

# What is infrastructure?

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## 1. **Introduction and context**

'Infrastructure' can have a number of definitions and interpretations.

In the context of this book, 'infrastructure' has been assumed to mean the underlying framework of fixed assets required to deliver a public service.

Within that interpretation, however, exist a number of grey areas, in particular with regard to what constitutes a 'public service'.

In most economies, services such as power, transportation, water, health, education, and municipal and governmental administration are seen as essential public services which the economy and population require for sustaining economic growth and development.

As these services are key to the well-being of the economy, a public interest requirement will inevitably underpin them such that they must, at least, achieve acceptable standards and quality of service, and represent value for money.

Alternatively, if the public are paying directly for the service provided (eg, for a toll road), the tariffs charged must represent acceptable value to users, otherwise users will go elsewhere. In this context, such services are usually controlled by the imposition of a regulatory regime under which service providers are licensed, and tariff levels are determined by a regulator which monitors and ensures that the standard and quality of service are maintained.

It is thus immediately apparent that the delivery of public services, whatever the boundaries of one's definition, will always be made against the backdrop of subjective, and not solely objective, criteria and judgements. Political influence and, possibly, interference is never far away.

In addition, some services may be deemed marginal in some countries and essential in others (eg, tourism facilities or sports stadiums). Similarly, in some sectors, such as telecommunications, the mode, or technology, of delivery of a specific public service (eg, for mobile phones) may change so rapidly that investment in fixed assets is very short term and could be deemed as a 'current', as opposed to 'capital', expenditure. By contrast, some components of the delivery of such services may be deemed as arguably 'long term' (eg, mobile phone masts) and therefore investment in such assets is treated as 'infrastructure'.

A third marginal infrastructure project type can be found in pipelines, which may be both constructed and operated for one dedicated user or beneficiary, or alternatively built and operated with open access – that is, available for use by third-party customers or beneficiaries. Pipeline financing, therefore, has many of the

characteristics of infrastructure project funding, whichever its type, and therefore has been included here in the definition of ‘infrastructure’.

In the table below, project investments are identified either as regulated (ie public services) or non-regulated (ie projects operating in open and competitive markets).

**Figure 1.1 Project types**

<b>Regulated (public services, some of which may be monopolies)</b>	
<b>Sector</b>	<b>Description</b>
Air transport	<ul style="list-style-type: none"> <li>• Airports</li> <li>• Air traffic control (ATC)</li> </ul>
Land transport	<ul style="list-style-type: none"> <li>• Roads</li> <li>• Rail, metros and light rail (LRT)</li> <li>• Tunnels and bridges</li> <li>• Bus lanes</li> </ul>
Municipal and government	<ul style="list-style-type: none"> <li>• Schools, hospitals, offices</li> <li>• Defence</li> <li>• Municipal and waste management</li> </ul>
Oil and gas pipelines	<ul style="list-style-type: none"> <li>• Oil/gas pipelines: open access</li> </ul>
Ports	<ul style="list-style-type: none"> <li>• Container ports/terminals</li> <li>• Bulk handling/oil terminals</li> <li>• Cruise terminals</li> </ul>
Water industry	<ul style="list-style-type: none"> <li>• Water treatment and desalination</li> <li>• Irrigation</li> </ul>
<b>Non-regulated (projects operating in competitive markets)</b>	
<b>Sector</b>	<b>Description</b>
Oil, gas and mining	<ul style="list-style-type: none"> <li>• Exploration and development</li> <li>• Single-user pipelines</li> </ul>
Process industries	<ul style="list-style-type: none"> <li>• Cement, steel, aluminium</li> <li>• Petrochemicals and refineries</li> <li>• Agro-industries</li> </ul>

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Property	<ul style="list-style-type: none"> <li>• Hotels, tourism and stadiums</li> <li>• Offices and housing</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>• Satellites</li> <li>• Mobile phones</li> <li>• Broadband infrastructure</li> </ul>

*Source: author*

The prime focus of this book is on the regulated projects listed above, which embrace infrastructure assets for whatever public service. Often such projects may, in the event, be in the form of public-private partnerships (PPP), but the underlying aim of the venture will be the same – namely, the creation of public service assets and delivery of a public service. On occasion, reference will be made in this book to projects in the non-regulated sector, when lessons can be learnt.

The fact is that the underlying financing structures for projects of both generic types, regulated and non-regulated, are largely similar. It is purely the internal balances within those structures that differ.

## 2. **Recent history**

Infrastructure project financing and PPP are, in essence, no recent phenomena. In the early 1800s a number of toll roads, turnpikes, railways and canals were funded as PPP-type concessions through the issue of shares to the public.

In 1854–59, the Suez Canal was funded using equity/shareholder funds, raised through a public issue to cover 51% of the costs, the balance coming primarily from the Egyptian government. This was then followed by a similar funding mechanism for the Panama Canal in 1878, although that project was overtaken by technical and environmental problems, leading to eventual completion being achieved only with the help of US government money. Similarly, many railway companies funded developments throughout Europe and North America by raising funds – debt or bonds, and equity – from investors.

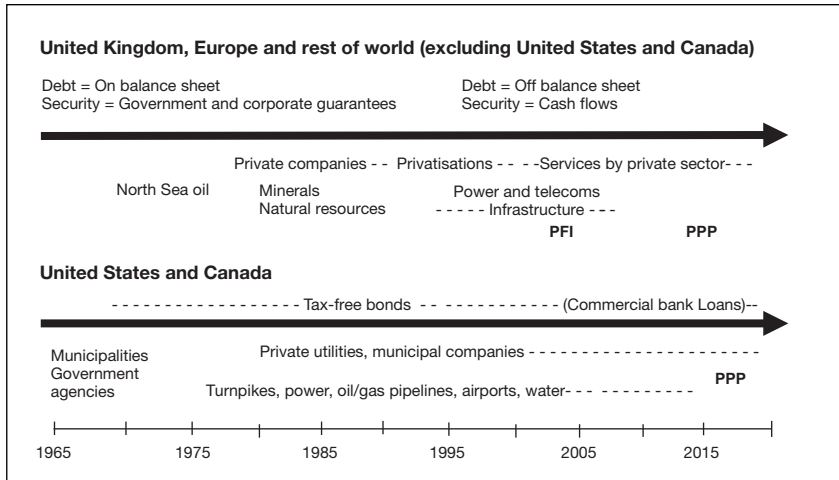
Unfortunately, by the early 20th century many such projects had cost the investors dearly, so governments had to step in to fill the breach for investment in essential transportation infrastructure.

For the first part of the 20th century, infrastructure projects were largely funded by governments, or by public utilities as corporate financings. Developments thereafter in the second half of the 20th century followed differing paths in North America, and Europe and the rest of the world (see Figure 1.2).

## 3. **History – Europe and the rest of the world (excluding North America)**

In the first half of the 20th century, infrastructure projects outside North America were funded either using funds directly from the government's budget, or using loans raised against government guarantees. This process was seen as quick and straightforward. Even today, a large portion of investment in infrastructure is still funded this way.

**Figure 1.2 – History of infrastructure project finance**



Source: author

The same applies to the industrial and commercial sectors, too. Much of the investment in capital assets by the large multinationals was funded through balance sheet or corporate debt financings, rather than using complex cash flow-based mechanisms. Indeed, this characteristic still applies today.

By the mid-1960s, North Sea oil and gas resources were beginning to be found and developed. Initially, the developers of such projects were large multinational oil companies, which funded these projects using the strength of their balance sheets (ie ‘on balance sheet’). Over time, the governments around the North Sea wished to introduce competition, so licences were offered to smaller companies, often in consortium with the larger developers. However, the smaller companies did not necessarily have the balance sheet strength enjoyed by their partners, so struggled to raise their portion of the project funding required.

Faced with this problem, City bankers came up with the concept of raising the debt required against the security provided by the cash flows that the projects were going to generate. After all:

- the demand and price for oil and gas in the European market were relatively stable and predictable;
- the technology of extracting oil and gas from under the sea was well understood and within experience;
- the companies involved with constructing, completing and operating the projects were substantial and experienced; and
- lenders could take security not only over the project assets (ie drilling and production rigs) during the period when their loans were outstanding (ie not fully repaid), but also over the oil and gas reserves in the ground which as yet had not been extracted.

Cash flow financing was reborn!

Before long, as more deals were implemented as above, the same technique was applied to natural resources – namely, iron ore, zinc or copper mines. Furthermore, not only were commercial banks involved as lenders, but also, in time, development banks (international financial institutions or IFIs) and export credit agencies (ECAs) were prepared to lend on such terms too. However, such deals were between private sector industrial companies and their bankers, so quite often the terms and conditions remained confidential to the parties.

After some years, particularly in the United Kingdom, government policies were moving towards more private sector participation in the delivery of public services. Margaret Thatcher's government privatised the telecoms, power, water, airports and ports sectors, so that any new investment in these sectors had to be undertaken as private sector deals. Projects such as the Channel Tunnel (Eurotunnel), the Dartford Bridge and others were brought forward. In Southeast Asia a number of toll roads were promoted as build, operate and transfer (BOT) or build, operate, own and transfer (BOOT) projects, with others also following suit, for instance in Turkey and Mexico, with mixed success.

By the early 1990s over 20 countries were considering the use of private capital for investment in public service assets, but there remained many question marks over the value for money generated by such deals and their public acceptability.

In the United Kingdom, such deals were often termed as 'private finance initiatives' (PFIs) – which today might be described as PPPs – and a specialised unit in Her Majesty's Treasury was set up to pioneer and sponsor the mechanism throughout government. Indeed, for any investment over a specific value (eg, £20 million), the privately funded or PFI route had to be considered by all UK government ministries or agencies against the alternative of using public money (see further the chapter on government options).

There was an added potential advantage of such PFI-type deals in that, suitably structured, the financial obligations for the host government could be kept 'off balance sheet', which offered some attraction for those responsible for government budgets. However, such off balance sheet funding is tantamount, in effect, to using a credit card – and we all know how easy it is to overspend on credit cards.

When the Labour party came to power in the United Kingdom in 1997, a number of PFI-type deals were either operational or in the pipeline. While the new government was attracted by this concept for the procurement of public service assets, it felt that a name change was needed and the term 'public-private partnership', or 'PPP', emerged.

Taken literally, this is, however, a misnomer. The underlying framework of any PPP transaction is contractual: when there is a dispute, usually under such a framework there is a winner and a loser, with not much sharing or 'partnering' in the outcomes. Nevertheless, the term 'PPP' remains fixed and, superficially at least, the name and concept are very attractive for politicians.

Now between 80 and 90 countries worldwide are developing, implementing and operating PPP-type deals for capital investment in assets for the delivery of public services, some with more success than others. In the United Kingdom, PPP deals are

still often referred to as 'PFIs', but the differentiation between acronyms and types is often blurred. Other countries now use different acronyms, such as 'P3' or '3P' in North America and 'PSP' in Southeast Asia. Generically, all these structures, however, are PPPs.

The PPP concept has taken hold not only in developed economies, but also in emerging markets, sometimes with negative effects. After nearly 25 years of global experience of the mechanism, one can arrive at two key conclusions:

- Infrastructure PPP deals are not free – their cost is merely delayed. Like credit cards, they allow the beneficiary – the government or taxpayers – to pay for the investment in public service assets at a later date. Unfortunately, as the financial obligations for PPP-type transactions can be kept off balance sheet, outside the watchful eyes of the International Monetary Fund (IMF), some emerging markets' governments have overspent on their PPP credit card. Regrettably, too, the guidelines as to whether any specific PPP is on or off balance sheet are somewhat imprecise and open to abuse, although in recent times the authorities have been tightening up on the interpretation; and
- Those countries which have been using the PPP mechanism as one option for investing in public service assets and have achieved the greatest success are those with either a long-term local capital market or an indigenous raw material (eg, oil or gas) which they can export for hard currency revenues, thereby providing a foreign exchange hedge against revaluations or devaluations of the domestic currency versus world markets.

This conclusion should come as no surprise as:

- PPP infrastructure concessions typically have a lifespan of 20 to 30 years. They are long-term deals;
- the underlying capital assets require a long cost recovery period and need to be funded with long-term debt and equity funding;
- much of the capital cost and, probably, much of the operating costs too, will be denominated in local currency. After all, such PPP concessions are delivering a public service locally; and
- in emerging markets in particular, the only source of long-term funds which can justify and support financial viability of the PPP will be denominated in hard currency.

Hence, any possible foreign currency fluctuation between the local currency and world markets for dollars, euros or yen can have a very significant impact on the PPP project's sustainability and ability to service its debts, in particular.

The conclusion, therefore, is that the development of PPP in any national environment ideally should proceed hand-in-hand with the development of local capital markets – that is, pensions funds and life insurance, among others.

Alternatively, if the country has a hard currency-generating export, then such revenues, often via some form of sovereign wealth fund, can be used as a foreign exchange hedge or buffer against such currency fluctuations, in support of PPP developments.

Here are two examples:

- As mentioned earlier, in the 1990s a number of Southeast Asian countries (eg, Malaysia, Indonesia and Thailand) embarked on PPP-type deals, often called BOOT in those days, particularly for toll highways and power projects. Such PPP projects were built and operated, for a time, quite satisfactorily.

In the late 1990s recession hit the region. The Thai baht and Indonesian rupiah devalued sharply, putting their PPP deals into jeopardy, in some cases terminally, as it was impossible to increase tariffs to compensate for the devaluation. Malaysia, for its part, weathered the storm thanks to its oil and gas exports, which cushioned the Malaysian ringgit from significant devaluation, thereby protecting PPP-type revenues.

Similar events have hit PPP-type deals in Argentina, Mexico and some Central European countries, too, over the years. Whereas the underlying PPP concession contracts may include clauses requiring tariff changes in the event of devaluation of the underlying currency, bolstered by international arbitration proceedings to enforce them, it can be politically unacceptable for host governments to impose such tariff rises on their populations.

- By contrast, countries such as South Africa and Chile have enjoyed the benefit of sizeable and long-term local capital markets, which have been available to fund most of such PPP-type deals, thereby avoiding the foreign exchange risks inherent in such funding structures.

#### **4. History – North America**

In the early days of the 20th century, the United States was in a similar position to Europe concerning the state and development of its infrastructure services.

After the depression of the 1930s, however, suddenly the demand for investment in new roads, bridges, rail connections, etc, flourished, not least because of the success of the mass-produced cars made by Ford and General Motors. Unfortunately, the municipalities and individual states sponsoring such infrastructure projects were short of funds to build the assets.

In response, the federal government recognised that the potential support for financing such assets over the long term would require participation from the private sector and, in particular, from the life insurance and pension fund industries, where fund managers took both a long- and short-term investment perspective and were seeking profitable, but low risk, investments for their funds.

To make such investments more attractive than those in commercial or industrial companies, investors in infrastructure ventures were not limited by amount and exposure, as for some industrial revenue bonds, and furthermore investors in such bonds did not pay tax on the interest that they received. Thus, states, municipalities, utilities or specific project sponsors could issue long-term bonds in support of infrastructure investments, giving investors this tax-free exemption. Today, we would call such tax-free bonds 'infrastructure bonds', which governments around the world sponsor to support infrastructure development.

A review of the US market for infrastructure developments today show that around 90% of the debt financing comes from this market source (ie, bonds, rather

than bank loans). Furthermore, the US bond market, which is at least twice as large in value as any other regional market, can provide more longer-term funding, both in terms of cost to the borrower and maturity, than is available in the commercial banking sector.

With the Canadian market closely linked to the US financial markets, the same characteristic can largely be found in Canada also.

It comes as no surprise, therefore, that the use of PPP as a procurement option for investment in public service assets was slow to take off in the United States compared to other countries, and there remain many US commentators who doubt the real benefits of using PPP in their market.

Canada, by contrast, has been using the PPP mechanism for some years, with seemingly significant success. However, its public service sector has traditionally and proportionally been much larger than in the United States, so the balance sheet benefits of PPP may count more heavily.

By the mid 2000s, the terms and conditions for long-term debt financing between the North American and European markets were quite comparable. However, the onslaught of the 2007–2009 financial crisis and the impact of Basel III on bank lending thereafter have severely curtailed the development of PPP in Europe and most emerging markets. It is only recently that banks have been prepared to lend once more for the long-term periods that PPPs require, even though the bank loans so provided contain embedded incentives for the borrowers to re-finance their debt before maturity.

In North America, the long-term bond markets have largely recovered, and against the backdrop of the good performance of project financed and PPP-type deals through the financial crisis, with few, if any defaults, cheaper, longer-term debt finance is more readily available there than in the rest of the world.

## **5. What are PPPs?**

As inferred earlier, over the past 20 to 25 years the PPP concept has been discussed and promoted widely by governments, politicians, development banks and aid agencies throughout the world. Regrettably, what PPP represents has, at times, been misinterpreted. Figure 1.3 summarises the possible range of private sector participation in the delivery of public services.

The first two columns show short-term contractual arrangements with minimal capital investment. If there is such investment, then the host government provides.

The next two columns describe medium-term contractual arrangements, typically some kind of lease, whether the assets are funded and provided by private sector entities or by government. Such arrangements have prevailed, particularly for vehicles in the public transport sector, for many years, but do not involve fixed or permanent assets.

The final two columns summarise what financiers usually describe as ‘PPPs’, where the capital investment and risk transfer from the public to private sector are significant, with the funding provided by private sector resources. Usually such arrangements are for a fixed concession period (eg, 20 to 30 years), but on occasion it can be indefinite – that is, until the underlying asset becomes economically unsustainable, for instance for a private power station.



Figure 1.3 – The range of PPPs

Type	Services Contract (cleaning)	Management Contract (outsourcing)	Public Lease (buses)	Private Lease (trains)	PPP Concession (motorway) (IPP* + CfD** or FIT***)	'Stand-alone' PPP concession (toll bridge or IPP*)
<b>Asset ownership</b>	Public	Public	Public	Private	Private	Private
<b>Duration</b>	1–3 year	1–5 year	5–12 year	5–12 year	20–30 year	20–30 year (even potentially indefinite)
<b>Capital investment</b>	Public	Public	Limited	Limited	High	High
<b>Risk transfer</b>	Minimal	Low/part	Moderate	Significant	Yes/high	Yes/high
<b>Operation and maintenance risk</b>	Public	Public	Shared	Private	Private	Private
<b>Payment structure</b>	Unit prices	Fees, plus incentives	Operator pays rent to government	Operator receives payment from government for financial costs	Availability payments or guaranteed tariffs	(Regulated) unit payments from customers
<b>Mobilises private capital</b>	No	No	No	Yes	Yes	Yes
<b>Features and issues</b>	Promotes efficiency, but requires underlying legal regime	Promotes efficiency and commitment, but requires underlying legal regime	<ul style="list-style-type: none"> <li>• Easier than PPP</li> <li>• Public/private conflicts possible</li> </ul>	<ul style="list-style-type: none"> <li>• Easier than PPP</li> <li>• Public/private conflicts possible</li> </ul>	<ul style="list-style-type: none"> <li>• Promotes efficiency and VfM</li> <li>• Complex and time-consuming to arrange</li> <li>• Not for small projects</li> </ul>	<ul style="list-style-type: none"> <li>• Promotes efficiency and VfM</li> <li>• Complex and time-consuming to arrange</li> <li>• Not for small projects</li> </ul>

\* IPP: Independent power producer \*\* CfD: Contract for differences \*\*\* FIT: Feed-in tariffs

Figure 1.3 differentiates between those PPPs where the user pays and those where a government agency responsible for delivering the service to the public pays a periodic 'availability payment', where 'availability' is measured against fixed performance criteria.

## 6. **Impact of the financial crisis on PPPs**

Overall, PPP-type transactions have weathered the financial crisis with few, if any defaults for financial reasons. That does not mean to say that PPPs have not failed, but when they have failed, the reasons have been technical, commercial or political rather than the result of the underlying funding mechanism.

One can summarise the impact of the financial crisis on PPPs and infrastructure as follows:

- The number of commercial banks actively supporting infrastructure and PPP-type deals is today probably half the number doing so before the financial crisis.
- The cost (ie, the lending margin over base rate) of commercial bank loans for infrastructure and PPP-type deals is approximately twice as much as before the financial crisis.
- The availability of commercial bank loans with maturity greater than 10 years, which many infrastructure and PPP-type deals require to be sustainable, has also been significantly reduced. The imposition of Basel III and subsequent regulations have reinforced this aspect for most banks.
- To overcome this lack of long-term debt maturity, many banks support project early repayment mechanisms (PERMs), which are loans with increasing margin over time, such that by years 8–10 the loan becomes increasingly expensive for the borrower, incentivising the borrower to refinance its debt.

However, some lenders are nervous about applying such mechanisms, as they fear the consequences of any market conditions in years 8–10 not allowing a refinancing. If default arises in such circumstances, the lenders will claim their security (ie, take over the assets), which in the infrastructure and PPP sector may be a politically sensitive action to take. Lenders may be reluctant to take such action in the event. Indeed, 'cash sweeps' seem to be a preferable and alternative loan covenant with similar outcomes.

The consequence of the above has been that, particularly in emerging markets, development banks and ECAs have had to step up as the main source of long-term funds, in an attempt to plug the lending gap left by commercial lenders.

- Balanced against the above part-withdrawal by commercial lenders from the sector, the pension fund and life insurance industry has become alert to the potential investment opportunities in the infrastructure/public services sector, as has long been the case in North America. However, the mode of bond market participation is not an exact fit into the gap left by the banks.

Typically, pension fund and life insurance investment managers will invest in corporate and project bonds (ie, PPPs and infrastructure) only post-

project completion. This is due to the fact that bond investors and pension fund managers have both a short- and long-term perspective, as their customers are either already retired and are drawing their pensions today, or younger, employed people who will not need a pension for some years. Hence, pension funds need income 'today', generated from interest on bonds invested, to satisfy the existing pension holders.

Unfortunately, project bond issuers will not be in a position to pay interest until the project is completed and operational, generating revenues. Accordingly, there is a mismatch.

Ideally, the debt portion of project funding should derive from commercial loans, which are flexible in their use (ie, 'drawdowns'), and then, on project completion, such loans are refinanced with bond-type funding. To date, the perfect refinancing mechanism which can be put in place at the outset of project funding has not been achieved, although the two generic funding sources are getting closer! Recently, the debt for a PPP highway transaction in the Netherlands was provided by bank loans, which, on project completion, was 80% refinanced with pension-type bonds committed at the outset of project funding.

- Each year Moody's publishes a review of defaults on project bonds, covering all sectors – many of them US infrastructure issues – and these have shown that such bonds have performed well throughout the financial crisis and since.

In this context, it should be mentioned that many of the US infrastructure project bonds issued in recent years have enjoyed the revenues from an existing and operational asset or public service during the construction period. Hence, the generally successful performance of such bonds has been seen throughout the financial crisis.

- Lastly, just as commercial banks are being constrained by Basel III in providing infrastructure projects with long-term loans, the same issue could also arise for the project insurance industry in due course.

Here are two anecdotes:

- Following the financial crisis, many economies suffered economic downturns, and governments sought to provide employment for their workers by investment in infrastructure projects, including PPPs.

However, *prima facie*, under the Basel III guidelines lenders to infrastructure and PPP-type transactions have to make the same kind of risk assessment for determining the weightings, or provisions, against possible losses that they will have to make in their balance sheets as for corporate lending in general.

Unfortunately, under Basel III infrastructure and PPP-type projects, which need long-term funding, seemingly receive no particular exemptions in this respect, notwithstanding their seemingly good track record.

On enquiry with the Basel Committee at the Bank of International Settlements, Switzerland, it is understood that banks can, if they deem it

appropriate for the underlying contractual structure for an infrastructure or PPP-type deal, adjust the weightings that they have to make in their balance sheets to reflect the underlying credit risk, although how large or how little an adjustment might be acceptable is not explicit.

Curiously, the Basel guidelines for such assessments are dated June 2006 and have not been updated following the financial crisis, notwithstanding the importance and demand for new investment in infrastructure by many governments.

- Shortly after the financial crisis, the author was assisting a client with the planning and preparations for raising the debt required for a UK PPP-type project. One of the candidate lenders was a bank which had unfortunately collapsed as a result of the crisis, and had had to be rescued by its national government.

Following the governmental rescue, a new CEO was appointed. Within days, he employed a consultant to review all the bank's departments' performances. Within four weeks, the results were available: all the bank's departments had failed somewhat, except the project finance and PPP department, which had had no defaults.

The conclusion drawn was that, although infrastructure project finance and PPP-type deals were complex and long term, and deal flow was erratic, the underlying credit quality of the lending was good and the CEO decided that the bank should do more!

As mentioned above, today nearly 90 countries around the globe are actively pursuing and developing PPP-type financings for investment in infrastructure and public service assets in their countries.

So, the anecdote above reflects a more general reality. Infrastructure project finance deals are complex and time consuming to prepare and implement, but rarely default. Part of that is due to the care and attention to detail that practitioners apply, and the due diligence undertaken by financiers in completing the transactions.