Progressive Infrastructure Projects in Indonesia: Views on Potential Growing Geoforensic and Dispute Cases

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Abstract. Recently, progressive government infrastructure projects on: roads and bridges, harbour, oil and gas, water and sanitation, railroad, electricity, city transportation and information technology have reached big records of government projects since the independence of Indonesia – A country with 17,504 islands and projected population in 2030 of 350 million. Every construction project carries its years of serviceability usually between 50 – 100 years. During and before that time, cost of risk due to the unfulfillment of engineering standard of design, construction, management, usage and maintenance can cause problems. Cases of past project failures that bring consequences in terms of cost, disfunction/ failure and sometimes people’s lives in some of the past projects are analyzed from the geoforensic point of view as cases to be avoided from the early beginning when the project was physically decided to be constructed in a certain geophysical area in specific parts of Indonesia.

Keywords: Infrastructure projects; Serviceability; Engineering standard of design, construction, management, usage, cost; Disfunction/ failure; Geoforensic point of view.

1. Introduction

Since the last 5 years, Indonesia government had adopted a progressive infrastructure development project in all part of Indonesia at the amount of more than 4.75 Trillion Rupiah or $328,215,475.19 USD. In the 3rd quarter of year 2018, GDP development in general remained stable at 5.2% year-on-year. Government stimulation not only in Java island with its highly densed population, but spread out in Sumatra island to Papua/ West Irian as well with the intention to keep Indonesia people economically and politically stable and connected well. Construction sector is noted to be one of the business sectors that has scored positive performance amid slowing economic growth. The role of the construction sector on Gross Domestic Product (GDP) has also increased. Based on data from the Central Bureau of Statistics, annual economic growth in the 3rd quarter of year 2018 recorded a slight increase to 5.79% in 3rd quarter of year 2018 compared to 2nd quarter of year 2018 to 5.73% [9]. Those projects consisted of roads and bridges, harbor, oil and gas, water and sanitation, railroad, electricity, public transportation and information technology. According to London based publications recently – Pricewaterhouse Coopers, published its long-term global growth projections until 2050 within 32 largest economies in the world. This projects China to lead the four largest economies in the world, followed by India, the United States and Indonesia.
On April 20, 2019, at the infrastructure summit 2019, the Indonesia national arbitration center (BANI) was invited to give presentation on arbitration related to construction dispute cases where cost and quality control involved in. The event was conducted jointly by PT. Infrastructure Guarantee Fund (IIGF) and university network for Indonesia infrastructure development (UNIID), held at the university of Padjajaran in Bandung, West Java. On that occasion, as an arbiter with geoforensic experience, I have the honour to present – Based on my knowledge and experience in handling arbitration cases in construction disputes for the last seven years.

In the earlier Indonesia construction law No. 18 of 1999, arbitration and litigation were the alternative to solve dispute. Only recently, in the new Indonesia construction law No. 2 of 2017, dispute board (DB) is preferred before arbitration.

![Registered Arbitration Case in BANI during a period of 2009-2013.](image1)

**Figure 1.** Registered Arbitration Case in BANI during a period of 2009-2013. [8]

2. **The Role of Experts**

Figure 2 shows the map of KPPIP (Komite Percepatan Penyediaan Infrastruktur Prioritas) – Accelerating Priority Infrastructure Provision Committee priority projects spreading out in Indonesia.

![Priority projects spreading out in Indonesia.](image2)

**Figure 2.** Ongoing infrastructure projects spread out in Indonesia. [5]

The big reason behind all of these is the huge commodities transportation and public transport costs between regions on national scale. For example, transportation of commodities from China is cheaper than from Java to Sumatra. If per kg from China is priced at Rp 10,000,-; from Java to Sumatra, it can
cost more than Rp. 30,000,-. Because of these conditions, the government has made massive improvements and development of supporting infrastructure to all regions of Indonesia. This is done by the government as a form of investment to encourage economic growth in the future. The government hopes that the availability of adequate infrastructure will trigger economic growth in Indonesia, which impacts on the growth of the social life of the community, especially in areas close to the built infrastructure. Figure 3 below shows that infrastructure budget increased rapidly by the year 2016 to 2017.

![Infrastructure budget chart by the year 2015 to 2019.](image)

Infrastructure development is a continuous process that covers all aspects of people’s lives - including social, economic, political and cultural aspects with the main goal of improving the welfare of the citizens as a whole. Therefore, the role of education in infrastructure development in Indonesia is very strategic. Infrastructure development should involve the active role of academics such as universities, experts in the fields of engineering and legal aspects, and research institutions in the process of design, implementation, development, and review. By involving the role of academics, it will create a domino effect for future development of infrastructure that will be carried forward by future generations. Research will develop which impact on the growth of quality human resources over time. In addition, assistance provided by certified experts will increase the reliability of infrastructure projects built in Indonesia.

### 2.1. Construction Problems: Failures or Disputes?
Infrastructure holds an important aspect for economic growth and for the welfare of society, however we often encounter various damage or failure within the projects. Is it “failures” or “dispute”?

#### 2.1.1. Typical Causes of Failures
Unexpected factors or “Act of God” type failure as mentioned by the insurance policy in general are distinguished then failures that can be predicted (predictable) or human error type of failure. Geotechnically, most building and construction failures in Indonesia are caused by a lack of understanding of problematic land [6]. There are at least two buildings / construction collapsed in Jakarta due to the fault of designing very soft soil foundations [2]. Some land in Indonesia is very soft and expansive. An understanding of soil-water interactions when construction near the river or sea edge is also usually not seriously considered by most geotechnical engineers [8]. Uniquely, this is what often escapes design and impacts on problems later on.
In this case, the designers missed not only workmanship but the basic understanding of typical offshore design where hydro-geotechnical multi disciplinary comes into play. This incident may caused by scour that happened on top layer of soil around the pile. Scour is the loss of soil because of erosion in river bottoms or in waterfront areas. A hydraulic evaluation forms the basis for estimating the scour zone, which can extend several meters below the river bottom. All foundations must extend below any potential scour zone, so deep foundation (usually piles) are usually necessary. These foundation must be designed to safely support the design loads even if the upper soils are lost to scour.

Scour also reduce the lateral load capacity of piles because the upper soils are no longer present to provide lateral support. In other word, the distance from the structure to the ground surface becomes greater, so the moments in the pile increases. Therefore, it becomes necessary to use larger pile sections or battered piles to support the lateral loads.

Another case history failures involving that is diversion Tunnel is located below the spillway at an elevation of + 164.00 meter, construction type selected in this section is circular reinforced concrete lined, reinforced with rock bolts and steel ribs on the body of diversion tunnel. The Tunnel + 550 meter length and 10 meter of diameter. Diversion tunnel is expected to drain the water discharge plan for 3200 m³/second. Dam project is the result of cooperation of four governmental contactors in Indonesia.

This case position is related to a construction claim of flood incident and roof collapsed in a diversion tunnel that both of them took place in year 2010, at Dam Project-West Java. The successful Novum are found in both of cases. In the flood incident, the successful Novum was: the extreme climate anomaly of La Nina caused the increasing rainfall intensity, and eventually impact to water entered the diversion tunnel and causing extensive damage.

Figure 6 shows questions on its design, analysis and common practice in the world. Figure 7 shows blasting works by the spillway contractor that affecting works of contractor handling the diversion tunnel.
According to Noon, R.K. (2001), Forensic Engineering is the implementation of engineering principles, knowledge, skills, and methodologies to answer questions of fact that have legal ramifications [10]. Initially, we only know the end results. This could be a building failure. Then the expert has to reconstruct it in order to know what causes it. Questions that should be answered is who, what, where, when, why, and how it happened.

Since last decade, Forensic Geotechnical Practice in Indonesia had gained National and International recognition through its involvement in solving construction disputes with: Contractors, International Insurances, Government, Developers/ Owners, and/or other Private Sectors. The growing number of construction cases solved by non-litigation institution in 2014 is estimated of more than 100 million USD which was believed still increases by 10-20% each year. Most building collapsed and construction failures in Indonesia did not happened by accident or Act of God. It started already when the designer composed the design or when the contractor interpreted the design to build the construction. Negligence and/or material defect could also contribute to the problem. Geotechnically, most of the building and construction failure in Indonesia were caused by inadequate understanding on Indonesia problematic soil.

Other building or construction failure in Indonesia were caused by less understanding on the nature and behavior of peat soil in Kalimantan and clay shale rapid degradation behavior in West Java. Understanding of soil-water interaction as the construction get closer to the riverside or ocean-side region were usually not considered seriously by most Geotechnical designer. Bridge collapsed, riverside retaining wall failures, or even road/infrastructure failures were mostly caused by lack of understanding on the soil behavior in those area.
2.1.2. Typical Causes of Disputes
The word “forensic” explains works that has to do with investigation. The result of the investigation should be bundled in such a way that could relate to law and courts. Based on Indonesia Construction Law No. 18/1999, construction failure is categorized as failure during construction, while building failures is failure after construction final handover for up to ten years where building insurance is usually still ongoing.

Indonesia has its own building and construction standard which is almost close the one adopted internationally such as the standard & practice in: USA, Japan, Malaysia, etc plus a few adjustment as dictated by Indonesia Geo-Ecological Structure. In other terms: if there is some criteria that is missing in the Indonesia code, a valid yet conservative related international code will be acceptable. This is agreed by ±27 professional association and stated in their guidelines of building failure and has been published as a guideline by the Indonesia Development Board of Construction, (LPJKN/Lembaga Pengembangan Jasa Konstruksi Nasional). LPJKN is stated in the law as the national authority for National Construction Regulation. It is also known that almost all professional association, just like HATTI (Indonesia Association of Geotechnical Engineer), were long time member of a worldwide international association namely The International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). HATTI professional member were mostly educated in Indonesia and/or abroad such as: USA, UK, France, Singapore, Japan, Malaysia, Australia, etc. which make them familiar with the international code of practice. It means that engineering practice in Indonesia is “friendly” and fully familiar with national or international construction standard, criteria, and specification.

2.1.3. Dispute Solution
Infrastructure construction failures that occur often cause disputes, both between contractors, insurance, owners, government, or the private sector. The law that regulates this is Indonesia Law No. 30 of 1999 ch. 11 on Alternative Dispute Resolution (ADR).

“Dispute of differences of opinion that are not of a criminal native in nature may be resolved by the parties through Alternative Dispute Resolution (ADR) based on their good faith, by waiving such resolution by litigation in district court.” (Umar, M.H., 2013) [7].

In that case, dispute in construction is usually solved through consultation, negotiation, mediation, conciliation or expert assessment, before it goes to arbitration. Litigation has long been the last resort due to its high cost and much longer time. Most of construction cases in Indonesia were not brought to litigation. There are 2 (two) solution that is usually chosen: nonbinding and binding ADR [1]:

(i) Non-Binding Dispute Resolution
- Conciliation: Where both parties appoint a conciliator who meets with parties separately in an effort to resolve differences. The main goals is to conciliate or seeking concessions.
- Mediation: Where both parties agreed to appoint a mediator (one or more) to solve differences in a private and confidential atmosphere in order to reach a win-win solution.
- Executive Tribunal: Where representatives of parties which previously has not been involved in the dispute, usually top management represent each party to negotiate for a settlement.

(ii) Binding Dispute Dispute Resolution
- Adjudication: This is a legal process where the arbiter or judge comes to a decision after reviewing evidence and argumentation including legal reasoning. Types of the disputes solved are: disputes between public officials or public bodies, between private parties and public officials or between private parties (individuals/ corporations).
- Negotiation. This is discussion for the purpose of exploring and arriving at an agreement in a legal way.
- Arbitration. It is a technique for the resolution of disputes outside the courts by a third party to review all evidence in the case and impose a decision that is legally binding on both sides and enforceable in the courts.
- Expert Determination: This is when the parties agreed beforehand to be bound by decisions of an independent expert.
- Litigation. The process of solving dispute through the public court.

Finally, the arbitration award shall be final and binding upon both parties to the disputes [12].

2.1.4. Dispute Boards or Arbitration?
The first construction law was introduced on May 7th 1999, i.e.: Law No. 18 of 1999. At that time construction dispute will be solved through non-litigation such as mediation, conciliation, and arbitration, or through litigation (Criminal or Civil Law). It addresses potential construction failures due to four related parties i.e.: The Owner, The Designer, The Contractor, and the management construction with the consequences cases could be brought to Civil/Criminal Law. Parties could also get involved for other reason under the potential “state lost” (kerugian negara). In this case, criminal law/misdemeanor could not be avoided, where responsible party will be brought to justice through litigation.

In the new law, no government agent should be involved since dispute will be solved amicably through mediation, conciliation, Dispute Board or arbitration [13]. The new law was issued in 12 January 2017 i.e. Indonesia Construction Law No.2 of 2017 on Construction Services, addressed solving disputes through mediation, conciliation, arbitration, as well as through Dispute Adjudication Board. The latest is a completely new thing for Indonesia while actually the philosophy was deep rooted in Indonesia cultural heritage i.e. solving difference through “musyawarah” (peaceful understanding/ agreement).

When FIDIC published the “Red Book”, it includes the traditional English system for the pre-arbitral resolution of disputes by the engineer. This practice is well adopted in common law countries – but unknown in civil law Countries.

Based on the old law, construction or building failures could possibly cause by faulty design, faulty function, faulty construction, or faulty management. Investigation related to construction failure (during construction process) or building failure (after construction completed) is the typical work done by government personnel including police and expert.

In government as well as in privately owned construction facilities, police has the right to investigate and bring the case to the court. Investigation is done by the help of certified forensic expert. Most of the time, fault was punished in front of court, for proven mismanagement, which could bring people to jail as one of the punishment. In other case, both parties agreed to bring the case to arbitration.

Recently, we often heard on the suggestion that the role of “Dispute Boards” be included in an Multi-hundred million dollar international projects contract. This suggestion should be made carefully towards a specific project as the experts said. Dispute Boards has already exists in Indonesia Construction Law No. 2 of 2017 for almost 2 years but not yet followed by government ordinance, ministerial decree, and so forth. No wonder the author found in some foreign financed project which in its contract include DAB (Dispute Adjudication Board) as a dispute resolution board (not yet formed) – both parties prefers to solve the case through arbitration.
Figure 8. Timeline of FIDIC Contracts/Settlement of Disputes by DAB. [7]

As far as cost of DABs concern, the following is a quote from Christopher S, Sepällä presentation (2015) [14]:

- For multi-hundred million dollars project, a three-member DAB can cost much less than 1% of project cost, whereas international arbitration may cost 10 to 15% or more of project cost.
- Ad-hoc DABs are less costly than permanent DABs but, arguably, are not true DABs as they cannot perform a dispute prevention function.

However, since Dispute Board practice is something new for Indonesia, intensive training and procedures not to mention communication as well, should be introduced in detail by professional association – including practicing in a DAB case studies. With the existence of Dispute Boards, it is expected that the arising of Construction problems can be solved through mediation since Dispute Boards have been followed to guarding the cooperation project between the two parties from the beginning. To ensure the execution process of the Dispute Board decision, it is recommended that if the FIDIC Red Book is used, the parties must agree to a statement where if one of the parties fails to fulfill the DAB's decision, it is entitled to be able to go to arbitration (anyway), without referring to the previous dispute.

Finally, the author is in the opinion that Indonesia needs more time before applying Dispute Boards system as one of an alternative to resolve dispute in construction area. Intensive training/short courses and thorough understanding on the FIDIC Contract besides remuneration for the DAB Expert should be considered in a very detail manners.

3. Conclusion

Finally, this paper reach a conclusions as follows:

- Since the last 5 years, Indonesia government had adopted a progressive infrastructure development project of infrastructure in all part of Indonesia. It is hoped that the form of investement will trigger economic growth in Indonesia. However, every construction project carries its years of serviceability. Not so often, some cases happened – during that time, due to the unfulfillment of engineering standard of design, construction, management and usage. This brings consequence of cost, disfunction/ failure and sometimes lives. However, this problem can be avoided from the early beginning – before the project start, by applying geoforensic engineering practice to determine the project to be in a certain geophysical area in specific parts of Indonesia. The word “forensic” explains works that has to do with investigation which comes as a result of relation to law and courts.

- Failures on construction that occurred often causes disputes, both between contractors, insurance, owners, government, or the private sector. The law that regulates this is Indonesia Law No. 30 of 1999 ch. 11 on Alternative Dispute Resolution (ADR). Based on this law, disputes can be resolved through Alternative Dispute Resolution (ADR) based on their good faith, by waiving such resolution by litigation in district court. The Indonesian Arbitration Center (BANI) and ADR open its door to international as well as national arbitration. The
arbitration award shall be final and binding upon both parties to the disputes. The new law – Indonesia Construction Law No.2 of 2017 on Construction Services, addressed solving disputes through mediation, conciliation, arbitration, as well as through Dispute Adjudication Board. Dispute Boards has already exists in Indonesia Construction Law No. 2 of 2017 for almost 2 years but not yet followed by government ordinance, ministerial decree, and so forth. Dispute board practice is considered to be more efficient since it costs much lesser than international arbitration. However, since Dispute Board practice is something new for Indonesia, intensive training and procedures not to mention communication as well, should be introduced in detail by professional association – including practicing in a DAB case studies. Indonesia needs more time before applying Dispute Boards system as one of an alternative to resolve dispute in construction area.

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