



Determinants of the successful signing of public–private partnership contracts for water and sanitation infrastructure financing in Zimbabwe

Justice Mundonde  and Patricia Lindelwa Makoni *

Department of Finance, Risk Management and Banking, University of South Africa (UNISA), 1 Preller Street, New Muckleneuk, Pretoria 0002, South Africa

*Corresponding author. E-mail: makonpl@unisa.ac.za; patricia.makoni@gmail.com

 JM, 0000-0002-7991-618X; PLM, 0000-0002-9038-1411

ABSTRACT

The private sector remains hesitant to invest in water and sanitation infrastructure in Zimbabwe. For policymakers and investors, it is pertinent to understand the factors that determine the signing of water and sanitation public–private partnership (PPP) contracts, in order to leverage expertise and resources to achieve the Sustainable Development Goal targets. This study applied count econometrics on data collected for the 25 years from 1996 ending in 2021, with the aim of investigating the determinants of the number of PPP contracts signed in Zimbabwe. Poisson regression estimations identified positive macroeconomic prospects, financial market development, and strong institutional governance environment as important determinants for PPP contracting in Zimbabwe. The number of PPP contracts is further confirmed to be dependent on the availability of inward foreign direct investment flows. The influence of institutional governance quality on the number of water and sanitation PPP contracts was tested using a composite index constructed using the principal components analysis technique. It is advised that the government of Zimbabwe should strengthen their governance institutions and further develop their capital and bank credit markets, so as to attract investors to take up the water and sanitation infrastructure PPP contract opportunities available in the country.

Key words: institutional quality, PPP contracts, Poisson regression, SDG 6, water and sanitation infrastructure, Zimbabwe

HIGHLIGHTS

- Economic sanctions imposed on Zimbabwe have stalled many of its public–private partnership (PPP) infrastructure projects, largely due to its inability to raise adequate capital.
- Strong institutional quality and financial market development are key determinants of the successful signing of PPP water and sanitation infrastructure financing contracts.
- The Zimbabwe government needs to strengthen its institutional governance and investment policy frameworks.

INTRODUCTION

Infrastructure is an indispensable component of the Sustainable Development Goals (SDGs), given its cross-cutting relevance across the 17 SDGs (Renwick *et al.* 2018). Although the impact that infrastructure has on the SDGs can be either direct or indirect, sector-wise, SDG 7 (affordable clean energy) and SDG 6 (clean water and sanitation) have the broadest direct influence on the SDGs (Thacker *et al.* 2019). Practitioners and academics have linked SDG 6 to SDG 3 (health), SDG 4, (education), and SDG 11 (sustainable cities) (Mugagga & Nabaasa 2016; Shah 2016). It can thus be argued that SDG 6 is an instrumental multiplier goal with the capacity to decide Zimbabwe's development pathway, as water and sanitation are at the centre of socioeconomic development. SDG 17, target 17.16, and target 17.17 recommend partnerships that mobilise and share knowledge, expertise, technology, and financial resources to support the achievement of SDGs (United Nations [UN] 2023). In Africa, public–private partnerships (PPPs) have received wider acceptance as several countries are reported to have projects in the pipeline (African Development Bank [AfDB] 2020). Nevertheless, there is no unanimity between academics, practitioners, and governments on what constitutes a PPP (OECD 2012). Organisations differ in their

This is an Open Access article distributed under the terms of the Creative Commons Attribution Licence (CC BY 4.0), which permits copying, adaptation and redistribution, provided the original work is properly cited (<http://creativecommons.org/licenses/by/4.0/>).

conceptualisation of PPPs and definitions that emphasise various dimensions of PPP agreements have been promulgated (Jomo *et al.* 2016).

The UK Home Treasury (1998), accentuating inter-organisational relationships, joint investment, and shared objectives, defines PPPs as follows: ‘*An arrangement between two or more entities that enables them to work cooperatively towards shared or compatible objectives and in which there is some degree of shared authority and responsibility, a joint investment of resources, shared risk-taking, and mutual benefit*’. Partnerships British Columbia (2003), underscoring risk sharing and contractual governance between PPP stakeholders in delivering infrastructure projects, defined PPPs as: ‘*A legally-binding contract between government and business for the provision of assets and the delivery of services that allocates responsibilities and business risks among the various partners*’. The United Nations Economic Commission for Africa [UNECA] (2005) stresses the importance of private sector resources and technical capabilities, and thus defines PPP as ‘*the combination of a public need with private capacity and resources to create a market opportunity through which the public need is met, and a profit is made*’. The World Bank Institute (2012) views PPPs as ‘*A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility and remuneration is linked to performance*’. Much like Partnerships British Columbia (2003), the World Bank Institute’s definition underpins the long-term nature of the contractual agreement and the assumption of major risks by the private partner. Thus, PPPs exploit synergies under joint innovative use of scarce resources, and managerial expertise where this cannot be attained to the same extent without partnering (Jomo *et al.* 2016; Lember *et al.* 2019). The Zimbabwe Investment Development Agency (ZIDA) Act of 2019 considers a PPP to be ‘*an agreement between the contracting authority and the counterpart where the counterpart undertakes to perform a contracting authority’s function on behalf of the contracting authority for a specified period and the counterpart receives economic benefits for the services rendered*’. This definition accentuates the principal-agent relationship in public–private infrastructure development collaboration (Ministry of Finance and Economic Development 2019; Mundonde & Makoni 2023). The ZIDA Act of 2019 stipulates that the private partner is compensated for the risk assumed through mechanics that include parliamentary grants, user charges, and cash flows from the project depending on the contract signed. This variation in PPP definitions makes it imprudent to generalise findings on PPP studies, hence the importance of country- and sector-specific research. We therefore focus our study on the nature of agreements, or contracts, which give rise to the PPPs in Zimbabwe, by specifically considering how they are decided upon.

There are various types of contracts used to formalise PPPs. In the water and sanitation sector, infrastructure PPPs are structured either as concessions, leases or affermage, management or service contracts. Concession contracts are long-term in nature, with contract periods of 20 or more years. Thus, a concession is best suited for infrastructure projects undertaken in countries with strong and predictable economic fundamentals (World Bank Institute 2012). From a public standpoint, concession contracts facilitate the intermediation of private capital for either the rehabilitation or construction of new infrastructure. Due to the long-term nature of the contract, the concessionaire is incentivised to be efficient in the construction, operation, and management of the project. The Asian Development Bank (2008) states that efficiency and effectiveness gains translate into higher economic profit for the operator. Transfer of the full package of financing, construction, and operation responsibilities enables the concessionaire to prioritize and innovate as it deems most effective. Variants of the concession contract such as the Build-Operate-Transfer (BOT) have been proposed (World Bank Institute 2012). The private investor undertakes the construction and operation of a project with ownership of the facility transferring to the public at the expiry of the contract. In turn, the public agency contractually commits to purchasing a minimum level of production in order to guarantee a minimum level of demand that allows the investor to realise the return on investment (World Bank Institute 2012).

Though similar to the BOT, the private investor retains ownership of the asset under a Build-Operate-Own contract (World Bank Institute 2012). The Build-Own-Operate-Transfer provides for private ownership, operation, and transfer of the asset to the public agency. With minimal government interference, the private investor can make economic decisions that include setting prices at levels that compensate for the risk assumed (Ameyaw *et al.* 2017). With a Build-Lease-Transfer (BLT), the private sector invests in the construction of the project, and once complete, operational obligation is moved to the government under a binding lease agreement that is negotiated beforehand. Through the lease, cash inflows from the public agency, payable over the term of the lease, the private players can recoup costs and earn a return on invested capital (Mutandwa & Zinyama 2015). Unlike a BLT, ownership is transferred immediately when construction is completed in a Build-Transfer-Operate. The private player is then granted the legal right to operate the facility on behalf of the government with the revenues shared as per the agreed matrix (Maposa & Munanga 2021). When the infrastructure facility exists but is in

a dilapidated state, a Rehabilitate-Operate-Transfer contract can be used. The private partner commits to refurbishing and maintaining the facility, in return for the right to operate it over the tenure of the contract, after which the facility is transferred to the public sector (Maposa & Munanga 2021).

Other than concession contracts, the ZIDA Act recognises other forms of PPP such as affermage contracts where the private partner is permitted by the public authority to maintain and operate the publicly owned infrastructure (ZIDA Act 2019). Sometimes, authority is granted to the private sector investor to directly bill and collect remittances for the services provided. Although the private operator provides services at their cost, the public sector remains liable for any new investments. The private sector is solely obligated to provide the service, while ownership of the infrastructure assets remains public. On average, the contract tenure ranges from 10 to 15 years, and as such the risk profile is medium, relative to concession contracts (Nwangwu 2018). On the other hand, with a management contract, only the day-to-day management and control of the services provision mechanics are delegated to the private operator. The ultimate obligation for service provision remains the responsibility of the public authority. Normally, the tenure of management contracts is short, ranging from 3 to 5 years, with a limited transfer of financial and commercial risks and responsibilities to the private operator. Management contracts are advantageous in that the public partner benefits from private sector operational efficiencies, while retaining ownership of the infrastructure asset (Nwangwu 2018). A service contract is a performance-oriented contract, anchored on commercial and financial administration that is awarded to a private operator. The private partner receives a pre-determined fee, payable either as a one-time fee payment or any other basis, as stipulated in the terms of the contract. A service contract is ideal when the government is reluctant to relinquish control of public water infrastructure systems to private companies. The effectiveness of service contracts is dependent on the clear definition of the services in the contract design (World Bank Institute 2012). Swai *et al.* (2018) recommended that the nature of a project to be undertaken must inform the choice of PPP model to be adopted. Stakeholders in the PPP deal must agree on the most effective model applicable to the prevailing infrastructure development scenario. The AfDB (2019) thus recommended that, in Zimbabwe, PPP models and contracts should be tailor made to specific infrastructure sectors and projects to be undertaken.

Accomplishing water and sanitation targets in developing countries is a momentous task that is constrained by multifaceted challenges (Herrera 2019). In Zimbabwe, water and sanitation projects have stalled due to financial constraints and other governance factors (Zhou & Chilunjika 2018). Jomo *et al.* (2016) argued that PPPs are a critical source of infrastructure finance if SDG 6 targets are to be achieved. Cognisant of this, the Government of Zimbabwe is making efforts to encourage private participation in water and sanitation infrastructure projects (Ministry of Finance and Economic Development 2019). This study thus seeks to determine the key drivers behind the successful signing of water and sanitation PPP contracts in Zimbabwe. This is pertinent given that largely because of information asymmetry, even in developed countries, there remains a hesitance to participate by the private sector and foreign investors with regard to water and sanitation PPP investments (Panayiotou 2017). Furthermore, the AfDB (2019) suggests that PPP financing policy has to be aligned to a specific country and to infrastructure segments as opposed to a general one-size-fits-all approach. Empirical studies that adopted the AfDB's recommended view are limited for Zimbabwe's water and sanitation sector, a gap that this study seeks to contribute towards in terms of both scholarly and practical insights by confirming the key drivers behind a country's ability to enter into and sign PPP contracts for the water and sanitation sector.

METHODOLOGY

Data, variables, and sample

In order to fulfil its objectives, this study uses secondary data on water and sanitation PPPs in Zimbabwe for a period of 25 years extending from 1996 to 2021, as extracted from the World Bank's Private Participation in Infrastructure (PPI) database. According to the databank, water and sanitation projects comprise water generation and distribution, along with sewage collection and treatment. Since the PPI databank does not provide comprehensive coverage of small water and sanitation projects (Jensen & Blanc-Brude 2006), the Reserve Bank of Zimbabwe (RBZ), World Development Indicators, and the World Governance Indicators' databases and the Government of Zimbabwe publications will supplement the PPI databank. Following the IMF (2006), Taguchi & Sunouchi (2019), and Pan *et al.* (2020), the dependent variable is the count of PPP (NPPP) that reached financial closure. NPPP, the discrete count dependent variable, thus ranges between zero and the maximum number of PPPs recorded per year over the sample period. If there is no water and sanitation PPP signed in a particular year, the dependent variable is zero. As alluded to in the study by IMF (2006), a zero recording may indicate the absence of

new financial flows into the water and sanitation sector through the avenue of PPPs even if the determinants in this study do not provide an inherent justification for not having a signed PPP in the same year. On the other hand, a high count of PPP deals that reach financial close is an indicator of private sector preparedness and commitment to finance water and sanitation PPPs (IMF 2006). Defining the dependent variable in this way distinguishes this study from others that either used survey strategies or qualitative desktop strategies to investigate PPPs in Zimbabwe (Sharma 2011; Sai *et al.* 2015; Chitongo 2017). The explanatory variables are summarised in Table 1.

Governance quality index

Similar to the approach of Nxumalo & Makoni (2021), this study uses the principal component analysis (PCA) technique to construct a composite institutional governance quality index (GIX). Using a composite index is necessitated by the observation in the literature that the World Bank's governance indicators are highly correlated (Jensen & Blanc-Brude 2006; Nxumalo & Makoni 2021). Moreover, there is no consensus among researchers on which governance indicators exert the most pertinent impact on water and sanitation PPP investments (Jensen & Blanc-Brude 2006; Banerjee *et al.* 2006). Conducting the PCA analysis requires the estimation of the eigenvalues of the correlation matrix of the original dataset. The components with high eigenvalues summarise the critical information about the original dataset and account for the greatest variation in the dataset (Nxumalo & Makoni 2021). The eigenvalues of the correlation matrix of the six institutional variables are summarised in Table 2. The first component explains the large proportion of the variation in the dataset (83.67%), and the respective eigenvalue is 5.02037.

Table 3 summarises the eigenvector loadings. It is evident that the first component (PC1) has positive coefficients across the six dimensions of measuring the quality of governance. This suggests that the six measures of governance – control of corruption (CC), regulatory quality (RQ), rule of law (RL), voice and accountability (VA), political stability (PS), and government effectiveness (GE) – played a positive role in explaining the overall governance quality in Zimbabwe. It can thus be deduced

Table 1 | Explanatory variables

Variable	Indicator	Data source	References
GDPP	GDP per capita	World Development Indicators database	Jensen & Blanc-Brude (2006); IMF (2006); Rao (2018)
IRIMP	International reserves to imports ratio	World Development Indicators database	IMF (2006); Sharma (2011); Kumar (2019)
INF	Consumer price index	World Development Indicators database; Reserve Bank of Zimbabwe	IMF (2006); Sharma (2011); Kumar 2019
FDI	Net FDI inflows to GDP (%)	World Development Indicators database	Marozva & Makoni (2018); Chikaza & Simatele (2021)
SMC	Stock market capitalisation to GDP (%)	World Development Indicators database	Ba <i>et al.</i> (2017)
DBC	Domestic bank credit to GDP (%)	World Development Indicators database	Ba <i>et al.</i> (2017)
BCD	Bank credit to bank deposits (%)	Reserve Bank of Zimbabwe	Pan <i>et al.</i> (2020)
NPL	Non-performing loans to bank assets (%)	Reserve Bank of Zimbabwe	Rao (2018)
CC	Control of corruption	World Governance Indicators database	Jensen & Blanc-Brude (2006); Nxumalo (2020)
RQ	Regulatory quality	World Governance Indicators database	Banerjee <i>et al.</i> (2006); Nxumalo (2020)
RL	Rule of law	World Governance Indicators database	Banerjee <i>et al.</i> (2006); Nxumalo (2020)
VA	Voice and accountability	World Governance Indicators database	Banerjee <i>et al.</i> (2006); Nxumalo (2020)
PS	Political stability	World Governance Indicators database	Banerjee <i>et al.</i> (2006); Nxumalo (2020)
GE	Government effectiveness	World Governance Indicators database	Banerjee <i>et al.</i> (2006); Nxumalo (2020)

Source: Authors' own compilation.

Table 2 | Principal components analysis–eigenvalues

Principal component	Eigenvalue	Proportion (of variance)	Cumulative (variance proportion)
1	5.02037	0.8367	0.8367
2	0.74742	0.1246	0.9613
3	0.14065	0.0234	0.9847
4	0.04465	0.0074	0.9922
5	0.03582	0.0060	0.9982
6	0.01107	0.0018	1.0000

Source: Authors' own compilation.

Table 3 | Eigenvector loadings

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
CC	0.4367	-0.1252	0.2781	0.4583	-0.4453	-0.5549
RQ	0.4379	-0.1618	0.0490	-0.2177	-0.5428	0.6615
RL	0.4376	-0.0919	-0.1895	-0.7439	0.1224	-0.4425
VA	0.4256	-0.0213	-0.7539	0.4202	0.2476	0.1103
PS	0.2465	0.9633	0.0936	-0.0220	-0.0326	0.0316
GE	0.4291	-0.1460	0.5542	0.1101	0.6555	0.2134

Note: CC, control of corruption; RQ, regulatory quality; RL, rule of law; VA, voice and accountability; PS, political stability; GE, government effectiveness.

that PC 1, relative to other components, embodies the critical information with regard to the institutional governance environment in the original dataset.

Having applied a data reduction technique to model the variance structure of the institutional governance variables, and afterwards generate the composite index (GIX), we now specify the regression model that best suits our study.

Model specification

The objective of this study is to establish the determinants of the counts of water and sanitation PPPs that reach financial closure in Zimbabwe. Given that the dependent variable is a count, discrete values generated from the yearly signing of PPP contracts between 1996 and 2021. The 25-year time frame is justifiable in view of the realisation that it was during the mid-1990s that the pioneering PPP reached financial closure in Zimbabwe. Being a single-country study, the sample period thus has 25 data points. This study, in line with previous researchers, adopts a Poisson regression model for econometric analysis (IMF 2006; Jensen & Blanc-Brude 2006; Sharma 2011). In as much as the ordinary least squares (OLS) could have been used in the study, OLS has the potential to create estimation problems when count data are involved. Coxe *et al.* (2009) noted that often, count variables violate the two OLS assumptions of conditional normality of error structure and homoscedasticity. Applying OLS under conditions of non-normality in error structure and heteroskedasticity leads to biased standard errors and biased tests of significance (Brooks 2008). The Poisson regression model is a generalised linear model with an error structure that follows a Poisson distribution with a natural log link function and is suitable for use with many different types of error structures and dependent variables. The regression model is specified as follows:

$$NPPP_t = \alpha_0 + \alpha_1 \log GDPP_{t-1} + \alpha_2 IRIMP_{t-1} + \alpha_3 \log INF_{t-1} + \alpha_4 \log FDI_t + \alpha_5 SMC_t + \alpha_6 DBC_t + \alpha_7 BCD_t + \alpha_8 NPL_t + \alpha_9 GIX_t + \varepsilon_t \quad (1)$$

where $NPPP_t$ is the count of PPP contracts signed, $\log GDPP_{t-1}$: is the logarithm of the one-period lag of GDP per capita, $IRIMP_{t-1}$ is the ratio of international reserves to imports ratio, $\log INF_{t-1}$ is the logarithm of the one-period lag of the level of inflation, $\log FDI_t$ is the logarithm of the inflow of foreign direct investment, SMC_t is the stock market capitalisation to GDP ratio, DBC_t is the domestic bank credit to the private sector, BCD_t : is the bank credit to bank deposits ratio, NPL_t is the

non-performing loans (NPLs), GIX_t is the PCA constructed governance index, and ε_{it} is the error term. Multicollinearity is controlled by retaining explanatory variables with a variance inflation (VIF) factor that is less than 10 (Chikaza & Simatele 2021). Robust standard errors are used in the estimation to manage heteroskedasticity, while one-period lag of the macroeconomic variables is used in the model to rule out endogeneity and to manage adjustment lags (Brooks 2008; Ba *et al.* 2017). The multicollinearity analysis for this study is reflected in Table 4 below.

The average VIF is 2.94, which indicates that multicollinearity is sufficiently managed (Chikaza & Simatele 2021). On the other hand, the use of robust standard errors and the log transformation of explanatory variables controls for heteroskedasticity in the model (Brooks 2008). The findings of the study are presented in the following section.

RESULTS AND DISCUSSION

The research findings of our study are presented in Table 5.

Table 4 | Multicollinearity analysis

Variable	VIF	1/VIF
SMC	4.86	0.205629
FDI	3.61	0.276951
DBC	3.22	0.310108
NPL	3.19	0.313640
BCD	3.11	0.321777
GDPP	3.01	0.332011
GIX	2.17	0.460557
IRIMP	1.88	0.532185
IFN	1.43	0.701414
Mean VIF	2.94	

Source: Authors' own compilation.

Table 5 | Regression results

Regression variable	Model estimates	Incident rate ratios
<i>logGDPP</i>	3.929342*** (1.398549)	50.87347*** (71.14905)
<i>IRIMP</i>	-0.5245803 (0.52676)	0.5918037 (0.3117385)
<i>LogIFN</i>	0.1413009 (0.2008627)	1.151771 (0.2313478)
<i>logFDI</i>	-2.407543*** (0.9356433)	0.0900362*** (0.0842418)
<i>SMC</i>	0.0096192** (0.0043829)	1.009666** (0.0044253)
<i>DBC</i>	-0.0904292*** (0.0284301)	0.913539*** (0.025972)
<i>BCD</i>	0.0734527*** (0.0183592)	1.076218*** (0.0197585)
<i>NPL</i>	-0.2159424*** (0.0751012)	0.8057817*** (0.0605152)
<i>GIX</i>	-0.754268** (0.317672)	0.4703548** (0.1494186)
<i>Constant</i>	6.561696 (4.950836)	707.4708 (3502.572)
<i>Number of obs</i>	25	25
<i>Wald chi2</i>	66.18	66.18
<i>Prob > χ^2</i>	0.000	0.000
<i>Pseudo R²</i>	0.2951	0.2951
<i>Log pseudolikelihood</i>	-30.196396	-30.196396

Note: ***, **, and * represent 1, 5, and 10% level of significance, respectively.

Source: Authors' own computations.

Consistent with earlier studies (Jensen & Blanc-Brude 2006; Sharma 2011; Pan *et al.* 2020), GDP per capita significantly and positively influences the number of water and sanitation PPPs in Zimbabwe at the 1% level of significance. High and growing GDP per capita is an indicator of an affluent expanding market with ample investment opportunities (Bodie *et al.* 2013). The opposite holds true. Post the global financial crisis of 2007, countries that are lead adopters of PPP for infrastructure development are characterised by strong GDP per capita (Nikolić *et al.* 2020). More so, the demand for PPP projects in Europe and selected Latin American countries responded positively to the drop in GDP during the financial crisis (Nikolić *et al.* 2020). The import cover in Zimbabwe has largely been very low (Kavila & Roux 2016). Contrary to Nakatani (2017), who established that the level of import cover impacts infrastructure investment through the exchange rate channel, in Zimbabwe, the variable was found to be insignificant. Likewise, this study established that the level of inflation does not determine the number of water and sanitation PPPs in Zimbabwe. This finding can be explained by the realisation that inflation risks in water PPPs are hedged against through claims on precious minerals, especially gold. However, Tshehla & Mukudu (2020), through qualitative survey analysis, identified inflation to be a significant determinant of project finance structures in Zimbabwe. We further unearthed a significantly negative relationship between Foreign Direct Investment (FDI) and the count of PPP contracts, implying that the inverse relationship exhibited points to the fact that private investment in water and sanitation is needed but foreign investors are discouraged by the prevailing economic and investment environmental conditions in the country.

In Zimbabwe, financial market development influences the signing of water and sanitation PPP contracts. Consistent with Ba *et al.* (2017), stock market capitalisation significantly determines the count of PPPs at 1%. The World Bank (2011) noted that, in Africa, stock markets often fail to consistently and adequately finance infrastructure, due to weak market sophistication and shallow services' offerings. Nevertheless, the Zimbabwe Stock Exchange has a long functional history, and strategies have been implemented to enhance the financing potential of the market. This study also confirms that the level of bank market development is a key determinant of the signing of water PPPs. The finding is consistent with Kamau (2016) and Rao (2018) who concluded that, through the credit channel, banks contribute positively to infrastructure development through PPPs. NPLs have a significant and negative causal relationship with the signing of water and sanitation PPPs in Zimbabwe. The finding supports the proposition that non-performing assets curtail financial institutions' lending potential, while high asset quality enhances the propensity to lend towards project finance deals. The RBZ (2020) stated that, since 2015, non-performing loans to total loans ratios have shown improvement, due to the effectiveness of debt recovery efforts, as well as the effective adoption of domestic credit checking processes and infrastructure by most banks in Zimbabwe. The governance composite index is significant (at 5%) and exhibits a negative relationship with PPP infrastructure investment. This confirms that the state and level of institutional governance within the country play a pivotal role in the decision-making of prospective PPP investors, particularly foreigners and the private sector, into water and sanitation projects in the country. Chinese investors, with limited regard for the state of governance in the host country, have become the main sponsors of water PPPs in Zimbabwe, due to limited investor alternatives. Diversifying sponsors and PPP players requires government commitment to improve institutional quality and governance scores, as many foreign investors are sensitive to the institutional governance environment in the project host country. A number of studies have stressed the importance of governance in PPP investments (Banerjee *et al.* 2006; Taguchi & Sunouchi 2019; Fleta-Asín & Muñoz 2021). A good track record on institutional governance variables strongly encourages the signing of PPP contracts.

CONCLUSIONS

This study concerned itself with the identification of the key determinants of the number of water and sanitation infrastructure PPP contracts signed in Zimbabwe during the 1996–2021 period. This study was timely in that Zimbabwe remains under strict economic sanctions from the West (the United States and European Union), but enjoys strong diplomatic and economic ties with the East (China). Despite this, the country remains optimistic that it is attractive to private investors, some of whom are interested in the infrastructural development opportunities that the country presents to them. This study has highlighted the importance of developed financial markets (both bank credit and stock markets), as well as good quality institutions, which are necessary absorptive capacities the country must possess if it stands any chance of harnessing the necessary capital to fund its multiple infrastructural development projects. For the private sector, the contracts must yield a substantial return on investment, or additional value, while for the public sector or government, the project should efficiently (operationally and financially) service the citizens in need. The Zimbabwean government should therefore make efforts to attract more private

domestic and foreign investors to finance its water and sanitation infrastructural development, by strengthening its institutional governance and policy framework and allowing the bi-directional flow of capital by easing capital openness.

The Government of Zimbabwe also needs to foster further bank market and capital market development in order to enhance credit availability and investment opportunities for PPP infrastructure projects.

This article's limitations are that it primarily focused on a single developing country, which has been economically isolated for several decades and the variables analysed may not apply to later phases of water and sanitation projects in Zimbabwe. As such, the findings may have little to no generalisability to other developing countries in the region. Hence, although this study contributes to the ongoing debates on water and sanitation infrastructure contracts in general, using Zimbabwe as the unit of analysis; future studies can extend the focus to other developing countries such as Botswana, Mozambique, Malawi, South Africa, and Zambia for comparison purposes, particularly since those countries are not affected by sanctions as is the case with Zimbabwe. Also, our present focus was on the water and infrastructure sector, so future research can consider a cross-sector analysis to include other infrastructures such as transport and Information and Communications Technologies (ICT), as their determinant factors may vary from the recently identified ones pertaining to a single sector.

DATA AVAILABILITY STATEMENT

Data cannot be made publicly available; readers should contact the corresponding author for details.

CONFLICT OF INTEREST

The authors declare there is no conflict.

REFERENCES

- ADB (Asian Development Bank) 2008 *Public Private Partnerships Handbook*. Available from: <https://www.adb.org/sites/default/files/institutional-document/31484/public-private-partnership.pdf>. (accessed 30 November 2022).
- AfDB (African Development Bank) 2019 *Zimbabwe Infrastructure Report*. Available from: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and%20Operations/Zimbabwe_Infrastructure_Report_2019_-_AfDB.pdf (accessed 1 January 2021).
- AfDB (African Development Bank) 2020 *Supporting Public Private Partnerships in Africa: African Development Bank Ready to Scale Up*. Available from: <https://www.afdb.org/en/news-and-events/press-releases/supporting-public-private-partnerships-africa-african-development-bank-ready-scale-37804>.
- Ameyaw, E. E., Chan, A. P., Owusu-Manu, D. G., Edwards, D. J. & Dartey, F. 2017 A fuzzy-based evaluation of financial risks in build-own-operate-transfer water supply projects. *Journal of Infrastructure Systems* **23** (4), 1–32. [https://doi.org/10.1061/\(ASCE\)IS.1943-555X.0000390](https://doi.org/10.1061/(ASCE)IS.1943-555X.0000390).
- Ba, L., Gasmí, F. & Um, P. N. 2017 The relationship between financial development and private investment commitments in energy projects. *Journal of Economic Development* **42** (3), 17–40.
- Banerjee, S. G., Oetzel, J. M. & Ranganathan, R. 2006 Private provision of infrastructure in emerging markets: Do institutions matter? *Development Policy Review* **24** (2), 175–202.
- Bodie, Z., Drew, M., Basu, A., Kane, A. & Marcus, A. 2013 *Principles of Investments*. McGraw-Hill Education, Sydney, Australia.
- Brooks, C. 2008 *Introductory Econometrics for Finance*. Cambridge University Press, Cambridge, UK.
- Chikaza, Z. & Simatele, M. 2021 Private financing for infrastructural development: A search for determinants in public-private partnerships in SSA. *Acta Universitatis Danubius. Oeconomica* **17** (6), 170–188.
- Chitongo, L. 2017 Public private partnerships and housing provision in Zimbabwe: The case of Runyararo South West housing scheme (Mbuzi) Masvingo. *European Journal of Research in Social Sciences* **5** (4), 17–29.
- 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. <https://doi.org/10.1080/00223890802634175>.
- 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. <https://doi.org/10.1016/j.worlddev.2019.02.009>.
- IMF (International Monetary Fund) 2006 *Determinants of Public-Private Partnerships in Infrastructure*. Available from: <https://www.elibrary.imf.org/view/journals/001/2006/099/001.2006.issue-099-en.xml> (accessed 20 October 2022).
- Jensen, O. & Blanc-Brude, F. 2006 The handshake: Why do governments and firms sign private sector participation deals? Evidence from the water and sanitation sector in developing countries. *World Bank Policy Research Working Paper* No. 3937. Available from SSRN: <https://ssrn.com/abstract=923244>.

- Jomo, K. S., Chowdhury, A., Sharma, K. & Platz, D. 2016 *Public-private Partnerships and the 2030 Agenda for Sustainable Development: Fit for Purpose?* UNDESA. Working Paper No 148. Available from: <https://euagenda.eu/upload/publications/untitled-62393-ea.pdf> (accessed 11 August 2021).
- Kamau, P. 2016 Commercial Banks and Economic Infrastructure PPP Projects in Kenya: Experience and Prospects. *KBA Centre for Research on Financial Markets and Policy Working Papers Series*, WPS/01: 16. Available from: <https://www.kba.co.ke/downloads/Working%20Paper%20WPS-01-16.pdf> (accessed 11 August 2021).
- Kavila, W. & Le Roux, P. 2016 Inflation dynamics in a dollarised economy: The case of Zimbabwe. *Southern African Business Review* 20 (1), 94–117.
- Kumar, N. 2019 Determinants of public private partnerships in infrastructure: A study of developing countries. *Journal of Commerce & Accounting Research* 8 (2), 79–85.
- Lember, V., Petersen, O. H., Scherrer, W. & Ågren, R. 2019 Understanding the relationship between infrastructure public–private partnerships and innovation. *Annals of Public and Cooperative Economics* 90 (2), 371–391.
- Maposa, L. & Munanga, Y. 2021 Public-private partnerships development finance model in Zimbabwe infrastructure projects. *Open Access Library Journal* 8 (4), 1–24. <https://doi.org/10.4236/oalib.1104211>.
- Marozva, G. & Makoni, P. L. 2018 Foreign direct investment, infrastructure development and economic growth in African economies. *Acta Universitatis Danubius. Economica* 14 (6), 90–102. Available from: <https://journals.univ-danubius.ro/index.php/oeconomica/article/view/5059/4674>.
- Ministry of Finance and Economic Development 2019 *The 2019 National Budget Statement. Harare, Zimbabwe*. Available from: http://www.zimtreasury.gov.zw/?page_id=731 (accessed 25 September 2022).
- 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. <https://doi.org/10.1016/j.iswcr.2016.05.004>.
- Mundonde, J. & Makoni, P. L. 2023 Public private partnerships and water and sanitation infrastructure development in Zimbabwe: What determines financing? *Environmental Systems Research* 12 (1), 14. <https://doi.org/10.1186/s40068-023-00295-7>.
- Mutandwa, H. & Zinyama, T. 2015 An analysis of the potential use of public-private partnerships in water infrastructural development in Zimbabwe: The case of Harare City Council. *Journal of Public Administration and Governance* 5 (1), 110–136.
- Nakatani, R. 2017 Structural vulnerability and resilience to currency crisis: Foreign currency debt versus export. *The North American Journal of Economics and Finance* 42 (1), 132–143. <https://doi.org/10.1016/j.najef.2017.07.009>.
- Nikolić, A., Roumboutsos, A., Stanković, J. Č. & Mladenović, G. 2020 Has the latest global financial crisis changed the way road public-private partnerships are funded? A comparison of Europe and Latin America. *Utilities Policy* 64 (1), 1–10. <https://doi.org/10.1016/j.jup.2020.101044>.
- Nwangwu, G. 2018 Managing contingent liabilities arising from public private partnership projects. *Journal of Sustainable Development Law and Policy (The)* 9 (2), 66–83. doi:10.4314/jsdpl.v9i2.5.
- Nxumalo, I. S. & Makoni, P. L. 2021 Analysis of international capital inflows and institutional quality in emerging markets. *Economies* 9 (4), 179. <https://doi.org/10.3390/economies9040179>.
- Nxumalo, I. S. 2020 *International Capital Inflows in Emerging Markets: The Role of Institutions*. Masters' dissertation, University of South Africa, Pretoria, South Africa.
- OECD (Organisation for Economic Cooperation and Development) 2012 *Public Governance of Public Private Partnerships*. Available from: <https://www.oecd.org/gov/budgeting/48144872.pdf> (accessed 15 October 2022).
- Pan, D., Chen, H., Zhou, G. & Kong, F. 2020 Determinants of public-private partnership adoption in solid waste management in rural China. *International Journal of Environmental Research and Public Health* 17 (15), 1–14. doi:10.3390/ijerph17155350.
- Panayiotou, A. 2017 *Infrastructure as a Financial Asset Class*. University College London, London. Available from: https://discovery.ucl.ac.uk/id/eprint/1571849/1/Infrastructure%20as%20a%20Financial%20Asset%20Class_Final%20Thesis_Athina%20P.pdf (accessed 11 August 2021).
- Partnerships British Columbia 2003 *An Introduction to Public Private Partnerships. Update June 2003*. Partnerships British Columbia. Available from: https://www.infrastructurebc.com/pdf/PBC_ARP_2003-04.pdf (accessed 15 October 2023).
- Rao, V. 2018 *An Empirical Analysis of the Factors that Influence Infrastructure Project Financing by Banks in Select Asian Economies*. ADBI No 554. Available from: <https://www.think-asia.org/bitstream/handle/11540/8651/ewp-554-project-financing-infrastructure-ppp-projects.pdf?sequence=1> (accessed 11 August 2021).
- RBZ (Reserve Bank of Zimbabwe) 2020 *Monetary Policy Statement*. Available from: <https://www.rbz.co.zw/index.php/monetary-policy/monetary-policy-statements> (accessed 18 November 2022).
- Renwick, N., Gu, J. & Gong, S. 2018 *The Impact of BRI Investment in Infrastructure on Achieving the Sustainable Development Goals. K4D Emerging Issues Report*. Institute of Development Studies, Brighton, UK. Available at: https://assets.publishing.service.gov.uk/media/5be9560ced915d6a166edb35/K4D_Helpdesk_BRI_REPORT_2018_final.pdf (accessed 6 February 2022).
- Sai, P. J., Muzondo, N. & Muranda, E. 2015 Challenges affecting establishment and sustainability of tourism public and private partnerships in Zimbabwe. *Asian Social Science* 11 (3), 35–50. <https://doi.org/10.5539/ass.v11n23p35>.
- Shah, T. 2016 Increasing water security: The key to implementing the sustainable development goals. *Global Water Partnership (GWP) TEC Background Papers* (22), pp. 1–56. Available at: https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/gwp_tec22_web.pdf. (accessed 17 October 2021).

- Sharma, C. 2011 Determinants of PPP in infrastructure in developing economies. *Transforming Government: People, Process and Policy* 6 (2), 149–166. doi:10.1108/17506161211246908.
- Swai, I. L., Anasel, M. G. & Masue, O. S. 2018 Designing and Managing Public-Private Partnerships in the Water Sector in Big Cities of the Developing World. In: *Handbook of Research on Urban Governance and Management in the Developing World* (Swai I. L., Anasel, M. G. & Masue O. S., eds.). IGI Global, Hershey, PA, pp. 101–117. doi:10.4018/978-1-5225-4165-3.ch006.
- Taguchi, H. & Sunouchi, Y. 2019 The role of institutions in private participation in infrastructure in low-and middle-income countries: Greenfield versus brownfield projects. *Economics Bulletin* 39 (3), 2027–2039.
- Thacker, S., Adshead, D., Fay, M., Hallegatte, S., Harvey, M., Meller, H., O'Regan, N., Rozenberg, J., Watkins, G. & Hall, J. W. 2019 Infrastructure for sustainable development. *Nature Sustainability* 2 (4), 324–331. <https://doi.org/10.1038/s41893-019-0256-8>.
- Tshehla, M. F. & Mukudu, E. 2020 Addressing constraints for effective project finance for infrastructure projects in emerging economies—The case of Zimbabwe. *Journal of Construction Business and Management* 4 (1), 48–59. <https://doi.org/10.15641/jcbm.4.1.806>.
- UK Home Treasury 1998 *Partnerships for Prosperity: The Private Finance Initiative*. HM Treasury, London.
- UN (United Nations) 2023 *The Sustainable Development Goals Report: Special Edition*. Available from: <https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf> (accessed 18 September 2023).
- UNECA (United Nations Economic Commission for Africa) 2005 *Public Private Partnerships for Service Delivery: Water and Sanitation*. Available from: <https://hdl.handle.net/10855/14326>
- World Bank 2011 *Zimbabwe's Infrastructure: A Continental Perspective*. Available from: <https://openknowledge.worldbank.org/bitstream/handle/10986/27258/647390WP0P12420e0country0report0Web.pdf?sequence=1&isAllowed=y> (accessed 2 February 2021).
- World Bank Institute; PPIAF 2012 *Public-Private Partnerships: Reference Guide Version 1.0*. © World Bank, Washington, DC. Available from: <http://hdl.handle.net/10986/16055> (accessed 2 February 2021).
- Zhou, G. & Chilunjika, C. 2018 A peep into the sources of policy implementation inertia in Africa: The case of the matabeleland Zambezi water project (MZWP) in Zimbabwe. *Asian Journal of Empirical Research* 3 (4), 447–463.
- ZIDA Act 2019 *Zimbabwe Investment and Development Agency Act Chapter 14:37*. Available from: <https://zidainvest.com/downloads/Zimbabwe%20Investment%20Development%20Agency%20Act%202019.pdf>

First received 1 June 2023; accepted in revised form 4 November 2023. Available online 17 November 2023