DISSERTATION

Innovating the funding models for transport megaprojects in Kenya

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Declaration

I, Brian Gachichio Karanja, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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ABSTRACT

Investment in physical infrastructure - roads, bridges, power plants, hospitals, schools, airports, sea ports, water ports, railways etc. - is a fundamental ingredient in the growth and economic development of a country. Compared to countries like Singapore, South Korea and China, countries in Sub-Saharan Africa have significantly underinvested in infrastructure over the years, resulting in stunted growth. Kenya has a large infrastructure funding gap, and with ballooning government debt, the country cannot solely rely on the government to meet its infrastructure funding needs. This study looks at the two predominant infrastructure funding models in Kenya, government funded procurement and public-private partnerships, to understand the salient features of each of the models and the causal relationships between them, before embarking on a process of creating a new model that results in the benefits of both. This systematic combining method emancipates the researcher, allowing the study to make use of Roger Martin's process of integrative thinking to innovate new models for funding transport megaprojects in Kenya.

TABLE OF CONTENTS

TABLE OF GRAPHS AND FIGURES

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To you the reader, I paraphrase Herbert Spencer: *the great aim of education is not knowledge, but action.*

ABBREVIATIONS

BPS	Budget Policy Statement
CS	Cabinet Secretary
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GNI	Gross National Income
GNP	Gross National Product
HSR	High speed railway
IDA	International Development Association
IFC	International Finance Corporation
IMF	International Monetary Fund
IPO	Initial public offering
KRA	Kenya Revenue Authority
KRC	Kenya Railways Corporation
MIGA	Multilateral Investment Guarantee Agency
MTDS	Medium Term Debt Strategy
MTP	Medium Term Plan
PFMA	Public Finance Management Act
PPP	Public-private partnership
RBA	Retirement Benefits Authority
RVR	Rift Valley Railways
SGR	Standard gauge railway
SSA	Sub-Saharan Africa
SDG	Sustainable Development Goal
URC	Uganda Railways Corporation

INTRODUCTION

Research area and the research problem

Kenya has underinvested in transport infrastructure since the country gained independence in 1963. As a consequence, its economy has performed well below its potential, with the per-person GNI[1] measured at US$ 1,340 in 2015 by the World Bank, and the country ranked 83rd (out of 140) in the 2016 Happy Planet Index[2] (Jeffrey, Wheatley, & Abdallah, 2016, p. 4). Its contemporaries from five decades, Singapore and South Korea, are now leading lights in the league of industrialised countries while Kenya "remains among the poorest 25% of countries in the world, and the poverty is high at around 40 percent of the population" (World Bank Group, 2016b, p. vi). Since the early 2000s the country has embarked on an aggressive infrastructure building path guided by its *Vision 2030* development blueprint that seeks to transform Kenya into an "industrializing middle income country providing a high quality of life for its citizens by the year 2030" (Government of the Republic of Kenya, 2007).

Owing to under-collection by the national tax authority, KRA, in the past, Kenya would be forced to fund large portions of its national government budget, including recurrent expenditure, from sources such as foreign aid. With budget deficits year-in year-out, and an inability to fully fund even recurrent spending, the country's pace of developing its infrastructure was significantly hampered. Under these conditions, the country lapsed into an 'infrastructure deficit trap' where the state was unable to pay for infrastructure programs, and the general public infrastructure deteriorated. Given fixed quantities of capital and labour, a country with advanced technology will produce much more output than another one using outdated technology. A country's transport infrastructure is a proxy for its technological advancement and a contributor to its capital stocks (Blanchard, 2017, p. 210). Considering two countries, one with an efficient, well-connected transport system and another whose transport system is ever in gridlock, the nation with the better transport system is expected to yield much more output for the same level of inputs. In Kenya's context of insufficient tax collections, government budget deficits and a reliance on public debt and foreign aid to fund the state's

[1] GNI (formerly GNP) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output, plus net receipts of primary income (compensation of employees and property income) from abroad.

[2] The Happy Planet Index (HPI) measures how nations are performing at achieving long, happy, sustainable lives for their people, ranking countries on the basis of citizens' wellbeing, life expectancy, inequality of outcomes and ecological footprint.

expenses, there was little capacity for the nation to make the required infrastructure investments. Following a regime change in the year 2002, fresh impetus of political will was harnessed and focus placed squarely on KRA to improve tax collections, and within a decade, tax revenues had increased nearly 3 times. In fact, the government's recurrent expenditure[3] was fully-funded from domestic revenue collections[4] by the year 2005. The improved national accounts created capacity for the state to make use of budget deficits to pay for infrastructure programs. In effect, while budget deficits have remained, their purpose has completely changed – from meeting recurrent expenditure needs, to funding infrastructure programs. The former perpetuates the *infrastructure deficit trap* that creates an environment of slow economic growth, while the latter creates a virtuous cycle where infrastructure investment speeds up growth. Consequently, a large part of Kenya's new infrastructure has been paid for through budget deficits that are funded through public debt. As a result, the overall public debt portfolio has ballooned, standing at 52.7% of GDP as of the end of September 2015 (International Monetary Fund, 2016). Kenya's capital markets are quite sophisticated, and the government has taken advantage of this to issue bonds earmarked for funding infrastructure projects. Domestic public debt has shot up in the last decade, rising from 6.3% of GDP in 2009 to 24% in 2015 (Government of the Republic of Kenya, 2010, 2015b), demonstrating the government's success in tapping domestic private capital to fund infrastructure. In international markets, Kenya's debt must be attractive enough to investors who are exposed to a wide variety of investment options, by providing satisfactory returns that allay country risk fears. Locally, government debt has the effect of signalling the cost of credit in the economy, with the private sector paying a risk premium over and above the rate established by "risk free" government debt. The higher the interest rate on government securities, the higher the cost of credit for individuals and corporates, and this has the effect of slowing down economic growth since credit is more expensive and increasing the general level of prices in the economy (inflation). Depending on how high the cost of capital is driven, it may cancel out or even negate the short-term growth impact that investments in infrastructure are expected to produce. A delicate balance indeed, but one that must be met if a debt-fuelled budget deficit approach is used to fund infrastructure projects and the desired outcomes are to be achieved. The country needs to

[3] Expenditure, as used here, includes cash payments for operating activities of the government in providing goods and services. It includes compensation of employees (such as wages and salaries), interest and subsidies, grants, social benefits, and other expenses such as rent and dividends.

[4] Domestic collections here comprise cash receipts from taxes, social contributions, and other revenues such as fines, fees, rent, and income from property or sales, but excluding grants.

continue spending heavily to close its infrastructure deficit. But with a growing mountain of public debt, national budget deficits are fast losing their lustre as a primary mode of infrastructure. Kempe (2010) puts it bluntly that the strategy is no longer sustainable and advises that "given the order of magnitude of the annual infrastructure spending requirements, there is need to mobilise other sources of investment capital and more needs to be done to attract private investment and PPPs, in particular private participation in infrastructure (PPI)" (Kempe, 2010, p. 99). Kenya needs alternative models of funding its public infrastructure programs to avoid a fiscal crisis and keep its goal of achieving economic prosperity by the year 2030 alive. A reduced public debt balance would release resources previously paid out to service public debt, which could be directed towards infrastructure projects, or other government programs. With a smaller debt portfolio, the public debt burden would not only be reduced but the overall economy would be more robust to shocks or other economic crises that may arise and require urgent funding.

This study explored the economic significance of transport infrastructure, and the characteristics of a unique type of infrastructure project, the megaproject, owing to their increased frequency as a mode for delivering infrastructure. The funding landscape for infrastructure in Kenya was reviewed and the two key funding models explored in depth. The traditional government procurement process and private-capital infrastructure financing initiatives were investigated, to develop understanding about how and why they worked. Martin's (2007) integrative thinking framework was used to activate the method of systematic combining put forward by Dubois and Gadde (2002), to interrogate the infrastructure funding problem in Kenya, and to interact with the empirical world in trying to develop innovative solutions.

This study aspired to contribute to the general body of literature on *economic development*; specific propositions in the areas of *innovation theory* and *infrastructure financing* would be icing on the proverbial cake. As a living body of work, the study should be of importance to scholars, policy makers, and practitioners in the areas of development economics and finance, and innovation theory, with ideas and language from these spheres of knowledge used frequently in this study.

Research questions and scope

The study explored the funding landscape for infrastructure projects in Kenya, and closely looked at the two dominant infrastructure funding models: the government procurement process and private-capital funding initiatives. Applying the method of systematic combining allowed the researcher to move between the worlds of theory and data using integrative thinking as a guiding framework to analyse the problem of funding infrastructure in the Kenyan case. The integrative thinking process required a deep understanding of the salient features of both funding models, and would draw on those insights to identify the essential features for success in privately-financed infrastructure initiatives. Once the study arrived at this point, it was well placed to shine a light on the weak links in the current funding systems, and point out areas in which improvements could be made to make the entire funding ecosystem for transport megaprojects in Kenya more efficient. Increased efficiency would increase the ease with which resources can flow into the funding ecosystem for transport megaprojects. By doing so, the study hoped to answer the following questions:

- Who were the key players in the infrastructure funding ecosystem in Kenya?
- What were the bottlenecks in the ecosystem?
- What roles have private-capital financing initiatives played in the development of infrastructure in Kenya?
- How can the private sector be better incentivised to direct capital into transport megaprojects?

Megaprojects are typically large-scale infrastructure projects that cost at least US$ 1 billion. Considering that the economies of most African countries do not exceed US$ 100 billion in size, transport megaprojects are a relatively novel and rare phenomenon on the African continent. Because African countries are priced out from pursuing them, they are very few and far in between. To address the challenge this posed in collecting data, the study widened its scope to include projects that cost US$ 100 million or more implemented between 1st January 1991 and 31st January 2016. Considering that the study is situated in the African context where many countries are still grappling with the challenges of poverty, lack of access to clean drinking water, lack of food and other basic human needs, lowering the cost threshold set by Flyvbjerg (2014) was would not have adverse effects on the central point being advanced. So while such projects do not exactly fit the bill in terms of cost as described by Flyvbjerg (2014), they remain (when looked at in context) "large-scale complex ventures" that tend to "take many

years to develop and build, involve multiple public and private stakeholders, are transformational, and impact millions of people" (Flyvbjerg, 2014, p. 6). This redefinition and re-scaling of the phenomenon of megaprojects ensured there was a data sample that was large enough for analysis. The study considered a variety of megaprojects, from air and sea ports, to roads, bridges and pipelines, airlines, cargo and commuter rail projects, bus service systems, power plants and telecommunications projects. To improve the data sample further, the study loosened the definition of *megaprojects* to include any projects costing at least KES 10 billion or about US$ 100 million in 2016 terms.

From the onset, the study was conscious that it faced several obstacles which would impact negatively upon the data, findings, and analyses, and, possibly, the final recommendations:

- As already mentioned, there is a limited number of projects that cost US$ 1 billion or more in Africa. Consequently, the study has responded to this limitation by widening its scope to include those costing at least KES 10 billion or US$ 100 million in 2016 terms. Considering that Kenya's GDP was about US$ 8 billion in 1991 and approximately US$ 63 billion in 2015, the frequency of individual infrastructure projects costing US$ 1 billion or more would certainly be low.

- Access to project documents that detail project players and the relationships between them may not be publicly available. The study may be forced to rely on sources that are not purely scholarly such as published reports or media sources, which may not necessarily be academic in their style and content.

- There is a possibility that the available data may be focussed on a narrow subset of infrastructure (such transport or energy infrastructure), or even a smaller subset such as rail systems (under the transport sector) or hydroelectric power plants (under the energy sector). This could introduce bias into the data and its derivatives, and could potentially lead the outcomes of the study into a less-than-objective direction.

Research assumptions

Based on the research questions and the scope of the study, the initial assumption is that there are enough megaprojects implemented in Kenya in the years running from 1 January 1991 to 31 January 2016 for the study to analyse as a sample.

It is possible that some projects were implemented in phases, divided into stand-alone 'medium-scale' projects that may each have cost less than the KES 10 billion threshold amount that the study has set as a sample criterion. In such an event, the researcher assumes that by consolidating the mini-projects into a larger construct that is satisfactory for study, the defining features of the mini-projects are not lost.

The researcher assumes that 1 Kenyan shilling will not be able to purchase the same bundle of goods in January 1991 as in January 2016. The study shall consider the time value of money and the depreciating purchasing power of money over time. Where necessary, projects shall be stated at their 2016 terms, values which would be different from their nominally-stated costs.

Research ethics

The Ethics Clearance form was submitted for review and clearance was subsequently received in July 2016.

Given that the study does not involve the use of interviews or surveys, or primary data that involves collection from human or animal respondents, the researcher does not anticipate ethical concerns arising out of human or animal interaction.

The researcher took all measures to ensure that all data that is collected and analysed, any third-party citations made shall be referenced appropriately.

LITERATURE REVIEW

This research study locates itself at the nexus of various topics and in the writings of various scholars. The research problem can be looked at from several points of view, and thus the intellectual foundation on which the study rests needs to be broad enough to coherently address the problem. Literature on the role of infrastructure in economic growth and development, the emergence of megaprojects as an increasingly popular method of delivering infrastructure, the role and usage of PPPs in delivering infrastructure, the problems of sovereign debt accumulation and other related topics is covered to demonstrate that the research problem is real and demands serious attention, before embarking on an effort to innovate potential solutions to the problem. Let us begin at the beginning.

The role of transport infrastructure in growing an economy

A frequently used framework for thinking about growth is a model developed by the economist and Nobel Prize winner Robert Solow in the 1950's. The Solow growth model is, 6 decades on, the textbook[5] framework students are taught and that economists use to think about growth. The Solow growth model shows how labour, technology and capital interact to affect the output of goods and services. We shall use Solow's model to understand the role of transport infrastructure in economic growth.

Solow's 1956 model puts it that "there is only one commodity, output as a whole, whose rate of production is designated *Y(t)*… Part of each instant's output is consumed and the rest is saved and invested… Output is produced with the help of two factors of production, capital and labor, whose rate of return is *L(t)*. Technological possibilities are represented by a production function *Y=F(k,L)*" (Solow, 1956, p. 66). Solow's model has been revised over the years, but it remains a cornerstone of economic growth modelling because of its logic and explanatory power. Infrastructure, including transportation systems, can be thought of as a part of a country's capital stocks (k), and as denoted in the production function above, an increase in the capital stocks shall result in increased output (for a given level of labour). Blanchard makes the point succinctly while discussing economic growth in France after World War II: "There is plenty of anecdotal evidence that small increases in capital led to large increase in output. Minor repairs to a major bridge would lead to the reopening of the bridge. Reopening

[5] The Solow growth model features prominently in the most recent editions of macroeconomics textbooks, such as Mankiw (2016) and Blanchard (2017).

the bridge would significantly shorten the travel time between two cities, leading to much lower transport costs. The lower transport costs would then enable a plant to get much needed inputs, increasing production, and so on" (Blanchard, 2017, p. 224). To grow an economy, that is, to increase the quantity of output produced each year, Solow's model is intuitive and direct:

(i) You can increase consumption, say by increasing the rate of consumption per person for a given level of population, or you can increase the population of consumers;

(ii) You can increase the quantity of output saved by reducing present-day consumption, which will have the effect of increasing the quantity available for future consumption;

(iii) You can increase the present stock of capital by tapping into past savings, which will effectively increase future output;

(iv) You can increase the productivity of a given level of labour, resulting in increased yield for a given level of labour employed. This approach, one the world has witnessed and enjoyed for a century, is referred to as *technological progress*.

An increase in physical public infrastructure[6], then, has a direct catalytic effect on economic growth and transport infrastructure is specifically concerned with improved connectedness between the factors of production and markets. Through this improved connectedness, the economy I catalysed to grow even faster. R.D. Mallion, in making his case regarding the relationship between transport networks and economic development, puts forward that "the role of transport lies not only in accommodating the needs of directly productive sectors such as agriculture and industry, but also in initiating and accelerating growth" (Mallion, 1960, p. 8). The author continues that "it is no coincidence that the periods of intensive railway construction in Great Britain, the United States, pre-Soviet Russia, Italy and other countries were also their periods of rapid economic development" (p. 8), stating that market expansion and increased mobility of goods and people would only be part of the explanation for this phenomenon. Mallion (1960) suggests that the heavy investment required to develop transport infrastructure has a multiplier effect on investment and income in other sectors of the economy, thereby pushing the overall economy upwards.

[6] As defined by Otto and Voss (1995) who refer to *infrastructure* as "capital projects that are pervasive inputs into production: that is, projects that provide services used at any one time by a large number of different firms and individuals to facilitate production" (Otto & Voss, 1995, p. 181).

Jean-Baptiste Say put it powerfully in his 2-century old treatise: "Commercial, in like manner as manufacturing industry, concurs in production, by augmenting the value of a product by its transport from one place to another. A quintal of Brazil cotton has acquired greater utility, and therefore larger value, by the time it reaches a warehouse in Europe, than it possessed in one at Pernambuco. The transport is a modification that the trader gives to the commodity, whereby he adapts to our use what was not before available; which modification is equally useful, complex and uncertain in the result, as any it derives from the other two branches of industry. He avails himself of the natural properties of the timber and the materials used in the construction of his ships, of the hemp whereof his rigging is composed, of the wind that fills his sails, of all the natural agents brought to concur in his purpose, with precisely the same view and the same result, and in the same manner too, as the agriculturalist avails himself of the earth, the rain, and the atmosphere" (Say, 1821, p. 66). The mere act of transporting finished goods to markets adds value (or utility, as Say puts it) to those finished goods, because the potential economic value they possess is more likely to be unlocked at the market place, than at the factory warehouse. The mere act of better connecting factors of production through improvements in a country's transport network similarly adds value to those separate factors of production: raw materials are more likely to be converted into value-added products, labour is more likely fulfil its internal potential to produce valuable goods and services if they are exposed to a wider variety of raw materials that can be utilised, capital is likely to be productive if it can be moved to where it is needed most, and so on. In itself, transport infrastructure may not have as much direct value to an economy (when compared to the project's cost) other than the short-term economic bump experienced during the construction phase. The *real* -and much more important- value of transport infrastructure is the economic multiplier caused by the 'spillovers' and these are often exponentially more valuable than the cost of individual transport projects.

In his 1776 *magnum opus* describing how nations build wealth, Adam Smith made the importance of good transportation networks clear. Mr. Smith describes 3 modes of transport, goods for delivery, and their estimated freight costs. In one scenario, a "broad-wheeled waggon, attended by two men, and drawn by eight horses, in about six weeks' time carries and brings back between London and Edinburgh near four ton weight of goods…In about the same time a ship navigated by six or eight men, and sailing between the ports of London and Leigh, frequently carries and brings back two hundred ton weight of goods. Six or eight men, therefore, by the help of water-carriage, can carry and bring back in the same time the same

quantity of goods between London and Edinburgh, as fifty broad-wheeled waggons, attended by a hundred men, and drawn by four hundred horses[…] Were there no other communication between those two places, therefore, but by land-carriage, as no goods could be transported from the one to the other, except such whose price was very considerable in proportion to their weight, they could carry on but a small part of that commerce which at present subsists between them, and consequently could give but a small part of that encouragement which they at present mutually afford to each other's industry. There could be little or no commerce of any kind between the distant parts of the world. What goods could bear the expense of land-carriage between London and Calcutta?" (Smith, 1776). While Mr. Smith's work is well known for its theme of the self-regulation of free markets, that the supply of goods and services rises and falls to meet demand, this freedom is encumbered by external pressures caused by the regulatory environment, tax laws, externalities[7], and others. While individuals and firms certainly are motivated by profits, there are not *only* motivated by profit. Therefore, even if markets were as free as Smith intended, externalities such as bridges on the road between London and Edinburgh, and ports along the seas between London and Leigh, greatly influence which means of transportation is used to deliver a consignment of goods, which in turn affects the price of delivered goods and the volume of trade carried out. The spillovers from improvements in transport networks are hard to quantify precisely, probably because of how diffused they tend to be, but they are easily seen and felt. In Mr. Smith's case, traders at the main London markets will immediately notice the 50-fold increased volume of cheaper goods brought on by usage of the London-Leigh cargo ship compared to the London-Edinburgh road wagons. Consumers will immediately experience the reductions in price and exponential increase in the variety of goods they can purchase. The savings made by use of cheaper, more efficient cargo transportation can be channelled towards hiring more labour to load and unload cargo at the London port, and hence the wagon drivers who would likely suffer dismissal following the introduction of the London-Leigh sea route would have alternative employment opportunities, with the net economic effect being a win for all.

In a John Maynard Keynes' 1933 essay written in preparation for the World Economic Conference (also referred to as the London Economic Conference), he speaks optimistically about the power of capital development as a means to restore (and by extension, cause)

[7] Externalities or external effects are the "impacts of activities in one market on another market without compensation" (Blum, 1998, p. 84). Positive externalities are the benefits that accrue to one market owing to activities in another market. For example, when the roads and street lights in a certain residential area are rehabilitated, the prices of houses in that area usually shoot up.

economic prosperity. “It is often said that it costs £500 capital expenditure on public works to give one man employment for one year. This is based on the amount of labour directly employed on the spot. But it is easy to see that the materials used and the transport required also give employment… But if the new expenditure is additional and not merely in substitution for other expenditure, the increase of employment does not stop there. The additional wages and other incomes paid out are spent on additional purchases, which in turn lead to further employment[…] Moreover, in so far as the increased demand for food, resulting from the increased purchasing power of the working classes, served either to raise the prices or to increase the sales of the output of primary producers at home and abroad, we should to-day positively welcome it… Nor have we yet reached the end. The newly employed who supply the increased purchases of those employed on the new capital works will, in their turn, spend more, thus adding to the employment of others; and so on” (Keynes, 1933, pp. 9–10). By Keynes’ analysis, even the direct and immediate economic impact caused by construction of new infrastructure has positive multiplier. Thus, the overall economic value derived from expanded transport infrastructure, directly during the construction phase and indirectly thereafter, while difficult to precisely measure, is very substantial. Transport infrastructure, by increasing the connectivity of raw materials to centres of production, production centres to domestic and foreign markets, shortening the time and reducing the costs of freight, significantly contribute to a nation’s speed of economic growth.

Mankiw et. al augment Solow’s framework by including human capital in their model. After analysing data of real income, government and private consumption for over 90 countries for a 25-year period, the authors conclude that “the accumulation of physical capital has a larger impact on income per capita than the textbook Solow model implies” when human capital is considered in the economic growth framework (Mankiw, Romer, & Weil, 1992, p. 432). If we use national literacy levels and the attainment of primary, secondary, and tertiary education as a measure of human capital, the findings of Mankiw and company (1992) bode well for Kenya with the country introducing a free public primary education program 14 years ago, which has helped raised the adjusted net primary enrolment[8] rate from 62.68% in 2002 to 86.21% in 2012, and is on course to introduce a follow-on free public secondary education policy.

[8] The World Bank defines the adjusted net primary enrolment rate as the total number of students of the official primary school age group who are enrolled at primary or secondary education, expressed as a percentage of the corresponding population.

The challenge of public infrastructure such as transportation systems is that they are, by their nature, largely exempt from the incentivising effects of markets. Orthodox economics puts it that the interaction of demand for a specific product and the supply of that product, through a market, leads to the determination of a price, the level of which market demand and supply reaches equilibrium. "When a good does not have a price attached to it, private markets cannot ensure that the good is produced and consumed in the proper amounts. In such cases, government policy can potentially remedy the market failure and increase economic well-being" (Mankiw, 2015, p. 216). Mankiw defines public goods as those that are "neither excludable nor rival in consumption[9]. That is, people cannot be prevented from using a public good, and one person's use of a public good does not reduce another person's ability to use it". The author goes on further to define common resources as those that "are rival in consumption but not excludable. For example, fish in the ocean are rival in consumption: When one person catches fish, there are fewer fish for the next person to catch. Yet these fish are not an excludable good because, given the vast size of an ocean, it is difficult to stop fishermen from taking fish out of it" (Mankiw, 2015, p. 216). The reason this comes up – public goods and common resources – is because they are inextricably linked to the topic of externalities, and, I submit, transport infrastructure can be thought of as economic externalities. "For both of these types of goods, externalities arise because something of value has no price attached to it. If one person were to provide a public good, such as a tornado siren, other people would be better off. They would receive a benefit without paying for it – a positive externality. Similarly, when one person uses a common resource such as the fish in the ocean, other people are worse off because there are fewer fish to catch. They suffer a loss but are nor compensated for it – a negative externality. Because of these external effects, private decisions about consumption and production can lead to an inefficient allocation of resources, and government intervention can potentially raise economic well-being" (Mankiw, 2015, p. 217). Transport infrastructure is not subject to the price-setting mechanism of markets because it is partially a public good and partially a common resource. For this reason, society relies on government to provide transport infrastructure and through state intervention, as Mankiw puts it, private economic well-being can be raised. Bartelsman, Caballero and Lyons (1991) investigate the transmission of externalities in US manufacturing. The authors find that in the short-run, the linkage between an industry and its customers is the most important factor in the transmission of external effects,

[9] Mankiw defines excludability as "the property of a good whereby a person can be prevented from using it". The author further defines rivalry in consumption as "the property of a good whereby one person's use diminishes other people's use" (Mankiw, 2015, p. 216).

while in the long-run, it is the linkage between an industry and its suppliers that is essential (Bartelsman, Caballero, & Lyons, 1991, p. 16). The stronger the linkages between an industry and its customers and suppliers, the greater the spillover effect of positive external effects on that industry on other sectors of the economy. In effect, transport infrastructure is itself not only a positive externality to an economy, but also can be a transmission mechanism for externalities between other sectors of the economy, enhancing the case for greater investment in national transport infrastructure. In their study on the relationship between road transport infrastructure and economic growth in India, Tripathi and Gautam are explicit that "transport projects may lead to economies of agglomeration, that is, positive externalities in terms of the productivity benefits that firms gain from being located close to other firms through knowledge spillover, access to more suppliers and larger labour markets. Second, reduced transport costs would save resources and may lead to increased output. This effect would be larger, the bigger the price-cost margins. Third, transport projects may lead to improved labour supply, for example, cheaper commuting may give people better access to jobs and it can also help in specialisation of labour" (Tripathi & Gautam, 2010, p. 136). The authors expand the scope of discussion under theme of transport infrastructure and externalities by highlighting "the dynamic externalities associated with transport infrastructure" (p. 136) and in particular, *network dynamic externalities*, those that "represent knowledge spillovers resulting from the whole agglomerated area" (p. 136). The authors find that there exists a positive long-run relationship between the network dynamic externalities that result from transport infrastructure and the level of GDP, the rate of employment and gross public capital formation. Furthermore, Tripathi and Gautam find that the long-run elasticity of output as measured by GDP is positive with respect to public capital, an important conclusion which "suggests that in the long term, public investment crowds in both private capital and employment" (p. 148), two macroeconomic variables that a developing country such as Kenya would need to improve if it desires to grow its economy quickly.

Without heavy focused investment in a country's transport infrastructure, growth may occur, but with it, growth is almost certain to occur at a much faster pace. The marginal gains to the economy are restricted to the country's base, that is, a country's level of economic development, with marginal gains narrowing as the base rises. For Kenya, starting from a national GDP level of around US$ 1,400 dollars, the gains to be made from heavy investment in the country's transport infrastructure are nothing short of enormous. At the same time, it must be made clear that infrastructure is neither the silver bullet that permanently fixes the

economic growth problem, nor the hen that forever lays the golden growth eggs. The relationship between transport infrastructure and economic growth is a nonlinear one, and the marginal effects of increased transport investment diminish as the stock of transport infrastructure accumulates. Deng clarifies that "once a threshold level of the transport network is exceeded, additional transport investments (building a new link or upgrading an existing link) tend to bring less impact on the economy, as accessibility enhancement benefits become limited…The magnitude of the impact of transport infrastructure investment on productivity and economic growth depends on the development stage of the transport network" (Deng, 2013, p. 694). The immediate growth spurt and the long-term catalytic effect that transport infrastructure has on the overall economy is limited by a country's level of transport infrastructure accumulation. For a developed, well-connected country, increased capital accumulation through improvements in transport infrastructure may not produce much marginal gain. But for Kenya, a country of over 580,000 square kilometres in land area but less than 1,000 kilometres of paved highways, increases in capital stocks through improvements in transport infrastructure are very likely to result in substantial increases in the level of economic growth. In fact, Briceño-Garmendia and Shkaratan (2011) find that Kenya's paved road density stands at 152 kilometres for 1,000 square kilometres of arable land, or 30% of the average for middle-income countries. This is an indicator that Kenya is yet to fully utilise the lever of capital accumulation and particularly transport infrastructure, as an approach to stimulating economic growth, and to put forward that the country likely to experience great gains, in the immediate construction phase and in long-run, from a dedicated program of transport infrastructure.

Introduction to megaprojects

While initially very few and far in between, transport megaprojects have become much more common, seemingly a preferred mode of delivery for government programmes in many parts of the world. Since they are a relatively new phenomenon, there is no expert consensus around the definition, or even the spelling of the word, with some authors writing "mega projects", and others "megaprojects". I defer to Bent Flyvbjerg, a pioneer in the field, that "megaprojects are large-scale complex ventures that typically cost US$1 billion or more, take many years to develop and build, involve multiple public and private stakeholders, are transformational, and impact millions of people" (Flyvbjerg, 2014, p. 6). Megaprojects are not just large-scale, complicated public works projects. As Flyvbjerg points out, they are "a completely different

breed of project in terms of their level of aspiration, lead times, complexity, and stakeholder involvement" (p. 6). They are "trait making" in as much as they are intentionally designed to alter the physical structures of society, rather than "trait taking," and fitting into pre-existing moulds. The eight-lane *Thika Superhighway* in Kenya (African Development Bank Group, 2016) is a good example of the "trait making" capability of megaprojects, even though itself is not a megaproject[10] as per the Flyvbjerg definition above. Before its completion in November 2012, the widest, most sophisticated highways in Kenya were four-lane dual carriageways (two lanes on each side). Following its completion, expectations on road planners today surely must be to deliver highways that meet ("trait taking") or improve the standards set by the *Thika Superhighway*. The study of megaprojects is of critical importance when discussing issues concerned with African infrastructural development today. This high level of significance arises from several things:

1) As discussed earlier, investment in transport infrastructure is a fundamental component for growing an economy.

An efficient, well-connected transport infrastructure network– roads, bridges, airports, railway lines, sea ports, etc. – is crucially important for the creation of an enabling environment that facilitates and supports private enterprise to thrive. In fact, Kenya's post-independence development blueprint described a strategy "to develop transport, power and marketing facilities, and other infrastructure in order to draw the entire nation into the market economy and to lay the basis for a rapid acceleration of industrial growth" (Republic of Kenya, 1965, p. 48). A well-connected and efficient transport network is essential for many reasons, most of which can be captured under the following themes:

- The cheap, quick and easy movement of goods and services, and
- The cheap, quick and easy movement of labour and capital.

The free movement of capital and labour to where they are needed for the production of goods and services, and the free movement of goods and services to where they are consumed (by labour, and paid for with capital), are foundational precepts upon which economies are built. As has already been noted, there is an immediate economic bump experienced during the

[10] The 50-kilometre Nairobi-Thika superhighway, completed in November 2012, cost US$ 360 million, hence was technically not a megaproject since it cost less than US$ 1 billion. Given its sheer size and impact, being the first superhighway in East Africa, it very well may have been.

construction phase of transport projects, as well as a lasting longer-term effect caused by an increase in commerce owing to cheaper and faster movement of labour and goods.

2) The emergence of the East Asian Tiger economies in the last half-century (Mankiw, 2016, p. 276).

Singapore was a low-income country in 1960, with a GDP[11] of US$ 704 million. Kenya, at the same time, had national GDP of US$ 791 million (see figure 1). Singapore now boasts a per-capita GDP of over US$ 50,000 while Kenya is a low middle-income country with per-capita GDP of US$ 1,377 as of 2015. While there are many plausible reasons as to why the two nations took such divergent development paths, Singapore's US$ 1 trillion investment in GCF[12] is 7 times more than that of Kenya (US$ 150 billion) over the same 5-decade period, and that undeniably counts for something. Whereas Kenya has committed an average of 18.39% of its annual GDP to gross fixed capital formation since 1964[13], Singapore has averaged nearly double that amount, with 31.1% of annual GDP committed to gross fixed capital formation over the same time. There are other factors to be considered in such analyses, but suffice it to say that the relationship between investments in infrastructure and long-term economic growth is plain to see. Calderón's 45-year, 136-country research paper underlies this, concluding that "growth is positively affected by the volume of infrastructure stocks and the quality of infrastructure services" and even going on to state that the statistical results "reflect causal, and not merely coincidental, effects of infrastructure on productivity growth" (Calderón, 2009, p. 19).

[11] The International Monetary Fund defines GDP as "the total value of goods and services produced within a country during a specified time period, such as one year" (International Monetary Fund, n.d.).

[12] The OECD glossary of statistical terms defines Gross Capital Formation as "the total value of the gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables for a unit or sector" (OECD, 2016). In addition, "Gross Fixed Capital Formation is measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period plus certain additions to the value of non-produced assets (such as subsoil assets or major improvements in the quality, quantity or productivity of land) realized by the productive activity of institutional units" (United Nations Statistics Division, 2016).
This study considers Gross Capital Formation as a proxy measure for physical infrastructure within a country.

[13] 1964 is the first year in which the gross fixed capital formation data for Kenya is available.

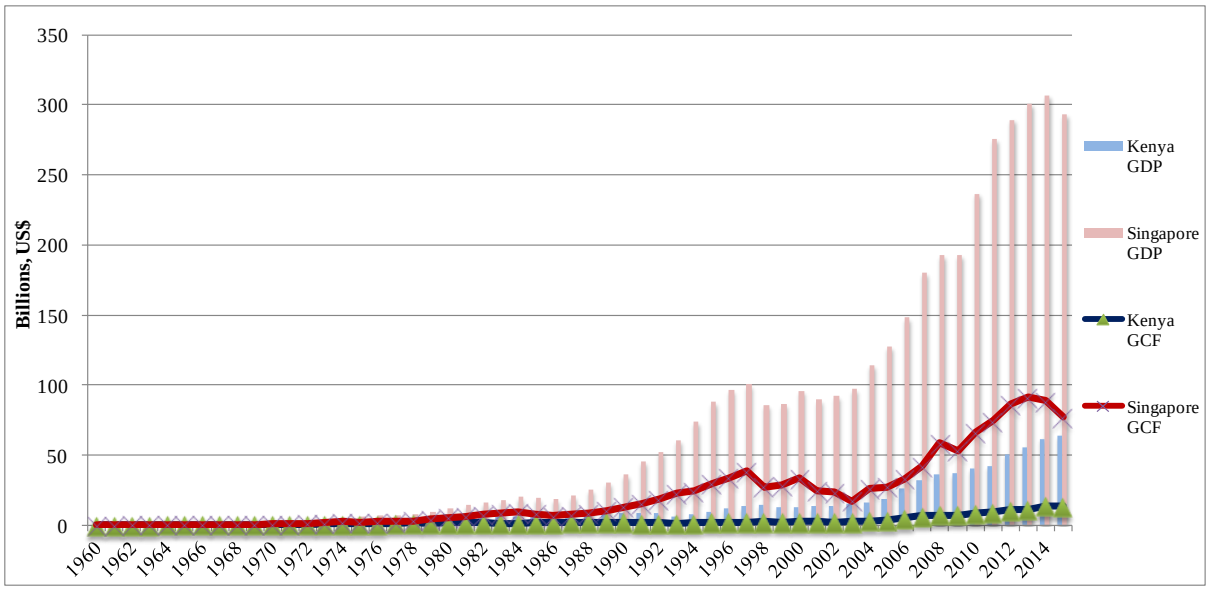


Figure 1: GDP and GCF comparison between Kenya and Singapore, 1960 to 2015

3) The "paradox of megaprojects" identified by (Flyvbjerg et al., 2003, pp. 1–10) suggests that megaprojects, as a mode of delivery for public and private sector ventures, are becoming incredibly popular with increasing size and frequency of projects.

Data from Flyvbjerg (2014) puts the largest megaprojects, the Joint Strike Fighter military aircraft program and China's HSR project at US$ 400 billion and US$ 300 billion respectively. On the African continent, among the first megaprojects to be implemented was the Aswan High Dam, constructed between 1960 and 1970, and costing E£ 450 million at the time, which translates[14] to approximately US$ 4.8 billion today. Today there are numerous megaprojects being implemented across the continent such as Kenya's US$ 3.4 billion Mombasa-Nairobi SGR line, South Africa's Sere Wind Power Plant and Upington Concentrating Solar Plant costing US$ 1.55 billion[15] (World Bank Group, 2011), and Nigeria's US$ 1.67 billion deep sea port at Lekki (African Development Bank Group, 2015a).

On one hand, megaprojects are being planned and implemented much more frequently, with the size and cost of projects ever increasing, as they fast become a primary method for delivering new transport infrastructure on the continent. On the other side of the paradox is the

[14] This computation was done by multiplying E£ 450 million, the project cost as of 1970, by accumulated annual inflation (consumer prices) from 1971 up to 2015. This inflation computation suggests that it would cost about E£ 95.5975 of present-day Egyptian currency to buy E£ 1 worth of 1970-goods. Ceteris paribus, the E£ 450 million dam constructed in 1970 would cost 95 times more in 2015 owing to the effect of price inflation. This figure was then converted to US$, using the exchange rate as of 21 July 2016 of US$ 0.11.

[15] The two power plants are components of the World Bank supported Eskom Renewables Support Project.

fact that the performance of megaprojects is "strikingly poor and has not improved for the 70-year period for which comparable data are available, at least not when measured in terms of cost overruns, schedule delays, and benefit shortfalls" (Flyvbjerg, 2014, p. 12). Flyvbjerg, Bruzelius and Rothengatter suggest a **1 in 1,000** (0.001) *success* rate for megaprojects (Flyvbjerg et al., 2003). "If as the evidence indicates, approximately one out of ten megaprojects is on budget, one out of ten is on schedule, and one out of ten delivers the promised benefits, then approximately one in one thousand projects is a success, defined as "on target" for all three. Even if the numbers were wrong by a factor of two – so that two, instead of one out of ten were on target for cost, schedule, and benefits respectively – the success rate would still be dismal, now eight in one thousand. This serves to illustrate what may be called the "iron law of megaprojects: Over budget, over time, over and over again" (Flyvbjerg, 2014, p. 11). If the Flyvbjerg, Holm and Buhl position is anything to go by, that "every passing year from the decision to build until operations begin, the average increase in cost escalation is 4.64%" (Flyvbjerg, Holm, & Buhl, 2004, p. 16), Kenyans should then expect, with a 9 in 10 (90%) chance, of spending an extra US$ 158 million[16] on its SGR project during its construction phase, just from schedule delays. The paradox, therefore, is that one hand we have an ever-increasing size and frequency of megaprojects, and on the other we have the astonishingly poor performance of megaprojects when measured in terms of cost overruns, schedule delays, and benefit shortfalls. Because of this paradox, the spotlight has been shone on megaprojects as low and low-middle income countries work to develop their transport networks, while at the same time trying to get the value for money given their scarce resources.

Interestingly, in spite of the seemingly overwhelming evidence against the utilisation of megaprojects as a delivery mode for public and private transport infrastructure, the global market for large-scale infrastructure projects is bigger now than at any other point in history, estimated at US$ 3.3 trillion per year through to 2030 (McKinsey Global Institute, 2016). This figure could turn out to be an underestimation, given that it does not account for baseline infrastructural needs required to meet the UN Sustainable Development Goals (SDGs (United Nations General Assembly, 2015) or the investment required to mitigate climate change effects. It is merely the minimum investment in infrastructure required to meet global economic growth projections. In practice, much more than US$ 3.3 trillion may be spent on megaprojects and other large-scale projects globally over the next decade and a half.

[16] Computed as 4.64% of the US$ 3.4 billion cost of Kenya's SGR.

Flyvbjerg proffers the following phenomena - what he calls the "four sublimes of megaproject management" (Flyvbjerg, 2014, p. 8) – as they key factors driving the growth in size and frequency of megaprojects. These four sublimes offer some explanations as to why megaprojects are so popular, and why this is likely to be the case for years to come.

I. **The technological sublime** – This is the rapture derived from building large, futuristic infrastructure such as "the longest-" something, "the tallest-" something, and/or "the first of-" something. The *Space Race*[17] at the twilight end of the 20th century is a good illustration of this behaviour at play.

II. **The political sublime** – The rapture politicians derive from building large-scale infrastructure, particularly the media attention megaprojects tend to attract. The pomp and colour surrounding launch ceremonies where politicians jostle for spotlight and newspaper photographs is common all over the world.

III. **The economic sublime** – This is the rapture that landowners, contractors, architects, engineers, project consultants and others directly involved in these very expensive projects derive, as well as the stimulus such projects give to the economy during the construction phase.

IV. **The aesthetic sublime** – The good feeling that anyone who appreciates good design gets from building, making use of or even just looking at something beautiful.

Taken together, these four sublimes form a considerable coalition in making the case for the increasing scale and use of megaprojects in delivering large-scale transport infrastructure projects. Except for the economic sublime that offers a rational justification for using megaprojects to deliver public projects, the other three sublimes seem to be irrational, driven by factors other than cold, hard economics. By Flyvbjerg and company's (2003) math that there is a 90% chance that projects will experience delays, and Flyvbjerg and company's (2004) estimation of cost escalations from delays at 4.64% of costs, this translates into a serious erosion of global wealth owing from megaproject mismanagement. To put this into perspective, Kenya's 2015 national GDP was US$ 66 billion, about 2% of the estimated US$ 3.3 trillion

[17] The United States of America and the Soviet Union engaged in a post-World War II competition for space flight capability. The Soviet Union succeeded by orbiting the first artificial earth satellite and sending the first person into space, but the USA got one over them by landing the first man on the surface of the moon.

global expenditure on large scale infrastructure projects, and less than half of what the world stands to lose from schedule delays in infrastructure projects annually. The paradox of megaprojects, considering the trillions of dollars going into them and their implications, is an area requiring serious study.

The low success rate of such projects coupled with their huge costs, makes the study of megaprojects and their financing arrangements very important within the scholarship on African economic growth and infrastructure development. The continent is badly in need of heavy transport infrastructure investment, but at the same time the continent has scarce resources and therefore cannot afford the wastage inherent in transport megaprojects. Those are the overarching tensions that this study is grappling with and hopes to innovatively address.

Characteristics of megaprojects

By themselves, megaprojects are not inherently *bad*. Flyvbjerg (2014) is categorical that if they are planned, organised, and implemented properly, megaprojects can:

- Create and sustain employment;
- Increase domestic productivity and competitiveness by lowering production costs;
- Benefit consumers by increasing the quality of services;
- Increase environmental friendliness where eco-friendly infrastructure replaces infrastructure that was harmful to the environment, etc.

Jia and company provide a unique contribution to the field of megaproject management, suggesting that an additional key benefit that megaprojects can yield is the resolution of social conflicts. The definition of social conflict used by Jia and company is "an expressed struggle between at least two interdependent parties who perceive that incompatible goals, scarce resources, and interface from others who are preventing them from achieving their goals" (Wilmot and Hocker, 2001 as cited in Jia et al., 2011).

While three propositions are put forward by the authors, this study places emphasis on two:

1) **Proposition 1:** Megaprojects can be the product of social conflict.
2) **Proposition 2:** Megaprojects can play a role as a safety valve for society.

The first proposition suggests that, in consideration of the unique socio-economic conditions of a country, megaprojects can be used as a tool with which societal conflicts can be resolved. The second proposition advances this idea, that megaprojects can be used as a safety valve in society, much like that in a pressure cooker, helping to relieve pent-up pressure caused by the social conflicts existing within a society. In many African countries, infrastructural development and the associated economic prosperity is concentrated in specific areas. This may be due to the concentration of natural resources in those areas, factors such as towns developed during pre-independence times by the colonialists, or even specific programs aimed to develop certain regions and neglect others by racist apartheid governments or tribalist regimes. The city of Nairobi, for instance, was founded by the British colonialists as a railway depot and stop-over town, but grew to become the capital city of the Republic of Kenya. In addition to the usual economic case-making done for megaprojects by project promoters, if a light is shone to this "second important factor" (p. 826), megaprojects can be used as a tool to address the infrastructural imbalances that have accumulated over time within a society, helping to relieve the pressure and potential societal conflicts. Major infrastructure programs can be initiated and implemented in geographical areas that have received underinvestment in the past, providing the necessary impetus to spur economic activity in those locales. Communities that have previously been disenfranchised can be beneficiaries of social and economic inclusion initiatives through such innovative methods that address their most pressing social, environmental, and economic concerns, helping to even out inequalities existing within the broader society.

Any risk that may be attributed to a megaproject is a feature of its inherent characteristics. Flyvbjerg lists the characteristics of megaprojects (from which the risks can be derived) as follows (Flyvbjerg, 2014, p. 9):

i. They have long planning horizons and complex interfaces;
ii. Planning, decision-making and management are typically multi-factor processes involving multiple stakeholders from public and private sectors;
iii. They are often led by planners and managers who lack deep domain experience and who keep changing over project cycles;
iv. Planners and managers tend to consider their projects as unique and singular, impeding their learning from other projects;
v. There is over-commitment to project concepts at an early stage, leaving analyses of alternatives weak and absent;

vi. Principal-agent problems, rent-seeking behaviour and optimism bias is common owing to the huge sums involved;
vii. Delivery is a high-risk, stochastic activity with overexposure to *black swans*;
viii. Complexity and unplanned events are often unaccounted for, leaving budget and time contingencies inadequate;
ix. Misinformation about costs, schedules and expected benefits is common, resulting in cost overruns, schedule delays and benefit shortfalls;
x. Project scope and ambition levels typically change significantly over time.

Complexity: The causes and cures for the crisis in megaproject performance

In the characteristics of megaprojects, described above, lie the causes for their poor performance. Megaprojects are rife with complexity. Backlund describes a complex organisation as "an organisation whose behaviour is complex…or whose inner structure is complex, or whose processes are complex" (Backlund, 2002, p. 32). The author goes on to elaborate that "the structure of the organisation is complex when: (1) it consists of many components or subsystems ("parts"), (2) and/or there are many relations and/or interactions between the components or subsystems, (3) and/or when these relations are not symmetric, (4) and/or when the arrangement of the components and/or subsystems is not symmetric" (p. 32). From this description and Flyvbjerg's (2014) elaboration of the features of megaprojects, it is clear that they can be described as having a high degree of complexity. Giezen puts this into perspective, saying that "the sheer size of the [a] project (in numbers of affected actors or in the amount of dollars invested) dwarfs day-to-day projects, and if the institutional context is taken into consideration, the task ahead can become almost paralyzing" (Giezen, 2013, p. 723). Given the many components that make up a megaproject, the many interactions between those components and the asymmetry between those interactions, megaprojects are characterised by high levels of uncertainty. This 'natural' uncertainty is compounded by the incentivising effect of the political sublime, where politicians and project promoters, intentionally or otherwise, underestimate the costs and/or overestimate the benefits of a megaproject, and/or their capacity to deliver the project on time. In many countries around the world where the rule of law is not always strictly adhered to and there is a locus between the political class and the business class, the economic sublime could also compound the uncertainty around megaprojects. In such instances, not only is the political class promoting megaprojects to advance their political agenda, but the politicians themselves or their families and associates could be beneficiaries of

lucrative contracts. In such an environment, the likelihood of underestimating the costs and/or overestimating the benefits from a megaproject, even unintentionally, is really quite high. Unfortunately, many young democracies such as Kenya fall into this bracket where the nexus between the political class and the business class is particularly strong. In addition to the 'structural complexity' (due to the many distinct and interdependent components of a megaproject) and uncertainty descried above, Geraldi and company tease out other forms of complexity that are congenital to projects. The authors include "dynamics", referring to "changes in projects, such as changes in specifications…, management team, suppliers, or the environmental context" (Geraldi et al., 2011, p. 978), "pace", when "urgency and criticality of time goals require different structures and managerial attention" (p. 980) and "socio-political complexity" which "emerges as a combination of political aspects and emotional aspects involved in projects" and which is "expected to be high in situations such as mergers and acquisitions, organisational change or where a project is required to unite different interests, agendas or opinions" (p. 981). Broadly speaking, the principle cause of the problems surrounding megaprojects is their inherent complexity. Despite writing principally for business managers, the three solutions proffered by De Toni and De Zan can be considered in the realm of megaprojects.

I. To the extent possible, megaprojects can be **modularized** such that they "have discrete functions that arise from interactions among their components" (De Toni & De Zan, 2016, p. 3). Modularity could increase the level of adaptability within the megaproject, with each module better suited to address complexity at the local level, and thereby increasing the overall "antifragility"[18] of the system.

II. A second proposal is that of **setting simple rules**, a "few straightforward, hard and fast rules that define direction without confining it" (p. 4). In the highly complex world that is megaproject planning and management, the ability to be flexible and creative can be the difference between a successful megaproject, and an unsuccessful one. Cantarelli and company concluded that cost overruns in megaprojects can be avoided if decision lock-in can be prevented (Cantarelli et al., 2010, p. 805). The authors study the effects of path-dependence in megaprojects caused by decision lock-in, showing that lock-in

[18] The concept of "antifragility" was formally introduced by Nassim Nicholas Taleb, referring to things that benefit from shocks, that thrive and grow when exposed to volatility, randomness, disorder and stressors, in direct opposition to the *fragile*, yet beyond the *resilient* (Taleb, 2012).

can harm project performance by escalating commitments to earlier decisions, even in situations where better alternatives exist and are known. If project planners and managers do not have creative latitude (bound by simple rules) to make tactical changes, a bad decision can carry through and escalate throughout the project.

III. De Toni and De Zan suggest **developing capabilities**, capacities that can enable better navigate and manage complexity (p. 5). From their multiple case studies, the authors discovered that organisations have to nurture the level of their capabilities – "interconnection, redundancy, sharing and reconfiguration" (p. 6) - to match the complexity they face, if they were to achieve greater levels of firm performance. While oversized capabilities drag on performance through excessive costs, undersized capabilities limit performance through lack of knowledge and the intellectual resources required to manage complexity. In the realm of megaproject planning and management where complexity is inherent, it is essential that project promoters and planners develop the capabilities required to improve the chances of megaproject success.

Giezen and company make the case for improving the decision-making processes involved in megaproject planning by developing *strategic capacity*[19]. "While adaptive capacity deals with ways of handling uncertainty and complexity, strategic capacity is about organising the process so it is best equipped to maximise the value from uncertainty and complexity" (Giezen, 2013, p. 724). Developing such capacity in project planners and managers is essential, given that megaprojects are characterised by multi-factor processes, involving private and public-sector participants often with misaligned incentives. The authors highlight three principles that are key for the development of strategic capacity: (i) strategic ambiguity, (ii) redundancy and, (iii) resilience (Giezen et al., 2015):

a) **Strategic ambiguity:** Requires that a project's mission is described as ambiguously as possible to avoid closing the decision-making process. By placing the highest emphasis on a project's purpose or motivation, project planners allow themselves to consider a wider set of options in the implementation of this purpose. At this strategic level, all key purposes or motivations should be recognized and considered, even if they are in competition. This is in line with the findings of Cantarelli and company mentioned

[19] The authors describe *strategic capacity* as "the ability to open and close the process…by widening perspectives, not just at the beginning but also throughout the whole process" (Giezen et al., 2015, p. 2), the "process" here referring to the decision-making process.

earlier, that decision lock-in, "the overcommitment of decision makers to an ineffective course of action (for example, a decision or a project)" could lead to cost overruns, reducing the chances of megaproject success (Cantarelli et al., 2010, p. 793). Strategic ambiguity speaks to De Toni and De Zan's proposal of setting a few key simple rules as a way of setting the strategic direction of a megaproject, while at the same time opening up avenues for tactical and operational creativity.

b) **Redundancy:** Once the project direction is expressed, a set of alternative models fulfilling all the project's purposes should be sought. "We may have hunches and rules of thumb and we may write elaborate plans which anticipate all conceivable outcomes, but these are only hypotheses" (Landau, 1969: 355 as cited in Giezen et al., 2015, p. 3). The authors specify redundancy of both project actors as well as that of knowledge in dealing with unexpected events, providing anchorage through a variety of alternative options when turbulence arises in the implementation of the project. Redundancy is one of the capabilities mentioned by De Toni and De Zan, whose development within a megaproject or among the megaproject actors is essential for the successful management of complexity within and during the implementation of a megaproject.

c) **Resilience:** "This concept of resilience deals with the ability of the decision-making process to deal with unexpected influences without risking indefinite delays in the process" (Giezen et al., 2015, p. 3). Sufficient strategic ambiguity and redundancy avails a buffet of options and alternatives that can be combined in various ways to fulfil the project's purpose. "From a problem perspective, resilience means that the commitment to the mission and overarching goals remain intact; however, the chosen solution can still change" (pp. 3–4). Resilience would be the outcome of setting a few key simple rules as proposed by De Toni and De Zan, and would go a long way in giving megaproject actors the creative license and freedom to better manage the complexities inherent in a megaproject.

Flyvbjerg elaborates on specific problems affecting megaprojects and suggests that the primary problem in the (front-end) planning of megaprojects is a high level of misrepresentation about the costs and benefits of such projects. This problem is so common, claims the author, "that large infrastructure and technology projects tend statistically to follow a pattern of cost underestimation and overrun" (Flyvbjerg, 2007, p. 581). "For rail, average cost overrun is

44.7%...For bridges and tunnels, the equivalent figure is 33.8%, and for roads 20.4%" (p. 579). Adding to this, the accuracy of demand forecasts is found to vary wildly. "For rail, actual passenger traffic is 51.4% lower than estimated traffic on average" while "for roads, actual vehicle traffic is on average 9.5% higher than forecast traffic" (p. 580). The author does concede that the data set on rail was less than ideal with 25 cases, but for both rail and road "standard deviations are large, indicating that forecasting errors vary widely across projects" (p. 580). It is important to clarify that this is not a blanket condemnation of all transport megaprojects. There do exist transport megaprojects that are delivered on or below budget, delivered according on schedule, and meet or surpass the promised benefits. They are simply much rarer. Flyvbjerg posits that the misinformation – understated costs and overstated benefits – "can be traced to political and organisational pressures, for instance competition for scarce funds or jockeying for position...Where there is political pressure there is misrepresentation and lying, according to this explanation, but misrepresentation and lying can be moderated by measures of accountability" (p. 584). This hypothesis seems sensible enough, especially in a context where legal systems and structures are either not fully formed, fully implemented, or fully adhered to, as is too often the case in Kenya. Flyvbjerg offers two solutions to address the misrepresentation problem plaguing megaprojects: better forecasting methods, and improved incentive structures.

I. **Better forecasting methods**: The key recommendation here is that of reference-class forecasting that aims to "reduce inaccuracy and bias" (p. 588). The method "consists in taking a so-called 'outside view' on the particular project being forecast. This contrasts from an "'inside view' focussing on the constituents of the specific planned action rather than on the outcomes of similar actions already completed" (Flyvbjerg, 2013, p. 761). The outside view is established on the basis of information from a class of similar projects, "using experience from previous similar ventures already completed, including (a) the average outcome in sets of such ventures and (b) distributional information about outcomes" (p. 761). Use of the outside view does not involve trying to forecast the specific uncertain events that will affect the particular project, but instead involves placing the project in a statistical distribution of outcomes from this class of reference projects" (Flyvbjerg, 2007, p. 11). Practically speaking, this consists of designing a class of similar projects already done elsewhere and preparing a statistical distribution. From this one can draw inferences on what the likely costs and expected benefits of the project will be, avoiding the trap of optimism bias that would be inherent

in a *worst-case vs base-case vs best-case* simulation. Reference-class forecasting would go a long way to address the challenges identified by Skamris and Flyvbjerg in their study on the inaccuracy of traffic forecasts and cost estimates on large-scale transport projects (Skamris & Flyvbjerg, 1997).

II. **Improved incentive structures**: Project planners can be motivated to improve the accuracy of cost and benefit forecasts, away from political pressures and other interested parties who are often ignorant of the financial, economic, social, and environmental ramifications, because of over-emphasis on scoring political points. Flyvbjerg's suggestion is that an intervention needs to be set up that hinges "not so much on what planners can do to reduce inaccuracy and risk in forecasting, but what others can do to impose on planners the checks and balances that would give planners the incentive to stop producing biased forecasts and begin to work according to their code of ethics" (Flyvbjerg, 2007, p. 16).

To achieve increased accountability in megaproject planning, the author's recommendations include:

1. To devolve transport infrastructure decision making powers to local infrastructure agencies to "let local political officials spend the funds however they choose to, but make sure that **every** dollar they spend on one type of infrastructure reduces their ability to fund another" (p. 16);
2. To submit forecasts for independent peer review;
3. To ensure all projects are evaluated using reference-class forecasting methods;
4. To make sure all project-related documentation is available to the public;
5. Hosting public forums where planners can defend their forecasts;
6. Projects found to have faulty forecasts should be reconsidered and stopped if necessary;
7. Professional and criminal penalties to be enforced on planners who produce deceptive forecasts;
8. To avoid issuing projects with sovereign guarantees for capital and, if necessary, capping any such guarantees at 30% of total capital needs;
9. To avoid full public financing of megaprojects, with or without sovereign guarantees;
10. To institute legal ways in which planners share financial responsibility for cost overruns and benefit shortfalls.

Bruzelius and company propose a set of suggestions that they believe would help to improve accountability in project planning, some of which have already been captured above (Bruzelius, Flyvbjerg, & Rothengatter, 2002, p. 148):

i. Engaging members of the general public and vulnerable groups in planning and decision-making from an early stage;
ii. To identify, to the extent possible, the public-interest objectives and requirements that projects must meet;
iii. To define, to the extent possible, the regulatory regime that will apply to the project;
iv. No total sovereign guarantee should be given to any lenders, and if any must be given, it must be limited;
v. The government must define its role within the project with a view to ensure that all project players are kept at arms-length, that it can be able to provide oversight on public-interest objectives and requirements;
vi. Some degree of private risk capital should be used to finance the project, to ensure that private-sector incentives are aligned with those of the government and the general public;
vii. Private-sector participants involved in construction should be given an opportunity to make technical suggestions, in the spirit of strategic ambiguity described above;
viii. Business and special-interest lobby groups should be closed out from planning and decision-making process, to minimise the opportunities available to introduce political pressure, decision lock-in and rent-seeking opportunities.

Patanakul and company also add their voices to the matter. Other than the recommendations already highlighted in this section, the authors add (Patanakul et al., 2016, p. 456):

a) The establishment and agreement on a methodology that will be used to evaluate the expected benefits of a megaproject;
b) Establishment of an effective quality management process that will ensure that projects will maximise long-term utility;
c) Modularise projects into sub-projects to manage the complexity inherent in megaprojects;
d) Project participants to make use of an integrated master schedule to coordinate the various project activities;

e) Government entities should ensure alignment between the project precepts and prevailing legislation;

An important addition to the recommendations highlighted above is put forward by Samset and Volden, a suggestion that "ex post evaluation should be an essential element in any project governance scheme. When a project succeeds at all levels, it should be imperative to ask what was done right. Correspondingly, one should learn from mistakes" (Samset & Volden, 2016, p. 311). Project evaluations should be considered an important part of the megaproject implementation process that promoters and planners should prioritise. While this activity of critical self-reflection may not provide direct benefits to the immediate project under review, it could lead to insights that may improve the chances of success of future projects.

In a 2012 paper, Flyvbjerg shares the experiences he and his colleagues have had in engaging the mass media to disseminate the findings of their research on megaprojects in Denmark. Lessons from Flyvbjerg's experience could go a long way in assisting scholars on PPPs and transport megaprojects in Africa to ensure that their research can achieve the desired impact in public debate, policy making and even in practice. Some of the lessons can be summarised as follows (Flyvbjerg, 2012):

I. In liberal democracies, working with mass media is essential to drive scholarship into public deliberation, policy and practice because public attention is dominated by the mass media;
II. By problematising tension points within megaproject policy and practice, scholars are able to generate interest in the findings and results of their research from media and members of the public.
III. Phronetic research and phronetic impact is scalable across different levels (for example, from the constituency level through to a national level) and replicable across different geographies and time periods. "The aim of phronetic research is to inform public deliberation and practice" (p. 169), to direct reason (from the research) to action (practice in the field). If producing research that aspires to change the practice of megaproject planning and management in Africa, mass media is likely to be an ally in sharing research results with the public.
IV. If research results are newsworthy, their dissemination in the mass media is unstoppable.

V. Press-releases are a much more effective way of communication research results, say compared to newspaper op-eds. "Generally, it works better for scholars to help journalists do their work by feeding journalists important and newsworthy research results than it is for scholars to try to do the work of journalists by writing journalistic articles about their own research" (p. 178).

Working with mass media to disseminate research findings, results and recommendations takes a significantly shorter time than the actual research process. By spending a relatively short length of time with media, the impact of research on policy and practice could be greatly increased, helping to achieve the phronetic aim of such research.

A caveat to the application of these recommendations is put forward by Muriithi and Crawford: "The growing weight of empirical evidence from cross-cultural management research suggests that Western management concepts may be wholly or partially inapplicable and irrelevant to other cultures. Why? Because values at work and in social settings are culturally based-therefore when dealing with human behaviour (i.e. managing) we must recognise the cultural context" (Muriithi & Crawford, 2003, p. 309). Megaprojects are not conceived, planned and executed in a vacuum. Planners, promoters and the projects themselves each exist in unique social, cultural, environmental, economic, environmental, technological and political circumstances, and considerations must be made to these, and any other externalities, that would have a direct or indirect impact on planning and implementation process. Indeed, conditions in and across African countries are very different from those in the Western world from whence most of the research on megaprojects comes. Academics, planners, financiers, government entities and other interest parties would do well to produce research, situated in Africa, that builds on lessons learnt elsewhere to address the challenges afflicting megaprojects in Africa. The scholarly landscape on megaprojects in Africa is bare when compared to that in other parts of the world, virgin lands that researchers should rise to the occasion and conquer.

Megaprojects are highly complex, long-term, multi-faceted, multi-actor, large-scale ventures that cost US$1 billion or more, and have the potential to significantly impact the society. They are beset by problems caused by their complexity, and because of their large political, economic and societal impact, attract the problems of politics, public resource management, and the challenges that characterise any human society. Geraldi et al. (2011) and Giezen (2013) make the case that megaprojects face problems brought on by their innate[20] complexity. De

[20] The complex nature is made clear by Flyvbjerg (2014) in his definition of a megaproject.

Toni and De Zan (2016) put forward 3 ways in which complexity can be managed, ideas which coincide with those of Cantarelli et al. (2010) and Giezen et al. (2015) which speak specifically to megaprojects. Flyvbjerg (2007) addresses the specific megaproject planning problems concerning the misrepresentation of costs and benefits, and makes proposals that seek to improve the forecasting methods used during the planning phase and the incentive structures for megaproject actors. Flyvbjerg's work is an extension of Bruzelius et al. (2002) who put forward specific ideas about how to improve the accountability of agents during the planning process, some of which are refined by Patanakul et al. (2016). Samset and Volden (2016) emphasise the importance of ex-post evaluation of megaprojects, that future project planners and promoters can learn from their immediate past experiences. Institutionalising such a learning culture among megaproject practitioners would go a long way to address the challenges made clear by Muriithi and Crawford (2003). The causes of poor megaproject performance are well known, and solutions to these problems have been put forward. This study spotlights the problems faced by megaprojects and highlights solutions, that any recommendations it shall put forward, assume that the specific problems already mentioned are either fully addressed, or undergoing remedy. Only then can the immense economic potential of transport infrastructure be fully unleashed on the Kenyan economy.

Funding transport infrastructure

In the earlier section addressing the role of transport infrastructure in growing an economy, this study makes the proposition that transport infrastructure is a positive externality to an economy, thereby making the case for increased investment in transport infrastructure megaprojects in Kenya to speed up economic growth.

Blum (1998) extends the field of discussion between public[21] goods and private goods by speaking of Samuelson's definition of public goods (and the inference made of private goods) as a continuum, with "pure public goods" on one end and "pure private goods" on the other. This is because "ideal public goods rarely exist in reality and that private allocation is possible

[21] Blum cites Samuelson, that public goods are those 'which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good' (Samuelson, 1954, p.387 as cited in Blum, 1998, p. 83).

once mechanisms can be found that: prevent the free use of public goods, and force groups to reveal their preferences, at transaction costs that do not reduce demand to zero" (Blum, 1998, p. 83). As this study expressed earlier, and in line with Blum's position on the matter, transport infrastructure cannot be entirely categorised[22] as a public good and "the usual one-dimensional classification of goods from pure public to pure private no longer applies" (Blum, 1998, p. 84). Consequently, the financing of transport infrastructure can be looked at from this expanded lens. To the extent to which the *private good*-ness of transport infrastructure megaprojects can be defined and ringfenced, the private sector can be incentivised to finance such infrastructure, while those megaprojects leaning on the *public good* side of Blum's continuum can be financed by public resources. Rienstra and Nijkamp clarify that "a good should now be provided by the sector which can offer this good against the lowest transaction costs" (Rienstra & Nijkamp, 1997, p. 232). The authors put forward that "for 'normal' goods, provision by the private sector will usually be optimal" (p. 232) and that other types of goods can justify public intervention. "At the same time it is widely acknowledged that provision by the public sector also causes costs – the so-called government failures – because this makes provision of goods more inefficient and is largely influenced by e.g. pressure groups" (p. 233). But they add that there are still reasons for governments to intervene in the transport sector.

Rienstra and Nijkamp look at the characteristics of investments in transport infrastructure and particularly why these investments are typically ill-suited to private investors (pp. 233–234):

- High fixed costs and long planning and construction periods;
- Transport infrastructure requires huge upfront investment and have long payback periods;
- The cashflow profiles of transport infrastructure projects (high upfront costs, little or no revenues until construction completion, and long payback periods thereafter) make them have high levels of uncertainty and risk;
- Political exposure and the attendant risks associated with transport infrastructure projects;
- High legal and regulatory risks since governing laws and regulations can be changed during the long planning and construction periods;

[22] In an earlier section, this study speaks of transport infrastructure as "partially a public good and partially a common resource."

- The high risk of variances in cost and revenue forecasts makes it difficult to estimate the potential return on investment for such transport ventures;

From the characteristics above, a private investor seeking a reasonably-safe positive real[23] return on investment within a short-to-medium term horizon, transport infrastructure is a most unlikely investment option. These characteristics, coupled with the features and risks inherent in megaprojects described in earlier sections go on to make transport megaprojects even less attractive to the profit-minded investor. Even then, in pursuit of profit, the private sector has still sought to participate in transport infrastructure ventures. Rienstra and Nijkamp (1997) refer to 4 possible ways in which the private sector participates in the provision of infrastructure:

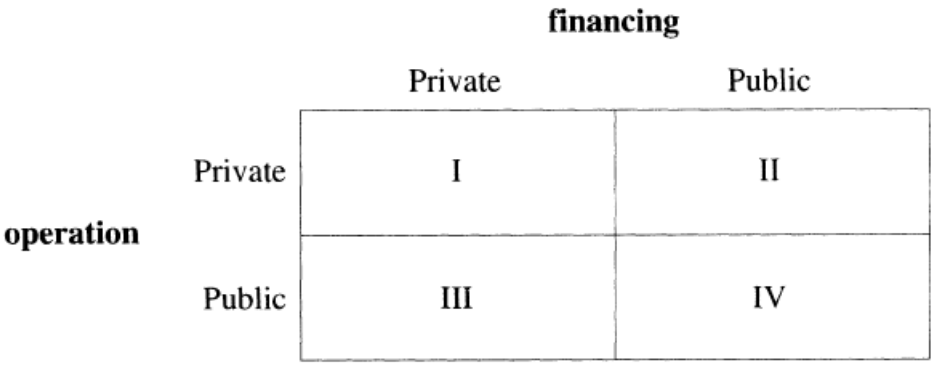


Figure 2: The role of the private sector in infrastructure projects | Source: Nijkamp and Rienstra, 1995, as cited in Rienstra & Nijkamp, 1997, pp. 234–235

Category I refers to transport infrastructure that is privately financed and privately operated, with no government intervention at the funding or operational level. Category II refers to infrastructure that is financed by public resources, but whose operations are left to the private sector. This scenario can obtain in a situation where fixed costs can be paid by the government, while operations and the associated variable costs can be paid for a private-sector actor. The third category – and probably the rarest - is one in which infrastructure is financed by the private-sector while operations are left to government. Category IV is the more common scenario and the conventional way in which Kenya has developed its road infrastructure. In this category, the government finances and operates infrastructure. For the private sector to be incentivised to participate in the provision of transport infrastructure, the operational aspects of that infrastructure venture should be able to be clearly defined and legally ringfenced, with the ability to levy charges and fees to compensate for the entity's operational effort. In cases where these conditions cannot be met – operational control over the infrastructure venture and

[23] After accounting for inflation, which has the effect of reducing one's buying power over time.

the attendant financial compensation – it is very unlikely that private sector players can be attracted to participate in transport megaprojects, and government will therefore be required to step in.

Trew (2010) demonstrates that a lot of the significant Industrial-era infrastructure (turnpikes, canals and railways) in the United Kingdom was initiated and financed by private investors, manufacturers, professionals and other capitalists (Trew, 2010). While today it seems that the consensus belief is that infrastructure investment is an ipso facto government function, Trew shows that "the majority of investments came from local landowners, merchants, tradesmen, manufacturers, and professionals – people whose wealth was not only relatively limited but also mostly tied up in their primary employment" (p. 990). Trew's work reminds us that the provision of transport infrastructure has never been a responsibility left only to the state. In fact, the private sector has often initiated and financed significant transport projects. If the conditions that Rienstra and Nijkamp (1997) express above can be met, there is no reason why the private sector cannot participate in financing the implementation of transport megaprojects, as they did with the canals, turnpikes and railways of Industrial Britain.

The role of government

Given the economic catalytic function of transport infrastructure which has been explored in earlier sections of this study, and the unique characteristics of transport infrastructure detailed above, it is essential that governments take leadership in creating an enabling environment and directly investing in transport infrastructure. It is widely agreed that it behoves a government to, in addition to protecting its citizens from external threats and aggressors, securing peace, law and order within its borders, and protecting the naturally-occurring public goods and common resources (like fresh air, clean rivers and lakes, animal habitats, etc.), to create and cultivate an environment in which all citizens have an opportunity to lead happy, healthy, productive and prosperous lives. From this point of view, government has the premier responsibility of allocating the funds collected from taxes levied on citizens and raised from other sources to investments in the public infrastructure that Otto and Voss (1995) referred to as "pervasive inputs into production" (Otto & Voss, 1995, p. 181).

Eichengreen (1995) describes a "low-level equilibrium trap" (Eichengreen, 1995, p. 75) that low-income countries can find themselves entangled in, a vicious cycle where the lack of physical infrastructure limits investment in the economy, and this lack of investment limits infrastructure development, and so on. The author highlights two initiatives a country can use to either avoiding getting caught up in this trap, or to break out of it: ***government subsidies and guarantees***, and ***foreign borrowing***. In the event that the returns from an investment in infrastructure fall below a pre-determined minimum benchmark, a government can step up to plug in that shortfall through a subsidy and protect investor returns. In doing so, the state is effectively sealing the gap between the private investors' gains (the profit incentive) and the social benefits (externalities) that accrue from the development of infrastructure. The essential reason why a government would subsidise a private investment in transport infrastructure is to ensure and protect the externalities that such investment would generate for the broader society, social benefits which would be at risk of being unrealised if the private investor's returns were to fall short of expectations and thereby causing the investment to be pulled back. Eichengreen also mentions *land grants* as specific government subsidy interventions that were made in the United States and Canada during the development of the railways in these countries. The author suggests that up to 150 million acres of land were granted to railways in the two decades between 1850 and 1870. This was very significant because "such grants obviated problems of assembling parcels for right-of-ways" and "compared with other bonds, those backed by mortgages on land had minimal bankruptcy costs; the interest and principal due to the primary creditors could be paid off, at least in part, through the sale of the land if the project failed" (p. 87). Through land grants from the government, the potential high costs that would be associated with direct purchases of parcels of land or right-of-ways on land are avoided, reducing project costs. Further, through land grants, infrastructure projects possess usage rights to these lands, providing important additional collateral that is critical when sourcing funding for transport infrastructure projects. In addition to subsidies, governments can make use of debt guarantees to assist project promoters source for project funding. When project promoters are unable to attract local capital at affordable interest rates, governments can intervene through debt guarantees that serve to de-risk projects, and thereby assisting project promoters in sourcing for capital at home and abroad. Given that a foreign investor would typically have much less information about a developing infrastructure project compared to local players, the foreign investor is given to *price in* this information asymmetry in the rate of return they would expect from their potential investment, reducing the chances of closing a deal. Through a partial or

full guarantee, the foreign investor is given comfort on their investment since the risk of default is significantly reduced (governments are generally less likely to default on their obligations that firms), increasing the chances of the project promoter successfully raising foreign capital.

The key benefit of using these tools with respect to transport megaprojects is that they act like a catalyst for capital. They de-risk projects by reducing the costs of capital/ financing costs, and protect investor returns by partially or fully guaranteeing their investment. That said, they do present a set of challenges that project planners, promoters and managers must be aware of even while considering their benefits. With returns on their investment guaranteed, investors have no incentive to hold project managers accountable to performance standards. This behaviour problem cascades into the projects themselves, with managers insufficiently motivated to ensure that projects are planned, constructed, and managed such that they are delivered within the appropriated budget and on time. Without these incentives, but provided with enhanced access to capital markets through subsidies and guarantees, the principal-agent problems and rent-seeking behaviour earlier identified as a feature of megaprojects are amplified, damaging the chances of a project's success. In using these tools to support the mobilisation of private capital towards transport megaprojects, governments must be aware of the potential pitfalls and be proactive to re-establish the right behaviour and incentive structures that would align all actors and catalyse successful project implementation.

How governments directly finance transport megaprojects

The government initiatives explored above – subsidies and guarantees, and government-backed foreign borrowing – are, at the core, government-supported private-sector ventures in transport infrastructure. The central protagonist in such transport megaprojects is the private-sector promoter, whereas the government would play an important but cameo role in the whole affair, helping to push the venture over the line. The other key method through which governments participate in infrastructure development is in the role of protagonist, taking the reins of project conceptualisation, planning, promotion, and funding. In fact, for many of the large-scale transport infrastructure projects in developing countries, this is the principal approach used. Many developing countries do not have well-established legal frameworks and regulatory environments for private investment in transport infrastructure, or trusted judicial systems that can reliably enforce contracts, or well-developed capital markets that can mobilise private capital for allocation to transport megaprojects. In countries where these institutions, systems

and frameworks are still being developed, governments can be expected to be relied on to initiate transport infrastructure ventures. However, even in countries where the environment is already in place for the private sector to comfortably participate in funding infrastructure ventures, the rationale for government involvement (the 4 sublimes referred to in earlier sections) remains strong.

Governments typically fund transport infrastructure ventures in 3 key ways: (i) through ***taxes and other revenues*** contributed to the exchequer, (ii) through ***conditional grants*** from development partners, and (iii) through ***debt***. From the pooled funds raised from taxes and other sources of revenue, and through a political process involving the executive and legislative arms of government, budgets are prepared and appropriations made for recurrent expenditures (such as salaries and wages, health and education programs, welfare initiatives, etc.) and development expenditures (such as building new schools and hospitals or paying for transport infrastructure projects, etc.). In this way, the resources available for a specific transport megaproject would be, at the very least, a function of (a) the total public resources available to government, (b) the recurrent budget, (c) the number and cost of other infrastructure projects required, and, (d) Flyvbjerg's 4 sublimes. In developing countries specifically, the infrastructure funding challenge government's face is enormous. Governments have limited resources on one hand, but have seemingly unlimited and urgent infrastructure needs on the other. This problem is compounded by the effects of politics, such that even if a particular transport project was identified as having the highest overall return to the society at large, individual political considerations would typically have a deciding influence on determining whether or not that project would get funded. Depending on the potential social and economic benefits of a particular project, a country's development partners - foreign governments, international development agencies, multilateral organisations, etc. - can be approached to provide project funding through a grant. When the potential social and economic benefits of a project are aligned with the impact objectives being pursued by a development entity, a government can approach the entity for a grant to fund the implementation of the project. Since a grant is, in accounting terms, *free money*, it would seem to be a choice way of funding transport projects. However, finding development partners whose goals can be met through the implementation of the transport projects at hand, and with the resources being sought is no easy feat. Even when these partners can be found, the due diligence they would perform on the proposed projects and the process of moving from initial conversations to contract signing and financial closure would take at least a few years. Given the churn rate among the political class,

it is possible that the government representatives on project teams can be changed before grant discussions are concluded and contracts signed as new leaders are elected into office, possibly setting discussions back years. Considering the long-term planning horizons that characterise transport megaprojects, the typically long negotiation and due diligence periods that characterise grants, and uncertainty of job tenure among government representatives in grant negotiating teams, grants should not be relied on as a primary method of funding transport infrastructure. A frequently used alternative infrastructure funding approach is debt. With developing countries encumbered by the budget constraints imposed by limited resources, and the practical challenges of getting transport megaprojects funded using grant sources, debt rises as an attractive alternate. With debt, governments are freed from the immediate problem of resource limitations that reliance on taxes and other revenue sources would imply, and liberated from the long-winding discussions and contracting process that would be feature when seeking grant funding. Governments can structure bonds that can be sold in domestic or foreign markets, tap concessional loans from development banks, or commercial loans from ordinary banks relatively quickly, usually without having to be interrogated on the minutiae of the specific megaproject as much as being assessed on their ability to satisfy the debt.

- *Concessional debts* are loans extended to a government by a friendly foreign government or multilateral development agency at "concessional" terms, that is, below market rates, often with a view of either strengthening political and economic ties (in the case of government-to-government debt) or achieving certain impact objectives.

- *Bonds* are simply short- and long-term debt instruments. A summary of Fabozzi and company's (2005) exposition on the defining features of bonds is provided below, whose understanding is integral to appreciating why governments are so enchanted to these debt instruments (Fabozzi, Ferri, & Mann, 2005, pp. 3–13).

  - **Type of issuer –** Bonds can be issued by domestic firms, local or municipal governments, and national or federal governments. Firms are able to place their bonds on securities markets for sale to the general public, or sell them directly to a few buyers (private placement), they can secure their bonds with assets, or even issue bonds without collateral. Local or municipal governments can issue 'general obligation bonds' that are "backed by the full faith, credit and taxing power of the governmental unit issuing them" (p. 4) or 'revenue bonds' whose creditworthiness

is limited to the success of the specific entity within the governmental agency issuing the bond.

- **Maturity** – The term to maturity is the number of years that the borrower has promised to honour the conditions of the bond, running from the bonds' date of issue through to the maturity date when the principal (or "par value" or "face value") of the bond shall be paid to the bondholder. In practice, "term" and "term to maturity" are used interchangeably to refer to the number of years remaining in the life of a bond.

- **Coupon and principal –** The coupon on a bond is the periodic interest payment made by the borrower to bondholders. The coupon rate, usually denoted in percentage terms per year, is multiplied by the face value of the bond to get the money value of the coupon payment made every year to bondholders. Although much rarer, there do exists "zero coupon" bonds, securities which do not have the periodic interest payment to bondholders. Investors therefore seek to buy such instruments at prices below their face value and hold on to them through to their maturity. "Floating rate" bonds on the other hand have the unique feature of coupon rates that vary over the term of a bond. In such instances, the coupon rate is pegged on some other reference rate (say, inflation, or a benchmark interest rate) and adjusted for a pre-determined spread (say, 2% or 3% above the reference rate). The principal or face value of a bond is the amount to be paid by the borrower to the bondholder either at maturity, when the bond is called or retired according to a repayment schedule in the bond indenture documents.

With the scope to set bond maturities and coupon rates, governments can issue bonds, domestically or in international markets relatively easily. Depending on the state of financial markets, governments can offer long or shorter terms, higher or lower coupon rates, or even auction the bonds such that coupon rates are determined by market forces. In the event that bond issues are successful, governments can open up windows for "tap sales" where investors can take up more of the securities on offer. Most importantly for governments, when a bond issue is about to mature such that principal payments are nearly due, they can easily structure new bond issues and offer them in the market, using the money collected from the new issue to pay the principal on the maturing bonds, effectively postponing principal payments into the

future. This ability to theoretically 'roll over' bonds infinitely into the future is a major attraction for governments trying to raise money, and it has the advantage of reducing the default risk of bonds to investors. The resultant effect is that of lowering coupon rates, since paying the bond principal is as easy as issuing a new bond.

- *Commercial loans* are loans extended to a government by commercial banks, at "commercial" terms, that is, at prevailing market rates, often when bond markets are experiencing distress or the money is urgently needed to stave off some sort of emergency. If the required amount is very large, several commercial banks can come together as a group of lenders to pool funds and 'syndicate' the loan.

While debt offers ease and numerous practical benefits, an ability to fast-track important transport megaprojects, and is a lever that can be used to hasten economic growth through Keynesian stimulus programs, there are significant problems presented by taking on too much debt.

Following the law of demand and supply, as a government's demand for money rises (taking on more debt), the price of money (that is, interest rates) rises as well to attract suppliers of money (investors), distorting the private credit market. With government securities acting as benchmarks for the 'risk-free' cost of money in an economy, as interest rates rise, the cost of capital in the overall economy rises as well, *pricing out* and other borrowers in the economy. When the cost of credit rises, borrowers are charged higher interest rates on bank loans, or required to put up more collateral to secure loans, or both. This may result in fewer individuals and businesses getting bank loans, as banks prefer to lend to the 'risk-free' government, which causes the economy to slow down. Debt that was taken up by a government with a view to stimulate the economy through spending on transport infrastructure or other programs could, in fact, have the opposite "crowding out" effect on an economy (Carlson & Spencer, 1975). If commercial banks are of the view that interest rates will rise even further in future, they are likely to hold on to capital tighter – lending less to borrowers – with the goal of lending to government through bonds or to borrowers at higher rates. This can cause private credit access to narrow even more, exacerbating a bad situation, and cancelling out the short-term economic stimulation that expansionary government policies such as infrastructure spending are intended to yield. Moreover, for a developing country heavily relying on micro, small and medium-size businesses to create jobs and growth, this may have negative residual effects as credit that would fuel business mechanisation and expansion is denied to them.

Reinhart and company (2003) introduce the concept of *debt intolerance* "which manifests itself in the extreme duress many emerging market economies experience at overall debt levels that would seem quite manageable by the standards of the advanced industrial economies. For external debt, 'safe' thresholds for highly debt-intolerant emerging markets appear to be surprisingly low, perhaps as low as 15 to 20 percent of GNP in many cases, and these thresholds depend heavily on the country's record of default and inflation" (Reinhart, Rogoff, & Savastano, 2003, p. 3). This is an important reminder that even through a government's external debt levels may seem manageable to policy makers and politicians, "well below the 50-percent indicative threshold" of the IMF (International Monetary Fund, 2016, p. 4), the country's debt intolerance levels may be quite high, making the country vulnerable to economic shocks and even at risk of default. To avoid creating a misconception that externally issued debt is a more important variable with respect to debt intolerance that domestically issued debt, Reinhart and company clarify that "the view that external debt is completely separable from domestic debt is dead wrong. As a by-product of capital mobility and financial integration, foreigners hold increasingly large amounts of the domestically issued debt of emerging markets, and their residents hold increasingly hold instruments issued by governments in advanced economies" (p. 48) showing the increasingly blurred line between externally-issued and domestically-issued government debt. While government debt, locally-issued and denominated in local currency, is considered free of default risk (since a government can always print local currency to pay off debts), as more debt is issued, the interest rate on debt tends to increase owing to market dynamics.

Depending on the levels of foreign-denominated debt, a country may be growing increasingly vulnerable to shocks which could have adverse effects on the economy. If, for instance, a large portion of a country's debts are denominated in a foreign currency such as the US dollar, the country is exposed to the market vicissitudes experienced by the US dollar. If the US dollar appreciates in value because of a geo-political event that has adversely affected the British Pound and/or the Euro, this country's debt payments automatically increase. This is because the country's currency would lose value relative to the strengthened US dollar, required more local currency per dollar to meet debt payments. This has the effects of reducing a country's reserves of foreign currency that it uses to keep its own currency stable, diminishing its ability to support its local currency. Importers of goods would be immediately required to pay more for them, owing to the local currency's depreciated value. This cost increase would be translated into higher market prices of goods and services, causing a spike in inflation. For

countries that are net-importers, this could have very significant effects of the cost of living for its citizens. If the currency depreciation is big enough, it could require taking on an emergency loan from the IMF to help contain the currency volatility, having the third effect of increasing public debt. Even the seemingly-distant effects of third party currencies, market moves which could be triggered by all sorts of events, could quickly escalate through the financial markets and bring an economy to a halt. According to the 2016 medium-term debt management strategy report of the National Treasury, "approximately half of the total government debt portfolio is exposed to exchange rate risk" (Government of the Republic of Kenya, 2016, p. 11), that is, US$ 14.213 billion (p. 8), and Kenya's Treasury finds that the "macroeconomic framework is exposed to significant downside risks" (p. 16). Policy makers and politicians must therefore be wary of the increased fragility they cause to the economy by taking on government debt. Despite its strong allure in funding transport infrastructure projects, it must be taken only after very careful consideration because even 'safe' levels of debt, as has been discussed above, can cause a lot of damage to an economy in the event of market shocks.

With a huge need for transport infrastructure, but limited resources from taxes and other government revenues, the long lead time required to secure grant funds and the narrowing capacity for public debt, Kenya should begin to look for other ways of funding its infrastructure.

The role of the private sector

It has already been shown above (Rienstra & Nijkamp, 1997) that private investors and private-sector capital played a central role in initiating and financing transport infrastructure projects in the Netherlands in the 19th century. Private-sector involvement in financing infrastructure projects in England has been shown (Trew, 2010) to go back to as early as the mid-eighteenth century, with individuals and companies pooling resources through joint-stock companies to fund the UK's turnpikes, waterways and railways. Private capital in transport infrastructure is not a new phenomenon; in fact, it has always been core to financing transport projects. Extending from *figure 2* above, we can elaborate specific ways that the private sector has been involved in the provision of transport infrastructure.

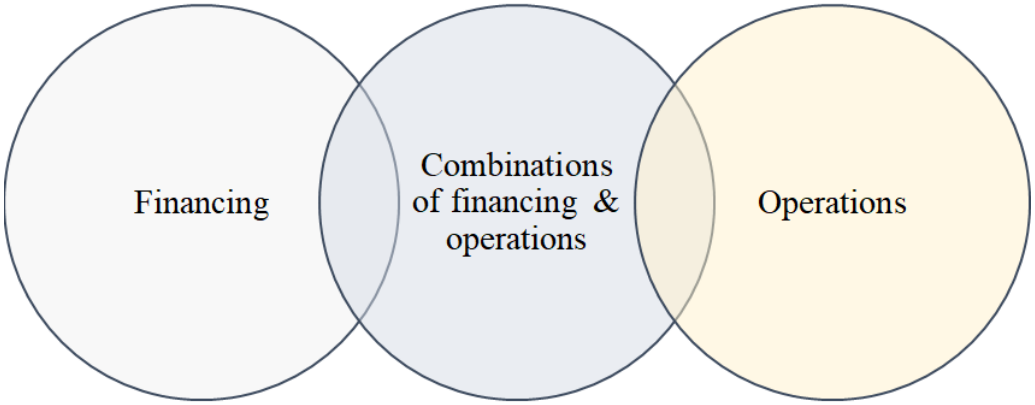


Figure 3: How the private sector participates in the provision of transport infrastrcuture

a) The private sector can participate in the provision of infrastructure from a purely financing point of view. Here, projects are conceived, planned, and constructed by the government, but using funding from the private sector. The primary incentive for private capital in such an arrangement would be safe and/or attractive returns, tax benefits, or other financial incentives. Private capital can be tapped through *infrastructure bonds* issued by a central/federal or municipal/local (or "county", in the case of Kenya) government. There are instances where transport projects are conceived, planned, promoted, and developed by private entities, and funded by other private entities. In such a case, the financier would be providing *private equity capital or debt* to the private project promoter, in the expectation of making attractive returns.

b) The private sector can be enticed to participate in transport infrastructure projects in an operational capacity. It is generally believed that rational economic agents (individuals and firms) work to provide better or the same value for customers, at cheaper prices through production efficiencies, to increase profit. By extension it is generally believed that if the private sector could be sufficiently incentivised, it could produce the same or better value for transport users than governments could, and at lower costs. Through this thinking, private firms can be *contracted* or granted *concessions* to operate transport projects and installations (such as railways, road tolls, airlines, sea ports, etc.) be financially compensated either by the government (based on the cost savings made) or by charging users directly for services.

c) Other than these two binary forms, there are many approaches that combine aspects of financing and operations through which the private sector can participate in the provision of transport infrastructure. Combining the operational efficiencies that can theoretically be gained from the private sector, with an opportunity to make attractive financial returns, private actors can be persuaded to invest their own capital in transport megaprojects. The simplest illustration of this is when firms conceive and plan transport projects and finance them directly, with a view of charging users for services e.g. a private airport where the owner would levy fees to airlines operating out of the airport, charge shop operators rent for leasing space, charge companies and individuals fees for parking their aircraft at the hangars, and so on. Governments also have the option of *privatising* public utilities through direct sale to private-sector actors. Partial or full ownership of a public utility could be sold through listing on a securities exchange, private placement, direct tendering or other methods of sale, on the basis that the private sector has the financing and/or operational capability of delivering better services, better than the public sector. Privatisation, however, is not a favoured approach for many governments because such actions could have political consequences, possibly signalling a dereliction of public duty. Given the limitations of public resources and the inefficiencies of government, and the need for transport infrastructure, an important approach that combines financing and operations is the *public-private partnership*. While experts are yet to agree on the definition of a PPP (or "P3"), this study uses the IMF description that a PPP "refers to arrangements in which the private sector supplies infrastructure assets and services traditionally provided by governments" (International Monetary Fund, 2008). Through PPPs, the government and private sector can join forces to leverage on the assets, strengths, and efficiencies of each party for the provision of transport infrastructure. PPPs are becoming a buzzword in the parlance of transport and infrastructure provision, and can be a vital approach for solving infrastructure problems faced by societies, without loading governments with debt.

Public Private Partnerships in the provision of transport infrastructure

Broadbent and Laughlin (2003) come out assertively that "PPPs open up the possibilities for the provision of public services, not only to come exclusively from organisations owned and controlled by the public sector, but also from both public and private sectors in partnership"

(Broadbent & Laughlin, 2003, p. 332). As this study has explained above, liberalisation in the financing and provision of transport infrastructure has (i) often been the case in the past, and (ii), is quickly evolving into an important 'third way' of implementing transport infrastructure for countries like Kenya that face the dual challenges of limited public resources and narrowing capacity to absorb additional public debt (Roumboutsos & Macário, 2013). From the IMF description of PPPs above, it is quite difficult to distinguish between a PPP and a concession or contractual arrangement to operate transport utilities. Fortunately, Broadbent and Laughlin shed light on this, explaining that "a PPP is an approach to delivering public services that involves the private sector, but one that provides for a more direct control relationship between the public and private sector than would be achieved by a simple (legally-protected) market-based and arms-length purchase" (Broadbent & Laughlin, 2003, p. 334). In explaining why the UK's Private Finance Initiative of 1992[24] is a bonafide PPP as opposed to merely being an arrangement to provide public services, the authors put forward three key differentiating factors which can be generalised as follows (p. 336):

- The underlying asset may or may not be owned by the public sector (this is contentious even among experts),
- The design of the underlying asset and accompany services is a responsibility of the private sector, and
- The public sector is locked into a long-term relationship specified through a legal contract.

A defining fourth factor is made explicit by Roumboutsos and Macário (2013) who state that while there are many approaches to PPPs, they "all have a common denominator: the use of private capital for financing and/or funding (through user charges or taxes)" (Roumboutsos & Macário, 2013, p. 161). Through PPPs, the provision of transport infrastructure can be expanded to include the private sector in financing and/or operating transport installations and utilities, ideally lowering the costs to the public while simultaneously increasing value for money (Kain, 2002, pp. 44–45 and Mouraviev & Kakabadse, 2012, p. 263). Siemiatycki and Farooqi (2012) define value for money (VfM) as "a measure of the extent to which cost savings

[24] The *Private Finance Initiative* put in place by the UK's Conservative government in 1992 was a pioneer in the field of PPPs as a mainstream government policy, deliberately shifting the state's role in the provision of infrastructure. The PFI was, at the core, a project financing scheme through which "the public sector purchases, directly or indirectly, services from the private sector responsible for owning, financing, and operating the capital asset that delivers the service, whereas before it owned the capital assets and was a direct service provider" (Debande, 2002, p. 371).

are achieved when delivering a public infrastructure project through a PPP relative to a traditional government-led procurement approach" (Siemiatycki & Farooqi, 2012, p. 286). To determine if society is better off using PPPs as opposed to traditional procurement of infrastructure by government, a "public-sector comparator" methodology can be used to evaluate value for money. "The financial VfM of PPPs commonly boils down to a calculation of whether innovation and efficiencies and real risk transfer as realized through the PPP arrangement outweigh the higher costs of private-sector financing, a premium paid to the private sector for assuming greater risk, and higher associated transaction costs" (Siemiatycki & Farooqi, 2012, p. 288). The public-sector comparator of VfM is designed to estimate the envisioned public benefits to be gained by collaborating with the private sector, and to examine whether indeed these public benefits have indeed been achieved. Value for money is the net sum of financial benefits gained by the public by procuring infrastructure through partnerships with the private sector, which are entered based on an expectation of lower costs and higher value. The authors describe 3 different payment models through which private-sector partners in PPPs can earn revenue (Siemiatycki & Farooqi, 2012, p. 294):

a) User fees: The private-sector operator can recoup their financial investment in the project by **charging fees to users** of the utility or facility over a period of time;

b) Scheduled payments by government: The private operator can be compensated through **scheduled payments from the government** over a period conditional on the underlying utility operating as specified in contractual agreements;

c) Payment on construction completion: The private-sector party can be compensated by the government at once and in full through **a single bullet payment** once construction is complete and the utility is confirmed to be operating as agreed. This would likely be the case when the private party is not engaged in a long-term arrangement to operate the utility or facility.

Mouraviev and Kakabadse (2012) contribute to the literature by distinguishing various forms of public-private partnership. While a PPP is generally understood to be a specific project implemented through collaboration between the public and private sectors, this describes a single variant called a *contractual PPP*. The authors describe an additional variant, called an *institutional PPP,* that arises when a company is owned jointly by the government and private sector entities and exists for the purpose of providing public services (Mouraviev & Kakabadse,

2012, pp. 264–265). PPPs can take various forms. Mouraviev and Kakabadse look at 3 common types, concessions, Private Finance Initiatives (PFIs) and asset life-cycle contracts (pp. 267–268):

- A ***concession*** is a PPP arrangement where a public asset or utility is constructed or renovated by a private entity using private funds, and thereafter assumes operational responsibility for a specified period. In effect, through a concession, the public sector is purchasing services rather than an asset. The private entity is responsible for providing services to the public and maintaining the underlying asset or facility during the specified period, in return for fees that it charges users.

- ***PFIs*** are similar to concessions, differing mainly in the specification of the public services to be provided. While concessions may allow for changes in the required service provisions over time (e.g. they may allow for upgrading of the underlying asset or utility and hence changes in the specifications of services provided), PFIs define the entire set of services that the private party is to provide over the life of the contract at the contract signing stage. Moreover, a PFI would be a direct service provider to the contracting public agency, and hence would be a going-concern kind of entity, whereas a concession may be a consortium of companies or a special purpose vehicle established for the sole purpose of engaging in the PPP.

- An ***asset life-cycle contract*** is like a concession, differing mainly in terms of the source of payment. Unlike a concession, here it is the contracting public agency that is responsible for making payments to the private entity over the length of the contract. The length of the contract is tied to the usable life of the underlying asset or utility, with members of the public receiving services that are paid for by the contracting public agency.

There are various models through which the public and private sector can interact, other than the *finance only* and *finance-and-operate* models referenced above. Each of these PPP models is defined by the degree to which risk is transferred from the public sector to the private sector (Kain, 2002, pp. 55–58). Commonly used PPP models include build-operate-transfer (BOT), design-build-finance-operate-transfer (DBFOT) and design-build-finance-own-operate-maintain-transfer (DBFOOMT) models (p. 268). In a BOT, the private entity constructs an asset or utility using public resources from the contracting agency, operates the new utility until

the end of the PPP contract when it transfers operations and management to the government. In a DBFOT arrangement on the other hand, a private entity designs and constructs a facility using private funds, operates it for a defined period after which operations and management is transferred to the contracting public agency. PPPs, as concepts, are pliable and can be arranged into all sorts of forms depending on the needs of the public agency and how they can be packaged into attractive ventures for private actors. In traditional government procurement, the public sector is responsible for designing, financing and operating infrastructure, usually only engaging a contractor to build a facility to pre-determined specifications. The builder is fully paid upon construction completion, with the funding burden left to the public through taxes or public debts. When it comes to a PPP however, the private sector takes up these roles from the public sector, aiming, of course, to maximise private benefits. The aim of a PPP is usually the delivery of specific outcomes, say certain transport infrastructure, and the public sector interacts with the private sector in a PPP to achieve these outcomes. However, the interests that bring PPP participants to the table are very different. The business of business is almost always, business. Private actors will tend to work to maximise private benefits, while public actors will tend to work to maximise public benefits. Because of the disparate and often-opposed motivations that drive the private sector and the public sector, and the interaction between them in a PPP, aligning these different interests is an essential prerequisite for success in any public-private partnership. PPPs come with unique challenges that project planners and policy makers must contend with.

- By their nature, some PPPs are intergenerational, with contract periods that run for several decades. This is an issue of concern because through PPPs, governments can create financial obligations for future generations. While they may alleviate the short-term fiscal concerns of present-day politicians, shifting the burden of paying for transport infrastructure to future generations could create a problem in future, where tax rates may have to be raised to meet financial obligations of PPPs entered into in decades past.

- Because of the long contract periods that characterise PPPs, the probability of unforeseen events occurring is high. It is quite possible that through a multi-decade period, natural calamities or other unforeseeable events could occur that cause significant damage to PPP assets. Repair costs arising from such damage could

potentially turn even exceptional PPP projects (in terms of the interim VfM) into bad projects, with the public already financially committed.

- By delivering infrastructure through partnerships with the private sector, governments are likely to be relieved of the fiscal pressure that would otherwise be weighing on them. Over time this could have negative ramifications as politicians and government officers are less compelled to be as strictly accountable as may have been the case before. This newfound fiscal comfort could easily lead to wastage and mismanagement of public resources, potentially offset the benefits gained from engaging in PPPs in the first place.

Siemiatycki and Farooqi (2012) put it that "the strength of the partnership approach is derived from the aligning of interests, risks, and rewards between the partners," (Siemiatycki & Farooqi, 2012, p. 287) and any form of public-private partnership that does not appreciate this is almost certain to fail. Considering that transport megaprojects typically cost hundreds of millions of US dollars, potentially impact millions of people and are themselves beset with unique challenges, getting the PPP arrangements around them wrong could compound the public losses in the event of failure. In guarding against this, Little (2011) proposes that the following should be basic tenets in transport megaproject PPPs (Little, 2011, p. 248):

- **Clarity** – This involves ensuring alignment of objectives between all PPP participants, and a statement of how the project objectives would be achieved and measured. By developing strategic ambiguity over the desired PPP outcomes and setting simple rules of engagement between the project players, a strong sense of clarity can be created that ensures all parties are on the same page, and have an agreed-upon point of reference going forward.

- **Transparency** – This would entail creating a culture of openness among the project partners, but also with the public. This can be established for instance by negotiating in public view, submitting project forecasts and other documentation such as VfM evaluation reports to the public for scrutiny, or holding public engagement forums. If properly established and maintained, a culture of transparency within a PPP would go a long way to greatly increase the chances of megaproject success.

- **True partnership** – To create a spirit of true partnership, PPP participants must come to the table with 'clean hands', appreciating the goals of each party, and respecting the knowledge and skills each party brings. To ensure that all parties have sufficient 'skin in the game,' the stakes can be raised through imposing professional and/or criminal penalties on public planners who produce deceptive forecasts, and imposing criminal penalties on private-sector players who engage in corrupt practices such as seeking preferential treatment in PPP negotiations. Enabling *competitive dialogue*[25] between potential private-sector partners and the public-sector agency could be beneficial since the approach "maintains competitive tensions between the bidders throughout the tendering process, spurs efficiency gaining project innovations, and builds trust and reduces conflicts between the partners" (Siemiatycki & Farooqi, 2012, p. 297).

- **Risk management** – It must be ensured that all parties to a PPP take responsibility for risks and eventualities as they arise during the implementation of project. By modularising the project say into phases, developing strategic capacity within the PPP, and creating redundancies of the key actors and project-specific knowledge, adaptability and resilience can be developed to ensure the PPP is able to manage complexity over the course of implementing the project.

- **Accountability** – All participants in a PPP must be held accountable for meeting the provisions of all contracts if public VfM is to be achieved. To incentivise both the private and public parties in a PPP, payment schedules can be tied to performance goals, and failure to achieve pre-set targets can attract financial penalties.

These suggestions are in line with the findings of Trafford and Proctor (2006) who emphasise effective communication, trust and openness, strategic planning, a coherent and cohesive ethos that is cultivated and directed through strong leadership as characteristic of successful public-private partnerships (Trafford & Proctor, 2006). Chou and Pramudawardhani (2015) contribute to the literature by providing a synthesis of several key aspects required for PPP success based on a literature review of PPPs in Taiwan, Singapore, China, and the UK. The authors develop

[25] The authors define this as an approach to tendering practice where "the public-sector client develops the performance specifications for a given project. They then enter into a dialogue with multiple prequalified concessionaires in order to refine the design and contract specifications of their bids to best meet the desired outcomes, prior to the submission of a best and final offer from each bidder" (Siemiatycki & Farooqi, 2012, p. 297).

an assessment tool comprised of 15 key drivers (for success), 20 critical success factors ("CFSs") and 69 risk allocation factors which could be used by project promoters and PPP teams (Chou & Pramudawardhani, 2015). The authors submit that their tool could be used by "investors who intend to invest in infrastructure procurements based on PPPs, and to enhance […] understanding of country profiles (i.e., key drivers, CSFs, and risk allocation preference)" (Chou & Pramudawardhani, 2015, p. 1137). By creating a PPP assessment framework that is publicly available, governments can lead national dialogues that can go a long way in-

(i) assessing local environments for readiness of PPPs,
(ii) creating awareness about government interest in engaging the private sector through PPPs,
(iii) helping legislators and regulators create the supporting legal and regulatory frameworks,
(iv) signalling to the market the expectations of government, and informing government on the expectations of the private sector based on the market response, and
(v) setting the tone for formal public and private sector engagement through PPPs.

In their evaluation of 15 countries in Africa, The Economist Intelligence Unit (EIU) ranks Kenya third behind South Africa and Morocco, in terms of its capacity to carry out sustainable infrastructure PPPs (The Economist Intelligence Unit, 2015). The EIU's benchmarking index is designed to assess a country's capacity for carrying out infrastructure PPPs by evaluating 6 broad areas: 1) "a country's legal and regulatory framework for private participation in infrastructure; 2) the design and responsibilities of institutions that prepare, award and oversee projects; 3) a government's ability to uphold laws and regulations for concessions, as well as the number of past projects and their success rate (operational maturity); 4) the business, political and social environment for investment;5) the financial facilities for funding infrastructure; and 6) the quality of subnational frameworks and experiences in PPPs" (p. 45). According to the EIU's index of 19 indicators, the country's institutional framework and PPP operational maturity, the investment climate and local (subnational) technical capacity are areas requiring improvement. The report finds that Kenya lacks enough well-trained talent in the field of PPPs, concluding that "units at both national and county levels need to be staffed with trained personnel with PPP-specific knowledge. At the moment, most transactions rely on international advisors" (p. 32). The country is also urged to harmonise the institutional framework established by recent legislation - the Public Private Partnerships Act, no. 15 of 2013 of the Laws of Kenya - with existing laws to harmonise the institutional framework

between the national and county levels of government, and to ensure that personnel at these levels of government are adequately capacitated. The report notes that Kenya's PPP legal framework is new and untested with no PPP project implemented since the law's enactment, but comments that it (the PPP law) borrows from international best practice, a cautious vote of confidence on the improving PPP environment in the country.

The Public Private Partnerships Act was assented into Kenyan law on the 14th of January 2013 "to provide for the participation of the private sector in the financing, construction, development, operation, or maintenance of infrastructure or development projects of the Government through concession or other contractual arrangements; the establishment of the institutions to regulate, monitor and supervise the implementation of project agreements on infrastructure or development projects and for connected" (Republic of Kenya, 2013b). The Act establishes a Public Private Partnership Committee that is constituted of 13 members, 9 senior government officials and 4 expert appointees. The Committee is tasked with responsibilities for setting policy and governance standards and guidelines, review and approval of project proposals submitted to it by contracting public agencies, overseeing the monitoring and evaluation of contracting public agencies, and ensuring implementation of all PPP project agreements. Further to this, the law creates a Public Private Partnerships Unit within the National Treasury. The PPP Unit is envisaged to function as a secretariat and technical arm of the PPP Committee that provides technical, financial and legal expertise to the Committee, as well as a serving as a knowledge repository and resource centre for the public also tasked with conducting civic education and promoting public awareness about PPPs and the PPP process in Kenya. Activation and implementation of the 2013 PPP Act to establish a strong legal and regulatory framework, and fully operationalising the institutions created by the Act, would significantly improve the environment for PPP projects in Kenya. Kenya has improved 21 places in the World Bank's *ease of doing business* ranking over the last 2 years to position 92 (World Bank, 2017), suggesting that the investment and business climate is steadily improving. Looking holistically at Kenya's PPP regulatory framework and investment environment, it is evident that the country is on a positive trajectory with regard to improving the conditions for stimulating interest in and cultivating partnership ventures between the public and private sectors. Public-private partnerships, if well planned and executed, can be a game changer in implementing public policy and delivering transport infrastructure. They can deliver the infrastructure that is so badly needed in Kenya through transport megaprojects,

while simultaneously reducing the reliance on the public purse and relieving the ballooning public debt burden.

Since megaprojects are likely to continue to be a choice method for delivering transport infrastructure, and PPPs an attractive instrument for delivering megaprojects, recommendations that seek to improve the chances of success should be taken seriously. Indeed, if typical transport megaprojects usually exceed the budgeted costs, take longer to be built than planned, and the realised benefits fall short of expectations, "the question of whether infrastructure investment leads to economic growth must be answered in the negative" (Ansar et al., 2016, p. 384). In an analysis of 95 transport projects developed over a 24-year period in China, Ansar and company conclude: "a typical infrastructure project fails to deliver a positive risk-adjusted return. There is a common tendency for the benefit-to-cost ratio of major infrastructure investments to fall below 1.0. Such unproductive projects detract from economic prosperity" (p. 384). Policy makers, project planners, and government officers must strive to ensure that the transport PPP megaprojects they implement in Kenya, and the continent at large, are not done in the *typical* way. Project planning, financing and decision-making must not be typical. Project management, governance and *ex post* evaluation must not be typical. The recommendations gathered above and in earlier sections, if implemented, could mean the difference for Kenya as the country endeavours to leapfrog out of low-middle income status and achieve its 2030 vision.

The infrastructure funding gap

McKinsey (2016) approximates that excluding past underinvestment, the world needs to spend US$ 3.3 trillion on infrastructure each year for the next 15 years just to meet the expected projections of global economic growth (McKinsey Global Institute, 2016). If one is to include the total infrastructure costs required to compensate for past underinvestment, this number swells. In fact, McKinsey estimates an annual shortfall of US$ 350 billion, not including maintenance backlogs, adding that "the size of the gap triples when we compare current[26] investment against what would be required to meet the UN Sustainable Development Goals,

[26] McKinsey estimates that the world spends US$ 2.5 trillion annual on transport, power, water and telecommunications infrastructure (McKinsey Global Institute, 2016).

which are critical for the future of undersupplied regions such as Africa" (p. 1). It is clear that most infrastructure funding should be going to the low income and low-middle income countries where extreme poverty is commonplace, since the investment would likely yield the highest return. Continuing at the current rate for instance, it will take most African countries more than 50 years to provide universal sanitation and access to clean water (Foster & Briceño-Garmendia, 2010, p. 3). The UN SDGs target to "ensure availability and sustainable management of water and sanitation for all" by the year 2030 (United Nations General Assembly, 2015, p. 14), and if Foster and Briceño-Garmendia's estimates are correct, many African countries will be more than 30 years late in achieving this goal. If developing countries are to catch up with their counterparts in the developed world, sustained high investment in infrastructure should be a top priority for governments all across the African continent and in other parts of the world struggling to emerge out of poverty. Yet looking at the historical amounts spent on infrastructure, one is likely to think that Africa should be much further along. Over the last 25 years for instance, Sub-Saharan Africa has collectively spent US$ 3.71 trillion, an average of US$ 148 billion every year on GCF (see figure 4 below). This translates to about 17.9% of GDP per year. In other words, for every dollar worth of goods and services produced in SSA annually, 18 cents was invested in accumulating physical infrastructure assets net of disposals.

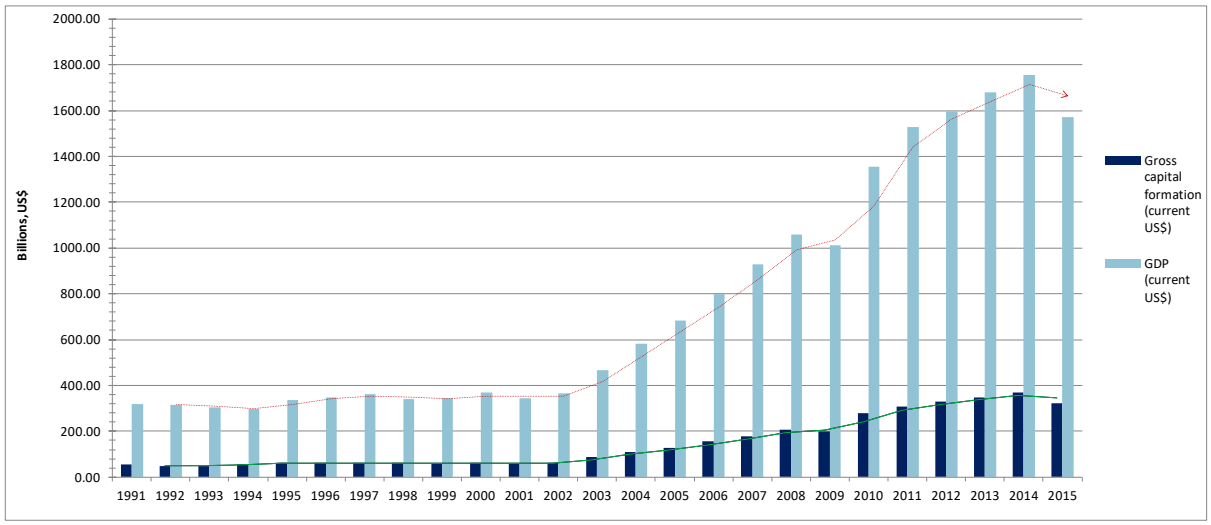


Figure 4: Sub-Saharan Africa's GDP and GCF, 1991- 2015

This seems quite good, until you compare it with the investment in other parts of the world, and account for the effect of compounding. In that same 25-year period, China maintained an average annual GCF rate of 40% of GDP (see figure 5 below). For every dollar of goods produced and services produced in China, 40 cents was invested in increasing net physical

infrastructure assets net of disposals, more than twice the 25-year average rate in Sub-Saharan Africa.

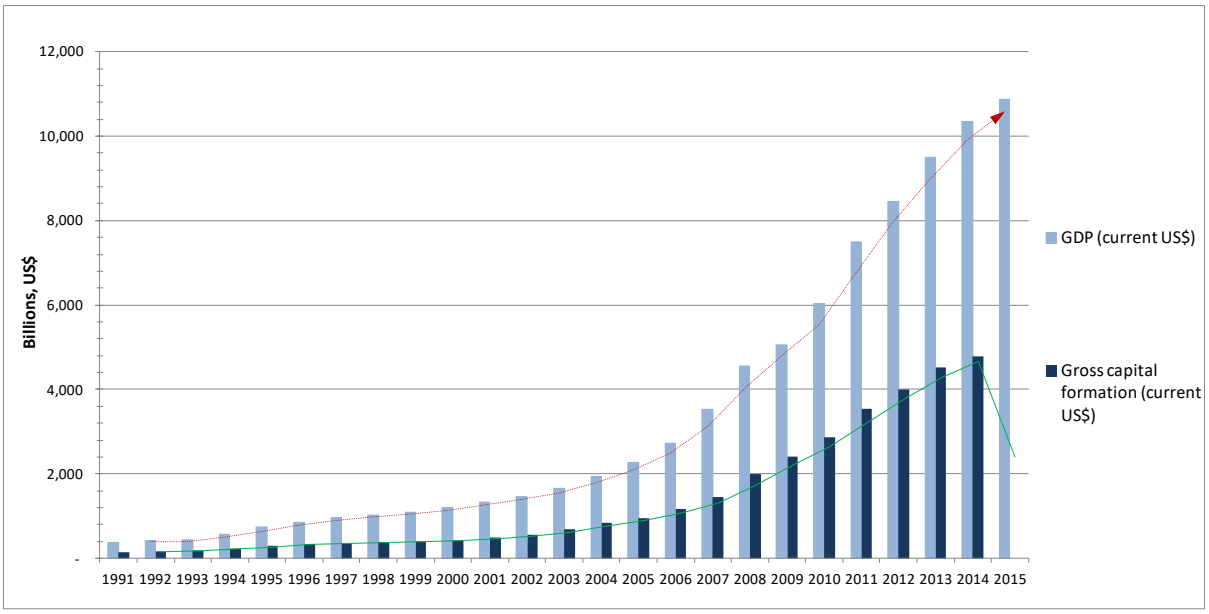


Figure 5: China's GDP and GCF, 1991 - 2015

Singapore managed an average annual GCF rate of 29% while South Korea averaged 31% over the same period. Considering the investment in infrastructure elsewhere, SSA's investment in its infrastructure has been decidedly deficient. Picture this: the difference between 3 and 2, is 1, or 50%. But the difference between 3 compounded 25 times (847,288,609,443) and 2 compounded 25 times (33,554,432) is 847,255,055,011, or 2,525,016%. The difference between China's 40% annual investment in infrastructure and Africa's annual 18%, compounded over 25 years, yields a truly astonishing result. In all fairness, SSA investment in GCF has increased in recent years. In fact, investment in GCF has averaged 19.8% of GDP per year over the last decade, almost a 20% increase compared to the 15 years prior. This is already beginning to pay off in many parts of the continent: freshly tarmacked highways litter cities and towns, numerous new power plants are being connected into national grids, there's increased investment by the private sector and consumer spending is on the up, supported by a growing African middle class. For Sub-Saharan Africa to experience the sustained economic growth that can lift the vast majority up out of poverty, a concerted and sustained effort to invest in its physical infrastructure must be made. The Global Infrastructure Hub[27] forecasts: "the total infrastructure investment forecast for Africa to 2040 is projected to be $4.3 trillion,

[27] The Global Infrastructure Hub is an initiative of the G20 club of developed countries, set up to grow the global pipeline of quality bankable infrastructure projects by facilitating access to knowledge, highlighting opportunities for reform and connecting the public and private sectors.

or $174 billion per year" (Global Infrastructure Hub, 2017, p. 56). While African countries collectively spent a substantial US$ 148 billion each year over the last 25 years, they will have to ramp up spending by at least 18% and sustain those levels for the next 23 years to match future infrastructure needs. The Global Infrastructure Hub predicts that Africa will fall short in meeting future infrastructure funding requirements by 28% (see figure 6 below), adding that "Africa's investment gap is forecast to widen further to 43%, if investment need includes SDGs" (p. iii). The report observes that Africa's infrastructure investment has been particularly heavy on utilities. The continent matched the global average spend on electricity and doubled the global average in water. This sector-strong focus has come at a cost: the report observes that Africa's transport sector received below-average investment at "27 percent of the total between 2007 and 2015, compared to the world average of 45 percent" (p. 56).

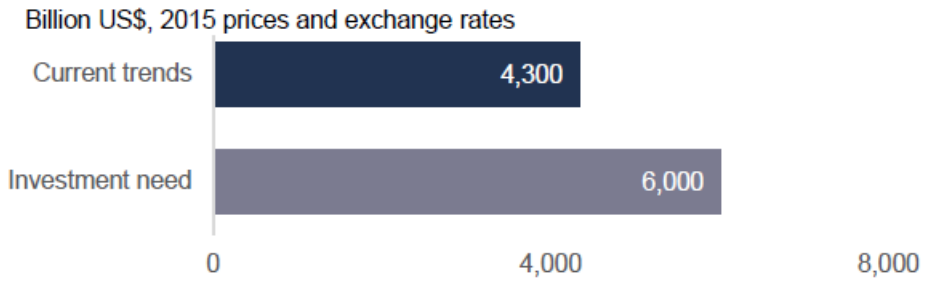


Figure 6: Africa's infrastructure funding need | Source: Global Infrastructure Hub, 2017, p. 56

Through their Heads of State and Government, Africans committed to meeting the continent's aspirations as espoused and documented in the African Union's *Agenda 2063*. The document envisions and describes "the Africa we want", it defines the collective aspirations of the continent, and sets target dates for achieving them. Through *Agenda 2063*, Africans have set a goal that "the necessary infrastructure will be in place to support Africa's accelerated integration and growth, technological transformation, trade and development. This will include high-speed railway networks, roads, shipping lines, sea and air transport, as well as well-developed ICT and the digital economy. A Pan-African High Speed Train Network will connect all the major cities/capitals of the continent, with adjacent highways and pipelines for gas, oil, water, as well as ICT Broadband cables and other infrastructure" (African Union Commission, 2015, p. 5). In an analysis of *Agenda 2063*, DeGhetto and company summarise that the continent targets to have developed its infrastructure for road, air and marine connectivity by the year 2025, and rail connectivity by the year 2040 (DeGhetto et al., 2016, p. 111). According to the UN Economic Commission for Africa, the annual African

infrastructure funding gap currently stands at about US$ 50 billion, and is forecast to grow by between US$ 14-15 billion annually owing to adaptation costs required to manage the effects of climate change (United Nations Economic Commission for Africa, 2015, pp. 12–13). To meet the infrastructure goals of *Agenda 2063* (which significantly raises the potential infrastructure bill when compared to the forecast by Global Infrastructure Hub that uses global growth predictions) while compensating for the existing funding gaps and past underinvestment, and mitigating for the effects of climate change, the continent requires to quickly mobilise, deploy and manage hundreds of billions of dollars' worth of capital projects.

Paying for such massive infrastructure programmes through taxes and government revenues is nigh impossible. Taxes would be insufficient, and increasing taxation to the levels required to raise the funds needed would be political suicide, and the equivalent of economic sabotage by the political class. Fortunately, SSA countries currently hold much less sovereign debt as a percentage of GDP compared to countries in other parts of the world. It can be argued that there is a lot of room for government debt levels to be raised and used as a primary financing method for plugging in the infrastructure funding gap. There is certainly some truth to this. But as has been noted in earlier sections of this study, the debt tolerance of developing countries is much lower than that of developed countries. With increased debt comes the need to service that debt. The annual principal and interest payments to creditors increases, reducing the pool of resources available for other development needs. Ideally this increase in outbound payments is offset by economic growth, reflected through increased investment and consumer spending, increased revenues from taxes, increased savings, and higher income from increased exports. Unfortunately, things often do not work out so smoothly. Even when there are moratorium periods before the beginning of debt service, there could be time lags between the predicted increase in economic growth and when debt service begins. The immediate benefits expected from transport megaprojects could fall short after projects are completed owing to deceptive forecasts or construction cost overruns. In addition, as countries accumulate debt, the marginal cost of that debt rises owing to increased risk of default. Depending on a country's debt tolerance as assessed by financial markets, an increase in debt could result in a more than proportional increase in interest rates. Domestic capital markets take pricing signals and are benchmarked against the interest rates paid by 'risk free' governments, adjusted for borrower-specific risk premia. As interest rates on government securities increases, this increase in the risk-free rate is transmitted through the financial system onward to final borrowers – individuals and firms. This has the undesirable effect of slowing down the economy as private

credit becomes increasingly expensive and harder to access. If this slowdown goes on for a prolonged of time, a vicious cycle of economic stagnation could begin. The rationale relied on by project promoters and politicians for taking on debt to fund transport megaprojects could fail, and very well be their undoing. If megaprojects do not deliver the promised benefits, they turn toxic, and depending on their cost relative to GDP, they could metastasize and become a burden to the overall economy as huge, unproductive debts are serviced from the public purse.

Kenya, and the need for innovating the funding models for transport megaprojects

McKinsey (2013) defines the infrastructure funding gap as "the difference between investment need and the resources available to address the need" (McKinsey Global Institute, 2013, p. 9). The definition of *need*, per McKinsey, "is more complex not least because it depends on the aspirations of each country, and these may differ widely" (p. 9). It is important to bear this in mind when estimating a country's infrastructure funding gap, that any solutions proposed to plug in the gap are thoughtfully designed to (i) address broad national fiscal concerns, and (ii) meet specific funding needs. Kenya's aspirations are articulated in the country's *Vision 2030* development blueprint, and infrastructure is addressed therein as follows:

> *"The 2030 vision aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications. By 2030, it will be impossible to refer to any region of our country as "remote" (Government of the Republic of Kenya, 2007)".*

Much like in many parts of Sub-Saharan Africa, "the infrastructure requirements for sustainable development in Kenya are seriously lacking and that means that the country's infrastructure stock needs to be upgraded" (Hope,Sr, 2010, p. 92). The *Second Medium Term Plan* (MTP 2) that runs from 2013 through to 2017 outlines the specific policies, programmes and projects planned for implementation during the period, inspired by and in line with the *2030* vision. MTP 2 builds on the achievements of MTP 1 and sets a target of gradually closing Kenya's infrastructure gap, and making the overall economy more frictionless (Government of the Republic of Kenya, 2013). An ambitious list of programmes is set out for implementation during the plan period and the *First Annual Progress Report* measures the country's performance in meeting the targets set out in MTP 2. Of the 17 reported challenges that hampered full implementation of MTP 1 initiatives in the transport sub-sector, financial inadequacy was alluded to 3 times, emphasizing the significance of the funding problem

(Government of the Republic of Kenya, 2015a, p. 45). Granted, finance is not the only challenge that will need to be surmounted in closing Kenya's infrastructure gap, but it is certainly a central one. By articulating Kenya's future aspirations, *Vision 2030* establishes a benchmark from which the country's infrastructure needs can be evaluated, and the infrastructure gap approximated. Briceño-Garmendia and Shkaratan (2011) calculate that implementing Kenya's MTP 1 and 2 projects would cost approximately US$ 4 billion annually for a decade, with capital investment accounting for over 70% of this expenditure (Briceño-Garmendia & Shkaratan, 2011, p. 22). To meet the growing demand for electricity and improve the reliability of power supply for instance, an additional US$ 1 billion would be required each year. According to the authors, the total infrastructure funding gap in Kenya stands at US$ 2.1 billion dollars annually, and they are categorical that "the funding gap can be addressed only by raising additional finance or, alternatively, by adopting lower-cost technologies or less-ambitious targets for infrastructure development" (p. 31). Reducing 'ambition' and scratching out development plans, and hoping Kenyans will be content with a poorly-networked, poorly-maintained and largely dysfunctional transport system is not a sustainable strategy, and it is unlikely to find appeal among the population. The authors approximate that by adopting low-cost technologies, the funding gap could be reduced by as much as half; this is probably a better idea than scraping development plans. Despite the country spending a substantial 18% of its GDP on infrastructure every year (see figure 7 below), a large funding gap remains which continues to perpetuate the infrastructure deficit.

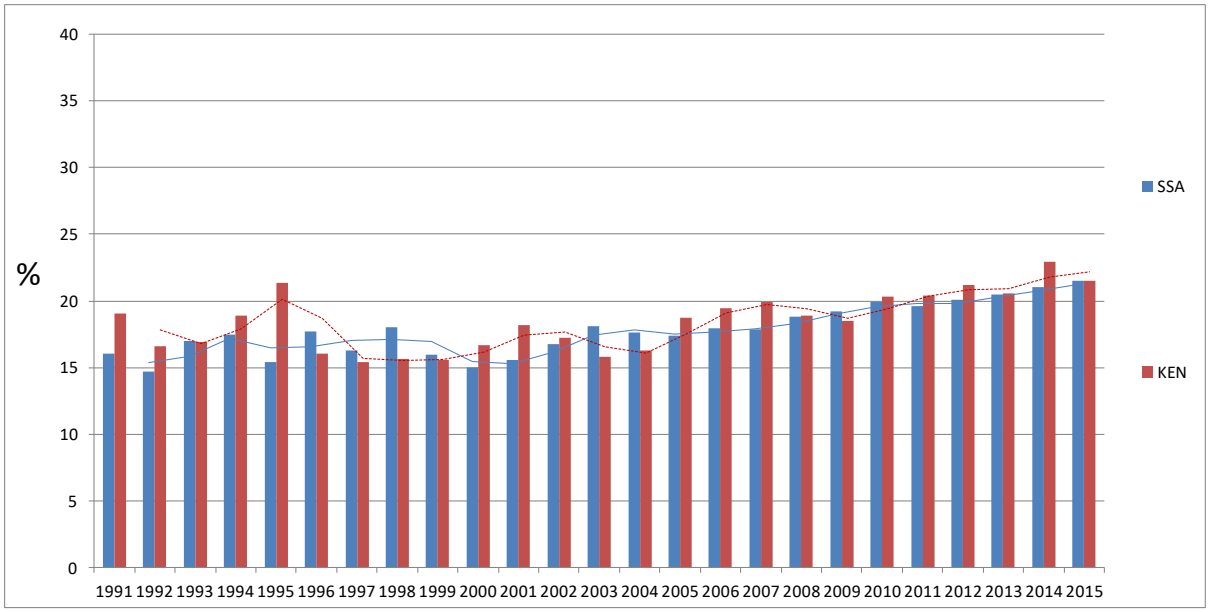


Figure 7: Kenya and SSA GFCF as a percentage of GDP, 1991 to 2015

While Kenya has successfully raised funds from international debt markets in the past, it is notable that this is not a panacea for funding its infrastructure needs. Yes, Kenya has slashed its debt service burden greatly over the last 25 years, currently paying about 2% of GDP to service public debt (see figure 8) and is at par with the average SSA levels.

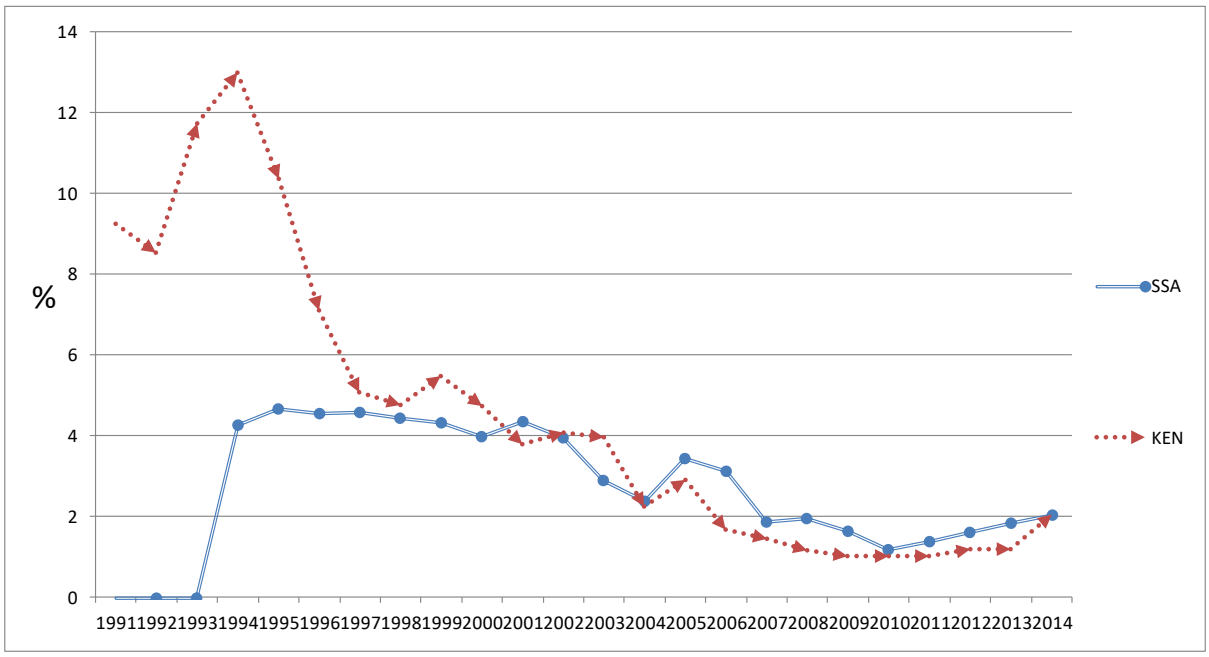


Figure 8: Kenya and SSA total debt service as a percentage of GDP, 1991- 2014

With such a debt service ratio, it is tempting to think that the country has room to pile on debt to fund infrastructure programs. Presbitero and company point out that when issuing sovereign bonds, SSA countries are more exposed than low-income countries in other regions to the prevailing global market conditions. Consequently, SSA countries typically pay a premium of 100 basis points on their external government debt (Presbitero et al., 2016). For this reason, while it is possible that external debt could be a cheap source of funds to finance the implementation of Kenyan megaprojects, external sources would be attractive only on a case by case basis, and when the conditions in international market allow. So, while international debt markets could be tapped occasionally to retire costlier external and domestic debt, Kenya (as a country within the SSA region) would rely on the prevailing vicissitudes of the markets. Sometimes this could bode well for the country, and other times this could mean trouble. According to the 2016 MTDS report for Kenya, debt service stood at 29.7% of total revenues (Government of the Republic of Kenya, 2016, p. 44), meaning that for every 100 shillings collected by the government of Kenya, about 30 shillings went to service principal and interest payments on public debt. This study observed earlier that nearly half of Kenya's public debt is exposed to exchange rate risks, with the US dollar accounting for 60% of the total external debt

portfolio and 30% of the total debt portfolio (p. 11). With 30% of Kenya's debt portfolio vulnerable to US dollar movements, a single 5% appreciation in the US dollar relative to the Kenya Shilling would have the effect of making Kenya's debt service costs 1.5% more expensive. A 10% appreciation is the US dollar, and Kenyans would have to cough out 3% more to service existing debts. As the IMF finds (International Monetary Fund, 2016), Kenya is indeed performing well in terms of keeping its public debt within manageable levels. That said, the country does not have much capacity to take on more public debt without 'fragilizing' the overall economy by increasing its exposure to exchange rate currency shocks. External debt should therefore not be relied on as the primary source of financing to pay for Kenya's heavy infrastructure needs. Doing so could have the effect of making *Vision 2030* much harder to achieve.

Chobanov and Mladenova (2009) estimate that the optimal size of a government's total expenditures should be about 25% of GDP, and the optimal size of government approximately 10.4% (measured as the ratio of government consumption to GDP) (Chobanov & Mladenova, 2009). DiPeitro and Anoruo (2012) confirm this assertion using a sample of 175 countries and conclude that if their data analysis results hold true, "to promote economic growth, there is a real need for policies that reduce the size of government and size of public debt, and for effective strategies that reduce incentives for growth in the size of government and in the size of public debt" (DiPeitro & Anoruo, 2012, p. 417). Megersa adds to these voices, suggesting that there is an association -if not clear causality- between large debt balances and low economic growth rates in SSA countries in an analysis of 22 countries including Kenya (Megersa, 2015). According to the findings of the Kenyan Auditor General (Office of the Auditor-General, 2015) and using data from the World Bank, the Kenyan Government's total expenditures are approximately 30% of GDP and general government final consumption stands at about 14% of GDP as at the end of 2014. Based on these statistics and the findings of DiPeitro and Anoruo (2012), one can infer that the Government of Kenya is currently not optimised in terms of its size within the economy, with the implication that its size may be holding Kenya back from achieving higher economic growth. This suggests that the large-scale infrastructural projects currently being implemented across the country, intended to stimulate economic growth, could in fact be depressing it, since the Government may very well be *too big*. As it stands, even if Kenya wanted to take on significantly more debt to fund a program of transport

megaprojects, there hangs a *Sword of Damocles*[28] over it. This 'sword' is double-edged: a narrow capability to sustainably service more public debt, and increases in the domestic cost of credit caused by additional debt. Both of which have political repercussions for decision makers. Consequently, debt of any source, even cheaper foreign debt, may not be the best way, or a sustainable way, to pay for Kenya's much-needed transport megaprojects.

The country thus finds itself in a bind: on one hand, there is a large infrastructure deficit that needs to be urgently addressed if Kenya is to meet its *Vision 2030* developmental goals. On the other hand, the Government of Kenya may already be "too big" in terms of its expenditures and consumption within the economy, with little room for further public debt-funded projects. Kempe (2010) observes that "addressing Kenya's infrastructure deficit will require sustained expenditure", acknowledges "that a substantial funding gap exists" and concedes that "given the order of magnitude of the annual infrastructure spending requirements, there is need to mobilise other sources of investment capital and more needs to be done to attract private investment and PPPs, in particular private participation in infrastructure (PPI)" (Kempe, 2010, p. 99). It is in this environment of tightening fiscal and macroeconomic constraints and a significant infrastructure deficit that this study lives. It aims to put forward a practical set of ideas that may help to address the Kenyan infrastructure funding problem without adding to the public debt, and ultimately contributing to faster economic growth. The research challenge therefore is *to innovate alternative funding models for transport megaprojects in Kenya.*

Drucker (2002) describes innovation as "the means by which the entrepreneur either creates new wealth-producing resources or endows existing resources with enhanced potential for creating wealth" (Drucker, 2002, p. 5). This study shall explore the megaproject funding landscape in Kenya to identify areas of weakness and opportunities for innovation within the ecosystem, and to propose practical solutions that could help plug in the Kenyan infrastructure funding gap. These solutions may be entirely new funding models; or they may combinations of existing models, or tweaks to existing models, that work better to produce better outcomes. The study shall evaluate several large-scale projects implemented over the last 25 years to identify the common features of successful projects, and then embark on an *integrative thinking* process to develop innovative solutions that address the funding problem for transport

[28] In the *Tusculan Disputations* of Marcus Tullius Cicero, the ancient Roman philosopher politician (106 BC – 43 BC, when Damocles revels in the throne and bed of the king, the tyrant king Dionysius orders that a sword is hung over Damocles' head, suspended only by a single horse's hair. The sword serves as a constant reminder of the perils Damocles is exposed to, admonition to all those in power of its transient nature.

megaprojects in Kenya. Given the closeness between Kenya and the SSA bloc in terms of GCF rates and debt service levels, the country should be a good test case for addressing the infrastructure funding problem with a view of generating scalable solutions that can be applied elsewhere on the continent. In delving deeper into the megaproject funding landscape in Kenya, it is hoped that any findings and recommendations proposed, while addressing the uniquely Kenyan context, may have relevance to the broader continental challenge. An innovative set of practical solutions that address the inherent problems in planning, decision-making and implementing megaprojects, ideas that build on the lessons from megaproject experiences globally, insights that consider the growing role of PPPs in implementing megaprojects, and that appreciate the country's contextual nuances, are urgently needed. This study hopes to provide some.

Many scholars have expressed themselves clearly on the matter of economic growth and indicators like GDP as being necessary but not sufficient for the widespread improvement of social welfare. The notion that "a rising tide lifts all boats" has been disproven time and again, and is better substituted by the "rising tide lifts many yachts and some boats". In as much as literature strongly makes the case for investment in physical infrastructure as a stimulant for economic growth, the author appreciates that improved physical infrastructure is no guarantee for improved social welfare. By improving transport links and reducing friction within and across the economy, commerce is catalysed and the probability of economic prosperity rises. If this study might have suggested that improved transport infrastructure will guarantee improved socio-economic conditions for all Kenyans, the author takes this opportunity to correct that perception. No such guarantee is given, or can be given. However, the guarantee that may be given is that improved transport infrastructure will increase the probability for improved socio-economic conditions via the mechanism of a more efficient economy.

RESEARCH METHODOLOGY

Research approach, strategy and design

Systematic combining: an abductive method for doing case-study research

Dubois and Gadde (2002) developed a creative method for doing case study research in their 2002 paper. The authors described their method - *systematic combining* - as "a process whereby theoretical framework, empirical fieldwork, and case analysis evolve simultaneously, and it is particularly useful for development of new theories" (Dubois & Gadde, 2002, p. 554). From the onset, such an approach (see figure 9 below) lent itself well to the aims of this study since it allowed for theory-building through a reflective process in which the 'initial working theory' of the researcher, and analysis of the specific case, evolved over time through the reflective process to culminate in the construction of a cohesive theory. The aspiration of this study was to propose a set of practical ideas that could *actually* work for the Kenyan context. To begin with a hypothetical proposition which the study would have attempted to prove or disprove in the empirical world would have suggested:

(i) that the funding landscape for transport megaprojects in Kenya was well understood,

(ii) that from a larger set of hypotheses, the proposed hypothesis had the highest probability of addressing the research problem, and

(iii) that proving or disproving the hypothesis would have been equally acceptable outcomes of the study.

Not so. First, it was unlikely that the funding landscape for megaprojects in Kenya was well understood, for if it were, the research problem would most likely not have existed. But it did. Secondly, knowledge of the probability of any proposed hypothesis to successfully address the research problem would presuppose knowledge of the research problem and a mechanism for evaluating its effectiveness in addressing the problem. Which was not the case. Third: proving or disproving a hypothesis were not equally acceptable outcomes for this study. If the proposed hypothesis turned out to be effective in addressing the research problem, that would have been an acceptable result. However, if it came to be that the proposed hypothesis would be ineffective in addressing the research problem, the research problem would remain unresolved and the study would have failed to achieve its primary objective. This study desired to conduct research through a process that not only avoided the risk of failure, but one that ensured high chances of success in addressing the specific research problem. With systematic combining,

research does not seek to merely prove or disprove a researcher's initial working theory, but evolves it, adapts it and tests it for real-world fitness through interaction with empirical data, to ultimately result in a theory that can stand on its own. A theory that could later be submitted to a process of proving or disproving its effectiveness in addressing the research problem. Being an abductive process, systematic combining emerged as an ideal method with which to approach the research problem since it (systematic combining) doesn't seek to ask *"Can this proposed solution solve the research problem?"* but, *"How best can the research problem be solved?"*

An exercise in systematic combining begins with the development of a ***preliminary framework.*** This framework guides the interaction between the researcher's initial working theory and the empirical world in collecting, analysing, and interpreting data with respect to the specific case being studied. This framework needs to be robust enough to ably direct the study's immersion into the empirical world with focus, while remaining flexible enough not to leave the researcher with tunnel vision. A "tight and evolving framework" (p. 558) is a compass to the research process, guiding the study into specific directions, but without constraining it to particular coordinates. This is a defining characteristic research done using systematic combining, where the preliminary framework is *tight* but *evolves.* Tightness allows the research process to be bound by and confined to the specific case (that is, the research problem), while providing a perspective at which to look at the empirical world from. Adaptability is essential for the reflective aspects of an abductive process, that the study can pause to zoom in to certain areas of the problem space, orient itself to the locale, learn, and later zoom out and move on ahead. Through this process, the initial working theory that research would begin with is certain to evolve over time, moving the researcher closer to a theory that corresponds better to the empirical world.

In addition to the preliminary framework, the researcher would set off into the empirical world with a loosely guiding ***preliminary theory*** ("theory" here is used softly to mean a stance or cognitive hypothesis or "hunch") that would be relied on to initiate the conversation between the case under study and the empirical world. Like the preliminary framework, it must be 'loosely robust' for any meaningful research to happen. Given that *theory* here is strictly used is the soft sense, "the researcher should not be unnecessarily constrained by having to adhere to previously developed theory...The question of whether one should start with 'received theory', which has been debated by inductionists and deductionists, is not an issue with which systematic combining is concerned" (p. 559). This is another defining characteristic of doing

research using systematic combining. As mentioned earlier, this study was not concerned with finding out if one particular funding model could solve the research problem or not. The study was concerned with solving the research problem, period. This opened the problem space to an exponentially large solution set, that the study could systematically narrow down to only those potential solutions that were informed by the empirical world and its limitations, and therefore had the highest chances of successfully addressing the research problem. Consequently, this study was not going to test out the effectiveness of any one potential solution, or try to generate an infinitely large set of potential solutions; it aimed to develop a set of solutions that had high chances of addressing the research problem, based on a certain understanding of the terrain in the empirical world.

The non-linear, back and forth movement between the framework, theory, data and case analysis is a *matching* process that results in the "identification of unanticipated yet related issues that may be further explored in interviews or by other means of data collection" (p. 555). The previously-unknown power structures, relationships, trends, and insights on research subjects that rise to the surface through the matching process are the gems that scholars and researchers seek when mining fields of knowledge, the raison d'être of research. However, while viewing the empirical world with expanded lenses is a crucial aspect for doing research using systematic combining, it is important to be deliberate in establishing boundaries. Where to look and where not look, when to look and how to look. The empirical universe must be parameterised, or else it can be as big as the universe itself. Too narrow and the research process is hindered from the start, but too wide and the research process can never end. Parameterising the empirical world before research begins prevents flooding the process with useless information which could otherwise be jeopardising. How those boundaries are set up is of "major importance because it determines what will be found" (p. 557). From the very beginning, one can suppose that any research done through systematic combining has an inherent sampling problem. Not necessarily because of poor sampling, but because a minor variation in the empirical boundaries could result in a significantly different outcome at the end of the research process. To accommodate for this, the research process can be *directed or redirected* several times throughout the research process by "expansion or change of the theoretical model" (p. 552). This ensures that the empirical world has been observed from multiple points of view and that research outcomes are a good map of the entire set of viable solutions, not just a map of a single corner.

With the preliminary framework and initial working theory in hand, the researcher is equipped to meaningfully engage the *empirical world* to try and develop deep insight and understanding of the case, that the initial theory can be evolved into a cogent theory that addresses the research problem.

Of note is that systematic combining acknowledges that research is not done in a black box. The lived experiences of the researcher matter. When one has a tooth ache, the opinion of an experienced dentist matters much to them than the opinion of a mechanic. But when one has car trouble, the opinion of a mechanic matters much more to them than that of an accomplished dentist. The experience of the researcher matters. There are nuances of the case, insights that the experiences of the researcher can help tease out, that spill over into the research process. Even with the same preliminary framework, initial working theory and data set, no two researchers will come to identically similar results. Through matching, and direction and re-direction, the researcher's reflective knowledge seeps into the study, giving it an added layer of texture. The challenge therefore is for the researcher to open themselves up and willingly go wherever the winds of the study take them, rather than try and pilot the process into a certain direction.

As a result of the continuous confrontation and iteration of theory with empirical data, the theory that eventually rises out of a process systematic combining process is likely to be potent in the real world. For one seeking to solve practical problems through research, this is the ideal for which one strives, making this research method appropriate for this study. Having said that, because the lived experiences of the researcher inevitably affect the research output, it must be made clear that two researchers working on the same study are likely to arrive at different results. For this reason, the outcome of a systematic combining exercise such as this should not be taken as definitive or truth, but rather *considered opinion*.

Integrative thinking: an enabling framework for doing systematic combining

Applying systematic combining in research requires the establishment of a preliminary framework that directs the interactive process between the initial working theory and the empirical world in collecting and analysing data, and in interpreting it with respect to the specific case. The choice of framework is an imperative one, for it is the cognitive toolkit with which the researcher shall embark into the worlds of theory and reality. A good toolkit will enable the process, and a bad one shall cripple it. The framework must be set up deliberately,

carefully designed to match the requirements of the specific case, and built to provide a solid foundation on which research is conducted. *Integrative thinking* empowers us to **deeply contemplate different models** or alternatives at the same time, to **make creative resolutions** of the tensions that may exist between the models or alternatives, with these resolutions producing better outcomes than would be the case if each of the existing models was taken as they are (Martin, 2007). Integral to integrative thinking is the deep contemplation of the different choices available, the benefits of each choice and the payoffs from making a decision. So often one is confronted with a fork in the road and a decision that requires the selection one option and forfeiting the other must be made. Martin (2007) proposed a new way of thinking about such seemingly binary choices. The integrative thinker benefits from having a mental framework that expands the boundaries of seemingly binary decisions, to allow for the innovative generation of new options that could result in better outcomes. Desiring to *innovate* alternative funding models for transport megaprojects, use of integrative thinking liberated the researcher to interrogate the dominant funding models for transport megaprojects in Kenya to understand what made each model work, and then provided the cognitive tools for innovating a new model that leveraged on the benefits of each of the prior models. If systematic combining was the lighthouse that the research process relied on to navigate towards new frontiers, integrative thinking was the illuminating torch atop the lighthouse. Figure 9 (below) illustrates the methodology that the study made use of, and how the various aspects of systematic combining came together to build a theory that addressed the research problem.

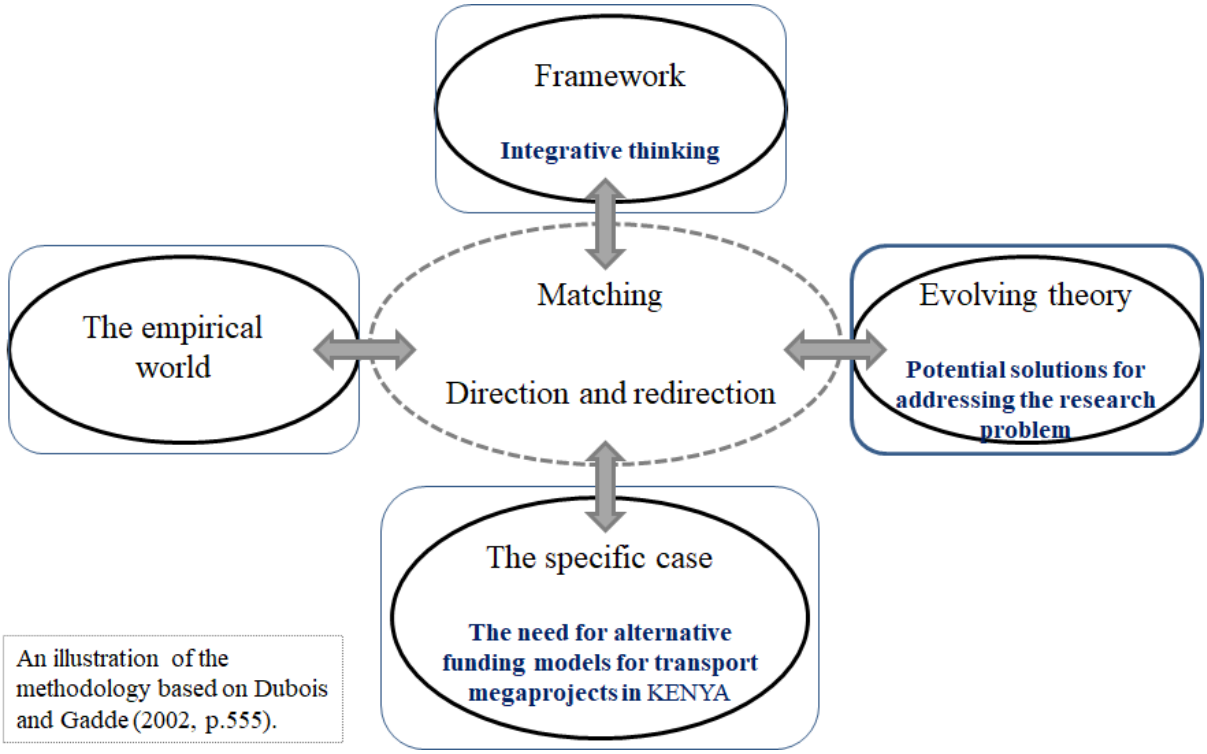


Figure 9: Systematic combining in practice

The features of integrative thinking that made it a compelling framework for doing systematic combining were explained by Martin (2007) as follows:

1. **An expanded view of what matters** - "Integrative thinkers take a broader view of what is salient...More salient features make for a messier problem. But integrative thinkers don't mind the mess. In fact, they welcome it, because the mess assures that they haven't edited out features necessary to the contemplation of the problem as a whole" (p. 42). An exploratory point of view is vital for innovation, and is necessary for one trying to discover new things. It means an ability to see the whole picture, and how individual aspects contribute to whole. But as was said earlier, the boundaries of an expanded view shall have to be clearly demarcated to minimise information overload and to ensure that the evolving theory is exposed only to relevant, value-adding information.

2. **Consideration of nonlinear and multidirectional causality** – "Integrative thinkers don't flinch from considering multidirectional and nonlinear causal relationships. Simple, unidirectional relationships are easier to hold in the mind, but they don't generate more satisfactory results" (p. 42). In the matching and sense-making process that goes on between the evolving theory and the observations from the empirical

world, the researcher is required to adopt a curious stance. Neither enforcing his or her assumptions of what is, or what should be, nor contently accepting things at their face value. Instead, the integrative thinker seeks to understand the deeper, more complex causal relationships that exist within the problem space, open to the discovery of new insights that better explain phenomena in the real world. If done right, this is likely to result in moments of cognitive dissonance during the research process, where the researcher comes across counter-intuitive information that is at odds with one's expectations. Admittedly, this could result in the loss of some information as the integrative researcher struggles to mentally come to terms with unexpected insights. Pre-emptive measures that can equip the integrative researcher with the cognitive muscle to manage the problem include engaging reflective practices such as meditation. Even then, such practices cannot entirely do away with the cognitive dissonance that is only human. In exploring the multiple webs that connect the various aspects of the existing funding models for transport megaprojects, the researcher may unearth the real drivers that make each model so prevalent, and becomes well placed to discover deeper insights that will facilitate the innovation of a better model.

3. **The whole is visualised while investigating the individual parts** – "Integrative thinkers don't break a problem into independent pieces and work on each piece separately. They keep the entire problem in mind while working on its individual parts" (pp. 42–43). This is a key cognitive skill of the integrative thinker, one that enables him or her to take a holistic view of a problem, while still able to see the various aspects of it. Essentially, the integrative thinker can see the forest, as well as the individual trees. Succumbing to the natural urge to concentrate on individual pieces of a puzzle (as opposed to the whole puzzle) could lead to an excessive closeness of inquiry that could totally shift the study in a new direction. While the study aspired to look at the subject matter closely, looking *too closely* was a risk, and doing so could have easily blinded the integrative researcher from insights that lay outside his direct field of view. One must be vigilant of this and work to maintain sight of the whole. The study aimed to innovate alternative funding models for transport megaprojects in Kenya. Excessive closeness in exploring one specific funding model could have had the effect of diverting the researcher's focus from 'developing a better funding model' to 'fixing a particular funding model.' While *fixing a particular funding model* may have been a necessary condition for addressing the research problem, it would not have been sufficient in

resolving the problem because the study sought a solution that had been refined by observations from empirical data. In the event that these observations suggested that the chosen funding model would not work, even with a funding model at hand, the research problem would remain unresolved. For this reason, the integrative thinker had to maintain an open and accepting stance. In addition to this, the integrative researcher believes that the whole is often greater than the sum of the parts, and that as individual parts of the problem receive attention, focus must be kept on addressing the entire problem, and not just its constituent parts.

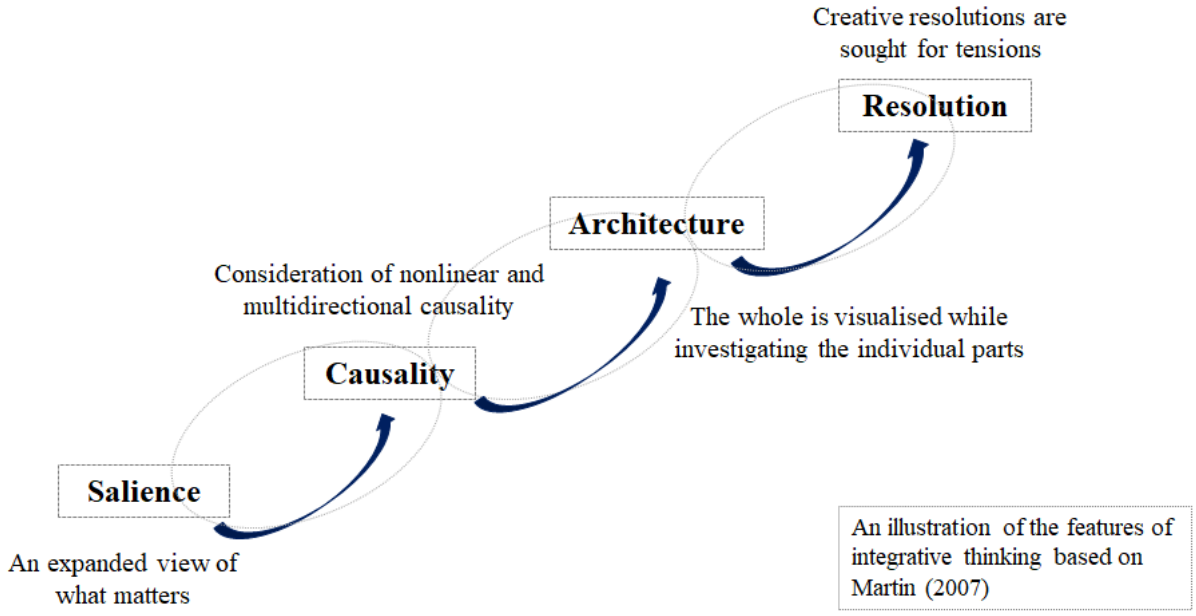


Figure 10: The features of integrative thinking

4. **Creative resolutions are sought for tensions** – "The integrative thinker will always search for creative resolution of tensions, rather than accept unpleasant trade-offs. The behaviours associated with such a search...can appear irresolute from the outside, but the results are choices that could only have been generated by an integrative thinker who won't settle for trade-offs and conventional options" (p. 43). The ultimate good of research is discovery. By approaching the study through the method of systematic combining, and applying integrative thinking as a framework for doing systematic combining, research is positioned to produce new insights and a nuanced understanding of the case at hand. It is possible that the insights produced from research could be very different to what the researcher is familiar with or expecting, causing cognitive dissonance to arise. Not only that, these insights may not only be at odds with the researcher's expectations, they could very well be in divergence with each other. It is

at such moments when the researcher lands at a fork in the road that his or her integrative thinking credentials are put to the test. Does the researcher ignore one set of insights and accept the other? Does the researcher accept both sets of insights, even though they are pulling in different directions? The integrative thinker does neither. To get to the end of the integrative thinking process, the researcher must wrestle with what is found, and creatively resolve these tensions. The next section shows how the integrative researcher can seek a 'third way,' one in which both sets of insights can hold true at the same time.

Data analysis methods

After exploring the research problem holistically to understand what really drives the adoption of the various funding models, what of the models makes them so prevalent, and their limitations, the integrative thinker then must innovate a way that leverages the best of each model. The final leg of the integrative thinking process is when innovation really happens. It follows then, that one would wonder "how exactly do you innovate?" For the integrative thinker and researcher, Martin (2007) sheds some light on this and offers tools for *doing* innovation:

A. Generative reasoning – The author describes "a form of reasoning that enquires into what might be rather than what is. Generative reasoning helps build a framework for creative resolutions that is sturdy enough to withstand the rigors of the real world" (p. 115). What is it that stirs the integrative researcher to *direct* or *redirect* the research process, or to better *match* empirical observations to the emerging theory and the specific case? That feeling, that cognitive dissonance, that realisation that things can be explained much better than they presently are, is an important aspect of systematic combining. Generative reasoning is what enables the integrative researcher to seek better solutions for the tensions that arise from the integrative thinking process. The integrative researcher holds the belief that existing models do not necessarily represent reality, and that better models can be created (pp. 92–94). Deduction and induction are the premier methods of thinking and logic taught in formal education systems all across the world, and have been pivotal in developing the body of knowledge through time. Another useful form of logic is **modal reasoning** that entails enquiry into "*what could*

possibly be true?" as opposed to the deductionist/inductionist enquiry into "*what is true?*" Unfortunately, modal reasoning has not received nearly as much attention as induction and deduction. Fortunately, as the world grows increasingly more complex, it is not enough to ask, "what is?", and asking, "what could be?" is becoming much more common. In addition to deductive and inductive logic, the integrative thinker makes use of an additional thinking tool - modal reasoning- to make creative mental leaps in developing new models that can create a new reality.

B. Causal modeling – An additional mental tool at the disposal of the integrative researcher is **causal modeling**. "Two forms of causation are important to causal modeling. The first is material causation, which says that under a certain set of conditions, x causes y to happen: if we price our product 10 percent below our competitor's price (x), our market share (y) will rise. The second form of causation we need to know about is teleological causation, which asks, what is the purpose of y, or why do we want y to happen?" (p. 120). For the integrative researcher aiming to make an intervention in the existing megaproject funding landscape, having a deep understanding of both material and teleological causation is fundamental for the success of the proposed solution to the research problem. It requires a deep understanding of *why* each model works as it does, and *what* about them makes them so frequently used in financing transport megaprojects in Kenya. With this understanding, the integrative researcher is empowered with the knowledge required to design a new model that builds on the *whats* and *whys* of prior models.

Generative reasoning and causal modeling will help the study in "answering the four critical questions related to enhancing practical wisdom:

- where are we going with this specific problematic(sic)?
- who gains, and who loses, by which mechanisms of power?
- is this desirable?
- What, if anything, should we do about it?" (Flyvbjerg, 2001, p.162 as cited in Flyvbjerg, Landman, & Schram, 2012, p. 5).

By using generative reasoning and causal modeling, the integrative researcher will effectively be exploring w*hat should be done*. This would transform this phase of the systematic combining process from one in which the integrative researcher asks, "what

could be done?" to one where the researcher explores "what can be done within this specific context?" In doing so, the study hopes that it can offer valid, plausible and practical solutions to the research problem. With generative reasoning and causal modeling, the integrative researcher has powerful tools with which to innovate, whether for incremental change of an existing model or disruptive change in creating a new one. The innovations produced from the integrative thinking process are imbued with the same DNA that makes the status quo work. This gives the integrative researcher doing systematic combining confidence, that whatever innovations are produced, have a better-than-average chance of being effective in practically addressing the research problem.

Application to the study

The study considered the two dominant models of funding infrastructure in Kenya i.e. **traditional government procurement**, and the use of **private-capital financing initiatives**. In cognizance of the fact that models are merely "our customized understanding of reality" (p. 50), the study dug deep into each of the two funding approaches to tease out the *salient* features of each model. Large scale projects built in Kenya between January 1991 and January 2016, and costing at least KES 10 billion (approximately US$ 100[29] million in 2016 terms) made up the data set. For this, the traditional government procurement process in Kenya was reviewed, and several projects funded using private-sector capital were analysed. Of note is that this review was not limited to projects in the transport sector alone. While Kenya has long relied on the government to fund and implement transport projects, the use of private capital in transport projects in Kenya is a relatively new phenomenon, and hence the data on this sector

[29] The study considered megaprojects in Kenya to be any large-scale infrastructure project that costs at least KES 10 billion, or approximately US$ 100 million. This differs from Flyvbjerg's estimation of US$ 1 billion (Flyvbjerg, 2014) for two reasons:
(i) Flyvbjerg states the US$ 1 billion figure as an estimation, and not as a precise minimum benchmark for the cost of a megaproject.
(ii) The relative worth of US$ 1 billion – The economic effects arising from a project costing US$ 1 billion in a developed country with an enormous economy like the USA or China could probably be compared with the economic effects from a project costing much less in a smaller, developing economy like Kenya. A project costing US$ 1 billion in the USA could be the equivalent of a fraction of a tenth of 1% of the overall economy, while a project of the same cost in Kenya could be the equivalent of nearly 1% of the overall economy. The study then uses a heuristic of an infrastructure project costing at least KES 10 billion, or US$ 100 million to represent a megaproject in Kenya.

was scarce and scanty. Furthermore, since the study was concerned with how the public-sector and private-sector could collaborate to fund transport megaprojects, the lessons from successful past collaboration in other sectors such as energy and telecommunications were useful in informing any proposed solution for the transport sector.

After this, the study drew causal loop diagrams of the financing structures underpinning each approach using Sterman's method (Sterman, 2000, pp. 163–190) that:

(i) considered the possible multidirectional and nonlinear relationships across the salient features of each financing arrangement and,

(ii) held those relationships within a latticework.

The causal loop diagrams were a representation of the salient features within each of the models, the power structures and/or incentive relationships between the various actors in the models, and a demonstration of how value was created by each of the models. From here the study engaged generative reasoning to innovate, either by improving one or both funding models, or to create a new and better model of funding transport megaprojects in Kenya.

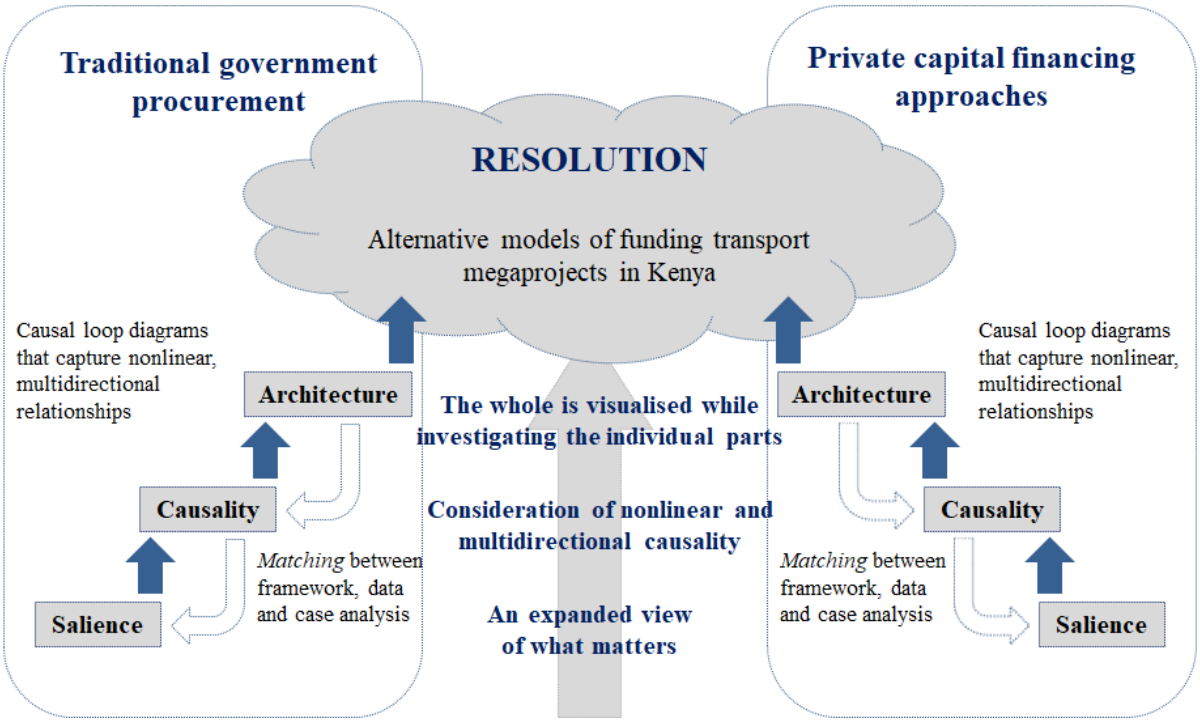


Figure 11: The methodology

Figure 11 (above) summarises the methodology that was used to conduct the study: Dubois and Gadde's (2002) *systematic combining* approach to doing case study research, with Martin's

(2007) *integrative thinking* applied as the analytical framework. This methodology enabled the researcher to emerge from the process better informed about the research problem, and bearing a potential solution that had been refined by input from the theoretical world as well as the real world. The study puts forward that rigorous application of this process succeeded in "producing research that has relevance to decisions about what can and should be done, and also how to do it" (Schram, 2012, p. 19) on the important and urgent matter of developing alternative funding models for transport megaprojects in Kenya.

RESEARCH FINDINGS, ANALYSIS, AND DISCUSSION

Research findings

Traditional government procurement

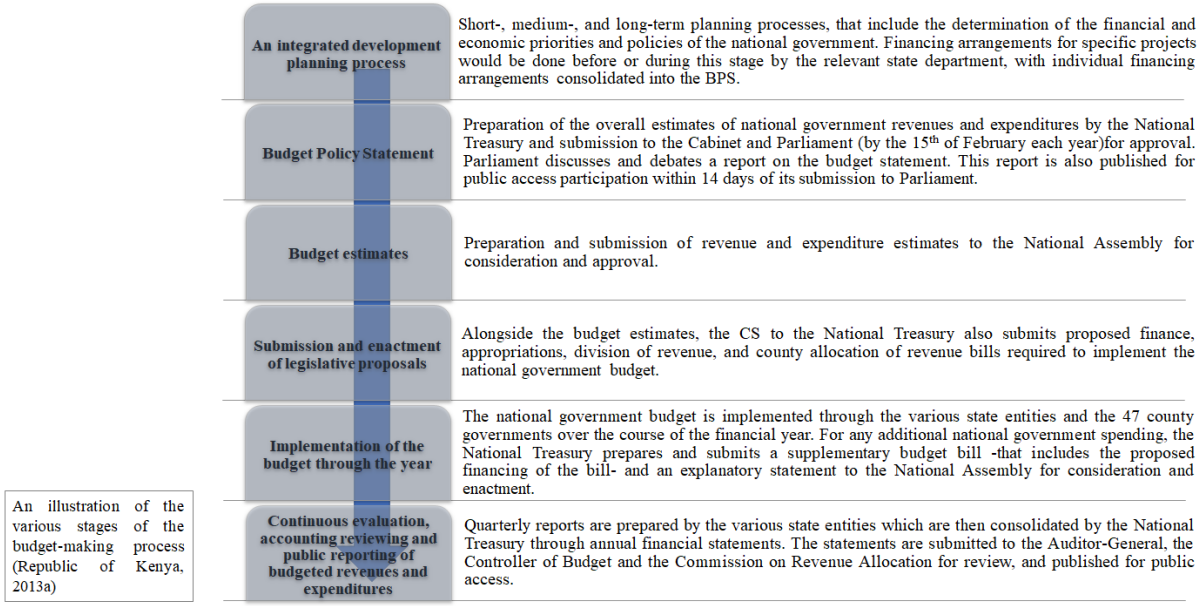
The government of Kenya typically finances the implementation – design, construction, and operationalisation - of large-scale infrastructure projects through budget allocation and direct state spending. Taxes and other revenues collected by the state, domestic debts and externally-sourced loans, and grants from donors are used to finance the implementation of infrastructure projects and other government programs. This set of fundraising mechanisms, where resources are collected by or on behalf of the government of Kenya for its infrastructure and other funding needs, is what this study refers and has been referring to as "traditional government procurement".

The governing law relating to matters of public finances and their management in Kenya is the *Public Finance Management Act* (chapter 412C of the Laws of Kenya). It is "An Act of Parliament to provide for the effective management of public finances by the national and county governments; the oversight responsibility of Parliament and county assemblies; the different responsibilities of Government entities and other bodies, and for connected purposes" (Republic of Kenya, 2013a, p. 11). By defining what constitutes public finances, detailing how the national and 47 county governments in Kenya are required to manage public finances, and setting up a regulatory framework and oversight bodies, the PFMA, sets up the procurement process for all state expenses, including transport megaprojects.

The PFMA establishes the National Treasury, the state department responsible for matters relating to finance, which is mandated to "formulate, implement and monitor macro-economic policies involving expenditure and revenue" (Republic of Kenya, 2013a) as well as other responsibilities related to making, implementing and monitoring the economic and financial policies of the government of Kenya. Following a deliberative process that incorporates the medium- and long-term plans of the government, and determination of the economic and financial priorities and policies to be implemented at the national level, the National Treasury is required to prepare a *Budget Policy Statement* of the revenues and expenditures of the national government over the next financial year. The document is presented to the Cabinet for deliberation, consideration, and approval, before submission to Parliament. Among other things, the BPS includes a financial outlook with respect to national government revenues, expenditures, and expected borrowings over the next financial year. In the BPS, the National

Treasury, through its Cabinet Secretary, allocates public resources towards the various state departments for their recurrent expenses and development needs, including the implementation of transport megaprojects by the relevant state department. Following Parliament's adoption of the BPS, financial estimates and other supporting documents are prepared by the National Treasury and presented to the Cabinet for approval. The National Treasury also prepares draft bills addressing the national government's plans for revenue collection, appropriations and expenditures, and revenue sharing with the 47 counties, which are also presented to the Cabinet for deliberation. After receiving Cabinet approval, the CS submits budget estimates and supporting documentation to Parliament (excluding those for Parliament and the Judiciary), as well as the draft bills on revenue collection, expenditure, and revenue-sharing with the counties that would be used to implement the national government's budget. Every year, the CS for the National Treasury is required to make a public pronouncement of the budget policy highlights before the National Assembly, that includes an explanation of the proposed measures of collecting revenue for the national government, and important policy changes. On the same date, the CS is also to submit a legislative proposal that elaborates on these revenue-raising proposals and following that submission, the parliamentary committee responsible for oversighting public accounts and expenditures is required to introduce a *Finance Bill* to the National Assembly. This bill essentially puts together the national government's financing plans over the next year into a form that can be debated, amended, and passed as legislation by Parliament. In addition to this, the National Assembly is also required to deliberate, consider, and enact a *Division of Revenue Bill* and a *County Allocation of Revenue Bill*. Taken together, these bills – the Finance Bill, the Appropriations Bill, the Division of Revenue Bill, and the County Allocation of Revenue Bill- when passed as legislation, are the foundation stones on which the national government's spending plans can be implemented. Any additional national government spending arising in the course of the financial year is to be requested and its financing articulated through a *supplementary budget* tabled before Parliament. If approved, a supplementary Appropriations Bill, and a statement explaining the need for and financing of the additional state spending is introduced to Parliament for debate, consideration, and approval by its members. At the end of every financial year, the National Treasury is required to prepare financial statements that consolidate the financial statements of all national government entities, and submit copies of these financial statements to the Auditor-General, the Controller of Budget, the Commission on Revenue Allocation, and publish these statements that they can be accessed by the public (Republic of Kenya, 2013a). Figure 12 (below) illustrates the traditional government procurement process. The planning and preparation of the financing

arrangements for a state-sponsored megaproject would be carried out during the integrated development planning stage of the budget-making process, with the funding for specific projects consolidated into the overall national government budget.



An illustration of the various stages of the budget-making process (Republic of Kenya, 2013a)

Figure 12: The stages of the traditional government procurement process in Kenya

Through the provisions of the PFMA, public finances collected or raised through taxes, fines, levies, licences, domestic and external debt, grants, donations, etc. are budgeted for, allocated, and spent through various national and county government agencies (see figure 13 below).

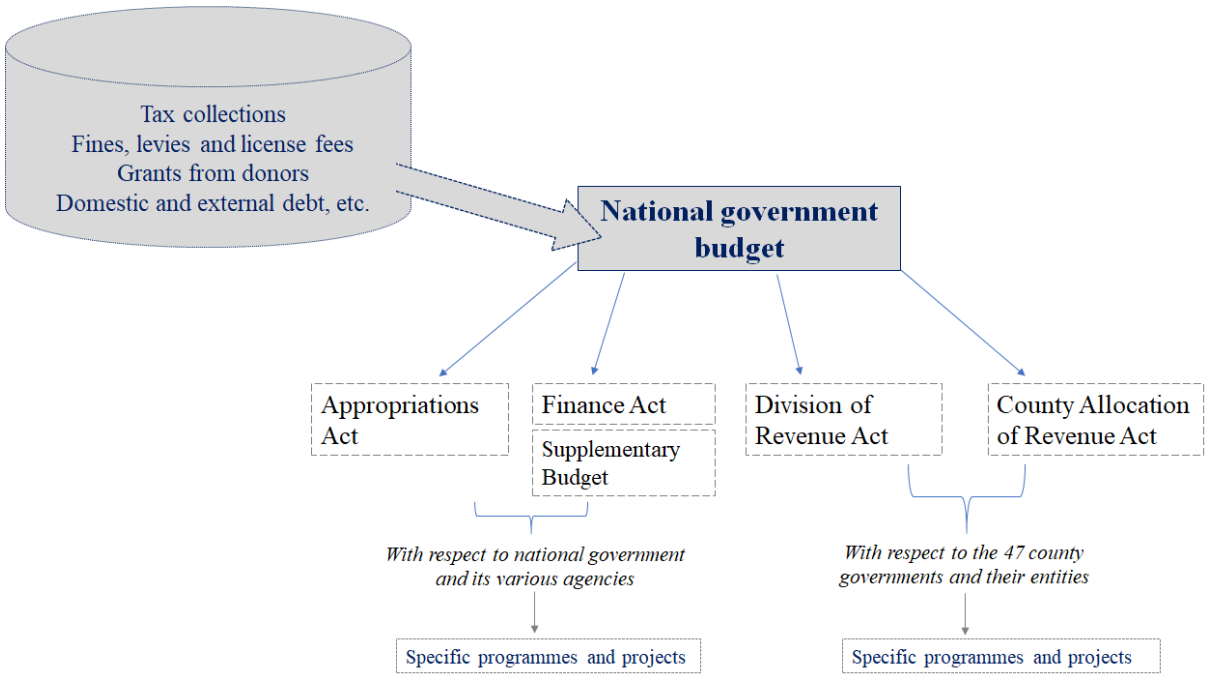


Figure 13: The flow of funds in the traditional government procurement process

Private-capital financing initiatives

Other than the traditional government procurement model, Kenya has made use of other approaches to finance various infrastructure projects. Various state-owned enterprises in the transport sector have been *privatised* through initial public offerings of their shares or direct sale to strategic investors. The financing and operating roles of various existing transport utilities have been transferred to the private sector through *concession agreements*, and the private sector has played an important financing role in mobilising the capital required to implement various infrastructure projects by participating in the government's *infrastructure bond* programs. With privatisation and concession programs, the government requires to have already planned, designed, and constructed the transport utility, with the private sector later coming in to simple run the operations of the utility. While such arrangements may go a long way in improving service delivery, they have not helped to address the funding problem that this study is concerned with. In recent years, PPPs have become increasingly important in delivering infrastructure in Kenya, and they offer the advantage of providing the initial capital required for implementing specific projects, a benefit that concessions and privatisation programs do not.

The study looked at megaprojects that were implemented in Kenya between January 1991 and January 2016, that were partially or wholly funded outside of the model of traditional government procurement by using private capital. As explained in the methodology, the study considered only those transport projects that cost at least KES 10 billion (or US$ 100 million) at the time, and the data set was expanded to include not only transport projects, but infrastructure projects in other sectors such as energy and telecommunications. As was explained in earlier sections, this is done for two reasons: (i) there are very few projects in the Kenyan transport sector that have been funded using private capital owing to the novelty of the funding approach in Kenya, and (ii), of importance to the study's aims was the insights that could be gleaned from the financing arrangements of the various projects, not so much that a specific project was implemented in the transport sector. Several large-scale projects that incorporated the use of at least KES 10 billion (or US$ 100 million in 2016 terms) of private capital were identified and interrogated, and their operating and financing arrangements mapped out for analysis.

Kenya Airways Airline Privatisation

In 1995-96, the Government of Kenya ***privatised*** the national carrier *Kenya Airways* through direct sale to a strategic partner, and an initial public offering of its shares. Incorporated in 1977, Kenya Airways was wholly owned and operated by the Government of Kenya as a state-owned enterprise, with the additional responsibility of carrying the national flag. Over the next two decades, the company accumulated financial loses and was encumbered with a heavy debt burden that it was unable to service. As part of a nationwide privatisation program laid out in 1992, a new board of directors and management team was appointed to lead the firm through a restructuring process that included privatisation of the airline. A multi-tranche privatisation process begun, starting with the sale of a minority ownership stake to a strategic partner who would be charged with steering operations of the airline, followed by an IPO of some of the Government's shares to the Kenyan public (World Bank Group, 2008). The Government of Kenya sold 26% of the ownership equity to *KLM Royal Dutch Airlines*, and 51% to members of the public via an IPO in the Nairobi Securities Exchange (then the Nairobi Stock Exchange) in 1996. Through these transactions the state received more than US$ 70 million from its share sales, the airline received a US$ 15 million loan from the International Finance Corporation to modernise its fleet, and the airline – now a leading carrier on the continent- was been profitable for nearly two decades ever since. The total project value of US$ 85 million- US$ 70 million to the government of Kenya and US$ 15 million in debt to the airline- in 1996, translates to about US$ 130 million in 2016[30] terms.

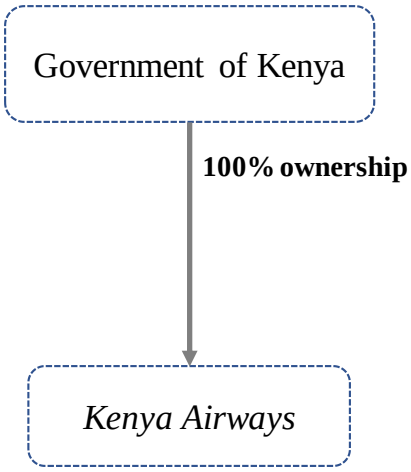


Figure 14: Kenya Airways' initial ownership structure

[30] The US dollar had an average annual inflation rate of 2.15% between 1996 and 2016, meaning that US$ 1 in 1996 would be equivalent to about US$ 1.53 in 2016 ("1996 dollars to 2016 dollars," 2017).

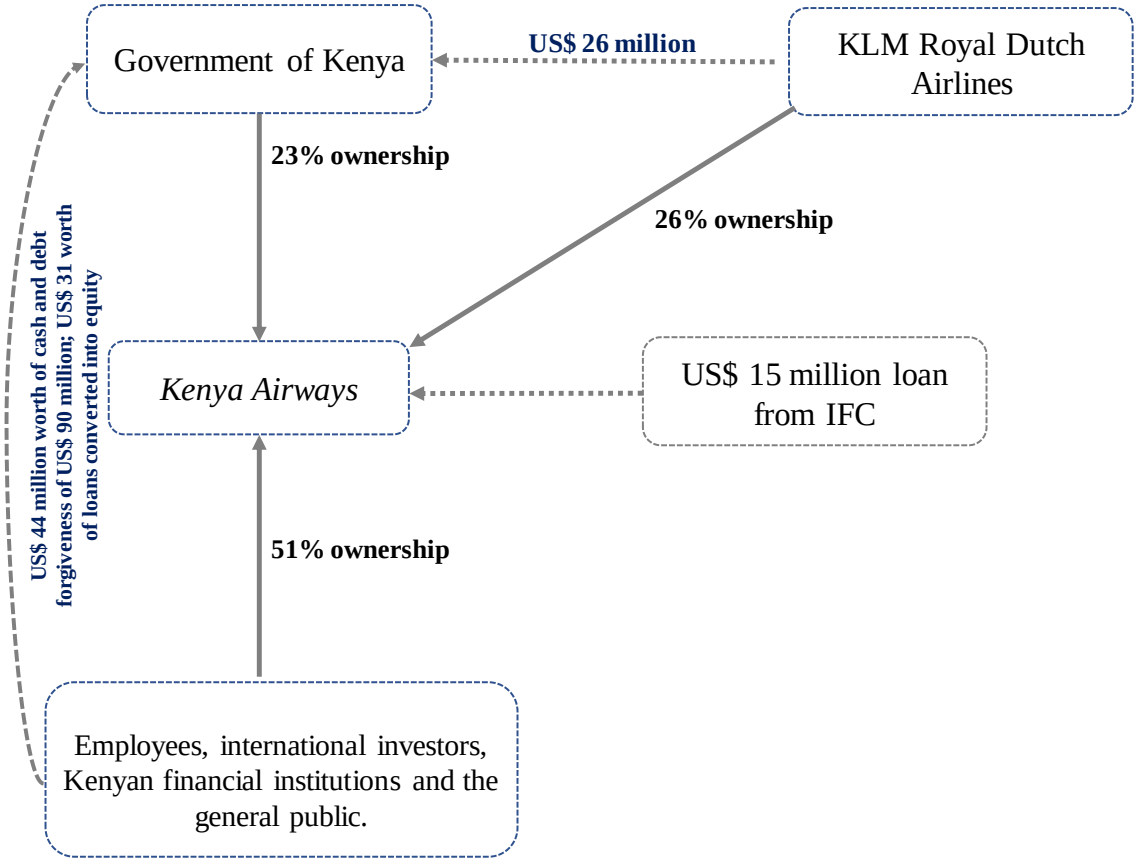


Figure 15: Kenya Airways' revised ownership structure

Figure 15 (above) illustrates the ownership structure of the airline following the share sale to KLM Royal Dutch Airlines in 1995 and privatisation in 1996. By privatising the airline, the government of Kenya relinquished the immediate operational control to KLM Royal Dutch Airlines, which is the oldest airline in the world and possesses a rich history and wealth of knowledge on international airline operations. The government reduced its initial 100% stake in the airline's ownership to 23%, leaving the airline to be operated and financed like any other for-profit airline business. The private sector collectively still owns more than half[31] of the airline's shares, and loans advanced to it are on commercial terms.

Kenya-Uganda Rail Concession

In October 2005, the governments of Kenya and Uganda issued a joint international tender for two nearly identical 25-year *concessions* for the rehabilitation, operation and maintenance of key railways that were then operated by the Kenya Railways Corporation and the Uganda

[31] There have been several rights issues of the airline's shares since its listing, where the state has always taken up its rights shares. Depending on the response from other shareholders during such events, the state may have increased its ownership stake in the airline over time.

Railways Corporation (both are state-owned enterprises). The tenders were awarded in 2006 to two special purpose concessionaire companies set up by the tender winner, Rift Valley Railways consortium. In Kenya, the concessionaire would be additionally required to operate the passenger services of the railway line for a period of 5 years. The concessionaires were required to rehabilitate the tracks to allow safe passage of trains at an average speed of at least 30 kilometres per hour, to upgrade the locomotive fleet, to repair and rehabilitate the existing wagon fleet and passenger coaches, to purchase new locomotives and wagons, to renovate the existing buildings, workshops, depots, equipment and machinery, and to install new information technology systems. Though legally separate, the two concessions were intended to be operated seamlessly as one railway system. The concessionaires were required to invest at least US$ 47 million through cash injections and internally-generated cash flows, while a US$ 64 million loan was jointly extended to the new entities by IFC, the World Bank Group's private-sector investment arm, and KfW, a German state-owned development bank (World Bank Group, 2013, p. 10).

Figure 16: The initial operating arrangements of the URC and KRC railways

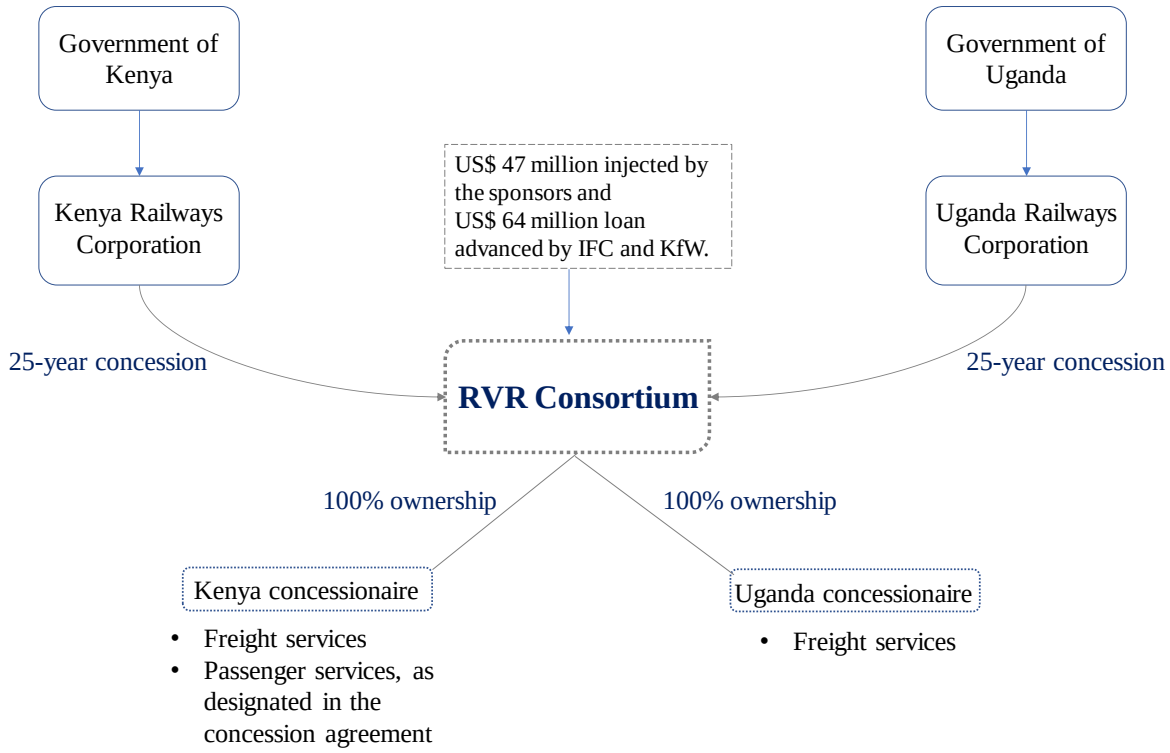


Figure 17: Revised railway operating structures under the concessions

The total project value of US$ 111 million (a minimum US$ 47 million investment by the concessionaire for rolling stock, and a US$ 64 million loan jointly extended to the two concession companies by the IFC) in 2005, is the equivalent of about US$ 136 million in 2016[32] terms. Following these concessions, operational responsibilities were transferred to the private concessionaire RVR, while final ownership remained with the respective governments. For its financial investment, and running railway operations, the concessionaire would earn revenues from passenger ticketing and cargo fees over the 25-year concession period.

Telkom Kenya Privatisation

In 2007, Telkom Kenya Limited, a monopoly state-owned fixed-line communications company was ***privatised*** by the Government of Kenya (International Finance Corporation, 2007). A consortium led by France Telecom won a competitive bidding process to acquire majority ownership in the company, paying US$ 390 million for 51% of the issued shares. At the time of the transaction, Telkom Kenya was on the verge of bankruptcy owing to operational and cashflow challenges, and facing dim prospects due to intense pricing pressure from privately-

[32] The US dollar experienced an average annual inflation rate of 1.9% between 2005 and 2016, meaning that US$ 1 in 2005 would be the equivalent of about US$ 1.23 in 2016 ("2005 dollars to 2016 dollars," 2017).

held competitors. In fact, the state had twice tried to privatise the firm but was unsuccessful in its attempts owing to the immense challenges the business faced. Part of Telkom Kenya's privatisation program involved unbundling its 60% shareholding in Safaricom Limited, a leading mobile telecommunications company. 15% of this ownership stake (that is, 9% of Safaricom Limited) was sold by the state to Vodafone Kenya Limited (the firm already owned 31% of the company) with proceeds from the sale going towards restructuring Telkom Kenya's balance sheet. In return, Telkom Kenya was awarded a mobile telephony operating license, which would be part of the assets that the new shareholders would receive upon taking over. The Government of Kenya also sold 25% of the 60% shareholding (15% of Safaricom Limited) to members of the public by way of an IPO that was held in June 2008. The IPO was dubbed the most successful one in Kenya's history, "raising more than KSh. 50 billion (about US$ 800 million) which more than offset the cost of restructuring" (p. 2).

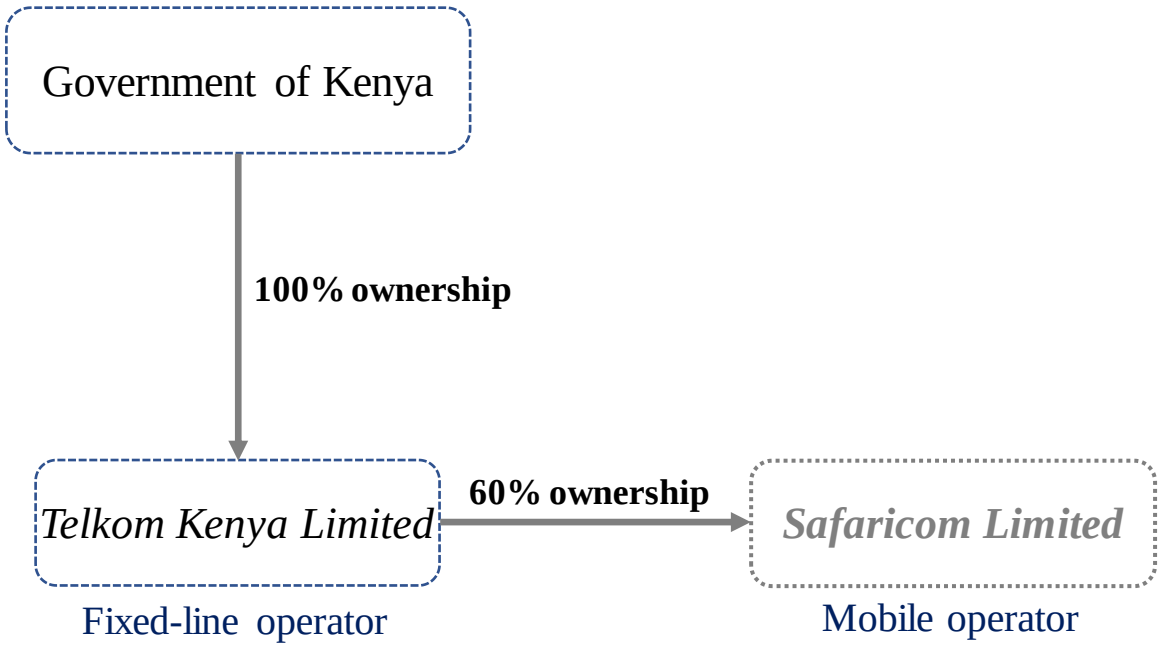


Figure 18: Telkom Kenya initial ownership structure

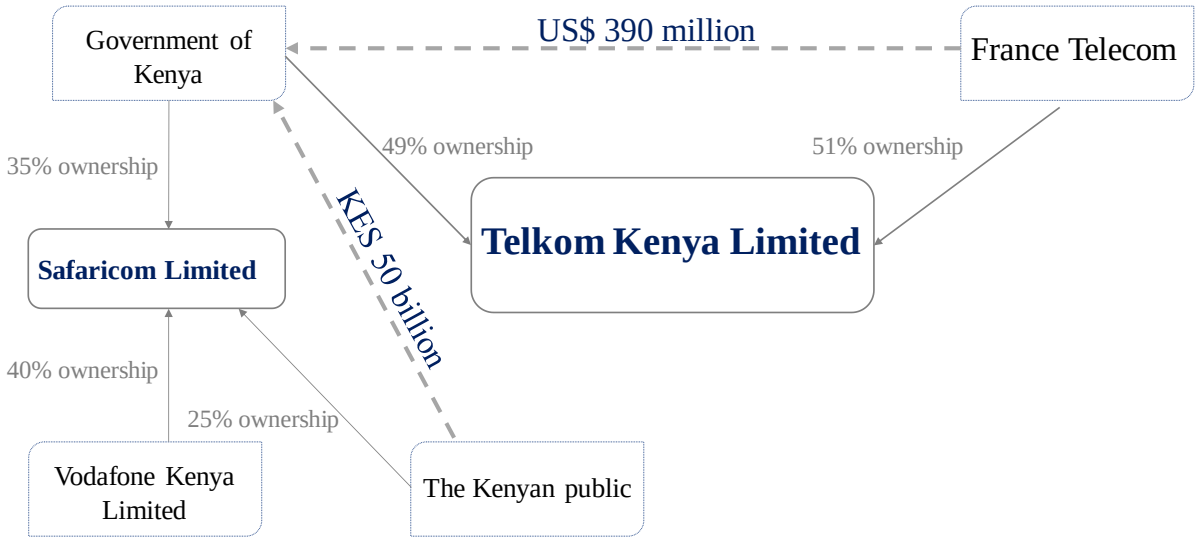


Figure 19: Telkom Kenya's revised ownership and structure

From the sale to France Telkom, the state earned US$ 390 million in exchange for 51% ownership in the firm. Furthermore, the state earned more than US$ 800 million from the sales of 9% and 15% of Safaricom Limited (initially a subsidiary of Telkom Kenya) to Vodafone Kenya Limited, and through an IPO in the Nairobi Stock Exchange respectively. The total value generated by the Telkom Kenya privatisation program was in excess of US$ 1 billion. From these transactions, more than half of Telkom Kenya's and Safaricom Limited's ownership is held in private hands, with the firms operating as typical for-profit commercial entities.

Thika Power Limited Heavy Fuel Oil Power Project

The Government of Kenya's *Least Cost Power Development Plan* (Kinyanjui et al., 2011) encourages the establishment of independent power producers to generate energy stocks and contribute supply into the national power grid with a view of bolstering and diversifying the country's energy mix. The plan is supported by the World Bank Group, and benefits from a combination of *guarantees* from the Multilateral Investment Guarantee Agency, and the International Development Association, and funding from the IFC. Since power plants typically take several years to build and operationalise, with investors receiving returns many years into the future, early confidence in the long-term viability of a project is essential for investors. Investors need to be sure that once they invest their money and project construction commences, future energy offtakers will buy their power supply at the agreed prices and make payments on time. Investment guarantees such as those offered by MIGA and IDA provide that

much-needed confidence and reduce the riskiness of projects by ‘insuring’ such investments. When highly-regarded entities such as MIGA and IDA guarantee an investment, third-party financiers such as commercial banks are provided the assurance that credit extended to the guarantee holder is secured to the extent of the guarantee provided. This has the effect of transferring risk to the guarantor, de-risking the project by protecting a financier’s capital, thus making such investments much more attractive to private capital.

Thika Power Limited was the first power project to be implemented under the Least Cost Power Development Plan. It consisted in the construction and operation of an 87 megawatt (MW) heavy fuel oil power plant in Thika, a busy industrial town on the outskirts of Nairobi (World Bank Group, 2016a). In 2009, the Government put 3 power plants up for tender, aiming to encourage private sector involvement in electricity generation. Melec PowerGen Inc. was awarded the tender in 2009, with total project costs estimated at US$ 153 million. Thika Power Limited, a subsidiary of Melec PowerGen Inc., entered into a 20-year power purchase agreement with the Kenya Power and Lighting Company, Kenya’s national electricity transmission and distribution utility (Kaçaniku & Izaguirre-Bradley, 2015). The IFC and AfDB each invested €28.1 million in Thika Power Limited, while MIGA issued a 15-year guarantee totalling US$ 61.5 million covering a loan extended to Thika Power by ABSA Capital. The guarantee provided cover for the risk of breach of contract and swap exposure from currency changes. IDA provided a partial guarantee to Thika Power covering short-term liquidity risks that would support short-term access to credit. The guarantees extended to Thika Power Limited effectively reduced the risk inherent in investing in the firm, by promising counterparties that in the event that specific events occurred, the guarantor would pay a specified sum to the obligor (the ‘covered party’), thereby assuring them of the safety of their investment.

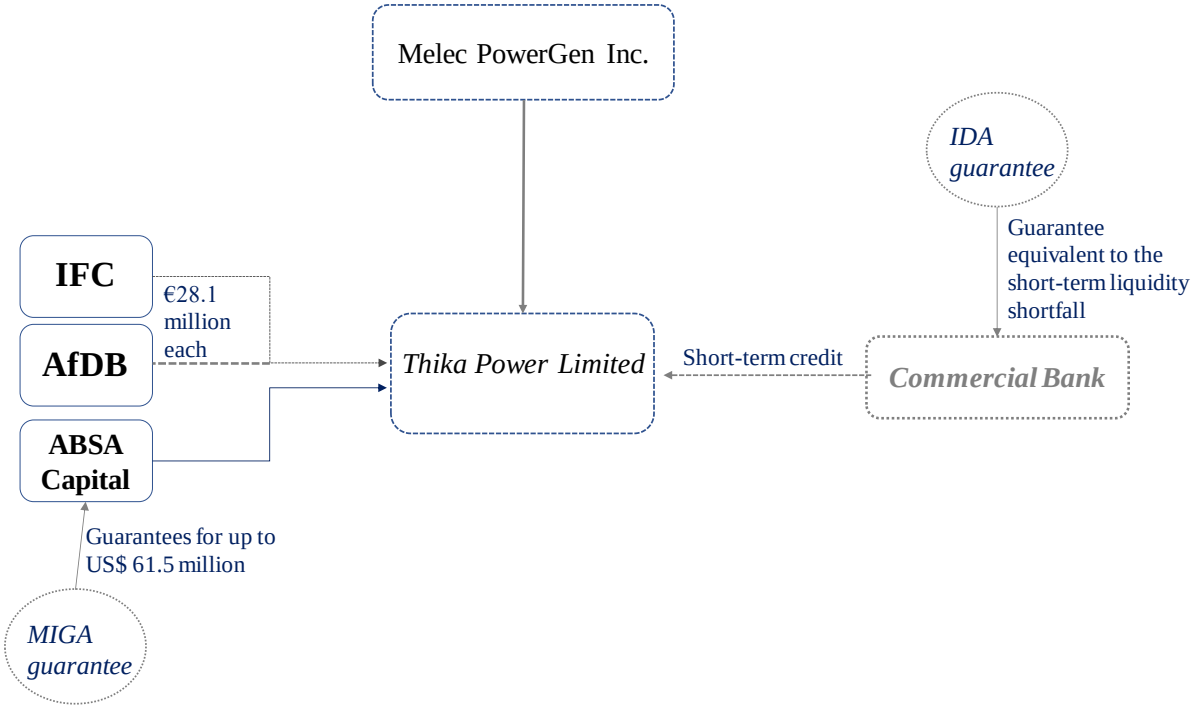


Figure 20: The financial structure of Thika Power Limited

Guarantees provided by organisations widely considered to be credible makes financiers much more comfortable to invest equity or extend loans which they would otherwise shy away from, or would only do so on terms that could make projects unviable. The total project value of Thika Power Limited's 87 MW plant stands in excess of US$ 120 million in 2009 terms, or over US$ 130 million in 2016[33].

Olkaria III Geothermal Power Project

The Olkaria III power plant is located in the Olkaria geothermal fields in Nakuru County, about 120 kilometres northwest of Nairobi. Olkaria III is the only privately owned and operated plant in the geothermal fields, the others- Olkaria I, II and IV – are owned and operated by the Kenya Electricity Generating Company Limited, the largest power producer in East Africa. MIGA provided a ***guarantee*** to Ormat Holding Corporation for an equity investment in OrPower 4, Inc. in the year 2000, which funded the expansion of Olkaria III, a baseload geothermal power plant (World Bank Group, 2015). The plant went online later that year with a capacity to

[33] The Euro is worth roughly 1.2 times the US dollar, such that €56.2 million converts to approximately US$ 67.4 million. The combined €56.2 million investments from AfDB and the IFC, and US$ 61.5 million from ABSA Capital adds up to over US$ 120 million dollars. Since the US dollar experienced an average inflation rate of 1.63% annually between 2009 and 2016 ("2009 dollars to 2016 dollars," 2017), US$ 120 million in 2009 would be the equivalent of approximately US$ 134 million in 2016.

produce up to 8 MW of electricity, all of which was to be sold to the Kenya Power and Lighting Company. This made Olkaria III the first privately funded and operated geothermal power project on the African continent. To support the plant's expansion program, MIGA issued a US$ 99 million, 15-year guarantee to Ormat Holding Corporation, covering the risks of transfer restriction, expropriation, and war and civil disturbance. This expansion initiative was completed in 2014 with the plant's total installed generating capacity up from the initial 8 MW to 110 MW, all of which is sold into the national grid through the Kenya Power and Lighting Company under a 20-year power purchase agreement. A US$ 99 million investment guarantee from MIGA supported the third expansion phase of Olkaria III by enabling an equity investment in the project by Ormat Holding Corporation and a US$ 310 million debt facility from the Overseas Private Investment Corporation.

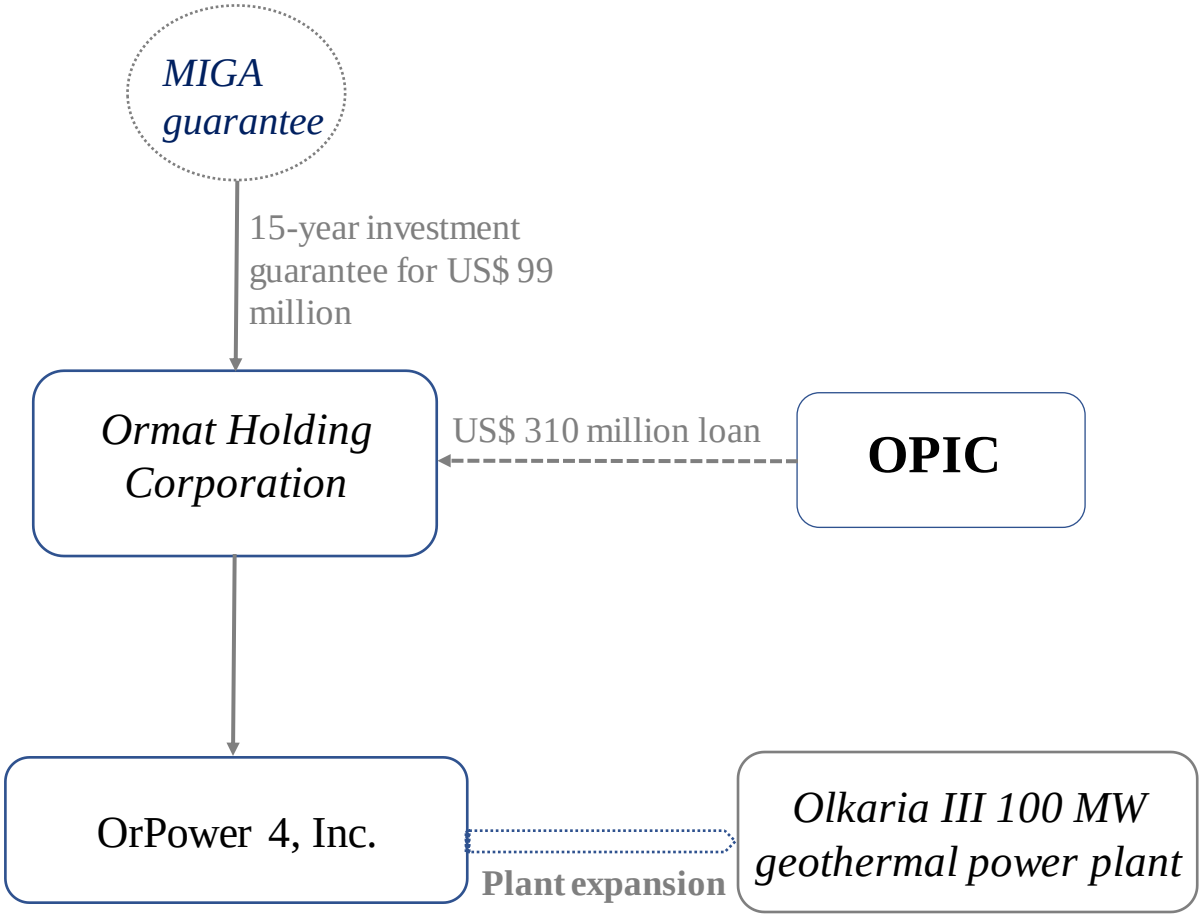


Figure 21: Olkaria III expansion investment guarantee and financial structure

The investment guarantee provided by MIGA to Ormat Holding Corporation for its equity investment in the project, de-risked the project, and provided partial security for a loan extended to it by the Overseas Private Investment Corporation.

Research analysis and discussion

Based on the findings from the empirical world detailed above, the study went on to make full use of integrative thinking as a framework for applying systematic combining to the research problem. Highlighting was mentioned in the research methodology, the integrative researcher must have a good understanding of the salient features of each model, an ability to tease out *what really matters* about each model, and why. While doing so, the integrative researcher must consider the nonlinear and multidirectional causal relationships that exist among the various actors present in each financing model. What are their incentives? These relationships must be held in view as part of a whole, an elaborate web, a complex system through which value is generated for the various actors through these relationships. The researcher must therefore be conscious to avoid narrowing down the focus to a specific part of a system because of the risk of overlooking or undervaluing the other parts that would be outside one's view. A deep understanding of both megaproject funding models, knowledge of the critical actors in each system and how they relate(d) with one another, and their motivating incentives, would also produce insights as to why neither funding model was robust enough to address the research problem at the time. With this understanding of the benefits and the value produced by either model, the researcher could apply the tools in the integrative thinker's mental toolkit (causal modeling and generative reasoning) to creatively resolve the tensions and contradictions that existed between both funding models and the research problem, and innovate a solution for the research problem. To do this well, the integrative researcher needed to cultivate in themselves a point of view that was *solution-seeking*. A mentality or outlook or frame of mind that was not only open to new or different things, but actively sought them when it came to solving problems. Martin (2007) described the **stance** and beliefs about the world and themselves that the researcher must hold fast to if they are to successfully navigate this phase of the integrative thinking process (Martin, 2007, pp. 93–106):

Outlook on the world

1. Whatever models exist do not represent reality. Just because transport infrastructure has been funded and constructed mainly by the government, does not mean that it must always be this way.
2. Conflicting models, techniques, styles, ideas, or ways of doing things are not cast in stone; they can be twisted and tweaked to create better approaches.
3. The existing models, approaches, techniques, styles, or ideas are not perfect; better ones can be created.

Outlook on themselves

4. “I am capable of finding or creating a new and better model”.
5. “I am capable of navigating complexity to identify different or new and better ways of doing things”.
6. “I can give myself the time that is required to innovate”.

From the above, the integrative researcher understands that even with the right mindset and tools to work with, the process of innovation cannot be rushed. It takes the time it takes. This could mean many years, or a moment’s flash of brilliance. The integrative thinker is ready to rigorously apply their toolkit to the research problem, for as long as it takes, to develop a solution that best addresses the problem at hand. The following sections detail how integrative thinking was used as a framework for activating and applying the method of systematic combining, and how it was applied to the research problem in search of potential solutions.

What were the salient features of the two funding models?

The first step in analysis was to identify the salient features of each of the two models being considered, that is, traditional government procurement and private-capital infrastructure financing initiatives. The study sought to identify the defining features, characteristics and traits that were relevant and important about each of the two funding models. It is important to re-emphasise here that “salience is individual and idiosyncratic; what I see as salient may be completely different from what you see as salient. And both of us have blind spots that make it likely, though not certain, that something important will be left off our list of salient concerns” (Martin, 2007, p. 27). This meant that whatever would be highlighted as salient, was not all there could be. Salience is subjective to the individual, and is informed by an individual’s worldview, knowledge and lived experiences. Another researcher conducting the very same study could have identified other completely different features as salient.

Based on the research findings, the following attributes were identified as salient features of the traditional government procurement model of funding transport infrastructure in Kenya:

- *The influencing factor of politics* – The national government budget-making process in Kenya began with short-, medium- and long-term development planning, which are central tenet of politics and political governance. The next stage involved the

preparation of a cabinet-approved Budget Policy Statement. Even if Cabinet was constituted of appointees who were career professionals and technocrats, they typically served at the pleasure of a President or Prime Minister, who in turn is a political being. Set on this foundation, a national budget is essentially a political document. Its contents and derivatives, including proposals to implement various infrastructure projects, are intended and designed to be either (i) good for the country in terms of improving the welfare of its citizens, (ii) good for the politicians and government technocrats in terms of maintaining a hold of state power, or (iii) both. Furthermore, because Parliamentary approval was required for the budget estimates, revenue and appropriations bills, proposed infrastructure programmes and projects were probably evaluated on the backdrop of the prevailing political climate in the country and the political calculations and machinations of Members of Parliament. Because financial resources are usually scarce compared to the country's needs, limited by the ability to raise revenue or sustain further debt, infrastructure projects tend to be implemented in order of priority. Even with access to additional sources of capital, a sovereign's ability to directly implement infrastructure projects is restricted by capacity limitations, with projects tending to be implemented in phases and in some sequential order. Because of this, and the urgent infrastructure needs that a developing country faces, political manoeuvring is a common feature of the planning process of state-sponsored projects, as political capital is sought to move priority projects along. In sum, the study found that politics was a significant influencer and played a major role in determining what and how transport megaprojects were implemented under the traditional government procurement approach.

- *A tight legal framework* – Since the resources funding infrastructure initiatives under the traditional government procurement model are public resources, they are governed by the PFMA in Kenya. Planning, budgeting, fundraising, and reporting procedures must adhere to the Law and its provisions which establish mechanisms for oversight over public resources. At the same time, these beneficial provisions of the Law have imposed limitations on how various initiatives and government projects can be funded. For instance, it was (and still is) only the Cabinet Secretary to the National Treasury who wields the power to guarantee a loan to a county government or any other borrower on behalf of the state, and the Law requires that the loan guarantee must be approved by Parliament (section 58, subsection (1): "Power of Cabinet Secretary to guarantee

loans"). This tight governing framework is good because it provides legal protections to public resources which the governing class is entrusted. But it has limited the flexibility with which government can raise or help raise the funds required to implement infrastructure projects. A project sponsor from the private sector needing a government guarantee to secure a loan would require the CS of National Treasury to make a proposal to Parliament, and for Members of Parliament to approve it. Such processes and requirements, necessary as they may be, complicate fundraising processes even for private infrastructure initiatives where the endorsement of various political actors in the executive and legislature is sought.

From the research findings, the following were identified as salient features of private-capital financing initiatives:

- *The profit motive* – For the 5 private-capital financing initiatives interrogated in the study, it was evident that in each case there was a clear and distinct profit opportunity that the private-sector party sought to benefit from. While the state and its agents are (or should be) motivated by the requirement to meet the needs of citizens through the provision of infrastructure, private enterprise is less inclined to act purely for the sake of the common good as much as it to make profit. Granted, it is now widely agreed that business does not exist for the sole pursuit of shareholder profit, and *sustainability* and *stakeholder value* have become corporate buzzwords. The business world seems to appreciate that a singular focus on maximising profit at the expense of other aspects that affect the businesses is a recipe for short-lived success. Even then, profit is a necessary condition for the long-run sustainability of a business, and remains a pre-eminent motivator for the private-sector. Private-sector actors therefore do not involve themselves in the provision of infrastructure for altruistic reasons. In the case of Kenya Airways, KLM Royal Dutch Airlines sought to make profit by participating in the business of transporting people and cargo by air. For Melec PowerGen Inc. and Ormat Holding Corporation which invested in the Thika Power and Olkaria III power projects respectively, the opportunity to make profit through those power plants was enough to attract them to make investments. The opportunity for, and ability of, private actors to make positive net returns on their investments is vital for the viability of any private-capital infrastructure financing initiative. If the private sector considered the profit opportunity in a megaproject to be too small or too risky, it would be very difficult to

attract the needed financial investment, but if the opportunity was compelling enough, there would be no shortage of interested parties.

- *Ownership rights, and/or operational and management control* – In the private-sector financing initiatives interrogated in the findings, private entities either partially or fully owned the underlying assets, or owned long-term rights to manage the operations of those assets. In the case of Kenya Airways, KLM Royal Dutch Airlines owned 51% of the airline's equity, giving it majority representation on the board of directors and enabling it to exercise authority over the airline's management. Because of its significant shareholding, KLM was not only the majority owner but enjoyed the added advantage of being able to dictate airline operations through the board of directors and its senior-management appointees. For the Kenya-Uganda railway concessions, the RVR Consortium was granted operational and management rights over railways in Kenya and Uganda for a 25-year period, after which operational rights would transfer back to KRC and URC. So long as the provisions of the concession agreements were met, the RVR Consortium would have the liberty to run the railways as they liked. Even without ownership over railway assets, with the freedom to operate the railways and an ability to charge customers for services provided, the private sector was sufficiently incentivised to participate in the provision of infrastructure services as demonstrated by the RVR Consortium. Without the ability to own rights to the equity of a utility, or rights to operate and/or manage a utility, convincing the private sector to participate in a transport project or other initiative would be a rather tall challenge.

What were the causal relationships between the salient points of each model?

Having identified the salient features of each model, the integrative researcher went on to determine how these key features linked up to each other to make the models work. This understanding would clarify how the salient features influenced each other. Did a tight governing framework increase the influence of politics in getting infrastructure projects financed through the national government budget? Did the right to ownership or operational control over an infrastructure asset influence the profit motive of private-sector actors? Maybe, maybe not. And so the study embarked on a process of answering such questions about the various salient features that had been identified in the findings.

Regarding the traditional government procurement process, the integrative researcher needed to investigate the following question: ***was there a relationship between the tight legal framework governing the use of public resources in Kenya, and politics in Kenya, with respect to financing infrastructure projects through the national government budget?*** Based on the research findings, the study drew the following conclusions:

> Yes, there was a relationship between the tight legal framework governing the use of public resources and politics in Kenya.
>
> Because of the *tightness* of the legal framework manifested in laws such as the PFMA, project promoters needed to navigate around a variety of political interests to push their projects forward and get access to the public purse. It is the nature of the beast that the planning, financing, and implementation of state-sponsored infrastructure projects includes a 'double dose' of the political sublime referred to in the literature review. The Public Finance Management Act for instance requires that budget estimates and allocations made through various bills are considered by members of Parliament for discussion, debate, and approval before they can be enacted as legislation and implemented thereafter. Parliamentarians are political beings, borne out of an elective process, and their existence is a political life. Their goings in and goings out tend to be politically inspired or motivated in some way. Consequently, the lenses with which they look at the world and its contents tend to bear a political hue. Because Parliamentarians have oversight responsibilities over all public expenses through laws such as the PFMA, the relationship between the tight legal framework (the law) and politics not only exists, but is strong. Members of Parliament have the power to question and even alter the allocation of public resources to specific infrastructure projects by proposing amendments to the various national government budget bills. Since they are elected to Parliament based on their ability to push forward certain agendas, they are likely to individually push forward potentially competing infrastructure agendas, each eying the implementation of projects where their constituents would be direct beneficiaries. This also happens at the level of the sponsoring political parties. Political parties frequently take alternative points of view regarding proposed budget plans and resource allocations, individual aspects of the budget bills or even specific infrastructure projects, making the process of implementing infrastructure projects much more complex. For political convenience, rival political groups may adopt a stance where projects get approved not on the basis of their societal importance or economic

significance, but on the basis of 'scratch my back and I scratch yours.' The decision-making process could easily metamorphosize into in a political game of the type where if one politically-aligned grouping gets approval for a project, they return the favour to the other side on a future project. The two salient features identified in the traditional government procurement process in Kenya were strongly linked and influenced each other heavily, and any process of innovation that touched on one of the salient points needed to be conscious of the second-order effects on the other.

With respect to the salient features of private-capital financing initiatives in Kenya, the integrative researcher needed to investigate the following question: ***was there a relationship between the right to ownership or operational control over an infrastructure asset, and the profit motive to the private sector, when it comes to financing infrastructure projects through the private sector?*** By exploring this question, the study drew out the various causal relationships that existed between the salient features, and gained understanding of how and why the private-capital infrastructure financing model worked in practice. Based on the research findings, the study arrived at the following conclusions:

> Yes, there was a causal link between the rights of a private actor to own and/or operate and manage infrastructure assets, and the incentive for the private actor to earn profit. Before investing in a project, a rational investor must be sure that in return for their financial outlay and the risk they bear as a result, they will receive ownership rights and/or operating and management rights to the underlying project or asset, from which they can receive future revenue. The private actor acts for their personal gain. If they are not sure of their ownership rights, or whether they get management control over the underlying infrastructure asset, or whether they can earn revenue from the asset, if their desired private gain is not reasonably assured, a private actor is unlikely to invest in a project. If the ownership and/or control rights, and the rights to charge users fees from infrastructure usage are not guaranteed and legally protected, no rational investor would risk losing their capital. Furthermore, the higher the cost of acquiring ownership and operating rights to a project, the lower the profit motive. This is because the high acquisition costs would require higher user charges (costs to the consumer), which may have the negative result of lowering the overall revenue earned due to reduced service usage with fewer consumers able to afford services. In a competitive business environment where customers probably have alternatives, such service providers may be unable to shore up market share if their competitors can provide similar services at

lower price points. For the private sector to be convincingly attracted to infrastructure projects, the price for ownership and operating rights must be considerate of the fact that the private entity must recoup its investment within a reasonable period of time, and enjoy a reasonably profit opportunity. But if a proposed project meets an investor's criteria but simply costs too much, is it likely to remain exactly that – a mere proposal. Ordinarily, ownership rights are bundled together with the operating rights of an asset, and are vested in the equity of the legal holding entity. If such rights are unbundled, for instance through a concession arrangement, it is expected that the sale price for a set of unbundled rights is likely to be lower than that if both sets of rights were bundled together. This is because operating rights allow the operator of the asset to earn fees or royalties that charged for usage, while ownership rights allow the owner of the asset to earn profit. When taken together, the potential revenue to the rights holder is likely to be higher than if they were held separately. Consequently, project planners and promoters must be aware of the strong causal relationship that exists between ownership and control rights and the profit motive of the private sector. When a decision that may affect one of the salient points of private-capital infrastructure financing is made, the strong causal effects of such a decision on the other salient point must be weighed and considered.

Determining an appropriate decision architecture

Having identified the salient points of each model and established the causal relationships that link them, the integrative thinking process moved on to build a decision architecture that would be used in the *resolution* stage of integrative thinking process. This architecture was informed by the prior processes that identified the salient features of each model and the causal relationships among those salient features. The points of salience and their causal relationships were held in a latticework that allowed the integrative researcher to look at the research problem and propose potential solutions while keeping the whole in mind, similar to the way one would look at a map. Martin (2007) described it in this way: "Integrative thinkers don't break a problem into independent pieces and work on each piece separately. They keep the entire problem firmly in mind while working on its individual parts. Integrative thinkers want to avoid the trap of designing a product before considering the costs of manufacturing it. So they would consider manufacturability as they design their product" (Martin, 2007, pp. 42–43). In imagining new and better ways through which transport megaprojects in Kenya could be

funded, it was essential that while the integrative researcher worked on the various parts of the problem, the whole remained firmly in view. It would have been foolhardy to focus on a single aspect of the research problem and design a solution for it: even if that solution worked, it would not have addressed the research problem, just a part of it. In the same way, one does not solve a jigsaw puzzle by focusing on only one piece. Martin noted that "with respect to architecture, the most common failing of conventional thinking is the tendency to lose sight of the whole decision. It may be easier to dole out pieces of a decision to various […] functions, but that ensures that no one will take a holistic view of a particular problem. And in the absence of a holistic view, a mediocre result is the likely outcome" (Martin, 2007, p. 46). A thoughtful arrangement of the salient points and their causal relationships produced a decision architecture that had the potential to yield a desirable solution for the research problem. Based on the literature review and the findings of the study, the following set of rules was established as the decision architecture that would guide the researcher in the later stages of the integrative thinking process:

- ✓ No proposed solution would have the effect of increasing the Kenyan public debt;
- ✓ No proposed solution would have the effect of increasing the existing rates of taxation;
- ✓ All proposed solutions would be designed to avoid the use of public resources for funding the implementation of transport megaprojects;
- ✓ All proposed solutions would have the effect of increasing the pool of funds available for transport megaprojects in Kenya.

These four golden rules allowed the study to cut through the immensity of the solution space and quickly narrow down on only those solutions that met this criteria.

Creatively resolving the tensions arising from the two models

With this decision architecture in place, the integrative researcher made use of their understanding of the identified salient features and their causal relationships to creatively resolve the research problem. After understanding the essence of the two models and establishing a decision architecture that filtered for the desired outcomes, the integrative researcher could confidently embark on a creative process to propose potential solutions to the research problem. Having said that, it must be noted that the researcher could not possibly proffer an infinitely exhaustive list of potential solutions. The decision architecture served to narrow down the proposed set of solutions from the realm of possibility to the realm of

probability, and even then, the set of proposed solutions could yet have remained very large. Having arrived at this final stage of the integrative thinking process, how did the researcher evaluate potential solutions and choose among various sets of benefits or payoffs against others, when, ideally, it would have been preferable to keep them all? Fortunately for the study, Martin (2011) provided three handy strategies for dealing with such payoff decisions. This allowed the researcher to approach the solution set with a toolkit that made it possible to select and keep only the payoffs that were most desirable in a potential solution, and had a high probability of success based on the context in which the research problem existed. Martin's three approaches are detailed below.

a) *Doubling down on one model* – When faced with clashing models, "our first impulse is to determine which one represents reality and which one is unreal and wrong, and then we campaign against the idea we reject. But in rejecting one model as unreal, we miss out on all the value that can be realised by holding in mind two opposing models at the same time" (Martin, 2007). If the integrative researcher prefers one infrastructure funding model for its payoffs, but also desires the payoffs presented by another model, a "double down" strategy could be applied. This strategy avoids missing out on the value that can be found in both models by pressing hard on the salient features of the preferred model, and in doing so, the benefits of the other model can also be realised (Martin, 2011b). By doubling down on model A, for instance, that produces desirable effects X, desirable effects Y from model B can also be realised in a double down strategy. If the integrative researcher finds that they desire a solution that produces the benefits of both infrastructure funding models, a strategy of doubling down on the salient points of one to produce the benefits from both could potentially be available, depending on the causal relationships that exist between the points of salience.

b) *Disassembling the problem* – Another way to avoid missing out on the value that can be found in two opposing models is "to disassemble the problem in such a way as to enable the use of both logics simultaneously" (Martin, 2011a). Ordinarily, to fully realise the benefits from the two funding models, the integrative researcher is likely to be presented with a set of solutions that lead into divergent directions that each focus on one of the two funding models. This approach is useful if the researcher finds that the models cannot be applied together to solve the problem. But by disassembling the problem into its component parts, the integrative thinker may find that they can use the

divergent solutions arising from the two models to solve those component parts in a way that ensures that the problem, as a whole, is addressed. If the integrative researcher finds that the solutions alluded to by the two infrastructure funding models are in opposition, a strategy of disassembling the research problem could prove useful. In disassembling the research problem, the self-imposed constraints that are implied in the way the research problem is framed are removed. The component parts of the problem can then be looked at with clearer lenses and the integrative researcher may find that solutions which initially seemed very divergent may now be applied easily to parts of the problem, and the problem as a whole solved satisfactorily.

c) *Finding the "hidden gem" in both models* – What of the integrative researcher who only desires a minor component from each model and in fact dislikes a great deal about both models? There can be instances when the researcher finds that neither model can produce the desired benefits or wholly solve the research problem. In other cases, the researcher may on only desire minor aspects from each of the models. An additional strategy consists in discarding most parts from the two models and retaining only a small kernel from each that forms the foundation for a new model (Martin, 2011c). If the integrative researcher finds that neither model can produce the desired benefits nor solve the research problem, but that both models contain minor elements that are desirable, these nuggets can be extracted and used as the basis for building an entirely new model that solves the research problem. The integrative researcher here has the challenge of looking at the two potentially-opposing models and seeing these desirable "non-obvious" gems from each, and then developing a new model around them.

Based on the research findings (the empirical world) and insights (preliminary theory) gained from the integrative thinking process (framework), the study determined that it only desired solutions that could harness *the private sector's motivation to make profit* to attract private capital into transport megaprojects. By doubling down on the private sector's desire to make profit, the Government of Kenya could stimulate increased interest in private-capital infrastructure financing initiatives. Should this increased interest translate into increased investments, many more transport megaprojects could be implemented across the country without the state having to spend its resources. If transport infrastructure improved across the country and Kenyans could have faster and better services, and more options for travelling or transporting their goods, the goals of politics would be achieved. Politics is concerned with the

welfare of the body politic. Through a strategy that doubles down on the private sector's profit motive to stimulate private-capital investments in transport megaprojects, the welfare of the body politic that is vested in the public sector could be enhanced, and the aims of politics thus achieved.

Having resolved the tensions that existed between the two funding models, the time was now ripe for the researcher to ask themselves the following question: *based on the research findings and insights gained from the integrative thinking process thus far, can I create new and better funding models for transport megaprojects in Kenya?* The answer to the question "***can I create new and better funding models for transport megaprojects?"*** was an unequivocal **yes**. The next few pages paint a clear picture of how the study proposed to create that new and better funding model for transport megaprojects.

From the literature review and research findings it had been established that both the public and private sectors in Kenya had been active in funding infrastructure megaprojects, including those in the transport sub-sector. The literature review showed that the provision of transport infrastructure was never a preserve of the public sector, and that the private sector had played an essential role in financing and implementing transport initiatives. The literature review suggested that Kenya required sustained heavy spending on its infrastructure, including transport systems, but that the state faced a funding dilemma. The country had a huge infrastructure deficit as well as funding gap. It had limited capacity to absorb much more public debt without setting off other effects in the economy, and could not possibly raise enough through taxes and other government revenues. On the other hand, the research findings had demonstrated that the private sector had actively participated in the past in funding and/or managing infrastructure projects in various sectors including transport. The study had set a decision architecture to ensure that the public debt levels and taxation rates were not increased as a result of this study's proposed solution(s) to the research problem. The study appreciated that because of the tight governing legal framework over public resources, projects could take unduly long to move through the stages of approval, and that the political complexity already inherent in megaprojects could get compounded when public resources were involved. Consequently, the decision architecture was set up to avoid the use of public resources in any proposed solution, which thereby established the private sector as the primary source of funding by default. The decision architecture also sought to increase the quantum of private capital available for transport megaprojects, meaning that any proposed solutions had to build in the insight that the profit motive was a primary incentive for the private sector. Put together,

the proposed solutions would have the effect of (i) meeting the private sector's need for profit, while (ii) achieving the public sector's need for increased investment in infrastructure. Increased private-sector investment in infrastructure would free-up public resources such that the existing public debt could potentially be paid faster. Over time this would have the positively reinforcing effect of allowing the state to invest more in infrastructure programs since resources that were previously used to service debts would then be available for infrastructure investment as the public debt reduced. And as increased investment was made into Kenya's transport infrastructure, domestic trade would be catalysed as raw materials could be moved to factories and finished goods hauled to markets faster. Slow-growing areas could be opened up by new infrastructure and local economies catalysed. As the quality and variety of transport alternatives increased, their costs would reduce, and, over time, customers could potentially get more value at cheaper prices. Producers of goods and services would have access to wider markets as the distance between different parts of the country was reduced by a more efficient transport network. The potential economic spillovers could be astronomical. Figure 22 (below) illustrates this *double down strategy* in action.

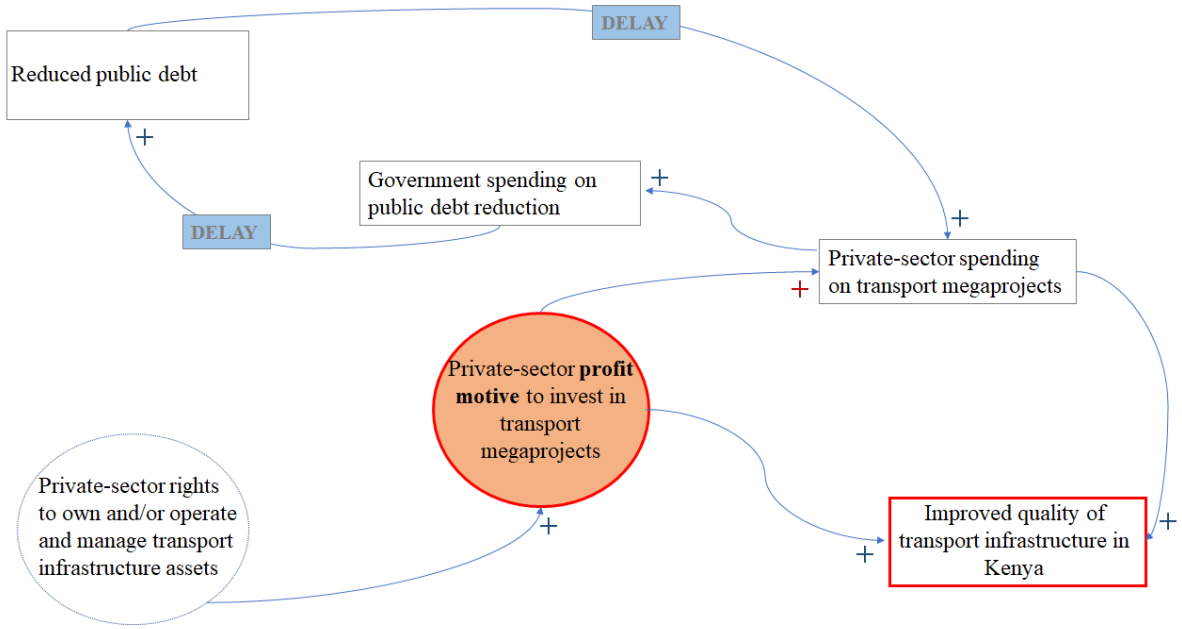


Figure 22: How a double down strategy can lead to increased private-sector funding of transport megaprojects in Kenya

By doubling down on a point of salience from one of the models (e.g. the private sector's profit motive) to achieve specific benefits (e.g. increased private-sector spending on transport megaprojects), the benefits from the other model could potentially be indirectly achieved if the right salient points were selected (e.g. improved quality of transport infrastructure and reduced public debt, both of which are goals of politics).

Conclusions and recommendations

From the research findings and subsequent analysis of these findings using Martin's (2007) process of integrative thinking, the study arrived at several conclusions regarding the research questions.

Who were the key players in the infrastructure funding ecosystem in Kenya?

The research findings showed that the major actors in the infrastructure funding ecosystem in Kenya were:

- The national government of Kenya, including Parliament and its members, the Cabinet Secretary to the National Treasury and the various county governments. The various public service institutions that directly procure transport infrastructure, such as the Kenya National Highways Authority, the Kenya Railways Corporation, the Kenya Civil Aviation Authority, and so on.

- Members of the political class such as politicians and political activists were major players in the infrastructure funding ecosystem. They exercised an oversight role over the traditional government procurement process and (ideally) served to protect the public-interest even when considering privately funded infrastructure initiatives.

- International financiers such as multilateral lenders (e.g. IFC and the World Bank), and development banks such as the AfDB and KfW were critical actors in the funding ecosystem for transport megaprojects.

What were the bottlenecks in the system?

Insights from the research findings showed that there were several weaknesses in the funding ecosystem for transport megaprojects in Kenya.

- *The influencing factor of politics* – When it came to funding transport megaprojects through the traditional government procurement process, political manoeuvring needed to be done by project promoters to ensure that their projects could get considered for implementation. Considering the myriad potential investments that could be made by the state, project promoters would have to work the political system to ensure that their desired projects gained visibility and stood a chance of implementation. Politics could

also rear its head into the traditional procurement process via the Cabinet and Parliamentary approval stages during national budgeting. A cabinet member or Members of Parliament was likely to promote the project that, ideally, advances the general social good, but typically, promotes their personal or collective political agenda. Either way, the decision being made was political in nature. Project planning and funding processes could be hampered by political activities in many ways, from politically-motivated delays in issuing approvals, to budget freezes, and/or budget cuts introduced through Parliamentary amendments. Projects which were financially viable and promised social, environmental, and economic benefits to the citizenry could easily get slowed down, side-tracked, or even completely blocked because of unrelated political issues.

- *Slow decision-making processes* – For projects funded through the traditional government procurement process in Kenya, project actors were required to adhere to the PFMA and its provisions. The law stipulated the various stages through which national government budget proposals made by the CS to the National Treasury must be passed before a coin of public money could be spent. The process was and is long. Budget proposals originated from an integrated development planning process that yielded the Budget Policy Statement, which later required Cabinet approval before submission to Parliament in the form of legislative proposals. Like all other legislative proposals, the national budget was subject to Parliamentary discussion, debate, and amendment. This process was intentionally designed to protect public resources and ensure accountability, but in doing so become a slow and long-winding one, significantly lengthening the planning process**.**

- *Complexity* – By themselves, megaprojects and other large-scale infrastructure ventures are rife with complexity. To ensure that the private sector's profit incentive was protected, coordination with various state agencies was and is required. Coordination between the Registrar of Companies at the State Law Office, the Kenya Industrial Property Institute regarding intellectual property, the national tax collecting authority KRA, licensing agencies within the national and county governments, regulators, and other arms of the executive branch of government could stretch planning processes out by many years. Even privately-funded transport megaprojects were required to subject themselves to the scrutiny of many of these state actors and regulators. The coordination

necessary to navigate through all the agency-specific requirements introduced a large dose of complexity to the megaproject planning process.

What roles have private-capital financing initiatives played in the development of infrastructure in Kenya?

Private-capital financing initiatives have played a major role in facilitating large-scale infrastructure projects in Kenya by providing the funding they require for implementation. The 5 cases in the research findings demonstrated various levels of government and private-sector collaboration in funding infrastructure projects. In some cases, the state sold its equity shareholding (ownership) in specific operating assets such Kenya Airways or Telkom Kenya to private investors. In other cases, the government sold only operating rights to private-sector players and retained ownership of the underlying assets, as was the case for the 25-year rail concessions by KRC and URC. Through such arrangements, private capital was successfully attracted and leveraged to implement and/or upgrade infrastructure assets for better service provision to Kenyan citizens. Additionally, private-sector actors have helped to de-risk projects by providing investment guarantees that enabled project promoters to access the capital they required to implement projects. In the case of Thika Power Limited, investment guarantees from MIGA and IDA to Thika Power Limited enabled the project to access debt from ABSA Capital to develop the power plant, and a short-term credit facility for its working capital and liquidity needs. Investment guarantees provided by MIGA to Ormat Holding Corporation over the years enabled it to access the debt funds it required to invest in OrPower 4, Inc. and the Olkaria III geothermal power plant.

How can the private sector be better incentivised to direct capital into transport megaprojects?

From the literature review and research findings, the study concluded that for the private sector to be attracted into any infrastructure investments, it must be sufficiently incentivised to do so through profit opportunities. If a profit opportunity is considered small relative to the risk that potential investors would be exposing their capital to, it is unlikely that such a project would generate much interest. But if the profit opportunity could be enhanced through the acquisition of ownership equity or long-term operating

rights at prices that allowed investors to recoup their investments over time, the private sector would be much more interested and willing to participate in infrastructure projects. By pulling on this lever - *the private sector's profit incentive* - Kenya could stimulate private-sector interest and financial investment in public infrastructure initiatives such as transport megaprojects.

Following from the above responses to the questions posed by this study, the integrative researcher could now weave together the insights from the entire process to put forward specific suggestions for alternative funding models for transport megaprojects in Kenya. The identified decision architecture led the researcher to a *double-down* strategy where the profit motive of the private sector would be emphasised to set off a series of events that would have the ultimate effect of improving transport infrastructure in Kenya without increasing the country's public debt burden.

Generative reasoning stood out as a powerful tool for responding to the four Flyvbjerg questions (highlighted in the research methodology) that pertained to the forms of case study research that seek practical implications or actionable outcomes. The 4 questions are: *Where are we going?* W*ho gains, who loses, and by which mechanisms of power? Is this desirable?* and, *What, if anything, should we do about it?* Summoning all the insights gained from literature and rigorously applying the method of systematic combining, the study could holistically interrogate the research problem and propose solutions that were practical to the case at hand and actionable in the real world.

- *Where are we going with the current models of funding transport megaprojects?* Based on the evidence from this study, we are fast heading towards a future where Kenya's public debt soars to levels that could potentially cause serious harm to the economy, and making the recent trend of heavy state-sponsored investments in infrastructure unsustainable. As Ansar and company (2016) showed, "unproductive projects carry unintended pernicious macroeconomic consequences: sovereign debt overhang; unprecedented monetary expansion; and economic fragility" (Ansar et al., 2016, p. 384). If not treated with utmost care, megaprojects could be extremely harmful. And when toxic projects are funded by public resources, their overall potential for harm is magnified. Public debt has been relied on to fund the country's infrastructure programs for the last decade and a half. Because of this reliance, the public debt portfolio has increased at a rate that is higher than the rate of economic growth as measured by GDP,

leading many to hypothesise that the country is approaching a tipping point where the socio-economic costs of public debt outweigh the benefits yielded by government's investment in infrastructure. Consequently, new models of funding infrastructure are needed. The literature showed that a set of skewed incentives characterised by cost underestimations and benefit overestimations, and the confluence of Flyvbjerg's 4 sublimes, created an environment that made megaprojects irresistible to decision-makers.

- Project promoters, planners, politicians, special-interest groups, and other parties in power *gain;* the taxpayer, who is supposed to be the principal beneficiary of any public spending, *loses*. The citizen bears the burden of servicing public debt: they pay more for their basket of goods because of high inflation, they are charged higher interest rates for loans that they are less likely to be given, and they bear the brunt of a slow-growing economy.

- *Are such outcomes desirable?* In one word, no.

- *What, if anything, should we do about it?* From the integrative thinking process that guided the research methodology, the study concludes that <u>much</u> can be done. Bottlenecks in the funding ecosystem for transport megaprojects have been pointed out, and the salient features of the two funding models identified. Fortunately, the integrative researcher is not satisfied with merely pointing out a problem; their aspiration is to solve the problem. It is in this regard that the study makes the following four recommendations.

1. A public education campaign to sensitise Kenyans about the *Public Private Partnerships Act*, and its provisions (Republic of Kenya, 2013b).
   The law provides mechanisms through which the private sector can participate in the financing, construction, development, operation, or maintenance of the public infrastructure projects. A nation-wide campaign to educate citizens on the contents and provisions of the PPP Act would ensure that there is widespread knowledge about the law, and could increase the public's interest in PPPs and other forms of private sector participation in the provision of public infrastructure. Increased public awareness could

boost the level of public participation in megaproject planning processes, and lead to increased scrutiny of projects.

2. The classification of investments in public infrastructure through PPPs and other private financing initiatives as a standalone asset class.

   The insurance sector in Kenya held nearly KES 500 billion in assets (approximately US$ 4.7 billion) as at the end of December 2015 according to the industry regulator (Insurance Regulatory Authority, 2016, p. 3). The pensions and retirement benefits sector held another KES 800 billion (approximately US$ 7.6 billion) as at the end of December 2015 (Retirement Benefits Authority, 2015). The money required to fund infrastructure projects is clearly there, and it is even available locally. Through its regulations, the RBA, establishes 14 categories of assets and sets the maximum portfolio value that can be held in any specific asset class by a retirement scheme or pooled fund. The regulations stipulate the maximum value (as a percentage of the total assets) that a pension or other pooled fund can hold in various asset classes. This protects the contributions of members by preventing overexposure to specific asset classes, but it also restricts the sectors in which investments can be made. Like many parts of the world, pension and other pooled retirement funds in Kenya are some of the largest sources of private capital in the economy. By amending the RBA regulations to introduce a 15th asset class that allows for investments in PPPs and other private infrastructure financing initiatives, institutional capital held by the pension and retirement benefits industry can be channelled into infrastructure projects. Such an amendment, simple-seeming and easy to do, is likely to result in convex effects that free-up and make hundreds of millions of dollars available for infrastructure programs.

3. Increasing the attractiveness of transport megaprojects by bundling-in assets that generate revenue for investors.

   Through the PPP Unit of the National Treasury, the state can take an enterprising role in making planned infrastructure projects compelling to the private sector by bundling bland utilitarian public assets with more attractive income-generating elements. Taken together, such projects will serve the public good (the bland public asset) even while providing the private sector with its desired return (the income-generating element).

   A typical road construction or rehabilitation project may not attract interest from the private sector other than those individuals and firms concerned with the construction of

roads and associated infrastructure. But if such a project was infused with income-generating capacity, say via the inclusion of a toll or parking building, the project as a whole could probably attract much greater private-sector interest. While their primary interest would be operating the toll or parking building for the revenues they would generate, the public good would be served through the construction of the road. Using such innovative approaches, projects can be embellished for the increased participation of the private sector in the provision of public infrastructure.

4. Formulation of a *Private Infrastructure Incentives Plan* ("PIIP"). Rather than dole out incentives for the private sector in bits and pieces via national gazette notices, a collaborative process that involves all the stakeholders should be launched to develop a comprehensive set of incentives for the private sector. The proposed PIIP would harmonise new and existing financial incentives in a single document with the aim of attracting private-sector resources towards public infrastructure initiatives. Such a document would serve several essential purposes:
    a. Set or emphasise the policy for private funding of infrastructure construction using tools such as investment guarantees;
    b. Standardise the transaction documentation for the revenue-generating components of infrastructure assets such as sale and purchase agreements, as in the energy sector in Kenya where power-purchase agreements typically run for 20 years;
    c. Attract private-sector investment in infrastructure though incentives such as tax holidays, tax deductions, and tax rebates to companies that make capital investments, reduced tax rates charged on incomes earned from infrastructure investments, etc.

    A broad set of financial incentives that enhances the private sector's profit opportunity would go a long way to increase the interest and participation of the private sector in the provision of public infrastructure. A prototype of this document (PIIP) has been developed and is included in the appendices as a foundation for the proposed PIIP.

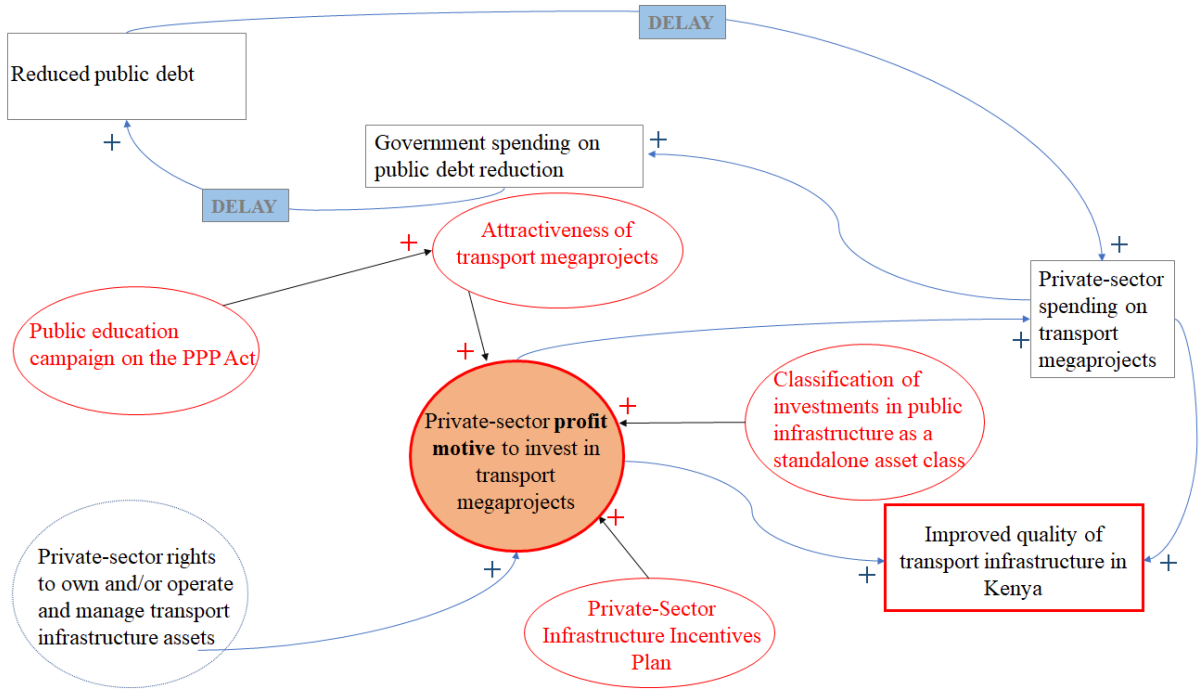


Figure 23: How the proposed recommendations are intended to work

Figure 23 (above) illustrates how the proposed recommendations are intended to work, to stimulate private sector's interest and investment in transport megaprojects in Kenya. The proposals aim to make transport megaprojects attractive investment opportunities for private capital. A by-product of increased private-sector investment will be a reduction of state spending on infrastructure, enabling the state to fast-track its debt service. With a reduced debt burden in future, less of the public purse will go to paying debts and resources can be sustainably spent on infrastructure and other public programs.

Are these recommendations plausible? Can they work?

From the onset, this study stated that it aimed to produce work that would be of high practical value. That the insights the research process surfaced, the conclusions drawn, and the recommendations put forward could be of practical use to policy makers, scholars, and practitioners. To verify that this was achieved, the study will reflected on its recommendations to confirm that indeed they were valid and plausible, remembering that "if there is to be any attainable truth[…] it is plain that the only way in which is to be attained is by trying the hypotheses which seem reasonable…" (Hartshorne et al., 1994). But how does one determine reasonableness? By what means does one establish the validity of ideas that have emerged from

an integrative thinking process, and their plausibility in producing the outcomes that the study desired? The reasonableness of the ideas proposed by the study was measured probabilistically, against their expected likelihood of achieving their objective. Having gone through a context-conscious integrative thinking process that systematically deconstructed, analysed, and combined elements of the traditional government procurement process and private-capital financing initiatives, the researcher believed that the recommendations were valid *eo ipso* and had every chance of addressing the research problem. A look at literature demonstrated that the recommendations made by this study had been tried and tested in some form or other in the past, and therefore stood in good stead when it came to solving the research problem.

- ✓ Flyvbjerg demonstrated how the mass media could be leveraged to disseminate research results to ensure they made impact in policymaking and in practice. The author suggested that by problematising the tension points existing between research findings and practice, as this study did, and using the media to create public awareness of these tension points, changes in policy and practice could be made and the chances of megaproject success increased (Flyvbjerg, 2012). The proposed public education campaign is therefore not a far-fetched idea.
- ✓ "If a particular infrastructure project is judged to be profitable by investors, they will know the value of the proposition and invest" (Mezui, 2012, p. 9). Several African governments have encouraged institutional investors like pension funds to actively participate in infrastructure financing initiatives by providing tax and other incentives (African Development Bank Group, 2015b, p. 192), demonstrating that a well-crafted scheme of private-sector incentives is a plausible idea.
- ✓ Arezki and Sy (2016) showed different channels though which private-sector institutions could direct capital into infrastructure projects. The authors illustrated various ways in which private-sector capital had been used to fund infrastructure projects in Africa, directly through unlisted equity investments (such as direct investment in projects themselves, investing in project funds or buying project bonds), or indirectly through investments in listed equity and corporate debt options (Arezki & Sy, 2016).
- ✓ Through a series of reforms in the pension and insurance sectors, the governments of Chile, Malaysia and South Korea were able to create a pool of institutional investors with an appetite for low-risk, long-tenure infrastructure assets that were denominated in local currencies (World Economic Forum, 2013). With these governments ensuring

that infrastructure assets posed low levels of risk, investments in infrastructure were much more attractive to the private sector and assets were quickly taken up by private investors.

With such illustrations, the researcher was more than convinced that the proposed ideas could work. Some of the proposed ideas had been implemented as-is elsewhere and worked successfully (not to suggest that just because they have worked elsewhere, they would also work in Kenya). And in other cases, scholars had proposed the same or similar recommendations on similar issues of infrastructure financing. The validity and plausibility of the recommendations of this study was clearly demonstrated. It was, and still is, the researcher's belief that, on a fair scale, the proposed solutions meet, at the very least, the test for *reasonableness*.

Infrastructure funding gaps pose significant challenges to developing countries like Kenya. To grow, Kenya needs to invest heavily in its physical infrastructure. But it being a developing country, lacks the financial resources it needs to fund its infrastructure development. At the time the study was being conducted, public debt levels had risen to levels that made it difficult to rely on sovereign debt as the primary source of funding for infrastructure projects and initiatives. This study sought to innovate alternative ways around this problem. Figure 23 illustrates the theory that evolved from the systematic combining exercise, having observed the empirical world with respect to the specific questions the study was looking to answer in addressing the research problem. The researcher believes that the conclusions that were drawn and the findings that were unearthed spoke "not just about what is true, but also about what it would be good to do in given circumstances" (Schram, 2012, p. 19). Having analysed the two models that dominate the infrastructure funding ecosystem in Kenya, the study proposed a set of recommendations that, if implemented, would:

i. benefit the Kenyan state, by releasing financial resources to clear accumulated debts in the short term, which would have the effect of increasing the availability of resources for sustained infrastructure development in the long term,
ii. benefit Kenyan citizens, who would enjoy the use of improved transport infrastructure and any benefits of faster economic growth that could result, and,
iii. benefit the Kenyan private sector and investors, who would have a pipeline of long-term infrastructure investments that could yield good and stable financial returns for them.

In just a few years, Kenya could make significant strides in addressing its infrastructure gap, reduce its public debt, and become an example to other developing countries on how innovative funding models for public projects could be created and implemented. Kenya could have its cake and eat it too; the country simply needs to be innovative in how it bakes its cake of finances and slices it up to address various needs.

FUTURE RESEARCH DIRECTIONS

Building on the literature review and following from the research findings and the study's recommendations, there is plenty of fertile ground for future research and investigation. Systematic combining involved the use of a preliminary framework that guided the researcher's immersion into the empirical world and informed their perspective for analyses with respect to the case at hand. A key feature of this research method was that the researcher did not necessarily have to restrict themselves to 'received theory'. Such freedom was particularly useful to this study since it sought not to prove or disprove a hypothesis, but to innovate around a specific problem. The objective of the study was to develop a plausible alternative model by which transport megaprojects in Kenya could be funded, that would address the infrastructure deficit without increasing the country's burden of public debt. After going through the process of systematic combining, a *theory* evolved to suggest various ways by which private-capital financing initiatives in Kenya could be stimulated to increase the pool of financial resources available for transport megaprojects and other infrastructure initiatives in Kenya. A preliminary suggestion for future research would be to test this theory in the real world for its efficacy in increasing private-sector financial investment in infrastructure projects in Kenya. In addition to this, future research could evaluate whether:

i. there is a causal relationship between public awareness on PPPs and other private financing initiatives, and the level of private-sector interest and investment in the provision of infrastructure. *Does increased awareness translate to increased investment?*
ii. an effort to increase the bankability and attractiveness of megaprojects translates to increased investments by the private sector in infrastructure projects. *Does increased project bankability lead to increased investment?*
iii. financial incentives to the private sector catalyse private-sector interest and investment in infrastructure ventures. *Do financial incentives to the private sector for investments in infrastructure work, and if so, how effective are they?*

iv. the introduction of a specific asset class for infrastructure investments leads to increased investments. *Does the creation of a specific asset class for investments in infrastructure by the pension and retirement benefits sector lead to increased investments from this sector?*

v. increased private-sector investment in infrastructure translates to reduced public debt and higher levels of economic growth in the long run. *Can the private-sector substitute the state in the provision of infrastructure? Does increased private investment in infrastructure lead to higher levels of economic growth?*

It is important to note that the funding model that this study proposed is not necessarily the single most optimally resilient one that could have been created. Use of integrative thinking allowed the researcher to identify features that he considered salient, and to make creative resolutions to the tensions that arose when considering the two dominant models of megaproject financing in Kenya. This is the beauty and the burden of using integrative thinking in doing research work. On the one hand, integrative thinking allowed the researcher to identify the features that he himself found salient. Yet on the other hand, it is quite possible that another researcher doing the same study could have identified other features as salient, meaning that the outcome of that study would be very different from this. Knowing this, before a definitive model can be proposed for funding transport megaprojects in Kenya, it would be ideal to conduct two or three other similar studies with the aim of finally designing a model that brings together the consensus view of various similar studies. Therefore, future research work should include re-doing the study as it was done here, with the expectation that a different outcome would most likely be the result of that effort. Two of three such studies would greatly increase the probability of creating a more robust model for funding transport megaprojects in Kenya.

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APPENDIX

Comparable data between Kenya and Singapore, 1960 to 2015

Source: World Development Indicators, retrieved via the World Bank website on 19 July 2016

	Kenya				Singapore			
Year	GDP (current US$)	GDP per capita (current US$)	Gross capital formation (current US$)	Gross fixed capital formation (% of GDP)	GDP (current US$)	GDP per capita (current US$)	Gross capital formation (current US$)	Gross fixed capital formation (% of GDP)
1960	791,265,459	98	-	-	704,453,107	428	79,869,596	9.5015
1961	792,959,472	95	-	-	764,298,138	449	88,134,221	12.7068
1962	868,111,400	101	-	-	825,874,494	472	127,791,354	14.2196
1963	926,589,349	104	-	-	917,210,032	511	159,118,529	15.8879
1964	998,759,334	109	130,479,962	12.4194	893,722,817	485	177,117,772	19.9971
1965	997,919,320	105	143,639,956	12.8227	974,186,784	516	211,582,315	20.9577
1966	1,164,519,673	119	216,719,913	14.7151	1,095,902,965	567	238,271,022	19.5332
1967	1,232,559,506	121	248,639,900	18.6733	1,237,415,176	626	271,525,738	19.4826
1968	1,353,295,458	129	271,319,891	18.5178	1,425,020,122	708	351,232,523	22.8503
1969	1,458,379,415	134	282,519,887	17.9898	1,659,044,471	812	469,551,366	26.1031
1970	1,603,447,357	142	391,187,843	19.6818	1,919,496,192	925	733,204,425	32.1392
1971	1,778,391,289	153	425,319,830	22.7037	2,262,529,370	1,071	907,514,018	36.2022
1972	2,107,279,157	174	470,287,812	21.7592	2,719,900,396	1,264	1,112,105,437	37.2710
1973	2,502,142,444	200	645,833,633	20.4497	3,693,760,000	1,684	1,438,293,333	34.7137
1974	2,973,309,272	229	765,794,626	19.1194	5,216,837,422	2,340	2,323,540,981	37.5407
1975	3,259,344,936	242	591,241,699	20.2131	5,633,455,805	2,490	2,186,082,879	34.8885
1976	3,474,542,392	248	703,393,930	19.9800	6,326,445,458	2,759	2,505,039,449	34.9709
1977	4,494,378,855	309	1,066,215,929	20.9694	6,617,425,714	2,846	2,332,162,363	33.1547
1978	5,303,734,883	352	1,579,944,929	25.0765	7,515,823,694	3,193	2,845,617,824	34.6311
1979	6,234,390,975	398	1,130,468,294	19.1713	9,294,553,436	3,900	3,915,049,195	35.5914
1980	7,265,315,332	447	1,780,521,045	18.3228	11,893,624,074	4,927	5,356,117,847	39.5257
1981	6,854,491,454	406	1,570,599,903	18.6113	14,171,752,830	5,595	6,347,392,128	42.1451
1982	6,431,579,357	366	1,405,957,065	19.0278	16,078,932,759	6,076	7,441,413,652	45.8298
1983	5,979,198,464	328	1,251,151,196	18.1146	17,775,115,135	6,630	8,259,876,486	46.1228
1984	6,191,437,070	327	1,226,587,576	17.1532	19,735,453,641	7,223	9,266,652,539	46.2467
1985	6,135,034,338	312	1,553,686,632	17.2714	19,138,445,912	6,995	7,872,313,162	40.8239
1986	7,239,126,717	355	1,575,815,795	19.6359	18,569,643,987	6,794	6,794,092,581	35.1562
1987	7,970,820,531	377	1,936,067,102	19.6261	20,897,470,244	7,531	7,638,317,578	32.3905
1988	8,355,380,879	382	2,126,364,307	20.4469	25,337,427,488	8,902	8,474,758,426	30.3307
1989	8,283,114,648	365	2,059,354,393	19.4581	30,423,195,895	10,380	10,374,846,268	31.7186
1990	8,572,359,163	366	2,071,432,832	20.6482	36,152,800,270	11,865	12,885,010,960	31.7103
1991	8,151,479,004	336	1,709,407,116	19.0301	45,474,442,836	14,505	15,447,120,116	33.1337
1992	8,209,129,172	328	1,389,053,537	16.5814	52,156,414,979	16,144	18,511,540,823	35.1753
1993	5,751,789,915	223	1,012,915,228	16.9376	60,644,572,348	18,302	22,542,022,528	34.6145
1994	7,148,145,376	269	1,379,109,055	18.8731	73,777,792,327	21,578	24,247,282,965	33.3087
1995	9,046,326,060	330	1,973,886,735	21.3856	87,890,009,877	24,937	29,742,556,794	33.1461
1996	12,045,858,436	428	1,807,339,241	16.0091	96,403,758,865	26,263	33,762,056,738	37.8546

1997	13,115,773,738	455	1,985,857,747	15.3879	100,163,995,151	26,386	38,266,433,190	38.4671
1998	14,093,998,844	477	2,352,671,257	15.6752	85,707,636,233	21,824	27,057,122,371	38.0972
1999	12,896,013,577	426	2,001,643,769	15.5914	86,283,126,844	21,796	28,217,404,130	34.5854
2000	12,705,357,103	409	2,212,522,399	16.7088	95,833,932,715	23,793	33,444,721,578	32.0438
2001	12,986,007,426	408	2,440,115,016	18.1516	89,286,208,629	21,577	24,786,124,909	31.0566
2002	13,147,743,911	402	1,990,333,858	17.2369	91,941,192,896	22,017	23,425,555,680	27.1683
2003	14,904,517,650	444	2,456,584,865	15.8382	97,001,377,569	23,574	17,111,583,056	25.2537
2004	16,095,337,094	467	2,730,170,839	16.2592	114,188,557,567	27,405	26,383,149,923	24.5228
2005	18,737,895,401	530	3,307,179,475	18.6991	127,417,688,056	29,870	27,224,885,845	23.0751
2006	25,825,524,821	712	4,812,221,224	19.4244	147,797,218,201	33,580	32,993,202,845	23.0606
2007	31,958,195,182	858	6,537,681,082	19.9647	179,981,288,567	39,224	41,611,770,951	24.4814
2008	35,895,153,328	939	7,040,012,837	18.8649	192,225,881,688	39,721	58,509,364,619	28.3376
2009	37,021,512,049	943	7,157,229,289	18.5051	192,408,387,762	38,578	53,230,938,467	29.2710
2010	39,999,659,234	992	8,293,884,382	20.3218	236,421,782,178	46,570	65,890,135,680	26.1275
2011	41,953,433,591	1,013	9,105,052,539	20.3908	275,221,020,830	53,094	74,380,664,653	25.5658
2012	50,410,164,014	1,185	10,858,989,041	21.2088	289,268,624,470	54,451	86,131,871,649	26.7627
2013	55,100,780,396	1,261	11,111,272,379	20.5991	300,288,499,960	55,618	91,030,128,666	27.9233
2014	61,395,415,492	1,368	13,810,527,944	22.9269	306,344,408,492	56,007	88,613,369,111	26.5477
2015	63,398,041,540	1,377	13,443,947,394	21.5185	292,739,307,536	52,889	76,961,739,889	25.5110
Totals			150,540,154,126				1,172,706,343,141	

Sub-Saharan Africa's GDP and GCF, 1991 to 2015

Source: World Development Indicators, retrieved via the World Bank website on 19 July 2016

Sub-Saharan Africa				
Year	GDP (current US$)	GDP per capita (current US$)	Gross capital formation (current US$)	Gross capital formation (% of GDP)
1991	319,242,644,293	610	53,600,149,649	16.0933
1992	315,397,427,361	587	48,261,703,244	14.3908
1993	303,770,108,486	549	48,345,025,086	15.5083
1994	298,056,876,899	525	54,965,664,401	16.9282
1995	337,323,149,165	578	62,826,266,630	16.1713
1996	348,990,455,749	582	61,927,268,859	17.4807
1997	360,983,891,937	586	62,288,254,270	16.3503
1998	340,524,879,271	538	62,399,590,074	18.1348
1999	343,169,880,527	528	59,393,947,168	16.3425
2000	367,684,964,387	551	61,496,015,084	15.4414
2001	342,258,522,219	499	58,098,223,530	15.7720
2002	366,799,826,512	521	62,121,943,419	16.9214
2003	468,482,928,040	648	87,568,252,720	18.4876
2004	582,611,848,265	785	110,869,061,043	18.2849
2005	685,042,578,987	898	126,184,898,094	17.5951
2006	799,471,145,176	1,021	154,542,112,020	18.1833

2007	929,083,765,335	1,154	179,251,878,508	17.9589
2008	1,060,100,505,690	1,281	208,333,920,969	18.6069
2009	1,012,946,855,153	1,191	200,643,504,747	18.5749
2010	1,355,385,369,041	1,551	278,790,270,154	19.9016
2011	1,527,194,806,784	1,701	306,767,461,173	20.1962
2012	1,595,978,753,437	1,729	330,607,849,456	21.0379
2013	1,678,735,616,972	1,770	346,829,505,068	21.0473
2014	1,754,486,218,759	1,801	368,668,369,702	21.3920
2015	1,572,873,067,288	1,571	322,981,220,585	21.6000

China, Singapore and South Korea GCF, 1991 to 2015

Source: World Development Indicators, retrieved via the World Bank website on 19 July 2016

Gross capital formation (% of GDP)			
Year	China	Singapore	South Korea
1991	35.9343	33.9688	36.8458
1992	37.2624	35.4924	34.5446
1993	44.2449	37.1707	33.0126
1994	41.9754	32.8653	34.1134
1995	41.6656	33.8407	34.8243
1996	40.2179	35.0215	35.9243
1997	37.7291	38.2038	33.1343
1998	36.8907	31.5691	22.9354
1999	36.5366	32.7033	26.6731
2000	34.9209	34.8986	32.9417
2001	36.0653	27.7603	31.5596
2002	37.6564	25.4788	30.9396
2003	40.9791	17.6406	32.0149
2004	43.0381	23.1049	32.1171
2005	41.8820	21.3666	32.1631
2006	42.7068	22.3233	32.7007
2007	41.3937	23.1201	32.5795
2008	43.6699	30.4378	33.0185
2009	47.5837	27.6656	28.4657
2010	47.3471	27.8697	32.0229
2011	47.1665	27.0258	32.9588
2012	47.3249	29.7757	31.0012
2013	47.6781	30.3142	29.1022
2014	46.1988	28.9261	29.2769
2015	-	26.2902	28.4882
Average	39.9227	29.3934	31.7343

A Prototype Private-Sector Infrastructure Incentives (PIIP) Plan

PROPOSED INCENTIVE	ANTICIPATED BENEFITS
Partial debt guarantees provided by the state for up to 70% of project cost	Reduction in interest rates charged on debt extended to private investors in infrastructure projects that reduce construction costs and, consequently, lower overall project costs.
Partial equity guarantees by the state for up to 70% of project cost	Reduced exposure to risk by project equity investors, reducing the cost of equity and overall project cost of capital, increasing investors' return per unit of risk, and consequently increasing the private sector's profit incentive for investments in infrastructure.
Tax incentives for private-sector capital investments in infrastructure	By providing a set of tax benefits – holidays, reduced rates, deductions, and rebates- for investments in infrastructure, the costs incurred by investors in capital projects are reduced, with the effect of increasing project returns.
Standardised transaction documents	By standardising the transaction terms and documents, the private sector is provided with the certainty it requires to evaluate investment opportunities. Investors are safe in the knowledge that cost and revenue terms are standardised and protected for the long project time horizons. Standardised terms and documents also make the structuring of projects easier for prospective investors, potentially simplifying the planning and financing process.