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Evaluating Insurance Funds as A Financing Source for Infrastructure Development: A Case Study of Indonesia

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EVALUATING INSURANCE FUNDS AS A FINANCING SOURCE FOR INFRASTRUCTURE DEVELOPMENT: A CASE STUDY OF INDONESIA

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ABSTRACT

There is a funding deficit that cannot be covered by relying solely on government money to build Indonesia's Infrastructure; consequently, additional sources of financing are engaging the private sector to fill the gap. Insurance funds are an alternative funding source in many countries, although their application is still at an early stage. By assessing the risks faced by insurance companies involved in infrastructure investment, this paper attempts to evaluate the use of insurance money as an alternative funding source for infrastructure investment in Indonesia. The analytical hierarchical process (AHP) technique was used in the quantitative methodology of this study to evaluate the risks faced by insurance companies when investing in infrastructure and to identify strengths and limitations. The results show that insurance funds are a possible alternative funding source for infrastructure projects in Indonesia; as a result, the government provides the necessary instruments, such as important policies and attractive partnership structures and models.

Keywords: Alternative financing; Infrastructure; Insurance funds; AHP analysis

1. INTRODUCTION

Infrastructure enhancement is crucial for increasing a nation's economic progress. By providing connectivity to facilitate people and mobilize goods from one place to another, infrastructure can reduce the effect of distance between regions, further interconnecting the economic activities in the areas, achieving efficiency, and improving productivity. Infrastructure development covers numerous sectors, such as public utilities (power, generation, water, and gas supply), public works (roads, dams and canals, tunnels, water treatment supplies), public transport (urban transport systems, railways, airports, bridges, and tunnels) (Grimsey & Lewis, 2002; Susantono & Berawi, 2015).

Since 2011, the Indonesian government has designated improving national connectivity as one of its tactics to promote business activity growth along economic corridors; thus, various initiatives for developing investment activities have been carried out in many infrastructure projects. However, the Indonesian National Development Planning Agency (BAPPENAS) calculated that only 37% of the necessary expenditures could be covered by the state budget,

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leaving a gap in funding that needs to be covered by alternative non-government resources (Berawi, 2017), involving private sectors through public-private partnership (PPP) financing schemes.

The utilization of insurance funds for infrastructure development has been implemented in some countries (Gatzert & Kosub, 2014). For insurance companies, investing in infrastructure has been seen as an attractive asset class with the combined characteristics of equity, debt, and real estate (Weber et al., 2016). The potential for favorable risk-adjusted returns on equity investments, long-term exposure to risk-matched long-term liabilities, illiquidity, and industry variety make them desirable for portfolio insurers (EY, 2015).

However, despite the growing interest among insurance companies (Gatti, 2014), Infrastructure investments have particular risk profiles due to the construction risk, high running leverage, limited market competition, and high degrees of asset specificity (Rothballer & Kaserer, 2012). Besides, investments in infrastructure are difficult to be assessed in terms of the risk/return ratio due to the high costs, limited liquidity, and long asset life (Blanc-Brude et al., 2016).

In addition to that, institutional and political factors such as the limitation on the transparent and stable regulatory framework, the unfocused long-term vision for the development of infrastructure, and limited institutional facilitation from the government have also been the causes for the slow adoption of institutional investors to participate in the investment of infrastructure development (Croce & Gatti, 2015; Verhoest et al., 2015).

In previous research, many identifications of risk factors due to infrastructure-related disasters were carried out. Insurance and mitigation measures are an efficient solution to reduce disaster losses and speed up recovery time (Tonn et al., 2021). In infrastructure development in India, non-life insurance companies significantly contribute to infrastructure investment (Babu & Rao, 2015). Insurance can also be a source of infrastructure investment funding due to the ability of the insurance industry to generate income even during a pandemic (Larasati et al., 2022). However, there are still many constraints and ineffectiveness in its application, one of which is due to the need for clear identification of risks for insurance companies investing in infrastructure projects.

The prospect of insurance funds in financing Indonesian infrastructure projects is still in its infancy. It has been explored through the efforts of the Non-Government Budget Equity Financing (PINA) program carried out in 2017-2019 to facilitate the participation of private sectors, particularly the utilization of long-term managed funds such as life insurance and pension funds to achieve national infrastructure development targets. Therefore, this paper aims to analyze the utilization of insurance funds as an alternative financing source for infrastructure development in Indonesia by evaluating the risks faced by insurance companies participating in infrastructure investment. This research also seeks to promote the potential of insurance funds for infrastructure financing and increase private participation, particularly insurance companies, in infrastructure investment. Other countries can use the results of this study to assess investment in insurance funds in the infrastructure sector to accelerate development.

2. LITERATURE STUDY

2.1. Insurance

According to the Indonesian Commercial Law Code (KUHD) article 246, insurance is an agreement. By accepting the premium from the insured, the insurer commits to pay him for any anticipated loss, damage, or loss of profits he may incur due to an unspecified event. According to (Abbas, 2007), insurance is a willingness to determine certain small failures as a substitute for large uncertain losses.

According to the Law of the Republic of Indonesia Number 2 of 1992 concerning the insurance business, insurance is an agreement between two or more parties in which the insurer guarantees himself to the insured party, called an insurance agreement, or transfers the right of responsibility to a third party who may make the insured suffer hardship as a result of uncertain events, or provide reimbursement based on the death or survival of the insured person. This kind of insurance is called life insurance, which helps protect individuals or their relatives who are left behind after a death or permanent injury (Bakar et al., 2018). From the economic aspect, insurance is a method used to reduce risks by transferring them and combining the uncertainty of a financial loss with other parties (Darmawi, 2006).

There are many benefits yielded by having insurance in a business, such as: (1) protecting business from investment risk and uncertainty; (2) being an alternative source coming from non-bank financial institutions that assemble public funds for investment; (3) increasing creditors' trust by having the business insured from investment risks; (4) lessening concerns as it reduces the uncertainty of the economic burden from the uncertain losses; (5) reducing capital costs owing to the high rate of return (RoR) of the invested capital; (6) ensuring company stability by having the employees insured; (7) stabilizing the business profits since incidental costs have been considered; (8) provision of professional services that are more engaged in technical fields to do business operates properly and efficiently; (9) encouraging efforts to prevent losses by minimizing the possibility; and (10) promoting healthcare (Darmawi, 2006).

2.2. Insurance Funds for Infrastructure Financing

The Insurance industry offers a wide range of products, including annuity, life, health, and reinsurance products (Baranoff & Sager, 2002). In the context of finance, the role of insurance businesses can be assessed in terms of the accumulation of reserve funds created by insurance businesses. Life insurance premiums, for example, are usually paid every year for life. Since the probability of death is initially low and will increase as a person ages, the premium received by a life insurance company at first is more than enough to cover the early years. Thus, insurance reserves are funds collected from excess premiums on claims plus compound interest required to ensure future insurance compensation payments, which consist of emergency funds, mathematical reserves of life insurance policies, unpaid claims, premiums received in advance, and other reserves determined by the insurance company (Raeva & Pavlov, 2017). After being reduced by operating expenses, these funds are deposited in banks or invested in certain businesses that are considered economically profitable, making the investment function extremely important in the operation of an insurance company (Chui & Kwok, 2008). The reserve funds of insurance companies encourage efforts to increase national savings and promote the fulfillment of investment funds in the industrial sector, both directly and through capital market instruments.

According to Syahrir (1996), insurance companies are faced with various risks in the investment process, such as; (i) financial risk, in which the debtors/issuers of shares have financial difficulties in paying the lenders/creditors/investors; (ii) interest rate risk, in which the changes in general interest rates prevailing in the market can affect the investment interest or market value of shares; (iii) purchasing power risk, in which the changes in commodity price levels, living costs, consumer price indexes, and inflation rates can reduce investment returns, (iv) liquidity risk, in which the amount of investment can be converted into cash, and some large shares can be marketed, and (v) market risk, in which the decline of investment returns is due to economic recession, war, structural changes, and changes in consumer preferences. In investing life insurance and pension funds in infrastructure projects, risk is an issue that all stakeholders must consider to understand the specific risks in infrastructure better. Risks related to infrastructure

investment include liquidity, price, time, government, management, and operations (Inderst, 2009).

Several main factors cause the amount limitation for investment funds from insurance companies in Indonesia; the first factor is that the insurance business requires a large capital because it must be accounted for the risk of fire, death, disaster, and so on; the second one is that the monetary conditions still provide relatively large investments in deposits. Lastly, there are still constraints for insurance companies to invest in shares.

2.3. Implementation of Insurance Fund for Infrastructure Financing

2.3.1. China

The practice of insurance funds for infrastructure investment was already regulated since 2006 in China; it was upon the approval of the State Council that the insurance funds were allowed to be invested in infrastructure projects following the issuance of Regulation Number 1 of 2006 by the China Insurance Regulatory Commission (CIRC) concerning the guidelines and administrative steps for pilot indirect investments of insurance fund in the infrastructure projects which aimed to regulate the investment of insurance fund in the real estate sector particularly to manage investment risk, to protect the asset, and to guarantee the rights of the insurers and insured.

The early notion of insurance funds in China's infrastructure investment in 2010 included the land provision projects done by the government both through debt and equity schemes. After some time, the Provisional Government Regulation on Infrastructure Debt Investment Plans took its position (CIRC Order No. 92 of 2012) (Calder & Min, 2012). Investors entrust the funds to the investment management of the infrastructure project, which will provide an infrastructure debt investment plan following the investors' objectives.

In 2016, CIRC revised the Pilot Measures for the Administration of Indirect Investment in Infrastructure Projects by Insurance Funds issued in 2006, intending to further develop asset management in the insurance industry. The revisions include simplifying the procedure of regulatory administration, eliminating administrative approval relating to an investment in infrastructure projects by insurance funds, and expanding the investment range: escalating the applicable industries and feasible models for investing insurance funds in infrastructure projects (Hogan Lovells, 2016).

2.3.2. Australia

Infrastructure financing from insurance and pension funds began in 2002 at around 2% of total funding in Australia. The Australian government slashed its infrastructure spending from more than 14% in 1970 to 5% in 2005. This also allowed insurance and pension funds to spend more on infrastructure, potentially displacing the government as the main funder of these projects.

Australia already has regulations regarding the investment process that mandate that trustees can discharge their responsibilities and that appropriate risk management mechanisms must be in place to monitor, manage and control risk exposure. The Australian system allows regulators to change capital or fee requirements in volatile markets (OECD, 2015).

2.3.3. United Kingdom

The PPP model in the UK has involved the construction industry during the planning, construction, and operation stages of a newly built road. A more comprehensive concept was created in 1997, enhancing the Private Finance Initiative (PFI) model introduced in 1992. This

plan covers infrastructure development, particularly in transit, health, education, housing, home construction, military, information technology (IT), wastewater management, and sanitation.

There are about 15 public and private funds that participated in infrastructure investment in the UK, in which some of which are large insurance and pension fund companies such as:

- 1) The London Pensions Fund Authority (LPFA) is the largest local government pension scheme fund. LPFA has 5%-15% of its investment portfolio allocated for infrastructure investment. This investment aimed to generate decent risk-adjusted returns through improved diversification of infrastructure assets located in various countries. The investment was made through several instruments such as direct investment, investment financial institutions, and in part, investment institutions listed on the stock exchange, and it also sought to offer certain cash flow and indirectly limit against inflation (LPFA, 2018).
- 2) Universities Superannuation Scheme (USS) is the second largest investor of insurance funds for infrastructure after LPFA. A percentage of 90% of USS's capital is placed in investment financial institutions, and the remainder is through direct investment. Since early 2007, USS has begun investing in private equity, commodities, and infrastructure. These investment placements and hedge funds will eventually result in an alternate 20% share in the total assets of the pension fund. Over the last five years, USS has globally deployed about £3 billion in real assets and executed around 15 transactions (USS, 2019).
- 3) Greater Manchester Pension Fund (GMPF) is the largest domestic insurance and pension fund in the UK, consisting of 10 regions in Manchester and around 200 related organizations. As of 2019, the total GMPF's fund amounted to £22,891 million. The current GMPF fund allocation target is realistically allocated 4%, 0.5%, and 2.5%, respectively. The objective allocation for private equity, private debt, and infrastructure funds is 5% of the primary fund value. The infrastructure investment started in 2001, and the value of assets currently invested in infrastructure as of March 31, 2019, was approximately £593 million, with improved inception performance to an annualized return of 10.9% per year (GMPF, 2019).

2.3.4. *Canada*

The authority for infrastructure development in Canada is given to each province, and despite the different regulations, they all have made efforts to increase the use of PPPs which have made up to 10% to 20% of Canada's infrastructure spending (Iacobacci, 2010). The region that has the clearest application of PPP is British Columbia, followed by Quebec, which has recently revised its regulations to attract more investment.

The Canadian insurance industry, which has been playing a significant role in providing longer-term finance (Kranc, 2012), has also participated in infrastructure investment, amounting to more than 3% of the total assets. There are more than 15 companies of state-owned and private insurance and pension funds that have invested in the infrastructure sector in Canada. These insurance companies invested their funds in the infrastructure sector both through direct investment in the infrastructure companies and the infrastructure company's shares. Some of the insurance companies that have an important role in Canada's infrastructure sector investment include:

- 1) The Ontario Teachers' Pension Plan (OTTP), which is one of the largest public pension funds, has been investing directly in infrastructure since 2001, with a focus on majority or joint controlling shares using an active governance strategy. Geographically, in terms of growth stage and in terms of business, the infrastructure stock varies. Airports, cargo

- hubs, power generation, transmission, and initiatives for green energy production are some of the areas where assets are addressed (Burgess, 2020).
- 2) Ontario Municipal Retirement System (OMERS), is a financial institution created back in 1962 for government employees in Ontario. As of Dec 2017, investment in infrastructure represented 10.6% of the total assets in the funds of about USD 82 billion (Walker, 2019). OMERS infrastructure, investing in infrastructure assets globally on behalf of OMERS, has a diversified portfolio of large-scale infrastructure assets that exhibit stability and strong cash flows, including the energy sector, transportation sector, and government-regulated services.
 - 3) Canadian Pension Plan (CPP) is an insurance company engaged in life insurance and retirement that began investing in the infrastructure sector in 2005 and developed a portfolio of direct investment and started commitments with financial institutions that invest funds in the infrastructure sector. At the end of 2010, an investment portfolio for the infrastructure sector was planned to reach 6.5% of their portfolio (BBVA, 2008).

3. METHODS

The research methodology followed these systematic steps, namely the expert validation questionnaire survey and the analysis of the results of the questionnaire survey using the AHP method. The proposed research workflow can be seen in Figure 1.

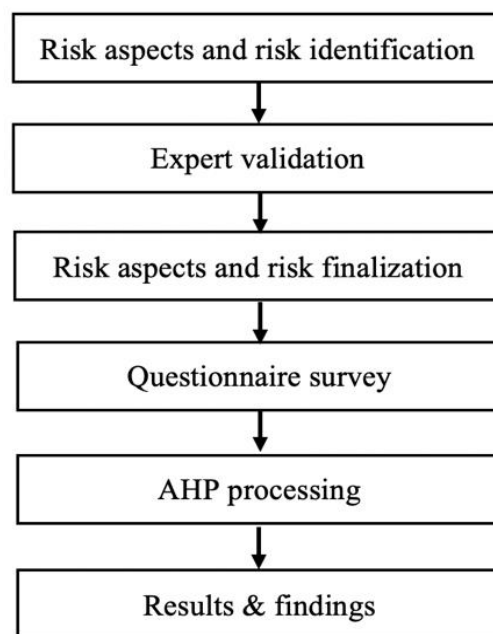


Figure 1 Research Workflow

First of all, the research variables were identified based on the investigation from journals, books, and regulations (Berawi et al., 2018; Berawi & Woodhead, 2008) regarding the risk aspects faced by insurance funds in infrastructure investment. The research variables will be validated through experts in insurance, development funding, and infrastructure financing as a reference and input, as well as suggestions for research variables so that the questionnaires are more targeted. This research identified the main risks that should be considered for infrastructure investment using insurance funds after consulting with Indonesian authorities in law and regulation, infrastructure, risk and finance, and transportation planning to assess these risks.

These validated variables were then sent to twenty respondents representing regulators, insurance practitioners, and infrastructure experts in the form of questionnaires. The purposive selection was used to select these interviewees, identifying those with the most knowledge and experience (Miles & Huberman, 1994), particularly in regulation, insurance, and infrastructure, with minimum requirements of holding a bachelor's degree and more than ten years of experience in insurance or infrastructure industry. Of twenty respondents, eight respondents represented regulators, nine respondents represented insurance practitioners, and three respondents represented infrastructure experts.

The results from the questionnaire survey were then analyzed using the analytical hierarchy process (AHP) method to evaluate the risks. AHP has been used by researchers and academics because of its adaptive application, among others, with fuzzy logic and linear programming (Vaidya & Kumar, 2006), as well as its simplicity, consistency logic, priority measurement, and process repetition (Saaty, 1980). This method combines mathematics and psychology in a structured and organized way to evaluate complex problems (Saaty, 2008). It uses qualitative and quantitative approaches to come up with a final decision. The multi-level hierarchical framework used in qualitative methods helps visualize problems (Crowe et al., 1998; Wong & Li, 2008), while the quantitative approach selects essential factors to less critical factors using a scaling system (Cheung et al., 2001; Ucler, 2017). When the problems and expected objectives were already identified, a hierarchical system was used to organize them down to the potential choices. To evaluate each element at each criteria level, a pairwise comparison was proposed using an intensity scale of importance, as shown in Table 1 below.

Table 1 Intensity Scale of Importance

Scale Value	Definition	Explanation
1	Equal	Two elements equally
3	Moderate	An element is slightly more important than another
5	Strong	An element is definitely important over another
7	Very Strong	An element is definitely very strongly important over another
9	Extreme	An element is more important than another
2,4,6,8	Intermediate between values	A numerically interpolated compromise judgment

Questionnaires filled out by respondents were analyzed using the AHP method and produced rating weights for each variable in the risk area. Respondents filled out a survey form with an importance scale from 1 to 9. The results of the questionnaires, which were processed using multi-criteria decision analysis, showed that for the goal decision is insurance fund as an alternative infrastructure financing, the level 1 criteria consist of constraints and potencies of investing insurance fund for infrastructure projects, while the level 2 criteria consist of the role and responsibilities of the government (GOV) and private (PTE) and the level 3 criteria consists of all risks (AR), most risks (MR), and evenly distributed risks (EDR), as can be seen in Figure 2.

To evaluate the hierarchical priorities of the criteria and the variable risks for infrastructure investment by insurance funds based on the identified risk aspects, eigenvalue, and consistency tests were conducted. A consistency ratio (CR) was used in the consistency exam to assess the degree of inconsistent judgment, with a CR of less than 10% typically being regarded as acceptable. The role and responsibilities that should be borne both by the government and the private sectors as investors were also determined using this analysis. And lastly, the AHP method was also used to analyze the constraints and potentials of insurance fund investment in infrastructure in Indonesia.

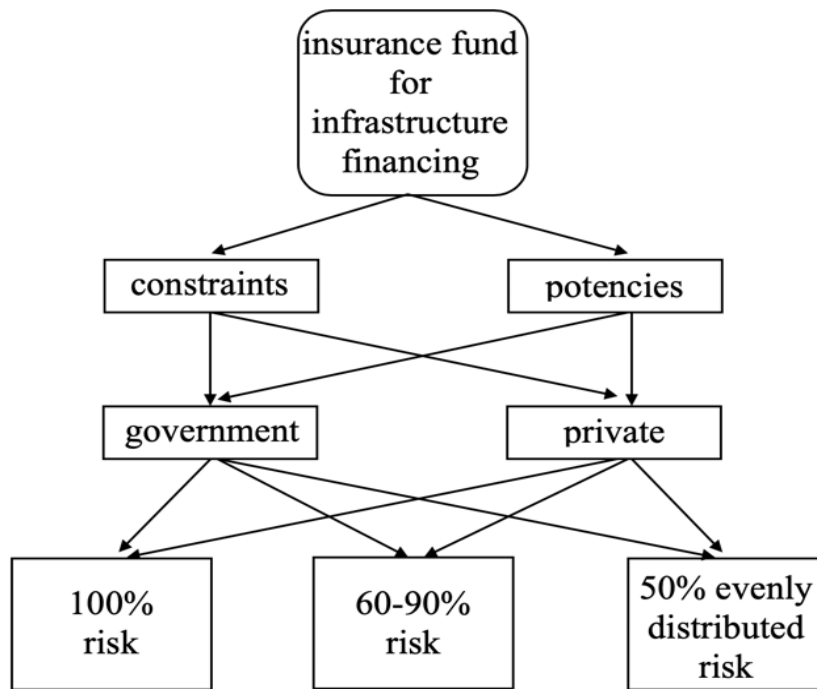


Figure 2 Hierarchy of Insurance Fund for Infrastructure Financing

4. RESULTS AND DISCUSSION

After the variables were identified based on the literature review conducted, they were then validated by the experts. These validated variables involved four risk aspects, including financial risk, political risk, liquidity risk, and market risk. Financial risk consists of five variables, namely, the debtors' ability to return loans, changes in the price level, changes in interest rate, insurance investment portfolios more into short-term investments, and changes in insurance industry assets. Political risk consists of five variables that include unclear insurance regulations for infrastructure financing, investment restrictions regulation, insurance fund more as alternative financing, government policies that often change, and tax increases. Liquidity risk consists of three variables that include a level of solvency and liquidity, project financing flexibility, and lapse rate. And there are three variables in market risk, namely limited information on insurance investment in infrastructure projects, economic growth, and unfavorable investment climate.

4.1. Constraints and Potencies of Insurance Fund Investment in Infrastructure

The result of the AHP analysis for level 1 showed that all criteria of insurance funds' investment risk parameters have a consistency ratio (CR) of less than 10%, meaning that all variable values are acceptable. The highest number of analysis findings indicates the choice for that specific hazard. For example, variable X1, with the debtors' ability to return loans, is considered a constraint since its value is higher than the value of potency. Meanwhile, variable X9, with government policies that often change as one of the political risks, is considered as a constraint, and variable X11, with the level of solvency and liquidity as one of the liquidity risks, is regarded as potency. An unfavorable investment climate as one of the market risks is considered a constraint (see Table 2).

Table 2 AHP Analysis Result (Level 1)

Variable	Insurance Funds' Infrastructure Investment Risks	Analysis Result		Consistency Ratio
		Constraint	Potencies	
Financial Risk				
X1	The debtors' ability to return loans	0,833	0,167	0
X2	Changes in the price level	0,250	0,750	0
X3	Changes in interest rate	0,857	0,143	0
X4	Insurance investment portfolios are more into short-term investments	0,900	0,100	0
X5	Changes in insurance industry assets	0,889	0,111	0
Political Risk				
X6	Unclear insurance regulations for infrastructure financing	0,889	0,111	0
X7	Investment restrictions regulation	0,857	0,143	0
X8	Insurance funds more as an alternative financing	0,250	0,750	0
X9	Government policies that often change	0,889	0,111	0
X10	Tax increase	0,833	0,167	0
Liquidity Risk				
X11	Level of solvency and liquidity	0,125	0,875	0
X12	Project financing flexibility	0,143	0,857	0
X13	Lapse rate	0,857	0,143	0
Market Risk				
X14	Limited information on insurance investment in infrastructure projects	0,889	0,111	0
X15	Economic growth	0,111	0,889	0
X16	Unfavorable investment climate	0,857	0,143	0

4.2. Role and Responsibilities of the Government and Private Sector

Likewise, the result of the AHP analysis for level 2 showed that all criteria of insurance funds' investment risks have a consistency ratio (CR) of less than 10%, which means that all values of all variables from four identified risks can be accepted.

Based on the highest value of the analysis results, the variables in financial risk considered as the government's responsibilities are the changes in interest rate (variable X1); meanwhile, the other variables, such as changes in the price level, changes in interest rate, insurance investment portfolios more into short-term investments and changes in insurance industry assets are considered as private sectors' responsibilities.

The values of analysis results for all variables in the political risks show that all five variables are considered as the government's responsibilities. Furthermore, the variables both in liquidity and market risks, which include the level of solvency and liquidity, project financing flexibility, lapse rate, Limited information on insurance investment in infrastructure projects, economic growth, and unfavorable investment climate, are considered as the responsibilities that are addressed to the government (see Table 3).

Table 3 AHP Analysis Result (Level 2)

Variable	Insurance Funds' Infrastructure Investment Risks	Analysis Result		Consistency Ratio
		GOV	PTE	
Financial Risk				
X1	the debtors' ability to return loans	0,125	0,875	0
X2	changes in the price level	0,111	0,889	0
X3	changes in interest rate	0,833	0,167	0
X4	insurance investment portfolios are more into short-term investments	0,167	0,833	0
X5	changes in insurance industry assets	0,143	0,857	0
Political Risk				
X6	unclear insurance regulations for infrastructure financing	0,857	0,143	0
X7	investment restrictions regulation	0,857	0,143	0
X8	insurance fund more as an alternative financing	0,833	0,167	0
X9	government policies that often change	0,875	0,125	0
X10	tax increase	0,857	0,143	
Liquidity Risk				
X11	level of solvency and liquidity	0,857	0,143	0
X12	project financing flexibility	0,900	0,100	0
X13	lapse rate	0,889	0,111	0
Market Risk				
X14	Limited information on insurance investment in infrastructure projects	0,875	0,125	0
X15	economic growth	0,800	0,200	0
X16	unfavorable investment climate	0,875	0,125	0

4.3. Risk of Infrastructure Funds as Infrastructure Financing

The AHP analysis results for level 3 showed that the first financial risk where debtors' ability to return the loaned funds to finance infrastructure projects through the PPP scheme is a form of constraint for the implementation of insurance funds as the alternative source for infrastructure investment and the solution to address this should be sought by private sector assuming all the risk responsibilities. The second financial risk, the changes in the price level, is found to be a potential, whereas this price level change is a benefit for the investors from both the public and private sectors in establishing infrastructure financing.

Changes in interest rates as the third financial risk is a constraint; thus, the role of the government is very significant in determining the interest rate level for the insurance fund. The insurance investment portfolios, which are more interested in short-term investment, are also a constraint that should receive major attention from the private sector in order to make insurance fund an alternative financing source for infrastructure in Indonesia. The fifth financial risk is also considered a constraint; therefore, the government and private sector, in this case, insurance companies, should work together to find solutions for the obstacles caused by the changes in insurance industry assets (see Table 4).

Table 4 AHP Analysis Result (Level 3)

Variable	Insurance Funds' Infrastructure Investment Risks	Analysis Result		
		Level 1	Level 2	Level 3
Financial Risk				
X1	the debtors' ability to return loans	Constraint	PTE	AR
X2	changes in the price level	Potency	PTE	EDR
X3	changes in interest rate	Constraint	GOV	MR
X4	insurance investment portfolios are more into short-term investments	Constraint	PTE	AR
X5	changes in insurance industry assets	Constraint	PTE	EDR
Political Risk				
X6	unclear insurance regulations for infrastructure financing	Constraint	GOV	AR
X7	investment restrictions regulation	Constraint	GOV	EDR
X8	insurance fund more as an alternative financing	Potency	GOV	AR
X9	government policies that often change	Constraint	GOV	AR
X10	tax increase	Constraint	GOV	AR
Liquidity Risk				
X11	level of solvency and liquidity	Potency	GOV	AR
X12	project financing flexibility	Potency	GOV	AR
X13	lapse rate	Constraint	GOV	AR
Market Risk				
X14	Limited information on insurance investment in infrastructure projects	Constraint	PTE	AR
X15	economic growth	Potency	GOV	AR
X16	unfavorable investment climate	Constraint	GOV	EDR

Four of five variables in the political risks have appeared as constraints for insurance funds to finance infrastructure projects. To address the risk of unclear insurance regulations for infrastructure financing and investment, the government needs to implement clear policies that support insurance funds as alternative financing in infrastructure development so that the investors' participation can be increased; meanwhile, regulation on investment restrictions could hinder infrastructure financing by insurance fund, the government also needs to help remove investment restriction by making necessary policies. In addition to that, the government's role is required in order to distribute and socialize the concept of infrastructure financing by insurance fund to increase the private sector's interest as the insurance fund for infrastructure investment is found to be a potency. However, the government policies that often change together with the change of government leadership could inflict a loss for the investors while making investments in infrastructure financing, and it is the responsibility of the government to improve the implementation of policies that can bring benefit for all parties involved. As the tax increase is also seen to be a constraint, it is necessary for the government also to determine the tax value that doesn't burden the investors.

The level of solvency and liquidity comes out as potency that can be used as an alternative source through the PPP scheme between insurance companies and the governments as the decision maker for the solvency and liquidity level. Another potency of liquidity risk comes from the flexibility in project financing, where it is, in fact, expected by investors in financing infrastructure; therefore, the government's role as a regulator in providing ease of project financing for the insurance funds. However, the lapse rate determined by the government turns out to be a constraint for infrastructure financing using insurance funds.

From market risk, it is found that the limited information on insurance investment in infrastructure projects makes investors unaware of the benefits of financing infrastructure projects using insurance funds, so it is necessary for the government to have the information socialized well. Nevertheless, economic growth is a potency that is highly expected by the implementation of insurance funds as the financing for infrastructure development; it is the responsibility of the government to ensure the country's economic growth so that the market of insurance investment can be more promising. It is also the responsibility of the government to ensure that the investment climate for insurance investment is conducive, as it comes out as a constraint.

4.4. The Utilization of Insurance Funds as Infrastructure Financing in Indonesia

Several constraints appeared in the result of the AHP analysis, some of them that are prominent should get more attention from the insurers and the government in the realization of insurance fund utilization in infrastructure financing, here are some constraints that are more prominent than the others. Thus, these prominent constraints could be followed up by both the government and the private sector, which in this case is the insurance companies.

As can be seen in Figure 3, the insurance investment portfolios which are more interested in short-term investment is the constraint that has the biggest score among other constraints, where funds invested by the public and private sectors in insurance companies in Indonesia are reinvested in the form of bonds, shares, lands and building, deposits, mortgages, and Bank Indonesia Certificates (SBI). The Insurance industry's investment portfolio placed most of its investment in deposits and stocks, respectively, around 24% and 20.4% of the total insurance industry investment as of 2014 (Setianto, 2016).

Other constraints that also have high scores in the analysis include changes in insurance industry assets, government policies that often change, and limited information on insurance investment in infrastructure projects. The Government has made various efforts to deal with these constraints in order to get the infrastructure development program that has been planned to succeed, both in the form of improved regulations and the establishment of financial institutions and guarantees and finance. Even though the macro policy has been agreed to make investment conducive, in practice, infrastructure investment financed by private investment is still going slowly.

In addition to the analysis of the above constraints, several risks potential for utilizing insurance funds for infrastructure financing are also recognized. As can be seen in Figure 4, the most prominent potential among the potential risks is economic growth. Indonesia's economic growth has experienced quite rapid development. At the very least, the rate of economic growth, which reaches around 6-7% per year supported by the rapid financial services industry, especially insurance, has a very big influence on the growth of assets and investment in the insurance industry.

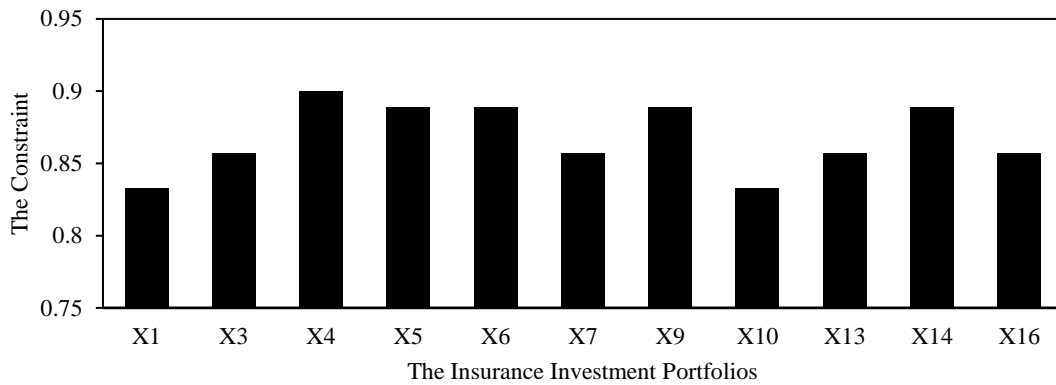


Figure 3 Analysis of the Constraints of the Insurance Fund for Infrastructure Financing

As the government plays an important role in regulating the investments for infrastructure development, therefore, this authority has the potential to improve the performance of infrastructure financing by providing guidelines for the insurance industry to invest its funds in infrastructure development. Besides, the accumulation of reserve funds has long-term characteristics so that it has a low liquidity level, so this has the potential for insurance funds to finance infrastructure that also has long-term investment characteristics.

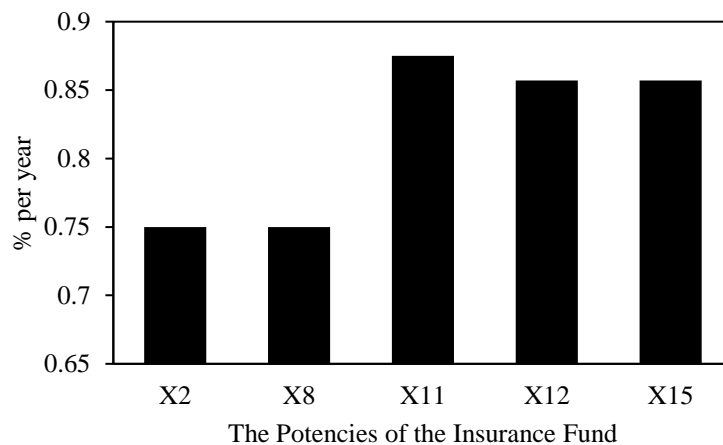


Figure 4 Analysis of the Potencies of the Insurance Fund for Infrastructure Financing

5. CONCLUSION

Infrastructure has a vital role in enhancing national economic development. Therefore, it is important to accelerate infrastructure development by opening opportunities for other financing sources to participate in its investment. Insurance funds have been widely discussed as alternative financing to be invested in infrastructure projects. Infrastructure is arguably an attractive portfolio investment for insurance companies as it is said to be more predictable and stable in terms of cash flow over long-term investments, as well as to be able to make diversification and reduce volatility.

The study conducted in this paper evaluates the constraints and potential for withdrawing insurance funds as an alternative source of financing for infrastructure investment in Indonesia. The subject of this research is alternative financing from non-bank financial institutions, namely insurance institutions, with research timeframes from insurance and investment industry asset

data. Insurance companies from 2006 to 2010 concluded that insurance funds are a potential alternative source of infrastructure financing in Indonesia. Therefore, despite already having clear and timely regulations regarding procedures for implementation of PPP in infrastructure provision established in the Regulation of the Minister of National Development Planning Number 2 of 2020, this paper encourages the government to open a solid pathway for insurance companies to take part in infrastructure investment by providing the specific requisite policies and legal aspects, as well as developing attractive partnership structures and models to attract private interest, especially insurance companies, to play an active role in the investment of infrastructure development.

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REFERENCES

- Abbas, S. (2007). *Asuransi dan Manajemen Risiko*. PT Raja Grafindo Persada.
- Babu, S. H. & Rao, M. S. (2015). Insurance As Source of Infrastructure Financing in India: A Study. *International Journal of Research in Commerce & Management*, 6(08).
- Bakar, Ö., Soykan, Y., & Acar, B. (2018). Measuring Students' Knowledge Level of Life Insurance: A Case on the Students of the Department of Insurance and Risk Management at the Dumlupinar University, Turkey. *Journal of Educational and Social Research.*, 8(1), 75–82.
- Baranoff, E. G., & Sager, T. W. (2002). The relations among asset risk, product risk, and capital in the life insurance industry. *Journal of Banking & Finance*, 26(6), 1181–1197.
- BBVA. (2008). *A balance of Pension Funds Infrastructure Investment: The Experience in Latin America. Working Paper No. 10/03*. BBVA Research. https://www.bbva.com/wp-content/uploads/mult/WP_1003_tcm348-215241.pdf
- Berawi, M. A. (2017). Designing National Policy and Strategies for Inclusive Development: Accelerating Infrastructure Development for Growth and Prosperity. *International Journal of Technology*, 8(5). <https://doi.org/10.14716/ijtech.v8i5.9546>
- Berawi, M. A., Miraj, P., & Sidqi, H. (2017). Economic corridor of industrial development in Indonesia—IOPscience. *IOP Conference Series: Earth and Environmental Science*, 109. <https://doi.org/doi:10.1088/1755-1315/109/1/012032>
- Berawi, M. A., & Susantono, B. (2012). Developing conceptual design of mega infrastructure project: Creating innovation and added value. *SAVE Value Summit 2013*, 337–346. <https://scholar.ui.ac.id/en/publications/developing-conceptual-design-of-mega-infrastructure-project-creat>
- Berawi, M. A., Susantono, B., Miraj, P., & Nurmadinah, F. (2018). Prioritizing Airport Development Plan to Optimize Financial Feasibility. *Aviation*, 22(3), 115–128.
- Berawi, M. A., & Woodhead, R. M. (2008). Stimulating Innovation using Function Models: Adding Product Value. *Value World*, 31(2), 4–7.
- Blanc-Brude, F., Hasan, M., & Whittaker, T. (2016). Benchmarking Infrastructure Project Finance: Objectives, Roadmap, and Recent Progress. *The Journal of Alternative Investments*, 19(2), 7–18.
- Burgess, D. (2020). *Infrastructure & Natural Resources—Ontario Teachers' Pension Plan*. Ontario Teachers' Pension Plan. <https://www.otpp.com/investments/asset-groups/infrastructure>
- Calder, K., & Min, Y. (2012, December 20). *China's insurance industry regulator revises the requirements for investing insurance funds in infrastructure debt investment projects* | Lexology. <https://www.lexology.com/library/detail.aspx?g=9124747e-f374-4a04-a8c0-5265fd15680a>
- Cheung, S.-O., Lam, T.-I., Leung, M.-Y., & Wan, Y.-W. (2001). An analytical hierarchy process-based procurement selection method. *Construction Management and Economics*, 19(4), 427–437. <https://doi.org/10.1080/014461901300132401>
- Chui, A. C. W., & Kwok, C. C. Y. (2008). National culture and life insurance consumption. *Journal of International Business Studies*, 39(1), 88–101.

- Croce, R. D., & Gatti, S. (2015). *International trends in infrastructure finance*. In: Caselli S., Corbetta G., Vecchi V. (eds) *Public Private Partnerships for Infrastructure and Business Development*. Palgrave Macmillan.
- Crowe, T. J., Noble, J. S., & Machimada, J. S. (1998). Multi-attribute analysis of ISO 9000 registration using AHP. *International Journal of Quality & Reliability Management*, 15(2), 205–222.
- Darmawi, H. (2006). *Manajemen Asuransi*. Bumi Aksara.
- EY. (2015). *Infrastructure investment, an attractive option to help deliver a prosperous and sustainable economy*. [https://www.ey.com/Publication/vwLUAssets/EY-infrastructure-investment-benefits-for-insurers/\\$FILE/EY-infrastructure-investments-for-insurers.pdf](https://www.ey.com/Publication/vwLUAssets/EY-infrastructure-investment-benefits-for-insurers/$FILE/EY-infrastructure-investments-for-insurers.pdf)
- Gatti, S. (2014). *Government and Market Based Instruments and Incentives to Stimulate Longterm Investment Finance in Infrastructure*. OECD Working Papers.
- Gatzert, N., & Kosub, T. (2014). Insurers' Investment in Infrastructure: Overview and Treatment under Solvency II. *The International Association for the Study of Insurance Economics*, 1018–5895(14), 351–372. <https://doi.org/DOI:10.1057/gpp.2013.34>
- GMPF. (2019). *GMPF 2019 Annual Report*. Tameside Metropolitan Borough. <https://www.gmpf.org.uk/documents/annualreport/2019.pdf>
- Grimsey, D., & Lewis, M. K. (2002). Evaluating the risks of public private partnerships for infrastructure projects. *International Journal of Project Management*, 20(2), 107–118. [https://doi.org/10.1016/S0263-7863\(00\)00040-5](https://doi.org/10.1016/S0263-7863(00)00040-5)
- Hogan Lovells. (2016). *Changes in insurance regulation: China / Hong Kong / Singapore*.
- Iacobacci, M. (2010). *Dispelling the Myths: A Pan-Canadian Assessment of Public-Private Partnerships for Infrastructure Investments*. <https://www.conferenceboard.ca/e-library/abstract.aspx?did=3431&AspxAutoDetectCookieSupport=1>
- Inderst, G. (2009). *Pension Fund Investment in Infrastructure, OECD Working Papers on Insurance and Private Pensions No. 32*. OECD publishing. <https://www.oecd.org/finance/private-pensions/42052208.pdf>
- Kranc, J. (2012). Leader of the Pack. *Infrastructure Investor*, 36.
- LPFA. (2018). *London Pensions Fund Authority (LPFA) Investment Strategy Statement*. www.lpfa.org.uk > Public > DWSDownload
- Miles, M. B., & Huberman, A. M. (1994). *An expanded resource: Qualitative data analysis (3rd ed)*. Sage Publication.
- N. F. Larasati, Dina Aprilia, Dinda Bhawika Wimala Pastika, Ismi Aulia Wahyudi, & Desya Annisa Anandita. (2022). Investment Of Insurance Funds as An Alternative to Infrastructure Financing Through Public Private Partnership in The Midst of Covid-19 Pandemic. *International Journal of Economics, Business and Accounting Research (IJEBA)*, 6(2).
- OECD. (2015). *Regulation of Insurance Company and Pension Fund Investment. OECD Report to G20 Finance Ministers and Central Bank Governors*. Available online: <https://www.oecd.org/g20/summits/antalya/Regulation-of-Insurance-Company-and-Pension-Fund-Investment.pdf>
- Raeva, E., & Pavlov, V. (2017). Planning outstanding reserves in general insurance. *AIP Conference Proceedings*, 1895(1), 050009. <https://doi.org/10.1063/1.5007381>
- Rothballe, C., & Kaserer, C. (2012). The risk profile of infrastructure investments: Challenging conventional wisdom. *The Journal of Structured Finance*, 18(2), 95–109.
- Saaty, T. L. (1980). *The analytic hierarchy process*. McGraw-Hill.
- Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Service Sciences*, 1(1), 83–98.
- Setianto, B. (2016). *Prospek Investasi saham Asuransi Ramayana Tbk per Laporan Keuangan Q1 2016: Lengkap Profile emiten, industry analysis, Key Financials dan Ratio, Benchmarking ratio, Analisa industry & Laporan Keuangan, Perhitungan Nilai Wajar Saham & beberapa metode valuasi*. BSK Capital.
- Susantono, B., & Berawi, A. (2015). Improving the Sustainable Infrastructure Development through Innovative Approaches in Technology, Management and Financial Aspects. *CSID Journal of Infrastructure Development*, 1(1), 1–3. <https://doi.org/10.32783/csid-jid.v1i1.5>

- Syahrir, I. (1996). Perkembangan Usaha Asuransi dan Pengaruhnya Terhadap Pengembangan Investasi Nasional. *Jurnal Keuangan Dan Moneter*, 3(1).
- Tonn, G., Reilly, A., Czajkowski, J., Ghaedi, H., & Kunreuther, H. (2021). US transportation infrastructure resilience: Influences of insurance, incentives, and public assistance. *Transport Policy*, 100, 108–119. <https://doi.org/10.1016/j.tranpol.2020.10.011>
- Ucler, C. (2017). Brainstorming the cryoplane layout by using the iterative AHP-QFD-AHP approach: Aviation: Vol 21, No 2. *Aviation*, 21(2), 55–63.
- USS. (2019). *Real assets*. <https://www.uss.co.uk/how-uss-invests/the-fund/investments/private-markets/real-assets>
- Vaidya, O. S., & Kumar, S. (2006). Analytic hierarchy process: An overview of applications. *European Journal of Operational Research*, 169(1), 1–29.
- Verhoest, K., Petersen, O. H., Scherrer, W., & Soeipto, R. M. (2015). How Do Governments Support the Development of Public Private Partnerships? Measuring and Comparing PPP Governmental Support in 20 European Countries. *Transport Reviews*, 35(2), 118–139. <https://doi.org/10.1080/01441647.2014.993746>
- Walker, D. (2019, March 1). *Ontario Municipal reports 2.3% return for 2018, below its benchmark. Pensions & Investments*. <https://www.pionline.com/article/20190301/ONLINE/190309976/ontario-municipal-reports-2-3-return-for-2018-below-its-benchmark>
- Weber, B., Staub-Bisang, M., & Alfen, H. W. (2016). *Infrastructure as an Asset Class: Investment Strategy, Sustainability, Project Finance and PPP* (2nd Edition). John Wiley & Sons Ltd.
- Wong, J. K., & Li, H. (2008). Application of the analytic hierarchy process (AHP) in multi-criteria analysis of the selection of intelligent building system. *Building and Environment*, 43(1), 108–125