

Sources of financing public infrastructure projects in South Africa

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Abstract:

The lack of financial investment in infrastructure development limits the delivery of public infrastructure; thus, it is important to ensure adequate investments for the delivery of infrastructure. This study aims to identify sources of financing public infrastructure projects in South Africa. To achieve the objective of the study, a quantitative method was used to gather data; the data was collected using closed-ended questionnaires that were distributed using google forms. The sample of 196 respondents, currently registered with the Councils for the Built Environment Professions (CBEP), was approached to form part of the study. 153 of the 196 completed and returned questionnaires (a response rate of 78%). The data received was analysed and interpreted using descriptive statistics and exploratory factor analysis. Given the explored sources of financing public infrastructure projects in South Africa, the findings reveal that government budget, Development Bank of Southern Africa (DBSA), local tax revenues, Public-private partnerships (PPPs) and state-owned enterprises (SOEs) are the key sources available for the South African government to use to finance public infrastructure projects in the country. Currently, in South Africa, government and state-owned entities mostly finance the delivery of public infrastructure, and financing only from the government is not adequate to meet the infrastructure-financing needs. This study recommends that the private sector participate in infrastructure investment and project financing schemes in order for the government to be able deliver the much-needed infrastructure and that international and innovative financing schemes should be considered for the financing of public infrastructure projects in South Africa.

Keywords:

Delivery, financing, public infrastructure, innovative

1 Introduction

Public infrastructure assets perform a critical role in the economic growth and development of any nation. Across the world, the delivery of public infrastructure has a huge impact on the sustainability of the economy and on the social welfare of the country (Schraven, Hartman & Dewulf, 2011:61). Therefore, it is important to ensure adequate investments for the delivery of infrastructure. According to Boex, Malik, Brookings and Edwards (2016:1-2), the delivery of public infrastructure does not only assist the country to overcome the significant challenges posed by rapidly growing populations, but it also assists the country to realise its full potential

in the development of a growing economy. Thus, infrastructure delivery plays a fundamental role in the economy of any developing country as the socio-economic success of developing countries is largely dependent on the development and delivery of infrastructure (Dithebe, Aigbavboa, Thwala & Oke, 2019:55; Oluwabukumi, A.O., et al., 2019).

In the past years, efforts to improve the infrastructure in South Africa to accommodate the rapidly growing population have been visible. The government of South Africa contributes more than 40% of the country's total infrastructure investment and has identified infrastructure development as a catalyst that can be used to enhance the economic growth and the social development of the country (Construction Industry Development Board (CIDB), 2019). Furthermore, the government of South Africa has prioritised infrastructure spending as a strategy to grow the economy of the country (Khumalo, Choga & Munapo, 2017). However, because most of the country's infrastructure has reached its useful lifespan, the efforts appear to be meaningless as indications of the need for infrastructure assets become visible. Due to a lack of private investors who are willing to invest in public infrastructure and other numerous factors, the government has not been able to deliver public infrastructure on a larger scale.

2 Literature Review

Infrastructure is the key element of a nation's economic movement, it enables the delivery of clean water, proper sanitation, educational facilities, communication services, health facilities, electricity and many other services (CIDB, 2019). The citizens of any nation expect their infrastructure systems to provide them with power and accessible clean water, to remove waste and enable them to travel and communicate without any struggle (Dahms, 1987:4). Hence, infrastructure is viewed as the primary support of any economy (Chen, 2018:126).

The demand for the public infrastructure is increasing apace across the world as new cities are being formed and populations grow rapidly (Noring, 2019:125). The population in the cities around the world was only 746 million in 1950; currently, it sits on 3.9 billion and it is predicted to be 6.4 billion by 2050 (United Nations, Department of Economic and Social Affairs, 2015:2; The One Brief, 2016). The dominating region is Sub-Saharan Africa with an increase in urban population of 40% between 1950 and 2010 (Shackleton, Blair, De Lacy, Kaoma, Mugwagwa, Dalu & Walton, 2018:273). According to Hodson, Marvin, Robinson and Swilling (2012:790), the World Bank (2019) and The One Brief (2016) more than 60% of the world's population will be living in cities by 2050 and there will be a need for more public infrastructure assets.

The injection of financial resources into the development of public infrastructure is an important component of economic growth (Xhala, Nemec & Kajimo-Shakantu, 2016:66; Ellis, Edwards, Thwala, Ejohwomu, Ameyaw & Shelbourn, 2021). The lack of financial investment in infrastructure development limits the delivery of infrastructure in developing countries (United Nations, 2013:2). In South Africa, it is mainly the government and state-owned entities (SOEs) who finance infrastructure development (Dithebe, Aigbavboa & Thwala, 2019:104). As the need for investment in the development of public infrastructure is rapidly growing, financing solely from national budgets may not be adequate to meet the infrastructure-financing needs (Biancone & Radwan, 2018:88). Therefore, for the government

to be able to deliver the necessary infrastructure, the private sector must participate in infrastructure investment and project financing schemes (Biancone & Radwan, 2018:88).

2.1 Sources of financing public infrastructure projects

Governments, especially of developing economies, struggle to deliver adequate public infrastructure and the countries' economies fail to grow due to the high fiscal deficit (Dithebe, Aigbavboa, Thwala & Oke, 2019:556). According to Biancone and Radwan (2018:88), the demand for public infrastructure is increasing exponentially, however, the governments' ability to finance public infrastructure development is limited. Traditionally, the delivery of public infrastructure has been financed by the following sources: local government budgets, grants and subsidies from higher levels of government and borrowings, but all these financing sources are now facing constraints (Peterson, 2008).

The private sector has the ability and depth to finance the development of infrastructure (Annamalai & Hari, 2016). It can assist governments and finance the development of the necessary infrastructure using the capital market, such as pension funds (Chong & Poole, 2013:65). It is reported that an average of approximately 1% of pension funds are invested in the development of infrastructure around the world. Meanwhile, in countries like Mexico and Brazil, pension funds account for up to 20% of the country's gross domestic product (GDP). This indicates a major, yet to be tapped, potential source of financing the delivery of public infrastructure (Williams, 2014:10). Furthermore, the assets of high-net-worth individuals (HNWIs) are estimated to be just above US\$42 trillion, which is almost 68% of the world GDP. Therefore, if a small percentage of that could be invested into infrastructure development, the infrastructure investment gap could be narrowed drastically (Williams, 2014:10). According to the Organisation for Economic Co-operation and Development (OECD) (2015:15), project bonds, municipal sub-sovereign bonds, green bonds, direct lending to infrastructure projects, syndicated project loans and equity finance are some of the sources that could be used for infrastructure financing. In addition, innovative financing schemes could fast-track investment in the development of infrastructure assets.

2.1.1 Development banks

Development banks play a vital role in eliminating the gap between infrastructure delivery and investment by funding projects that the private sector is not able to finance, either due to their risk profile or to the size of the project (Williams, 2014:8). Development banks charge interest rates that are below market rates, repayment periods are longer and more flexible and loans from the development banks are normally coupled with technical assistance to ensure that projects are implemented successfully and are sustainable in the long term (Williams, 2014:17; Newman, Edwards, Martek, Lai, Thwala, and Rillie, 2020). The purpose of development banks in many countries is to finance sectors of the economy that governments report to be underfinanced by private financial institutions (PFIs) (Poole, Toohey & Harris, 2014:125). Development banks give loans, guarantees or equity investments directly to the borrower or through private financial intermediaries, on condition that the funds are used for a particular sector, such as infrastructure development (Poole et al. 2014:125).

2.1.2 *Commercial banks*

Commercial banks play a vital role in financing infrastructure projects through loans, providing performance guarantees and letters of credit (Williams, 2014:9). In countries like Brazil, Chile and Mexico, commercial banks are the leading funders of infrastructure projects, especially public infrastructure projects because there is the possibility of measuring infrastructure project risks accurately compared to projects that are not backed by public resources (Williams, 2014:9; Mwanaumo, Thwala, & Mambwe, 2018). However, many countries in Africa are not able to attract long-term local and foreign currency infrastructure financing from commercial banks due to low or absent sovereign credit ratings (Shendy, Kaplan, Zachary & Mousley, 2011:10).

2.1.3 *Public-private partnerships (PPPs)*

The private sector has the ability and depth to finance the development of infrastructure (Annamalai & Hari, 2016; Nazir, Edwards, Shelbourn, Martek, Thwala & El-Gohary, 2020). The governments, especially of developing economies, struggle to deliver enough public infrastructure and the countries' economies fail to grow due to their high fiscal deficit (Dithebe, Aigbavboa, Thwala & Oke, 2019:556). The private sector can assist the government and finance the development of the necessary infrastructure using capital markets like pension funds (Chong & Poole, 2013:65). The innovative financing schemes can fast-track the investment towards the development of infrastructure assets (Zawawi, Ahmad, Umar, Khamidi & Idrus, 2014:180).

Public-private partnerships (PPPs) are long-term arrangements between the government and the private sector for the provision of goods and services to the public. The concept emerged in the United Kingdom in the 1980s as a result of the government's inability to deliver improved infrastructure on a large scale because of limited funds (Jefferies, Gajendran & Brewer, 2013:809). Governments can utilise PPPs to enhance the delivery of infrastructure assets, using the expertise and innovation of the private sector and the leverage of private finance (World Bank, 2017; Ahmed, Edwards, Lai, Roberts, Debrah, Owusu-Manu, Thwala, 2021). Through PPPs, the parties involved create a close partnership and commit themselves to deliver improved and efficient goods and services (Othman & El-Gendawy, 2012:379). PPPs are one of the strategic initiatives undertaken by the Indian Government to enhance the delivery of public infrastructure as they encourage the participation of the private sector to assist the "extremely short of money" government to develop infrastructure (Agarchand & Laishram, 2017: 642).

Table 1 below shows the distribution of the public-private partnership projects in China in 2017. Public-private partnerships (PPPs) play a huge role in the delivery of infrastructure across the world; through PPPs, the public and the private sector forms a collaboration and shares resources to achieve one goal. The private sector develops the infrastructure with its own money and the financial, construction and operation risks lie with them, and they recoup their money with profit by either charging end users for the usage of the infrastructure or by receiving a payback from the government over a long period (The Advertiser, 2011). The Advertiser (2011) further notes that the public sector benefits through delivering an infrastructure to the public without bearing any risks, as the financial, construction, operations and maintenance risks are transferred to the private sector.

Table 1: Distribution of the public-private partnership projects in China, in 2017

Types of PPPs	Number of PPPs Projects	Percentage of PPPs Projects
Build, Operate and Transfer (BOT)	6476	77.24%
Build, Own and Operate (BOO)	452	5.39%
Toll, Operate and Transfer (TOT)	390	4.65%
Renovate, Operate and Transfer (ROT)	223	2.66%
Operation and Maintenance (O&M)	60	0.72%
Management Contract (MC)	4	0.05%
Other	779	9.29%
Total	8384	100%

Source: Tan & Zhao (2019:515)

3 Research Methodology

The research methodology adopted to collect, analyse and interpret data was carefully selected as the best way to meet the purpose and the objectives of this study. Therefore, because of its level of objectivity, a quantitative approach was chosen to identify sources of financing public infrastructure projects in South Africa. Furthermore, a quantitative approach was adopted because it is suitable for comparing results using the primary data and through it one can easily describe the present status of what exists without manipulating anything. The research was conducted in the Republic of South Africa, mainly in the Gauteng province as the population is well-represented in this province. The respondents for study were professionals in the construction industry i.e., architects, landscape architects, quantity surveyors, engineers, construction & project managers, working for both the public and private sectors.

Purposive sampling was used to select the study sample because only a portion of the specialty group was required to fulfil the objectives of the study, not the entire population. The sample of 196 respondents, based in South Africa, was approached to form part of the study, however only 153 of the 196 completed and returned questionnaires (a response rate of 78%). The sample size was based on the population of 83 418 individuals registered with the Councils for the Built Environment Professions (CBEP), listed by the Council for the Built Environment (CBE) in their 2018/19 annual report. The sample size was determined using Yamane's simplified formula; the desired confidence level is 95% and level of precision is 7%. The mathematical formula for determining the sample size is as follows:

$$n = \frac{N}{1+N(e)^2}$$

Where: n – Sample size

N – Population size

e – Level of precision

Closed-ended questionnaires were developed from the literature reviewed to collect primary data for the study and they were distributed via emails to respondents through google form links. The respondents chose their responses, using the Likert scale and there was no option to give reasons for choosing specific answers as the questionnaire structure was closed-ended. The data received was then analysed and interpreted using the IBM Statistical Package for Social Science (SPSS) to provide descriptive statistic results, i.e., mean item scores, standard

deviations and Cronbach's alpha. Furthermore, exploratory factor analysis was undertaken to group the variables in accordance with their variance, SPSS was used.

4 Findings

4.1 Biographical data analysis

The findings that were drawn clearly showed that 7% of the respondents had a national diploma as their highest qualification, 5% had national higher diplomas, 49% had bachelor's degrees, 24% had honour's degrees, 13% had master's degrees and only 2% had a doctorate. Twenty two percent of the respondents were registered with the Engineering Council of South Africa (ECSA), 9% were registered with the South African Council for the Architectural Profession (SACAP), 26% with the South African Council for the Landscape Architectural Profession (SACLAP), 17% with the South African Council for the Project and Construction Management Profession (SACPCMP), and 26% were registered with the South African Council for the Quantity Surveying Profession (SACQSP). The distribution of the sample according to the respondents' years of experience clearly showed that only 4% of the 152 respondents had less than 12 months experience in their respective professions, 41% of the respondents had between 1 and 5 years of experience, 24% had between 5 and 10 years of experience and respondents who had between 10 and 15 years, 15 and 20 years and more than 20 years of experience in their respective professions were represented by 12%, 7% and 11% respectively. These results give a clear indication that the respondents had a sufficient working experience and the adequate academic qualifications to understand matters concerning the sources of financing public infrastructure projects. Therefore, the response received from the respondents can be deemed reliable based on the results obtained.

4.2 Sources available to finance public infrastructure projects

The respondents' rankings of the extent of usage of sources available to finance public infrastructure projects in the Gauteng Province of South Africa are presented in descending order in Table 2 below. The respondents were required to indicate the extent of usage of sources of financing for public infrastructure projects, using the following five-point scale: 1 = No Extent, 2 = Small Extent, 3 = Moderate Extent, 4 = Large Extent and 5 = Very Large Extent. Table 7.15 shows that government budget ranked first with a mean item score (MIS) of 4.38 and standard deviation (SD) of 0.898; Development Bank of Southern Africa (DBSA) ranked second with an MIS of 3.75 and SD of 1.169 and Local tax revenues ranked third with an MIS of 3.72 and SD of 1.142. Public-private partnerships (PPPs) ranked fourth with an MIS of 3.68 and SD of 1.082; State-Owned Enterprises (SOEs) ranked fifth with an MIS of 3.64 and SD of 1.147 and Investment Programme for South Africa (IIPSA) ranked sixth with an MIS of 3.53 and SD of 1.271. Furthermore, Grants and subsidies ranked seventh with an MIS of 3.40 and SD of 1.236.

On the other hand, the least ranked factors include Municipal sub-sovereign bonds, which ranked twenty first with an MIS of 2.55 and SD of 1.212, Bilateral Investment Treaties (BITs) had an MIS of 2.55 and SD of 1.255 and ranked twenty second, followed by Green bonds funding with an MIS of 2.53 and SD of 1.212; and Syndicated project loans, land transfer fees and sharia-compliant financing (Islamic Financing) were the lowest ranking sources of financing. Syndicated project loans ranked twenty fourth with an MIS of 2.48 and SD of

1.201, Land transfer fees ranked twenty fifth with an MIS of 2.45 and SD of 1.211 and sharia-compliant financing ranked twenty sixth with an MIS of 2.01 and SD of 1.083. The average mean of the extent of usage of sources available to finance public infrastructure projects was 3.01.

Table 2: Sources of financing

Sources of financing	$\bar{x}$	σX	R
Government budget	4.38	0.898	1
Development Bank of Southern Africa (DBSA)	3.75	1.169	2
Local tax revenues	3.72	1.142	3
Public-private partnerships (PPPs)	3.68	1.082	4
State-owned enterprises (SOEs)	3.64	1.147	5
Infrastructure Investment Programme for South Africa (IIPSA)	3.53	1.271	6
Grants and Subsidies	3.40	1.236	7
Local government borrowings	3.38	1.292	8
Fees and User Charges	3.24	1.259	9
Direct lending to infrastructure project	3.20	1.299	10
Project bonds	3.07	1.318	11
Commercial banks	2.97	1.187	12
Equity finance	2.86	1.250	13
Private capital	2.85	1.132	14
African Development Bank (AfDB)	2.80	1.153	15
Multilateral Development Banks (MDBs)	2.76	1.276	16
Foreign direct investment	2.73	1.139	17
Pension funds	2.68	1.209	18
Special-Purpose Bonds	2.60	1.164	19
Land Value Capture	2.59	1.182	20
Municipal sub-sovereign bonds	2.55	1.212	21
Bilateral Investment Treaties (BITs)	2.55	1.255	22
Green bonds funding	2.53	1.212	23
Syndicated project loans	2.48	1.201	24
Land Transfer Fees	2.45	1.211	25
Sharia-Compliant Financing (Islamic Financing)	2.01	1.083	26

$\bar{x}$ = Mean item score, σX = Standard deviation; R = Rank

5 Discussion

According to the results, the level of usage of the following financing sources was rated highly: Government budget, Development Bank of Southern Africa (DBSA), Local tax revenues, public-private partnerships (PPPs), State-owned enterprises (SOEs), Infrastructure Investment Programme for South Africa (IIPSA), Grants and subsidies, Local government borrowings, Fees and user charges, Direct lending to infrastructure project and Project bonds. The level of usage of the financing sources was ranked from one to eleven with mean item scores that were above average. The findings are in agreement with those of Peterson (2008), Williams et al. (2014:8), Biancone and Radwan (2018:88) and Dithebe et al. (2019:104). They all found that the level of usage of the financing sources ranked from first to eleventh is

relatively high. Moreover, Commercial banks, Equity finance, Private capital, African Development Bank (AfDB), Multilateral Development Banks (MDBs), Foreign direct investment, Pension funds, Special-purpose bonds, Land value capture, Municipal sub-sovereign bonds, Bilateral Investment Treaties (BITs), Green bonds funding, Syndicated project loans, Land transfer fees and Islamic financing were rated as less used.

The level of usage of these financing sources ranked from twelve to twenty-six with mean item scores that were below average. Even though the financing sources that are ranked from twelve to twenty-six are largely used in many developed countries, in South Africa, most of these sources are either adopted less frequently to finance public infrastructure projects or they are not used at all. The findings correspond with the research results of Shendy et al. (2011:10), Chong and Poole (2013:65), Williams et al. (2014:9), Zawawi et al. (2014:180) and OECD (2015:15). The results found that the financing sources ranked from twelve to twenty-six are not highly used in developing countries.

6 Conclusion and Further Research

The lack of financial investment in infrastructure development limits the delivery of public infrastructure, and lack of funding is the major challenge, hindering the development of public infrastructure in South Africa. Currently, in South Africa, government and state-owned entities mostly finance the delivery of public infrastructure. However, government financing is not adequate to meet the infrastructure-financing needs.

If South Africa wants to enhance its economy and compete with the best nations around the globe, its government must lure the private sector and partner with it to deliver efficient infrastructure assets. Even though the private sector is encouraged to invest in the delivery of public infrastructure, it is only the government that can set the regulations and preserve lead planning responsibility for public infrastructure. Therefore, it is important that the government sets clear, stable and credible policies to attract investors who will be committed to injecting financial resources into public infrastructure.

Lastly, the purpose of this study is not only to identify sources of financing that can be utilised to enhance the delivery of public infrastructure in South Africa but also aim to contribute to the built environment body of knowledge by providing various perceptions and lessons from public infrastructure pioneers around the world. These will help to develop a clear approach that can be used to finance the delivery of public infrastructure on a larger scale.

7 References

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