ABSTRACT: According to PPI World Bank Database that infrastructure investment in East Asia (China, Indonesia, Philippine, Malaysia, and Thailand) from 1998 to 2005 was stagnant, where infrastructure investment in Indonesia slowed down after financial crises, total investment in 1996 was 7,492.6 million US dollar but in 2000 fell down to 642.3 million US dollar and in 2005 raised on 1,445 million US dollar.

To create a more efficient and encourage the growth of infrastructure investment market, infrastructure financing needs a financial innovation. The potential of innovation in infrastructure financing which will be researched is a new financial product. What will be a new financial product in infrastructure financing? Therefore, the board aim of this study is to analyze the potential for, and the impact of, innovation in the financing, funding and procurement of infrastructure and to spread knowledge of innovation techniques to relevant parties with interests in Indonesia. The specific objectives arising from that aim were to: critically review existing models of finance, funding and appraisal in the infrastructure in the light of changing business requirements; survey recent innovative financial products, vehicles and funding techniques in infrastructure investment markets; examine case studies of innovative finance and procurement methods to illustrate the potential (and pitfalls) of the new techniques; draw lessons from developments in United State of America, China, Malaysia, and Thailand markets; consider likely future trends in the infrastructure market and assess the interaction between innovation and public policy.

A Vector Auto-regressive (VAR) or econometric method will be employed to estimate effect of infrastructure investment on the economy.

KEYWORDS: infrastructure financing, financial innovation, Vector Auto-regressive (VAR)

1. INTRODUCTION

The impact of Asian financial crisis ten years ago, having become a global financial crisis, causing the crash of Russia’s ruble and Brazil’s real, still effects then and today. Where, capital flows to developing countries stagnant, Stiglitz (2007). This opinion, supported by the World Bank (2007a) that the growth in Emerging East Asia reach 8.1 percent in 2006, which was, fittingly, the strongest pace in the ten years have elapsed since the start of Asian financial crisis in 1997. However, this impact not only effect financial sector but also infrastructure investment.

For financial sector, based on the World Bank, mentioned that the capital adequacy ratio in Indonesia rose to over 20 percent with net interest margins remaining close to 6 percent. Where, the return on equity (ROE) fell to a little over 17 percent from 18 percent in 2005, reflecting charges to cover an increase in non-performing loans in the earlier part of the year (due in part to a change in rules for loan classification). However, the non-Performing Loan (NPL) ratio fell sharply in late 2006 due to a pick up in intermediation and total loans outstanding, as well as a regulatory change by which state owned banks could write down NPLs according to the same procedures as private banks.

Furthermore, for infrastructure investment, the PPI Database of World Bank, mentioned that infrastructure investment in East Asia (China, Indonesia, Philippine, Malaysia, and Thailand) from 1998 to 2005 was stagnant, where infrastructure investment in Indonesia slowed down after financial crises, total investment in 1996 was 7,492.6 million US dollar but in 2000 fell down to 642.3 million US dollar and in 2005 raised on 1,445 million US dollar.

In addition, there are many factors why the stagnancy of financial and infrastructure investment occurs; one of them is the quality of investment climate, playing an important role to grow economics. The latest survey in mid-2006 conducted by University of Indonesia, reported by the World Bank (2007b), showed that business perceptions of the investment climate improved between 2003 and end-
2005, but there was little perceived improvement between end-2005 and mid-2006. Other findings are as follows:

- **The ranking of perceived obstacles remained similar:** Macroeconomic instability, economic policy uncertainty, and corruption remained the biggest obstacles.
- **Perceptions of infrastructure deteriorated:** Perceptions of electricity and transformation worsened, most likely in response to the doubling of fuel prices in October 2005.
- **Taxes and labor are viewed as greater problems:** Perceptions of labor issues (labor skills and education, and national labor regulations) and tax issues (tax administration and tax rate) deteriorated. These are core parts in the investment climate package. The delay in passing the three draft tax law by parliament and the failure of the government to submit changes to the labor law to parliament may have contributed to deteriorating perceptions.

How important are investment climate variables for the operations of firms? To take just one example, econometric analysis shows that adverse investment climate variables in Indonesia have had a large and significant negative impact on firm level total factor productivity (TFP) and investment (measured here as the probability of undertaking a new investment). Total factor productivity is adversely affected by a wide range of investment climate conditions such as regulatory burden, policy uncertainty, poor financial market development, excessive labor disputes, and poor infrastructure, the World Bank (2007a).

Otherwise, the Government of Indonesia has conducted the infrastructure policy package. It covers four general areas: (i) strategic policy framework; (ii) sector policy frameworks; (iii) local government related policy; and (iv) implementation of infrastructure projects. According to the government, as of end- 2006, 92 out of 114 policy actions have been completed. Where in 2006, government disbursed Rp2 trillion for an infrastructure fund with an additional Rp2 trillion is earmarked in the 2007 budget. However, the specific allocation of the fund has not yet been specified, i.e., for guarantees, land acquisition, infrastructure financing facility. In the meantime, the Rp2 trillion from the 2006 state budget has been put in an escrow account.

Moreover, also based on the World Bank (2007b), the financial sector policy package covers five areas: (i) financial system stability; (ii) banking institutions; (iii) non-bank financial institution; (iv) capital market; and (v) privatization and export financing. According to the government, until November 2006, the government completed 35 of the 40 targeted policy actions.

On the account of the fact that if fundamental economic change and uncertainties continue to be of similar magnitude as in the past, Merton (1995), e.g., drastic economic, social, and political change; creating a long-term macroeconomic imbalance and rising oil prices, and also inflation has been fluctuating the 5% mark. The revolution in the financial and monetary sectors would be used in the implementation of major financial liberalization policies. However, financial innovations are non neutral with regard to their effects on the liquidity and productivity of different assets, Binner, Gazely, Chen and Chie (2004), furthermore Block (2002) studied that complementary between financial infrastructures and complex organizational innovation process best described at the sectoral level of the economy can help to explain observable differences in national industrial structures.

In order to identify empirical patterns in the relationship between infrastructure financing and financial innovation, I apply the experience of Department of Transportation (DOT), U.S.A. to implement financial innovation which can accelerate projects and expand infrastructure investment. Specifically, this study considers the role of financial innovation for infrastructure investment, e.g., what, why and what motivates financial innovation, based on Frame and White (2004); and lessons the benefit of innovative finance tools based on DOT experienced; and also how the impact of financial innovation in economic growth.

### 2. INNOVATION IN INFRASTRUCTURE PROJECT

There are four classes that enhance the innovation achieved on an infrastructure project. These classes are defined briefly as follows Russell, Tawiah, and Zoysa (2006):
Product innovations – The construction industry is essentially an adopter of innovative products, rather than being a mainstream producer of them (Anderson and Schaan 2001). It therefore regards the use of advanced products (e.g., equipment, tools), novel product assemblies (designs), and new materials as product innovation. Different ways of delivering services in the operation and maintenance phase of a project may also be considered product innovations.

Process innovations – (Anderson and Schaan 2001) identified three types of process innovation that can occur during the construction phase of an infrastructure project. They are logistical technologies, site preparation, and assembling technologies (see also Miller et al. 2001) for an extensive bibliography on construction innovation. Process innovation also includes practices that utilize emerging technologies such as information technology tools (e.g., three- and four-dimensional computer-aided design systems) in project design and management processes. Innovation can also occur during the operational phase of a project; for example, new ultraviolet disinfection technology is being used on DBO water treatment plant in Seattle (Haskins et al. 2002).

Organizational-contractual innovations– New or significantly improved organizational practices (e.g., computerized inventory control) (Anderson and Schaan 2001) and partnering can be considered organizational innovations. In terms of contractual relationships, the negotiation of the assignment of risks, instead of the unilateral imposition of risks, could also result in contractual innovations, as could the development of contractual terms dealing with performance-based revenue or payment mechanisms.

Financial-revenue innovations – Novel financing arrangement that lead to off-book financing, the minimization in the increment of cost for private-sector financing (as opposed to public-sector financing), desirable patterns of cost and revenue, and the identification of creative revenue streams are all examples of financial-revenue innovations.

2.1. What Is Financial Innovation?

“The primary function of the financial system is to facilitate the allocation and deployment of economic resources, both spatially and across time, in an uncertain environment” (Merton 1992, p. 12). This function, in turn, encompasses a payments system with a medium of exchange; the transfer of resources from savers to borrowers/investors/users of the resources (and the eventual repayment to the savers); the gathering of savings for the purpose of pure time transformation (i.e., deferral/smoothing of intertemporal consumption); and the reduction of risk through insurance and diversification.

The operation of financial system involves real resources costs such as labor, materials, and capital employed by financial intermediaries (e.g., banks, insurance companies, etc.) and by financial facilitators (e.g., stock brokers, market makers, financial advisors, etc.). Much of these resources are expended in the data gathering and analyses in which financial market participants engage so as to deal with problems of asymmetric information. Further, since multiple time periods are an inherent characteristic of finance, there are also uncertainties about future states of the world that generate risks. For risk-averse individuals, these risks represent costs. The possibility of new financial products/services/instruments that can better satisfy financial system participants’ demands is always present. Viewed in this context, a financial innovation represents something new that reduces costs, reduces risks, or provides an improved product/service/instrument that better satisfies participants’ demands.

Financial innovation can be grouped as new products (e.g., adjustable-rate mortgages, exchange-traded index funds); new services (e.g., online securities trading, internet banking); new “production” processes (e.g., electronic record-keeping for securities, credit scoring); or new organizational forms (e.g., a new type of electronic exchange for trading securities, internet-only banks). Of course, if a new intermediate product or service is created and used by financial-services firms, it may then become part of a new financial production process.

Much of the research attention to innovation focuses on the new idea. But at least as important is the adoption and spread of an innovation – its diffusion – across an industry. Indeed, faster diffusion means a higher societal return on the underlying investments in the innovation.
2.2. Why Is Financial Innovation Important?

Innovation is clearly an important phenomenon in any sector of a modern economy. Although standard microeconomic theory (rightly) focuses much of its attention on the issues of static resource allocation and economic efficiency, there is nevertheless general appreciation that performance over time is driven by a variety of dynamic factors, including innovation. The centrality of finance in an economy and its importance for economic growth (e.g., Ross Levine, 1997) naturally raises the importance of financial innovation. Since finance is a facilitator of virtually all production activity and much consumption activity, improvements in the financial sector will have direct positive ramifications throughout an economy. Further, since better finance can encourage more saving and investment and can also encourage better (more productive) investment decisions, these indirect positive effects from financial innovation add further to its value for an economy.

2.3. What Motivates Innovation in General and Financial Innovation in Particular?

Profit-seeking enterprises and individuals are constantly seeking new and improved products, processes, and organizational structures that will reduce their cost of production, better satisfy customer demands, and yield greater profits. Sometimes this search occurs through formal research and development programs; sometimes it occurs through more informal “tinkering” or trial-and-error efforts. When successful, the result is an innovation.

If the search-and-success were a relatively constant phenomenon, innovations would tend to appear in a roughly continuous stream. However, since the observed streams of innovations do not appear to be uniform across all enterprises, across all industries. Across all industries, or across all time periods, the general innovation literature (see Cohen and Levin 1989; Cohen 1995) has sought to uncover the environmental conditions that may encourage greater (or lesser) search efforts and a larger (or smaller) stream of innovations. That literature has focused on hypotheses concerning roughly five structural conditions: (1) the market power of enterprises; (2) the size of enterprises; (3) technological opportunity; (4) appropriability; (5) product market demand conditions.

3. FINANCIAL INNOVATION FOR INFRASTRUCTURE FINANCING

As Fahrholz (2001) said that the infrastructure financing needs of developing countries alone were going to run into the trillions of dollars over the next few decades and public institutions alone simply would not be able to pick up the tab. In the meantime, infrastructure has to be upgraded constantly to ensure sustainable, long-term economic growth. To compete, they must build a competitive infrastructure in a matter of years. All of this takes money. Yet, financing infrastructure investments has always proved to be a challenge. The world financial system over the past fifty years reflected a clever solution to this difficult problem. It appeared in the form of quasi-public agencies that were charged with becoming the banks for infrastructure investment in developing countries. More recently, however, limitations in this system have become apparent. Whatever the reason for these limitations, the fact of the matter is that the amount of infrastructure financing these international financial institutions can provide is far below current needs, and unlikely to catch up very soon. Developing countries simply cannot rely upon these institutions alone to help pay for necessary investments in roads and telephone networks.

According to Federal Highway Administration (FHWA), Department of Transportation (2002), definition of "innovative finance" for transportation is a broadly defined term that encompasses a combination of specially designed techniques that supplement traditional highway financing methods. While many of these techniques may not be new to other sectors, their application to transportation is innovative. Whereas, this “innovative finance” initiative was as attempt to meet the increasing gap between transportation capital needs and available resources, without direct increases in Federal grant funding. The initiative also responded to states’ calls for greater flexibility in the use of their Federal-aid funds.

However, FHWA initiated its innovative finance initiative, seeking to:
- Accelerate projects by reducing inefficient and unnecessary constraints on states’ management of Federal highway funds; and
- Expand investment by: 1) removing barriers to private investment in surface transportation infrastructure, 2) encouraging the introduction of new revenue streams, particularly for the purposes of retiring debt obligations, and 3) reducing financing and related costs, thus freeing up the savings for investment into the transportation system itself.

Furthermore, we can align these goals to the new tools that have been developed as showed on Table 1.1.

**Table 1.1 Innovative Finance Goals**

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<th>Goal</th>
<th>Approach</th>
<th>Tools</th>
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| **Accelerated Projects** | Identify and reduce inefficiencies/unnecessary barriers in Federal-aid grants management. | ▪ Advance Construction  
▪ Partial Conversion of Advance Construction  
▪ Tapering  
▪ Toll Credits  
▪ Flexible Match |
| | Create and conduct outreach on new models for borrowing to leverage new and existing revenue streams. | ▪ Grant Anticipation Revenue Vehicles  
▪ State Infrastructure Banks (SIBs)  
▪ Transportation Infrastructure Finance and Innovation Act (TIFIA)  
▪ Federal Credit Program |
| **Expand Investment** | Reduce barriers to attracting private contributions to Federal aid projects, including investment of at risk equity. | ▪ Flexible Match  
▪ TIFIA |
| | Encourage identification of new revenue streams, in part by creating new borrowing options that facilitate the use of project based revenues to retire debt obligations. | ▪ TIFIA  
▪ Section 129 Loans  
▪ SIBs |
| | Lower cost or more flexible borrowing options. | ▪ Section 129 Loans  
▪ SIBs  
▪ TIFIA |

4. **ECONOMIC EFFECTS ON INNOVATION FINANCIAL**

As Hao and Hunter (1997) studied that the role played by financial innovation and development on the rate of economic growth in a cross-section of countries. In particular, they attempted to focus on second stage financial innovations such as the exigency of trading in financial futures, the openness of a country’s financial markets and banking system to foreign investors, and the extent to which the equity markets are open, liquid, and deep. Indicator variables were created to capture a country’s financial innovations as well as banking system structure. From their cross-country growth regressions, their findings suggest that financial development, as exemplified, for example by the presence of a well functioning financial futures market(s), is positively linked to the growth rate of GDP. On the other hand, other financial variables under study (such as the presence of a commodities futures market) appeared not to sufficient to capture the level of sophistication required to pick-up their full growth benefits. This conclusion is based on the fact that the presence of a financial futures market was found to be a significant determinant of economic growth. Since the existence of a well functioning financial futures market is predicated on the existence of a well functioning underlying market, it is likely the case that the failure of some of our simple proxies for financial market innovation is due to the lack of more sophisticated measures of financial innovation. The positive
results found for financial futures trading are encouraging and strongly suggests that further work in this area would be well justified.

Practically, according to Federal Highway Administration (FHWA), Department of Transportation (2002) that estimation of the economic effects related to transportation projects funded with the support of innovative finance tools is based on total project costs, regardless of the source of funding (Federal, state, local, private, etc.) or the amount of leverage provided by those tools. Project costs are used as the basis for representing the economic impacts of construction spending for all dollars accounted for in the project inventory. It should be recognized that these impacts do not take into account the opportunity cost of the spending. In other words, most of the direct spending for these projects would have been spent elsewhere in the economy if not for the innovative financing tools. This analysis thus captures the economic contribution of total innovative finance project costs and the related economic activity on the aggregate United States economy. In addition, this analysis provides a breakdown of the economic effects associated with the four primary categories of innovative finance projects: TE-045, SIBs, GARVEEs, and Federal credit projects.

To estimate these economic effects, project costs were first separated by highway, rail/transit, and water ferry spending based on the transportation improvement type; this separation by mode is needed to identify the most appropriate multipliers for the specific type of project. Most of the spending is clearly for highway oriented projects, but some spending is for transit, and a few projects involve intermodal centers or water ferries. For intermodal centers, construction spending was split into highway and rail/transit. Again, this is an important step because economic impacts vary depending on the type of project (highway, rail, ferry, etc.) due to industry differences in purchasing patterns and wages.

The next step was to take the direct spending impacts by innovative finance category and run the spending impacts through the IMPLAN economic model. IMPLAN is a widely used input output model used for analyzing the multiplier effects of economic events. The multiplier effects are composed of two primary impacts: indirect and induced effects. Indirect effects are generated as the result of direct spending on construction, which requires supplier inputs such as cement, wood, engineering services, etc. Induced effects refer to the responding of income created by direct and indirect job creation.

Economic impact results from the analysis are presented. Key findings include:

- Total innovative finance project costs are over $29 billion. Total direct spending for Federal credit projects is projected to be $17.8 billion, largest of the four categories. Direct spending for TE-045 is $4.85 billion, $3.3 billion for GARVEEs, and $4.1 billion for SIB projects. The economic impacts by innovative finance category are roughly proportional to the direct project cost distribution.

- The impacts presented the entire life of projects and are not annual impacts. For example, spending on TE-045 projects may occur over the next 10 years. Consequently, employment impacts are interpreted as job-years. A job-year translates into one job for one year. TE-045 projects generate a total of 133,700 job-years. If it is assumed that TE-045 projects will result in construction spending over the next 10 years, then the average annual impact will be 13,400 jobs.

- The output multiplier for highway construction spending is over 3.0, which means that every dollar spent on highway construction generates an additional two dollars of economic activity. Total output impacts as contributions to the United States economy are estimated to be roughly $90 billion. More than half of this is generated by Federal credit projects and the remainder is split somewhat evenly by the other categories of innovative finance tools.

5. CONCLUSION

In conclusion, there are two reasons why infrastructure financing in Indonesia needs financial innovation. Firstly, the investment climate improved between 2003 and end-2005 condition in Indonesia is unstable, i.e., macroeconomic instability, economic policy uncertainty, and corruption remained the biggest obstacles. Perceptions of electricity and transformation worsened, most likely in
response to the doubling of fuel prices in October 2005. Perceptions of labor issues (labor skills and education, and national labor regulations) and tax issues (tax administration and tax rate) deteriorated.

Second, the Government of Indonesia has conducted the infrastructure policy and financial sector package, but according to the government, as of end-2006, 92 out of 114 policy actions have been completed; and in financial sector, until November 2006, the government completed 35 of the 40 targeted policy actions.

Otherwise, the benefits of innovative finance initiative are: accelerate projects by reducing inefficient and unnecessary constraints on states’ management of Federal highway funds; and expand investment by: 1) removing barriers to private investment in surface transportation infrastructure, 2) encouraging the introduction of new revenue streams, particularly for the purposes of retiring debt obligations, and 3) reducing financing and related costs, thus freeing up the savings for investment into the transportation system itself.

So, the economic impacts by innovative finance category are roughly proportional to the direct project cost distribution, the entire life of projects and are not annual impacts and the output multiplier for highway construction spending is over 3.0, which means that every dollar spent on highway construction generates an additional two dollars of economic activity, using innovative finance tools e.g., TE-045, SIBs, GARVEEs and Federal credit projects.

For further discussion, the implementation of innovative finance tools in infrastructure financing in Indonesia has to be deeply researched whether these tools can be used in Indonesia’s condition.

6. REFERENCES


Advance Construction (AC): States or local governments independently raise up-front capital required for a Federally approved project and preserve eligibility for future Federal-aid reimbursement for that project. At a later date, the state can obligate Federal-aid highway funds for reimbursement of the Federal share. This tool allows states to take advantage of access to a variety of capital sources, including its own funds, local funds, anticipation notes, revenue bonds, bank loans, etc., to speed project completion.

Flexible Match: Any non-Federal match that is allowed under FHWA laws and regulations other than state and local cash contributions to a project. Flexible matches permitted under new regulations include use of private cash and in-kind contributions, publicly owned right-of-way, and funds from other Federal agencies.

Grant Anticipation Revenue Vehicle (GARVEE): A GARVEE is any bond or other form of debt repayable, either exclusively or primarily, with future Federal-aid highway funds under Section 122 of Title 23 of the United States Code. Although the source of payment is Federal-aid funds, GARVEEs cannot be backed by a Federal guarantee, but are issued at the sole discretion of, and on the security of, the state issuing entity.

Partial Conversion of Advance Construction (PCAC): Process allowing states to begin a project with their own source of funding, and then incrementally obligate Federal funds.

Right-of-Way Acquisition: Federal authorization is required prior to contacting property owners in the right-of-way acquisition process and, under traditional funding, Federal funds are obligated with authorization. Using partial conversion of advance construction, California is able to contact property owners early on in the project while preventing authorized funds from being tied up while in negotiation with property owners. As some complicated right-of-way acquisitions can take two to three years, without this technique, authorized funds could be tied up for long periods of time.

State Infrastructure Bank (SIB): A state or multi-state revolving fund that provides loans, credit enhancement, and other forms of financial assistance to surface transportation projects.

Section 129: Loan Section 129 of Title 23 of U.S. Code permits states to use Federal aid funds to make loans to any Federally eligible project. The loans must be repaid with a dedicated, non-Federal source.

TE-045 Innovative Finance Initiative: A research program begun by FHWA in 1994 in response to Executive Order 12893. This finance initiative is designed to increase investment, accelerate projects, promote the use of existing innovative finance provisions, and establish the basis for future initiatives by waiving selected Federal policies and procedures, thus allowing specific transportation projects to be advanced through the use of non-traditional finance mechanisms.

Transportation Infrastructure Finance and Innovation Act (TIFIA): A new Federal transportation credit program authorized as part of TEA-21 that provides direct Federal loans, lines of credit, and loan guarantees provided through U.S.DOT to large projects of national significance, under criteria developed by Congress.

Tapered Match: Permitting the Federal/non-Federal share of payments to vary over the life of a project, as long as the appropriate matching ratio is achieved by the end of the project.

Toll Credits: Section 1044 of the Intermodal Surface Transportation Efficiency Act permitted states to apply the value of certain highway expenditures funded with toll revenues toward the required state match on current Federal-aid projects. States may only substitute toll credits for state match if they demonstrate a "maintenance of effort" (MOE). The MOE test requires that a state's prior-year highway spending equaled or exceeded the average of the previous three years' expenditures.