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QUALITY INFRASTRUCTURE INVESTMENT: WAYS TO INCREASE THE RATE OF RETURN FOR INFRASTRUCTURE INVESTMENTS

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Abstract

High-quality infrastructure will boost regional economic development and reduce poverty and income inequality. The spill-over effects created by this high-quality infrastructure will be seen in the form of an increase in gross domestic product and tax revenue in the region. These positive effects can be utilized to address the gap between infrastructure demand and financing. Private–public partnerships (PPP) in infrastructure have been advocated for many years. However, PPP partners, such as insurance and pension funds, have been discouraged by the low rate of return from investing in quality infrastructure projects. This is because the main sources of revenue from infrastructure investment are user charges.

This paper aims to provide a new mechanism for government and investors to utilize the spill-over effects of infrastructure projects and share them with infrastructure investors for a better rate of return in order to compensate their risk. This mechanism will motivate stakeholders to design infrastructure with high economic benefits and encourage instruments, such as city infrastructure concepts, hometown investment trusts, land trusts, and the improvement of education and digital literacy, to ensure the infrastructure projects will create positive spill-overs to the region. Hometown investment trust funds can provide financing for start-up businesses along with the new infrastructure investments. Land trusts will solve the issue of owners not wanting to sell their land by giving them the option to keep it and lease the land to infrastructure companies. The landowners can receive long-term rent income, for example for 99 years. In this way, land trusts will smoothen the use of land and transfer the usage rights to infrastructure companies.

JEL Classification: H54, H71, O18

Keywords: infrastructure, public–private partnerships, tax revenue, rate of return, land trusts

Contents

1. INTRODUCTION: QUALITY INFRASTRUCTURE INVESTMENT

Asia's varied demographic conditions and host of economic challenges, including debt-burdens, signal its dire need for infrastructure building. Well-designed infrastructure can cause a boom in development, boosting education and regional economies and creating opportunities and business. Table 1 shows the major infrastructure needs in regions in Asia and the Pacific. More than 8.8% of gross domestic product (GDP) is needed to finance infrastructure-related projects in South Asia.

Table 1: Infrastructure Investment Needs in Asia and the Pacific (2016–2030)

Region	Baseline Total ($ billion)	Share of GDP (%)	Climate Adjusted ($ billion)	Share of GDP (%)
Central Asia	33	6.8	38	7.8
East Asia	919	4.5	1,071	5.2
South Asia	365	7.6	423	8.8
Southeast Asia	184	5.0	210	5.7
The Pacific	2.8	8.2	3.1	9.1
Asia and the Pacific	1,503	5.1	1,744	5.9

Note: Monetary values are in billions of US dollars in 2015 prices (annual average).
Source: ADB (2017).

Policymakers and governments have proposed some solutions that seem simple and straightforward. They include building domestic savings, technology education, and quality infrastructure for encouraging sustainable livelihoods. However, there are certain pressing challenges in the implementation stages, including shallow capital markets, weak governance, and a lack of capacity for technological development. We would like to demonstrate our views on developing the economy with win-win model strategies.

Asia needs a fair number of high-quality infrastructure development projects to move its economy forward. However, in order to create good infrastructure, countries need large amounts of funds. The general budgets collected from taxpayers' money is not enough to satisfy all the needs of infrastructure investments. Multilateral development banks (MDBs), such as the Asian Development Bank (ADB), can provide the basic finance for building infrastructure (in Asia, for instance). However, at the same time, there is a major responsibility for each country to start saving and building such funds to disburse future infrastructure investment and secure domestic capital.

The creation of large domestic savings is important for many developing countries in Asia. To encourage such savings, the rates should be increased, and proper paths should be established for people to put their money into savings accounts. The stability of financial systems is also crucial for boosting savings rates. As such, banks and savings institutions should play a major role in keeping their clients. It is important for countries to have trustworthy banking and financial industries.

Many people in Asia have traditionally shown their interest in investing money in gold rather than investing their money in banks. They do this for various reasons, including a lack of trust in banking institutions and the poor return of investment offered by financial institutions. Therefore, it is important for the government and the banking industry to build customers' confidence. One solution could be deposit guarantees undertaken by the government.

The danger if people invest all their money in gold is that the money circulation within a country drastically decreases. Therefore, building savings in fixed deposits, insurance, and pension funds is very important—this will allow governments and private financial institutions to allocate enough funds for small and medium-sized enterprises (SMEs) and infrastructure investment.

2. ECONOMIC VALUE

On the other hand, how much economic and social value can be created by infrastructure projects? In order to successfully develop infrastructure projects, all local governments, central governments, and infrastructure operating companies must collectively participate to build, develop, and operate infrastructure and related facilities.

Connectivity among regions and rural communities is important for boosting economic value. Therefore, the development of railways, roads, and highways is crucial. Such comprehensive infrastructure projects should have the ability to support communities and provide opportunities to build businesses, including improvement in agriculture and farming. Farmers will be able to transport their harvests conveniently and access markets outside their regions easier when supported by these infrastructure facilities. In other words, market accessibility and trade networks can be expanded vastly if there are quality infrastructures that thrive within a country. Furthermore, the connectivity will also lower production costs and shorten the distances between buyers and producers, eradicating the "middle man" concept. This allows room for farmers and other villagers to start SMEs, building entrepreneurship capacity for farmers.

Based on the challenges above, this paper addresses the importance of creating high-quality infrastructure investment wherein quality is measured by economic and social value created by infrastructure projects in the region, and, at the same time, the solutions to these issues are also relevant in addressing the financing gaps in infrastructure investments.

In this paper, the increase in economic value as a result of infrastructure development is called the "spill-over effect." This "spill-over effect" can be described by the increase in regional GDP (Y), which is affected by the change in regional development created by its infrastructure investment (Kg). The increase in regional development (Kg) will drive new business opportunities (Kp) and create new employment (L).

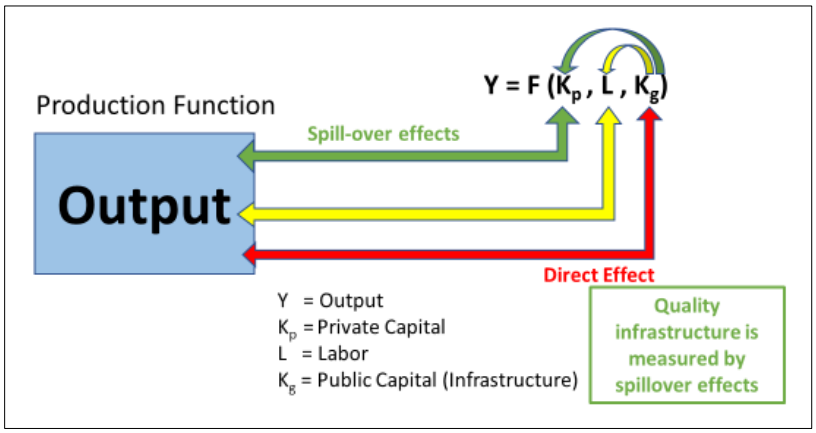
This concept is explained in the equation below:

$$\frac{dY}{dK_G} = \eta K_G \frac{Y}{K_G} + \eta K_P \frac{\eta K_G \eta K_P + \beta K_G}{\eta K_P (1 - \eta K_P) + \beta K_L} \frac{Y}{K_G} + \eta L \frac{\eta K_G \eta L - \beta K_G}{\eta L (1 - \eta L) + \beta K_L} \frac{Y}{K_G}$$

To clarify the equation, there are two effects of infrastructure development: direct and indirect. The direct effect implies private firms can increase outputs without changing inputs, while the indirect effect occurs when a private firm wants to further increase output by changing the amount of inputs in order to maximize profits. This indirect effect reflects

the benefits of infrastructure investment for the economic activities of private firms. This consequently increases capital inputs and employment resulting from the infrastructure investment. The indirect effect is assumed to be equal to the "spill-over effect," as explained by the production function Y = F (Kp, L, Kg) and Figure 1. below:

Figure 1: Direct Effect and Spill-over Effects



As new businesses start production, hotels and restaurants will open near stations and roads. Those new businesses will create new employment. Furthermore, property prices will also rise, which will increase property tax revenues. New business activities will also increase corporate tax revenues. New employment will increase, and income tax revenues and sales tax revenues will also start to rise (near locations of the infrastructure investment). The increase in tax revenue is described in the equation below:

$$\Delta T_{it} = \alpha_i + \emptyset_t + \beta X_{it} + \delta D_{gt} + \varepsilon_{it}$$

ΔT is the increase in tax revenue in the region impacted by the infrastructure projects; α_i is the sum of autonomous affect; (α) is the time-invariant unobserved region-specific effect; $\emptyset_t$ is the year-specific growth effect; *X* denotes the time-varying covariates (vector of observed variables); *D* is the binary variable indicating whether the observation is related to the affected group after the provision of the project; and ε_{it} is the error term assumed to be independent over time.

In a conventional tax system, the increase in tax revenue as a result of the spill-over effect of an infrastructure project is retained by the government. The revenue could be used for the next infrastructure development or other public facilities. There is no direct incentive for infrastructure investors except for the usage charge, which is more often lower than expected. With the challenges that governments face in financing their infrastructure development, a new design for the dividend policy for investors and the salary system of the infrastructure operating entity for both entities and investors is important.

With our concept, we propose to share the spill-overs from infrastructure development with infrastructure stakeholders, including investors and landowners. In line with the progress of economic development, regional development will lead to higher tax revenues. If part of these increased tax revenues is returned to the investors in

infrastructure, their rate of return will keep on increasing for many years, keeping pace with the development of the region. For example, Manila's highway has shown a significant increase in tax revenues after 4 years of operation (t+4). Tax revenues in Batangas City went up to P1.21 billion compared to the period before the construction of the highway, as seen in Table 2.

Table 2: Calculated Increase in Business Tax Revenues for the Beneficiary Groups Relative to Nonbeneficiary Groups
(P million)

	Years						
	T-2	**T-1**	**T**	**T+1**	**T+2**	**T+3**	**T+4**
Lipa City	134.36	173.50	249.70	184.47	191.81	257.35	371.93
Ibaan	5.84	7.04	7.97	6.80	5.46	10.05	12.94
Batangas City	490.90	622.65	652.83	637.83	599.49	742.28	1,209.61

The relationship between infrastructure projects, new businesses, and employment with tax revenue is described in Figure 2.

Figure 2: Spill-over Effects of Infrastructure Investment

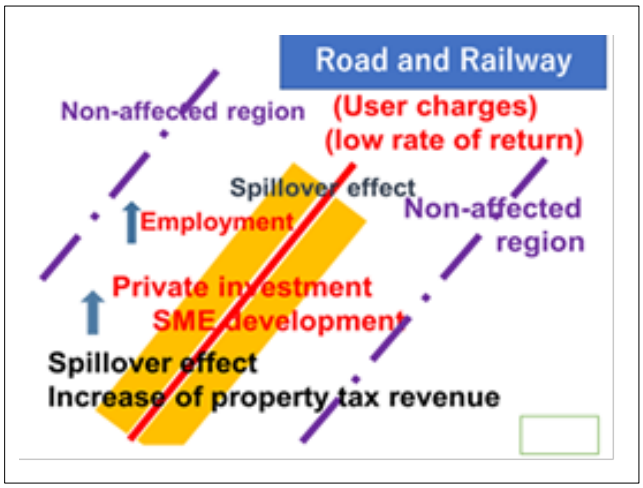
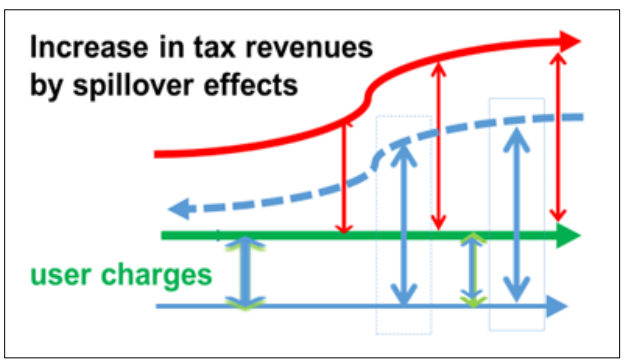


Figure 3: User Charge is Not Enough

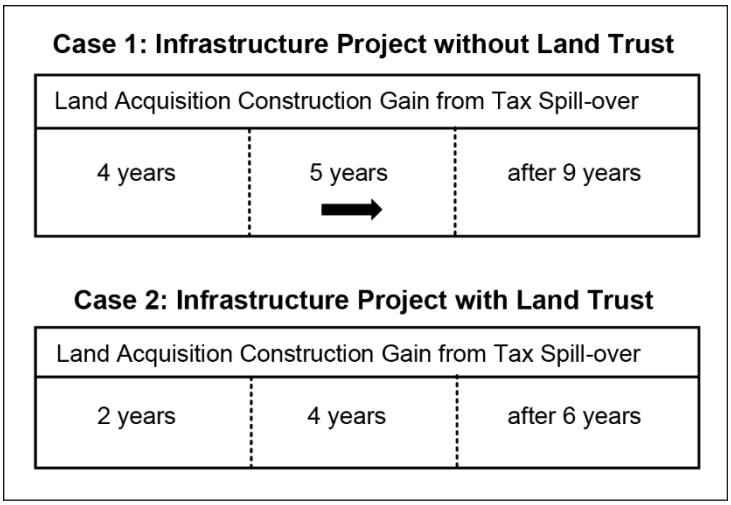


This concept can be expected to address the problem of the low rate of return of the infrastructure investment. With current practices, investors usually receive the return of their investments from the usage charge after the infrastructure commences operation. The usage charge is often lower than expected compared to the risk that investors face during the construction stages. On the other hand, if the return is taken from the spill-over effect of infrastructure, it will keep increasing in line with the economic development of the region (Figure 3). For projects with low economic value, the government involved to cover the risk through viability gap funding can use public-private partnerships (PPP). However, this PPP concept burdens the government budget, which leads to major accumulated debt for local and central governments. With all the weaknesses of the current two concepts, the new concept of the spill-over of infrastructure investment could be a long-term solution. With such attractiveness in terms of the rate of return and the opportunity to receive greater economic value, the willingness to invest from banks, insurance, and pension funds will surge. The injection of private funds will inevitably encourage the transparency and governance structure of infrastructure investments.

Even though the sharing of the spill-over effects of infrastructure investment is expected to boost the investment rate, there are implementation stages that the government needs to consider, such as how to calculate the increase in the economic value of the infrastructure. Yoshino and Abidhadjaev (2017, 2016) use the difference-in-difference approach to quantify the additional value. This approach applies two alternatives as parameters: the growth rate (GDP and the value added of each industry) and tax revenue. The parameter that has an obvious connection in value sharing with infrastructure investors is tax revenue. However, not every country has regional tax collection. Developing countries mostly use a centralized system for collection and allocation regarding spending (proportional to the region). If those countries want to apply this new concept, they need to change their tax collection system. In this case, using the growth rate as a parameter could be an alternative. And the link between the growth rate and tax revenue in the said areas should be determined. Further research is needed to find an accurate method to convert the value from growth to potential tax revenue. In the short term, the proxy for aggregate tax revenue can be applied.

The sharing of the spill-overs of infrastructure investment with infrastructure investors could be applied to landowners as well. The concept could be a solution for the challenges in land acquisition for infrastructure projects, such as toll roads and railways. The acquisition of land for development projects has been a major barrier in many Asian countries. Landowners are reluctant to give up their land for development projects. By applying this concept and letting them benefit from the increased economic value (from the project development) of their land in the form of rent, the landowners will have a sustainable income over several years. This strategy could encourage people to give their usage rights to infrastructure companies and city planning and shorten the completion time of infrastructure projects (Figure 4). Furthermore, the acquisition costs of land be will significantly reduced, which will thereby reduce the one-time costs for infrastructure developers. They can pay only for the moving costs of landowners and return an annual rent for 99 years to landowners. Spill-over tax revenues will keep on coming from the infrastructure projects, which will finance the rental payments to landowners.

Figure 4: Land Trusts Shorten the Completion Time of Infrastructure Projects



The opportunities above leave landowners with much to gain. However, there are certain challenges that can deter land leasing for quality infrastructure development. For instance, in government-initiated projects, land acquisition faces multiple hindrances due to the absence of overall transparency and in compensation allocation. The absence of a strong legal framework for grievance redressal has created a sense of insecurity among landowners. The lack of a strong database that aids in title recognition and identifying rightful ownership has led to wealth accumulation within the more powerful landowner groups. This has directly impacted the compensation rates offered, leading to an imbalance, which is a core reason for many a land protest. An overall institutional framework with an egalitarian approach is required to ensure a more judicious process. Land Trust Bank is one proposed institution that prioritizes the rights of landowners and facilitates an inclusive process.

Furthermore, in developing infrastructure, we cannot investigate infrastructure projects in isolation. There are many areas that require careful design in order to make quality infrastructure projects. Most regions in Asia struggle with digital connectivity, which hampers the process of information dissemination to a large population in a short period of time. Encouraging quality infrastructure investments for addressing this problem will lead to greater access to skills-based education through digital mediums, thus positively impacting the livelihoods of many.

3. IMPLEMENTATIONS AND RECOMMENDATIONS

In order to successfully impact livelihoods, it is imperative that reforms be well implemented. Creating an institutional framework with poor implementation may lead to more problems than solutions. The next section proposes recommendations to facilitate better implementation.

3.1 City Infrastructure

When developing infrastructure, many countries, policymakers, builders, and contractors overlook the city planning aspects. City planning is imperative for the construction of sustainable infrastructure and can ensure a positive spill-over effect from infrastructure investments. Traditionally, infrastructure has been considered only from the construction perspective. However, it goes much further beyond simple

construction. It is pertinent to address the capability of the proposed infrastructure to develop the region, cascading the benefits to multiple communities. Such projects should allocate areas or zones for markets, shops, residences, and manufacturing industries. This kind of zoning will help create a good city.

3.2 Hometown Trust Funds to Promote SMEs and Start-up Businesses

The authorities should think beyond "building infrastructure." Encouraging businesses to grow in the regions impacted by infrastructure is also important. Even if infrastructure is available, most SMEs find it difficult to receive financial support for their start-ups. Banks and financial institutions are often reluctant to lend money to start-ups, due to the inherent high risks. This is where "hometown investment trust funds can play an integral role. Furthermore, hometown trust funds can also improve inclusiveness in regions, and due to the nature of SMEs and start-ups, female participation in labour markets can be encouraged by providing hometown funds.

Two decades ago, Japan was able to create such funds, which is the reason why Japan was able to create a generation of new entrepreneurs. These funds had two primary objectives: (i) to provide finance for start-ups, especially for women who wanted to start their own businesses, such as restaurants and shops; and (ii) to start internet-based selling portals where villagers could sell their products to markets outside their villages. Through internet marketing they could capture a large clientele around the country and, thanks to the well-built infrastructure, goods and produce could be dispatched without much delay.

Hence, home funds can help SMEs to start their businesses around highways, railways, and other large-scale infrastructure projects while also helping to move their products conveniently through modern infrastructure. Hometown trust funds are registered and supervised by the Japan Financial Services Agency (JFSA) in order to screen illegal funds and strengthen the governance and integrity of the funds.

3.3 Enabling Digital Literacy for Better Education

The level of education among infrastructure stakeholders also determines how large the economic value of the spill-over effects (of a project) can get. The said stakeholders include investors, governments, landowners, farmers, and businesspeople (both from SMEs and start-ups). Yoshino and Abidhadjaev (2016) show that secondary school education and university education together will lead to a higher GDP in the region with infrastructure investment estimated using data of 40 different countries.

A modern education system can be introduced using mobile phones and the internet. Technological progress and innovation are very important in the education system, especially in STEM education. Traditionally, in order to receive quality education, students in Asia had to attend exclusive private schools with competitive admissions processes. With the expansion and advancement of technology, it is becoming convenient for young students and those keen to study further to listen to compelling lectures and learn from the foremost professors and academicians through the internet and smartphones, regardless of their geographical location. It is important for the government to provide facilities with quality technology and encourage students and school leavers to make use of these facilities for personal growth.

The relation of education and technology to the region's economic growth can be expressed in the production function as: $Y = A\ F\ (K_p, L, K_g)$ where Y = regional GDP, A = technological progress, K_p = private capital, L= labor, and K_g = infrastructure. If technological progress (A) advances, the regional output created by the infrastructure investment will also rise further. Human capital development (L) will enhance the regional output induced by the spill-over effects.

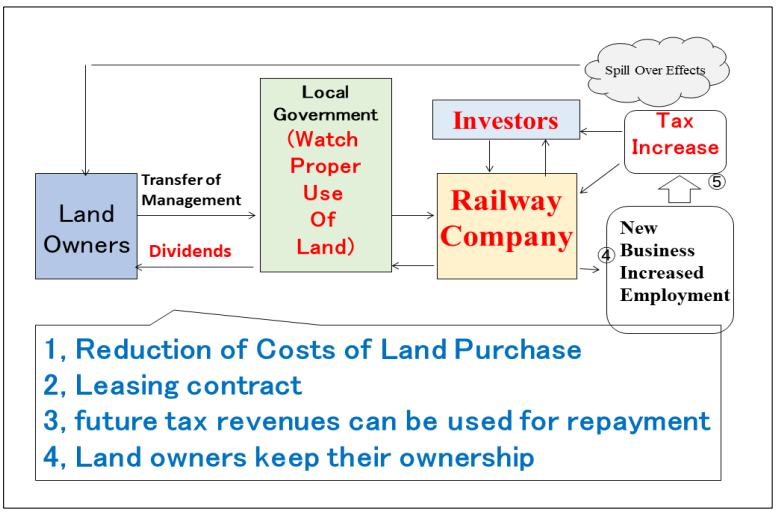
Therefore, this paper suggests Asian countries include digital education for all levels from secondary to university. Professors and lecturers can conduct digital lectures that can be broadcast all over the country. This technique will be beneficial for students and people across various regions and villages. People can learn basic technical skills, languages, and gain knowledge to pursue industrial and vocational training.

3.4 Land Acquisition by Creating Land Trusts

Land trusts can act as an intermediary between landowners and governments for managing the spill-over effects of infrastructure. Japan's Land Trust was created many years ago, and, accordingly, the owners can keep ownership of their land. Furthermore, they can lease the land through a long-term contract, for instance for a period of 99 years. By doing so, owners can earn a reasonable income over many years.

Under the land trust concept (Figure 5), landowners entrust their land to trust banks, and the trust banks manage the land. For instance, in the case of agricultural land, the trust bank aids a young farmer who wishes to farm on a large consolidated land in order to enhance his/her economies of scale. The landowners will receive part of the profit as dividends. The consolidation of land leads to higher profits for landowners. The proposed framework allows for the usage rights allowing owners to maintain their ownership rights while increasing their profit by leasing land for infrastructure and development projects.

Figure 5: Land Trusts for Infrastructure Investment



The stages of this method are: (i) to consolidate the assets owned by individuals, (ii) to entrust the assets to the trust banks, and (iii) to make better use of the assets. This concept has a similar function to a trust fund. Pooling the funds and then investing them in more effective operations is similar to consolidating the assets owned by individuals who are not able to maximize the utility of their assets themselves or do not have the

know-how. Entrusting them to the trust bank can increase the utility of the assets.

4. CONCLUSION

The development of infrastructure is a prerequisite for long-term, sustainable economic growth (Yoshino et al. 2018). However, there are challenges to increasing infrastructure financing, acquiring land, securing rehabilitation, and deriving socioeconomic value from the infrastructure itself. This paper has attempted to highlight the benefits of investing in sustainable quality infrastructure for improving regional development. The economic and social value is expected to bring dividends but will also fail in the absence of a strong institutional framework to support it.

Economic value is derived not only from the number of quality infrastructure projects completed but also from the positive impact on people's livelihoods. This is shown in the "spill-over effect" of quality infrastructure investments. This spill-over effect can be described by the increases in regional GDP and tax revenue, which are affected by the change of regional development created by infrastructure investment. The increase in regional development is expected to drive new business opportunities and create new employment opportunities. In the traditional tax system, the government retains the increased tax revenue from infrastructure spill-overs. However, this paper proposes the sharing of the spill-over with infrastructure stakeholders, including investors and landowners. For instance, it suggests that if certain portions of the revenue were to be returned to investors, they would be incentivized to further invest due to their increased rate of return.

Similarly, with landowners retaining ownership, a recurring income in the form of rent will allow the landowners to improve their livelihoods through other businesses. The spill-overs will also create opportunities for employment. For instance, a large-scale highway project may bring in business opportunities for restaurants, small businesses, and repair shops, etc.

The social value of quality infrastructure primarily addresses the question of livelihoods of landowners. For instance, land trusts compliment quality infrastructure by enabling positive negotiations between landowners and investors, encouraging better livelihood measures from investors while providing them with an efficient land leasing model.

Seeking better policy measures in improving digital connectivity aims to facilitate not just higher spill-over effects but also the provision of competitive, skills-based training for those seeking supplementary employment opportunities. Education can no longer be restricted to traditional classrooms; investments in digital-focused infrastructure will help strengthen a more mobile education service. It is recommended to pursue better city infrastructure planning, the encouragement of small and medium-sized businesses through hometown trust funds to promote SMEs and start-ups, and interests including digital literacy and digital connectivity to facilitate the strengthening of the socioeconomic value of quality infrastructure investment.

In conclusion, the acquisition, administration, and allotment of land for the purposes of development are intimately tied with the issues of rights, local aspirations, power structures, and economic factors. A process involving the consideration of these multiple factors will enable a region to gain infrastructure development without compromising on the livelihoods and capacity of its people.

REFERENCES

Asian Development Bank (ADB). 2017. Meeting Asia's Infrastructure Needs. Manila: ADB. http://dx.doi.org/10.22617/FLS168388-2.

Yoshino, N., and U. Abidhadjaev. 2016b. Explicit and Implicit Analysis of Infrastructure Investment: Theoretical Framework and Empirical Evidence. *American Journal of Economics* 6(4).

———. 2017. An Impact Evaluation of Investment in Infrastructure: The Case of a Railway Connection in Uzbekistan. *Journal of Asian Economics*, *49*, 1–11.

Yoshino, N., S. Paul, V. Sarma, and S. Lakhia. 2018. *Land Acquisition and Infrastructure Development through Land Trust Laws: A Policy Framework for Asia*. ADBI Working Paper No. 845. Tokyo: ADBI.