)	World development Indicator databank	Ba, Gasmi, and Noumba (2010) Ba,Gasmi and Noumba (2017) Hyun, Park, and Tian (2018)
BCD	Bank lending to commercial bank deposits (%)	Zimbabwe Central Bank	Pan, Chen, Zhou and Kong (2019
NPL	Non-performing loans to commercial bank's asset base (%)	Central Bank of Zimbabwe	Mwakapala, L. and Sun (2018); Van Wieringen and Zajontz (2023)
CC	Percentile ranking of corruption control	World governance Indicator databank	Pusok (2016); Sabry, 2015; Mundonde and Makoni 2023
RQ	Percentile ranking of regulatory quality	World governance Indicator databank	Pusok (2016); Sabry, 2015; Mundonde and Makoni 2023
RL	Percentile ranking of the rule of law	World governance Indicator databank	Pusok (2016); Sabry, 2015; Mundonde and Makoni 2023
VA	Percentile ranking of voice and accountability	World governance Indicator databank	Pusok (2016); Sabry, 2015; Mundonde and Makoni 2023
PS	Percentile ranking of political stability	World governance Indicator databank	Pusok (2016); Sabry, 2015; Mundonde and Makoni 2023
GE	Percentile ranking of government effectiveness	World governance Indicator databank	Pusok (2016); Sabry, 2015; Mundonde and Makoni 2023

3.1. Model specification

The methodology closely follows that in Jensen and Blanc-Brude (2006). The dependent is a count: discrete yearly generated signed water and sanitation PPP contracts over the 25 years ending 2021 and having confirmed the absence of over dispersion, Poisson regression modelling is used for econometric estimation. Poisson regression has rarely been used in PPP studies in Zimbabwe despite having been used elsewhere (Sharma, 2011). The Poisson regression model falls under the generalized linear model classification and has an error profile that depicts a Poisson distribution and a natural log link function (Long & Freese, 2001; Coxe, West & Aiken, 2009). The error structure of count data is

not distributed normally (Coxe et al., 2009) hence the use of Ordinary least squares generates biased standard errors and biased test of significance according to Brooks (2008). Based on the research objective, theory and previous studies, the regression models are specified as:

$$NPPP_t = \alpha_0 + \alpha_1 logGDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 logINF_{t-1} + \alpha_4 logFDI_{t-1} + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \varepsilon_t \quad (1)$$

$$NPPP_t = \alpha_0 + \alpha_1 logGDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 logINF_{t-1} + \alpha_4 logFDI_{t-1} + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \alpha_9 CC_t + \varepsilon_t \quad (2)$$

$$NPPP_t = \alpha_0 + \alpha_1 logGDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 logINF_{t-1} + \alpha_4 logFDI_{t-1} + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \alpha_9 RQ_t + \varepsilon_t \quad (3)$$

$$NPPP_t = \alpha_0 + \alpha_1 logGDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 logINF_{t-1} + \alpha_4 logFDI_{t-1} + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \alpha_9 RL_t + \varepsilon_t \quad (4)$$

$$NPPP_t = \alpha_0 + \alpha_1 logGDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 logINF_{t-1} + \alpha_4 logFDI_{t-1} + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \alpha_9 VA_t + \varepsilon_t \quad (5)$$

$$NPPP_t = \alpha_0 + \alpha_1 logGDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 logINF_{t-1} + \alpha_4 logFDI_{t-1} + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \alpha_9 PS_t + \varepsilon_t \quad (6)$$

$$NPPP_t = \alpha_0 + \alpha_1 logGDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 logINF_{t-1} + \alpha_4 logFDI_{t-1} + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \alpha_9 GE_t + \varepsilon_t \quad (7)$$

Where $NPPP_t$ defines the number of PPP agreements signed, $logGDPP_{t-1}$: is defined to be the natural logarithm of a period lag of GDP per capita, $IRIMP_{t-1}$ defines the international reserves to imports ratio, $logINF_{t-1}$ is the natural logarithm of the one period lag of the consumer price index, $logFDI_{t-1}$ defines the natural logarithm of the foreign direct investment lagged once, SMC_t measures the proportion of equity market capitalisation to GDP, DBC_t is the proportion of local bank lending to the private entities, BCD_t: is a metric measuring the proportion of bank lending to bank deposits, NPL_t defines the level non-performing loans, CC_t is the percentile ranking of corruption control, RQ_t measures percentile ranking of regulatory quality, RL_t represents the percentile ranking of the rule of law, VA_t is the voice and accountability, PS_t depicts the percentile ranking of stability of the political climate, GE_t is the percentile ranking of public sector effectiveness and ε_t: defines the error term. Other than controlling multicollinearity by modelling explanatory variables that has a variance

inflation factor [VIF] under 10 (Chikaza & Simatele, 2021), governance variables are added individual to the base model (model 1). Heteroskedasticity is managed by log transformation of variables as well as using robust standard errors (Brook, 2008).

4. Poison Regression Results and Discussion of Findings

Table 3 summarises the variance inflation factor analysis. Variables with VIF under 10 are retained for further analysis. The average VIF is 2.837 which suggests that multicollinearity is adequately managed.

Table 3. Variance Inflation Factor Analysis

Multicollinearity Diagnostic Test		
Variable	**Acronym**	**VIF**
Equity market value to gross domestic product	SMC	5,14
Proportion of foreign direct investment to gross domestic product	logFDI	5.00
Non-performing loans to banking sector asset base	NPL	3,68
Local bank credit to gross domestic product	DBC	3,23
Bank credit to bank deposits	BCD	3,05
Gross domestic product per capita	logGDPP	2,83
Percentile ranking of political stability	PS	2,74
Inflation	logIFN	2,24
Percentile ranking of government effectiveness	GE	2,11
Percentile ranking of regulatory quality	RQ	1,98
Percentile ranking of corruption control	CC	1,87
Percentile ranking of the rule of law	RL	1,86
Percentile ranking of voice and accountability	VA	1,94
International reserves to imports	IRIMP	1,86
Mean VIF		2,823

Table 4. Poison Regression Estimates

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
logGDPP	2,8483***	3.6078***	3.7963**	4.0581***	4.2776***	3.3366***	3.9293***
	(1,0390)	(1.37127)	(1.2573)	(1.5014)	(1.6285)	(1.1410)	(1.3985)
IRIMP	-0.403536	-0.44836	-0.53841	-0.5386	-0.5057	-0.3975	-0.5245
	(0.452580)	(0.51730)	(0.5262)	(0.5128)	(0.5490)	(0.4274)	(0.5267)
logIFN	0.0590508	0.11386	0.20502	0.1217	0.1112	-0.1509	0.1413
	(0.20035)	(0.2004)	(0.19732)	(0.2059)	(0.1872)	(0.2756)	(0.2008)
logFDI	-1.8348**	-2.3327**	-2.3290***	-2.3614**	-2.3232**	-1.7002**	-2.4075**
	(0.75092)	(0.9493)	(0.8557)	(0.9831)	(0.9820)	(0.8719)	(0.9356)
SMC	0.006673	0.0088*	0.0103**	0.0090*	0.0084**	0.0052	0.0096**
	(0.004148)	(0.0044)	(0.0041)	(0.0046)	(0.0042)	(0.004)	(0.0043)
DBC	-.0626819**	-0.0851***	-0.1000***	-0.0888***	-0.0829***	-0.0337	-0.090***
	(0.029002)	(0.02882)	(0.0276)	(0.0302)	(0.0260)	(0.0246)	(0.0284)

BCD	0.038228***	0.06409***	0.07526***	0.06878***	0.05879***	0.0425***	0.0734***
	(.0091161)	(0.0166)	(0.01797)	(0.01722)	(0.0159)	(0.0103)	(0.0183)
NPL	-0.16150***	-0.2174***	-0.2370***	-0.2286***	-0.2107***	-0.174***	-0.215***
	(0.058742)	(0.0775)	(0.0741)	(0.0777)	(0.0776)	(0.0590)	(0.07510)
CC		-0.0532*					
		(0.0273)					
RQ			-0.115873				
			(0.0463)				
RL				-0.0758*			
				(.0340248)			
VA					-0.07566*		
					(0.0449)		
PS						-0.0927	
						(0.0902)	
GE							-0.0610*
							(0.0257)

****, ** and * represents 1%, 5% and 10% level of significance respectively*

The results of the study are given in table 4. Evidence is provided that at 10% level of significance, the control of corruption negatively relates to the count of WSS PPPs. The finding may not be surprising given that Transparency International (2020) ranks Zimbabwe at position 157 out of 180 countries on the corruption index. The UNCT (2021), reiterated that, despite the country's elaborate institutional infrastructure, corruption is a major constraint for companies operating in Zimbabwe. The finding substantiates Bowen, Edwards and Cartell (2012) observation that corruption practices such as tender rigging, kickbacks are widespread in construction projects. Water and sanitation projects are by nature complicated and involves many stakeholders who, for selfish gain compromise ethical conduct (Dithebe et al., 2019). Consequentially, corruption in water and sanitation PPP infrastructure projects give rise to unsustainable project costs, delays project implementation and compromise project outcomes.

Even though Al-hmoud, and Edwards (2004), Jensen and Blanc-Brude (2005) evidenced that the rule of law directly relates to PPP implementation, this is not the case in Zimbabwe. Though the connection between the rule of law index and count of PPPs is significant, the structure is such that the improvement in the rule of law index reduces the count of PPPs agreements in Zimbabwe. The negative relationship is rationalized by the observation in UNCT (2021) that even though the PPP soft infrastructure exist in Zimbabwe, adherence to the same is the key problem. Statutory provisions are sometimes circumvented in PPP implementation. A positive relationship can only be envisaged in the environment where constitutional provisions are adhered to.

Fleta-Asin and Munoz (2021) reported a positive association between voice and accountability and PPP investments. However, the relationship is negative and significant at 10% in the Zimbabwean context. Similarly, government effectiveness, negatively and significantly relates with PPP investment at 10%. The fact that the Asia pacific region, particularly China commands a large share of the PPP market explains the relationships. Shan, Lin, Li and Zeng (2018) and Anderson, Bailey, Alon, Sutherland, (2020) averred that governance variables have limited influence on investment decision in China. For this reason, China is sympathetic to countries that ranks low on WGI indicators. As such, irrespective of Zimbabwe's poor record on voice and accountability (UNCT, 2021), China continues to finance infrastructure development in Zimbabwe. Regulatory quality and political stability are concluded to be insignificant determinants of WSS PPP investment in Zimbabwe.

Other than governance variables, the study established that gross domestic product per capita is a significant determinant (1%) of WSS PPP investments in Zimbabwe. The finding aligns with previous studies in this regard (Sharma, 2011; Rao, 2020). High GDP points to affluent markets with ample

investment opportunities that attract investors. FDI, a proxy for international capital flows significantly influences PPPs in Zimbabwe. The relationship is negative and suggestive of the fact that private sector involvement in WSS is valuable subject to dwindling international capital inflows. The study further confirms that bank market development is imperative to private sector participation in WSS PPPs. Bank credit to deposits ratio is significant at 1% level. Hyun, Park, and Tian, (2018), emphasised the centrality of liquid and capitalized financial institutions in project finance. The notion that non-performing assets impedes lending is supported in the study. Non-performing loans inversely and significantly relates to WSS PPPs. The Reserve Bank of Zimbabwe (2020) noted that, since 2016, the value on non-performing loans has been declining which implies that the odds of PPP projects accessing finance has improved. The study further shows that the size of the stock market is relevant in PPP financing. Ba et al., (2010), Ba et al., (2017) reported similar findings. The level of inflation and the ratio of international reserves to imports does not influence WSS PPPs in Zimbabwe.

5. Conclusion

To examine the impact that the institutional environment has on WSS PPP infrastructure development, the study adopted a quantitative approach. The quality of institution environment is characterised by the six aspects that represent the fundamental dimensions of institutional quality according to the World Bank's Governance Indicator data bank: CC, GE, RL, VA and RQ. Macro-economic variables, bank market development and capital market development variables supplemented the set of governance variables in the analysis. Poison regression is used given that the count of PPPs is the dependent variable, and the period of the study is 1996 to 2021.

The analysis shows that WSS PPPs in Zimbabwe response to corruption. High level of corruption is associated with few PPPs agreements signed. Reflecting the uniqueness of Zimbabwe's institutional environment, the study provided evidence that the RQ, VA and GE percentile ranking inversely relates to the number of PPPs financially closed. An observation that is explained by China's dominance in Zimbabwe's PPP market and its soft diplomacy towards Zimbabwe. Political calmness and the RL have insignificant influence on water and sanitation PPPs. The findings that make a strong case for the government of Zimbabwe to reinforce the enforcement of counter-corruption laws and regulations. The Anti-Corruption Commission of Zimbabwe complemented by other law enforcement agencies should play a leading role in fighting corruption. In as much as the study reports the RL, VA and GE as negatively relating to the count of PPPs, in the interest of attracting PPP finance from European and American sources, Zimbabwe should seek to improve its ranking on these institutional metrics. Soley relying on Asian economies, exposes the water and sanitation sector to concentration risk should China shift its policy standing on Zimbabwe.

Other than institutional variables, evidence is provided that macroeconomic variables: GDPP and FDI, SMC, BCD and NPL influences water and sanitation PPP investments. International reserve to imports ratio does not impact WSS PPP investments in Zimbabwe. Policy design should thus seek to stabilise Zimbabwe's macroeconomic environment. A stable macro-environment enhances the risk profile for water and sanitation PPP infrastructure in Zimbabwe. In the same light, the government should institute strategies that foster capital market and bank market development. Developed capital markets are an essential to financing Infrastructure.

References

AfDB [African Development Bank] (2019). *Zimbabwe Infrastructure Report 2019*. Retrieved from: Documents/Project-and%20Operations/Zimbabwe_Infrastructure_Report_2019_-_AfDB.pdf (accessed 1 January 2021).

Al-Hmoud, R.B., & Edwards, J., (2004). A means to an end: studying the existing environment for private sector participation in the water and sanitation sector. *International Journal of Water Resources Development*, 20(4), 507-522.

Ameyaw, E.E., Chan, A.P., & Owusu-Manu, D.G., (2017). A survey of critical success factors for attracting private sector participation in water supply projects in developing countries. *Journal of Facilities Management*, 15(1), 35-61.

Ba, L., Gasmi, F., & Um, P.N. (2017) The relationship between financial development and private investment commitments in energy projects. *J Econ Dev*, 42(3), 17–40.

Banerjee, S.G., Oetzel J.M., & Ranganathan, R. (2006) Private provision of infra structure in emerging markets: do institutions matter? *Dev Policy Rev*, 24(2), 175–202.

Bowen, P., Edwards, P.J., & Cattell, K. (2012) Corruption in the South African construction industry: a thematic analysis of verbatim comments from survey participants, *Construction Management and Economics*, 30(10), 885-901.

Brooks, C. (2008) *Introductory Econometrics for Finance*. Cambridge University Press

Canamary, B., Cooper, C. & Kiymaz, H. (2024). The State of Public-Private Partnerships in Times of Global Economic Disruption. *Journal of Management Policy and Practice*, 25(2), 26-53.

Chikaza, Z., & Simatele, M. (2021) Private financing for infrastructural development: a search for determinants in public–private partnerships in SSA. *Acta Universitatis Danubius Œconomica*, 17(6), 170–188.

Coxe, S., West, S.G., & Aiken, L.S. (2009). The analysis of count data: A gentle introduction to Poisson regression and its alternatives. *Journal of personality assessment*, 91(2), 121-136.

Dithebe, K., Aigbavboa, C.O., Thwala, W.D., & Oke, A.E. (2019). Analysis on the perceived occurrence of challenges delaying the delivery of water infrastructure assets in South Africa. *Journal of Engineering, Design and Technology*, 17(3), 554-571.

Fleta-Asín, J, & Muñoz, F. (2021). Renewable energy public–private partnerships in developing countries: Determinants of private investment. *Sustainable Development*, 29(4), 653–670.

Herrera, V. (2019) Reconciling global aspirations and local realities: Challenges facing the sustainable development goals for water and sanitation. *World Development*, 118, 106–117.

Hyun, S., Park, D., & Tian, G. (2018). Determinants of public–private partnerships in infrastructure in Asia: Implications for capital market development. *Asian Development Bank Economics Working Paper Series*, 552.

Jensen, O., & Blanc-Brude, F. (2005) The institutional determinants of private sector participation in the water and sanitation sector in developing countries. *4th Conference on Applied Infrastructure Research*.

Kamau, M., Chasek, P., & O'Connor, D. (2018). *Transforming multilateral diplomacy: The inside story of the Sustainable Development Goals*. Routledge.

Kumar, N. (2019). Determinants of public private partnerships in infrastructure: a study of developing countries. *J Commer Account Res*, 8(2), 79–85.

Lengwe, E.C. (2014). *An investigation into the use of existing public-private partnerships models in the Zambian water and sanitation sector*. Heriot-Watt University. London.

Long, J.S., & Freese, J. (2001). *Regression Models for Categorical Dependent Variables Using Stata*. Stata Press, Texas.

Mara, D., & Evans, B. (2018). The sanitation and hygiene targets of the sustainable development goals: scope and challenges. *Journal of Water, Sanitation and Hygiene for Development*, 8(1), 1-16.

Matandare, M.A., & Matandare, T.O. (2015). Effects of water management practices on crop yields at Insukamini irrigation scheme, lower Gweru, Zimbabwe. *Int. J. Sci. Eng. Res*, 6, 45-48.

MIGA (Multilateral Investment Guarantee Agency) (2021). *Guaranteeing Investments in Water and Sanitation Projects*. Retrieved from: https://www.miga.org/sites/default/files/archive/Documents/waterbrief.pdf.

Monica-Lavinia, D.A.N., (2022). The impact of public-private partnership in the energy field on economic growth. *Romanian Journal of Economics*, 54(1 (63)), 24-33.

Morrissey, O., & Udomkerdmongkol, M. (2012). Governance, private investment and foreign direct investment in developing countries. *World development*, 40(3), 437-445.

Moszoro, M., Araya, G., Ruiz-Nuñez, F., & Schwartz, J. (2015). What Drives Private Participation in Infrastructure Developing Countries? *Public private partnerships for infrastructure and business development: Principles, practices, and perspectives*. New York: Palgrave Macmillan US, 19-44.

Mugagga, F., & Nabaasa, B. B. (2016). The centrality of water resources to the realization of Sustainable Development Goals (SDG). A review of potentials and constraints on the African continent. International Soil and Water Conservation Research, 4(3), 215–223.

Mundonde, J., & Makoni, P.L. (2024). Framework Model for Financing Sustainable Water and Sanitation Infrastructure in Zimbabwe. *Water*, 16(12), 1691.

Mwakapala, L., & Sun, B. (2018). Public–private partnership in developing countries: Seeking available domestic financing options. *Journal of Economics, Business and Management*, 7(2), 77-82.

Nhamo, G., Nhemachena, C., & Nhamo, S. (2019). Is 2030 too soon for Africa to achieve the water and sanitation sustainable development goal?. *Science of the Total Environment*, 669, 129-139.

Nhongo, K., Hoko, Z., & Kugara, J. (2018). Investigating disinfectant by-products in Harare potable water supply, Zimbabwe. *Journal of Water, Sanitation and Hygiene for Development*, 8(3), 415-428.

Nicholas, M., & Lieberman, S. (2023). Public-private partnerships and foreign direct investment for space. *The Commercialisation of Space*. Routledge, 103-122.

Nwangwu, G., (2018). Managing contingent liabilities arising from public private partnership projects. *Journal of Sustainable Development Law and Policy*, 9(2), 66-83.

Percoco, M. (2014). Quality of institutions and private participation in transport infrastructure investment: Evidence from developing countries. *Transportation research part A: policy and practice*, 70, 50-58.

Pérez-D'Oleo, J., Castro, C., Herraiz, I., & Carpintero, S. (2015). The influence of the institutional environment on public–private partnership transport projects. *WIT Transactions on The Built Environment*, 146, 399-410.

Pusok, K. (2016). Public-private partnerships and corruption in the water and sanitation sectors in developing countries. *Political Research Quarterly*, 69(4), 678-691.

Rao, V. (2020) *An empirical analysis of factors responsible for the use of capital market instruments in infrastructure project finance.* Retrieved from: https:// www.adb.org/publications/empirical-analysis-capital-market-instr uments-infrastructure-project-finance.

RBZ (Reserve Bank of Zimbabwe) (2020). *Monetary policy statement.* Retrieved from: https:// www.rbz.co.zw/index.php/monetary-policy/monetary-policy-state ments.

Sabry, M.I. (2015). Good governance, institutions and performance of public private partnerships. *International Journal of Public Sector Management*, 28(7), 566-582.

Sadoff, C.W., Hall, J.W., Grey, D., Aerts, J.C.J.H., Ait-Kadi, M., Brown, C., Cox, A., Dadson, S., Garrick, D., Kelman, J., & McCornick, P. (2015). *Securing water, sustaining growth: report of the GWP/OECD task force on water security and sustainable growth*. University of Oxford.

Salvador, J., Trillas, F., Ricart, J.E., & Planas, M.R. (2016). New Cairo wastewater treatment plant (Egypt). *Specialist Centre on PPP in Smart and Sustainable Cities*.

Shan, S., Lin, Z., Li, Y., & Zeng, Y. (2018). Attracting Chinese FDI in Africa: The role of natural resources, market size and institutional quality. *Critical perspectives on international business*, 14(2/3), 139-153.

Sharma, C. (2011). Determinants of PPP in infrastructure in developing econo mies. Transform Gov People Process Policy 6(2), 149–166.

Sutherland, D., Anderson, J., Bailey, N. & Alon, I. (2020). Policy, institutional fragility, and Chinese outward foreign direct investment: An empirical examination of the Belt and Road Initiative. *Journal of International Business Policy*, 3(3), 249-272.

Taguchi, H., & Sunouchi, Y. (2019) The role of institutions in private participation in infrastructure in low-and middle-income countries: greenfield versus brownfield projects. *Econ Bull*, 39(3), 2027–2039.

Van Wieringen, K., & Zajontz, T. (2023). From Loan-Financed to Privatised Infrastructure? Tracing China's Turn Towards Public–Private Partnerships in Africa. *Journal of Current Chinese Affairs*, 52(3), 434-463.

WB [World Bank] (2024). Best Practices on Contract Design in Public-Private Partnerships. Retrieved from: Best Practices on Contract Design in Public-Private Partnerships | Public Private Partnership (worldbank.org).

WT [Water Technology] (2013). *Standard Bank funds desalination plant project in Ghana.* Retrieved from: Standard Bank funds desalination plant project in Ghana (water-technology.net).

Yurdakul, H., & Kamasak, R. (2020). Investment through public private partnership (PPP): The impact of PPP activities on the growth of GDP. *Press Academia Procedia*, 11(1), 150-152.