

# Chapter 3

## The Quality of Infrastructure and Infrastructure Projects

ERIA CADP research team

November 2015

**This chapter should be cited as**

ERIA CADP research team (2015), 'The Quality of Infrastructure and Infrastructure Projects', in ERIA (eds.), *The Comprehensive Asia Development Plan 2.0 (CADP 2.0)*. ERIA Research Project Report 2014-04, Jakarta: ERIA, pp.31-40.

## Chapter 3

### The Quality of Infrastructure and Infrastructure Projects

‘The quality of infrastructure’ and ‘the quality of infrastructure projects’ are multidimensional.<sup>6</sup> This chapter discusses the quality issue from the viewpoint of project design, project implementation, and strengthening partnership among stakeholders, particularly among development partners and between the public and the private sectors.

#### **3-1. Project Design**

##### 3-1-1. The appropriate grade of infrastructure

The key message of the whole CADP 2.0 is to establish a tight link between infrastructure development and industrialisation. Different stages of industrialisation require diversified infrastructure needs, and we have to provide infrastructure with proper technical grades and specifications for specific needs. That is why we divide infrastructure into two categories: infrastructure for connectivity and infrastructure for innovation. For each category, projects are further classified into Tier 1, Tier 2, and Tier 3.

In planning to build infrastructure, the cost consideration is certainly important to construct and operate infrastructure efficiently, but the cost should not be the single criterion for adopting a project plan. In a sense, it is natural for governments under budgetary pressure to tend to choose cheap but low-quality infrastructure projects. However, we still want to emphasise that infrastructure should be suited to the stage of industrialisation and economic development. The required resiliency of infrastructure against various risks such as natural and human-made disasters, including cybersecurity threats, is also one important element in setting the appropriate quality of infrastructure. We will discuss this issue of appropriate technical grades and specifications again in Chapter 6.

---

<sup>6</sup> The Asia-Pacific Economic Cooperation (APEC), Committee on Trade and Investment (2014), is a useful document to get an overview of the whole cycle of infrastructure projects from the viewpoint of the quality of infrastructure.

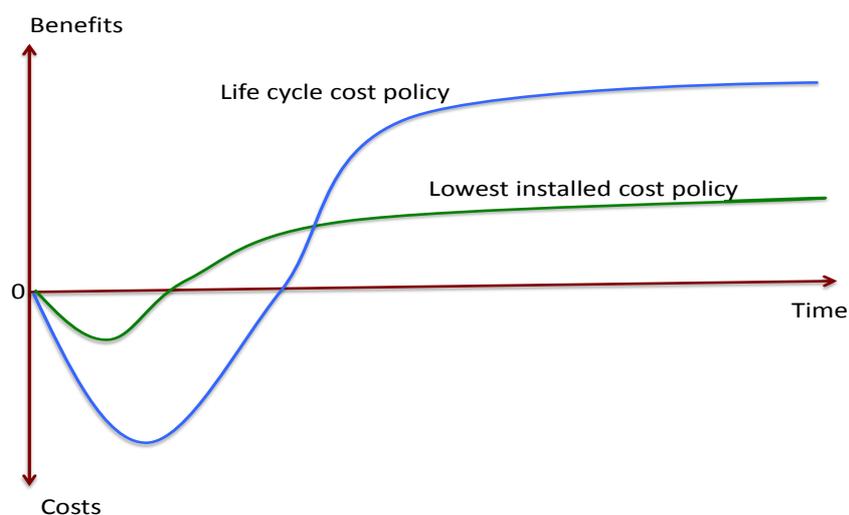
### 3-1-2. Project design in the time horizon

The construction of infrastructure takes time, and its financial/economic returns come over a very long period. We must thus properly design projects in the time horizon.

The project design should include the whole period of the feasibility study, procurement, construction, operation/maintenance, and ex post evaluation. Proper planning of the whole project is important not only for the sake of the project itself but also for the interface with the private sector's decision-making. This is because infrastructure is by nature tightly connected with the rest of the economy.

Another angle of the issue is the life cycle cost structure. Figure 3.1 illustrates a case. To implement a project, one may choose the lowest installed cost policy where the cost of construction will be low, the period of construction will be short, and the benefit of the project will start to come early. The other possibility is to choose a life cycle cost policy where the construction may be more expensive and lengthy but the future returns will be large. Which is better? To decide which, we must calculate the discounted sum of costs and benefits over time and compare the cost–benefit balance between the two schemes. The message here is that the cheapest, easiest way is not always the best. The life cycle cost policy in the figure, for example, may be optimal. In this example, we had better choose the scheme of large-scale and durable infrastructure.

**Figure 3.1. The Life Cycle Cost Structure**



Source: ERIA CADP research team.

Furthermore, the sequence of projects over time matters. Is it better to build a four-lane highway immediately? Or should we start from a narrow road and expand it later? Or, alternatively, we may start from a narrow road and construct a separate motorway later. How to set up a proper sequence of projects is one of the important decisions for policymakers.

In actual planning, the key is how to deal with uncertainty. Although it is not easy to grasp uncertainty that is external to the project, we should at least try to reduce internal uncertainty of the project as much as possible. It is also important to continuously reduce uncertainty during planning and implementation. In this regard, the way of thinking in 'real option' may be applicable to some cases. Even in the case of a project with a lot of uncertainty, we may set proper phasing in the timing of investment by progressively reducing uncertainty.

### 3-1-3. Taking care of possible negative effects and negative externalities

An infrastructure project may possibly cause negative effects to a certain group of people or generate negative externalities such as air pollution, noise, and others that are not fully internalised in the market mechanism. Project planning should build in the structure to deal with such possibly negative impacts from the beginning.

A typical concern about infrastructure projects is their possibly negative impact on the environment and society, disaster prevention, and others. Specific studies on environmental and social impact, for example, must be incorporated in project planning and implementation. Such studies should be open to the public as much as possible; public hearings and other exchanges should likewise be held to solve incomplete information and minimise social conflict. Communication with various stakeholders, including the private sector, local governments, and local residence, is essential.

### 3-1-4. Taking advantage of possible positive effects and positive externalities

Infrastructure projects may also generate indirect positive effects as well as positive externalities. For example, projects may accelerate technology transfer and human resource development for engineers, managers, and operators. It is worth planning a built-in mechanism to enhance such positive impact in the project design.

## 3-2. Project Implementation

### 3-2-1. Bidding

The bidding process is important in order to identify the most capable company/consultant who will implement projects efficiently.

In addition to its fairness and transparency, the quality of bidding depends on its openness. As a part of its procurement, the government may want to limit bidders only to domestic companies in order to protect infant industries. However, particularly in large-scale and technically difficult projects, the bidding had better be open to foreign bidders on non-discrimination basis because more competition may result in infrastructure of better quality and possibly accelerate technology transfer and spillover.

Another important element for quality is the criteria for selection. Figure 3.2 illustrates a case. Suppose private players that participate in bidding have two types of strengths: price competitiveness and non-price competitiveness. The pool of such private players is drawn as a convex set bounded by a frontier convex to the origin. On the other hand, levels of national welfare are depicted as community indifference curves. Now what would be the choice if we followed one of the standard two-step bidding procedures? In the first step, we impose the minimal technical standard and kick out low-quality bidders. In the second step, we choose the cheapest bidder. Then, we would choose B, which is obviously inferior to the optimal point A. The message here is that the bidding must follow multidimensional criteria rather than seemingly innocuous methods like the minimal technical checking and the lowest price.

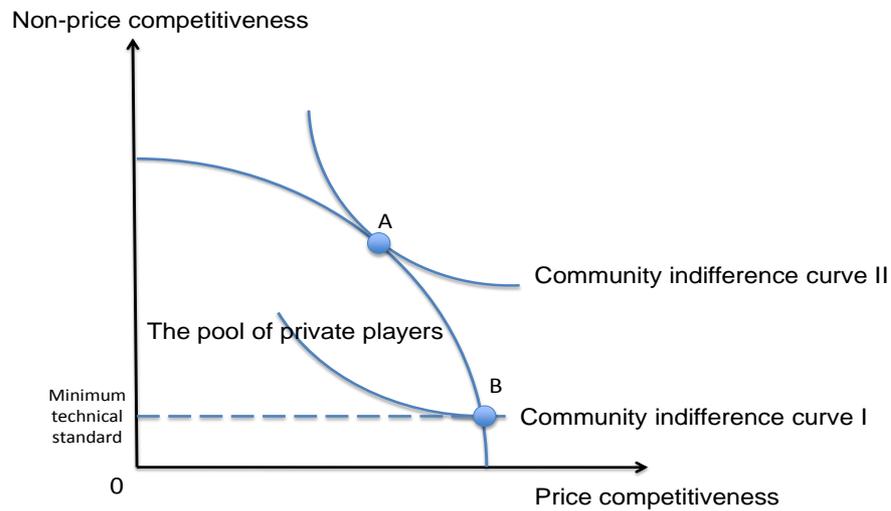
### 3-2-2. Construction

Timely construction is very important. A delay may seriously affect the profitability of projects. This must be emphasised because some government officials do not care much about interest rates.

A delay in construction occurs often due to difficulty in land acquisition and various legal procedures. Land acquisition is a difficult issue. Unfair displacement of residence is not acceptable, particularly in a democratic society. Yet, various forms of misuse of compensation schemes are observed in many countries. The establishment of a fair, transparent, and efficient procedure is necessary. On the other hand, legal procedures are

mostly what the government should take care of. Strong support of the government for the implementation is needed.

**Figure 3.2. Competitive Bidding**



Source: ERIA CADP research team.

### 3-2-3. Operation and maintenance

A project does not end until efficient operation and maintenance are stably provided. Maintenance is often completely neglected in the overall planning of infrastructure projects. For example, in road construction, maintenance costs are not typically included in the project budget; they must be covered by the annual government budget, which is often unstable over time. Although the maintenance cost is not huge, infrastructure does not work without it. One idea is to collect small amounts of toll fees from users. Thus, even if the whole construction cost may not be recovered, some money is at least secured for maintenance.

### 3-3. Macro Discipline for Development Partners

Infrastructure development has various stakeholders, and strengthening partnership among stakeholders is the key for successful projects. Stakeholders include central and local governments, public utility companies, consultants, constructors, private banks, other private companies, local residences, non-government organisations, foreign governments, foreign governmental financial institutions, international organisations,

foreign consultants and constructors, foreign private banks, other private companies, and others. Although perfectly reconciling all sorts of conflict over costs and benefits of various stakeholders is difficult, we should strengthen partnership among stakeholders as much as possible in a transparent way.

The launch of the Asian Infrastructure Investment Bank seems to work as a good stimulus for further activating our development efforts. It is good to see incumbent bilateral donors and international organisations start to review their lending practices and try to speed up and upgrade their activities. This is good competition. However, the problem is that communication among development partners looks thin.

It is important to strengthen partnership among development partners. To keep the fiscal sustainability of recipients, we need information on the amount and term conditions in detail for all sorts of foreign loans. We have to check whether the whole programme of development partners is consistent with each country's development strategy. We would like to watch whether the ownership of recipients on the programme is secured or not. Until now, some development partners do not fully disclose these types of information.

The establishment of the Asian Infrastructure Investment Bank and others is a good occasion for new partners to come into the international community. All kinds of bilateral donors and international organisations working as development partners in this region must disclose basic information on lending and other activities and conduct objective ex ante and ex post evaluations.

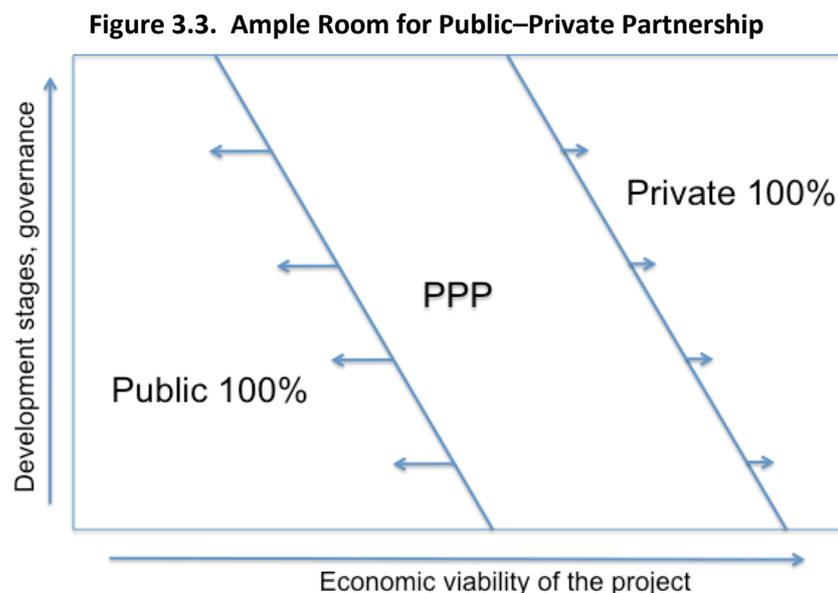
### **3-4. Micro Discipline on the Partnership between the Public and the Private Sectors**

#### **3-4-1. Public-private partnership**

In the past several years, many ASEAN Member States made substantial progress in establishing institutional arrangements for public-private partnership (PPP) and in conducting the first bunch of PPP projects. PPP is not a panacea; it can, however, be a powerful tool to effectively and efficiently provide a certain type of infrastructure. ASEAN is now in a learning process to further utilise the mechanism. ERIA published in 2014 the

*ASEAN Public–Private Partnership Guidelines* (Zen and Regan, 2014) to promote this move.<sup>7</sup> An important breakthrough is establishing a perception that PPP is not just to save on government expenditure; rather, the government should initiate the creation of a market for the private sector.

There is potentially a huge room for PPP, and PPP is essential to some types of projects (Figure 3.3). Infrastructure was traditionally provided by 100 percent public projects. This type of arrangement is still needed for some economically unviable projects. On the other hand, some infrastructure can be provided by a 100 percent private scheme. When the projects are economically viable, we had better ask the private sector to take care of them with its creativity and efficiency. The difficult part lies in the middle. A lot of potential projects do not fall into either category: 100 percent public or 100 percent private. These projects may not be fully financially viable, though the economic and social return would be large because of positive externalities. Or some projects are too huge for the private sector to pool the risk effectively. In such cases, the public–private collaboration is essential. Thus, we should design the project scheme so that the public sector would take care of the financially unviable portion and a part of the risks including a policy risk while leaving the financially viable portion for the private sector with transparent and efficient competition. In this sense, governments must generate a market for the private sector.



Source: ERIA CADP research team.

<sup>7</sup> Farquharson, Torres de Mastle, and Yescombe (2011) and The World Bank and others (2014) are also useful references for PPP.

### 3-4-2. Possible policy discipline on public involvement in investment

Although the following is a complicated issue that cannot be solved immediately, we just want to point out the existence of potential problems. The issue is related to a possible asymmetry between investment liberalisation and involvement of the public sector.

Compared with international trade on which the World Trade Organization imposes a certain level of discipline, almost nothing is disciplined in the field of investment. In the past, there was at least a loose consensus that the government sector or governmental financial organisations should not jeopardise market competition among private companies in the arena of international investment, and activities such as export credit were placed under the loose discipline of the guidelines of the Organisation for Economic Co-operation and Development (OECD). The Official Development Assistance was under the umbrella of the Development Assistance Committee of the OECD so that a certain discipline, though not fully consistent with economics, was imposed. However, in the past one or two decades, globalisation was advanced and new players in the investment area came in; these included state-owned enterprises, sovereign wealth funds, and investors/aid donors from non-OECD countries such as China. In addition, the Global Financial Crisis loosened the discipline of public involvement in the market even in developed countries. Governments helped private companies such as General Motors and Japan Airlines get out of bad performance. Although such measures may be justifiable as temporary measures to avoid further macro shocks, it is certainly at the cost of partially giving up a discipline for the government to not intervene in private competition.

It is not at all easy to establish a new international rule on investment and government involvement. However, we at least have to realise that the current situation without any discipline on government involvement may not be ideal to maintain healthy and efficient market mechanisms in the future. In the case of international trade, the World Trade Organization bans export subsidy and allows countries to impose countervailing duties on domestically subsidised imports. While these may not be ideal, these at least try to remove distortions that government involvement may cause in the market. In the arena of foreign direct investment, state-owned enterprises in newly developed economies now extend active outward foreign direct investment. Foreign aid by some countries is

sometimes used to directly help private companies to invest. It is also a common practice that governmental financial institutions participate in a consortium with the private sector for a specific infrastructure project. While these do not always distort the market, at least these risk making the playing field uneven.

For a host country, the current situation may not necessarily be bad as far as it can freely select and control investors. However, once free trade agreements or other international treaties would impose the obligation of investment liberalisation and the non-discrimination principle, a host country may realise the necessity of some sort of discipline on possibly subsidised foreign investment.

One possible approach to constructing a new discipline is to go back to the basics of public economics where government policy may be justified only if it cancels out the original distortion due to market failure. Typical market failure occurs because of the existence of (i) scale economies, (ii) imperfect competition, (iii) positive or negative externalities, (iv) public goods, and (v) incomplete information and uncertainty. In economic development, the role of government is potentially large in cancelling out distortion due to the existence of scale economies, positive externalities, public goods, and incomplete information; these market failures are often salient in infrastructure development. However, when the market mechanism works, the government should not intervene.

This argument can apply to both domestic and foreign governments. Foreign aid and government-based financial institutions can also cancel out market distortions in some cases. When a project is economically meaningful but is not financially viable because of positive externalities or difficulty in private risk pooling, the involvement of these players is justified. However, if such a project directly benefited companies of the same nationality in market competition, it should not be allowed.

The issue is related to competition issues between state-owned enterprises and private companies. The status of state-owned enterprises, particularly in the interface with the market, is widely different across countries. However, in a general direction, we may want to strengthen discipline on state-owned enterprises to keep the market competitive and efficient. The negotiation over the Trans-Pacific Partnership seems to include competition issues with state-owned enterprises. We would like to see whether such an agreement could be a starting point to build up an international rule. In the case of foreign

direct investment by state-owned enterprises, as far as competition among private companies exists, in principle, we should impose some discipline to guarantee healthy competition. For example, the information disclosure of investing state-owned enterprises may be enforced to prove that the investment is not directly or indirectly subsidised.

If we have a chance to rewrite international policy discipline on government involvement in the market, we also had better review the justification of concessionality. Concessionality is the extent to which a soft loan reduces the return in terms of the amount or duration, compared with usual commercial loans. There was a loose discipline on concessionality by OECD's Development Assistance Committee (DAC) though new donors are not DAC members and thus do not follow it. Unless the aid is heading for basic human needs in very poor countries or under disastrous circumstances, concessionality should be limited to the extent of the commercially unviable portion of the project.

These are not easy issues to solve but would eventually be big agenda in our region. It is great to have various players coming into globalising economic activities. We may want to establish a fair and efficient market mechanism with disciplined involvement of governments in the future.