DIGITAL TOOLS TO SUPPORT PPP PROJECTS IN INDONESIA

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ABSTRACT

Objective: The Industrial Revolution 4.0 and the digital economy are challenges for Indonesia’s economy, particularly for 2020-2024. This Industrial Revolution has given challenges and opportunities to the onward economic development. Public Private Partnership (PPP) is a potential scheme for infrastructure development in Indonesia. The implementation of PPP in Indonesia is still a challenge, and the process has consumed time and complexity, which needs a solution to accelerate the development by using information technology as digital tools in PPP.

Method: This article uses a normative juridical approach, namely research that performs data processing, which essentially means an activity to analyze written legal materials. This research method refers to legal norms contained in laws and regulations as well as applicable legal norms, and the aim is to produce a PPP regulatory model in dealing with the era of the Industrial Revolution 4.0 and Society 5.0. Data collection techniques through Focus Group Discussions are carried out by inviting stakeholders of PPP in Indonesia, primarily to obtain information on the urgency of using information technology in the PPP process in Indonesia during the COVID-19 pandemic. This research has novelties, including using information technology as a digital tool in the PPP process that can be applied to the PPP stages.

Result: The contribution of this study provides for the PPP regulatory model using information technology as one of the characteristics of the Industrial Revolution 4.0 and Society 5.0, as well as the form of mapping the PPP process that can be used through information technology.

Conclusion: The results of this study are expected to be an input for the Indonesian government, especially the Secretariat of the Indonesian PPP unit, to create an integrated system by using information technology to support the PPP Project in Indonesia. Establishing a PPP information technology system must also be based on regulations in Indonesia and follow the regulation model that the government should regulate the use of information technology in the PPP Regulation. Information technology use in Indonesia’s PPP process starts from the planning stage to the agreement’s implementation.
FERRAMENTAS DIGITAIS PARA APOIAR PROJETOS DE PPP NA
INDONÉSIA

RESUMO

Objectivo: A Revolução Industrial 4.0 e a economia digital são desafios para a economia da Indonésia, especialmente para 2020-2024. Esta Revolução Industrial trouxe desafios e oportunidades para o desenvolvimento económico futuro. A Parceria Público-Privada (PPP) é um esquema potencial para o desenvolvimento de infra-estruturas na Indonésia. A implementação de PPP na Indonésia ainda é um desafio, e o processo tem consumido tempo e complexidade, o que necessita de uma solução para acelerar o desenvolvimento utilizando a tecnologia da informação como ferramentas digitais em PPP.

Método: Este artigo utiliza uma abordagem jurídica normativa, ou seja, pesquisas que realizam processamento de dados, o que significa essencialmente uma atividade de análise de materiais jurídicos escritos. Este método de pesquisa refere-se às normas legais contidas em leis e regulamentos, bem como às normas legais aplicáveis, e o objetivo é produzir um modelo regulatório de PPP para lidar com a era da Revolução Industrial 4.0 e da Sociedade 5.0. As técnicas de coleta de dados por meio de discussões em grupos focais são realizadas convidando as partes interessadas do PPP na Indonésia, principalmente para obter informações sobre a urgência do uso da tecnologia da informação no processo de PPP na Indonésia durante a pandemia de COVID-19. Esta pesquisa traz novidades, inclusive a utilização da tecnologia da informação como ferramenta digital no processo de PPP que pode ser aplicada às etapas do PPP.

Resultado: A contribuição deste estudo prevê o modelo regulatório de PPP utilizando a tecnologia da informação como uma das características da Revolução Industrial 4.0 e da Sociedade 5.0, bem como a forma de mapeamento do processo de PPP que pode ser utilizado por meio da tecnologia da informação.

Conclusão: Espera-se que os resultados deste estudo sejam um contributo para o governo indonésio, especialmente o Secretariado da unidade de PPP da Indonésia, para criar um sistema integrado utilizando tecnologia de informação para apoiar o Projecto de PPP na Indonésia. O estabelecimento de um sistema de tecnologia de informação de PPP também deve basear-se nos regulamentos da Indonésia e seguir o modelo de regulamentação segundo o qual o governo deve regular o uso de tecnologia de informação no Regulamento de PPP. A utilização da tecnologia da informação no processo de PPP na Indonésia começa desde a fase de planeamento até à implementação do acordo.

Palavras-chave: revolução industrial 4.0, tecnologia da informação, projetos de PPP.

1 INTRODUCTION

The need for infrastructure is still a primary focus of Indonesia's development. Increasing productivity and the economy requires adequate facilities and infrastructure to support sustainable economic mobility. In its growth, one of the critical aspects is the...
availability of proper infrastructure. The availability of adequate infrastructure is expected to increase the flow of goods and services circulation and improve people’s welfare (Kumar, Zindani, and Davim 2019). Other than that, infrastructure may also create national development acceleration in Indonesia.

The effort to increase national economic growth is carried out to face the challenges of the global financial crisis. This is also in line with the increasing need for adequate infrastructure development, and infrastructure development will emphasize national connectivity, which aims to improve the economy and the smooth flow of goods and services in the territory of Indonesia. Following RPJMN 2020-2024, infrastructure is one of the central government concerns that must be pushed and increased. The limitations of cost to accelerate the development seem to require innovation and other financing alternatives, one of which is through the PPP financing scheme, which is regulated in President Regulation Number 38 of 2015 concerning Government Cooperation with Business Entities in Infrastructure Development (President Regulation 38/2015).

Public-Private Partnership, from now on referred to as PPP, is a collaboration between the government and business entities in the infrastructure development for the public interest by referring to the specifications previously determined by the Minister/Head of Institution/Head of Region/State-Owned Enterprises/Regional Owned Enterprises, which partly or wholly uses the resources of the business entity by taking into account the risk sharing between the parties. With the presence of PPP, it is hoped to be a solution to accelerating infrastructure development in Indonesia. (Adb 2014).

According to RPJMN IV for 2020-2024, 7 development agendas are set, one of which is strengthening infrastructure to support economic development and essential services. Infrastructure strengthening is aimed at supporting economic activities and promoting equitable distribution of national development. Indonesia Government will ensure the infrastructure development is based on regional needs and advantages through:

1. Making regional advantages as a reference to determine regional infrastructure needs;
2. Improved regulation, guidance, and supervision in the development;
3. ICT-based urban infrastructure development;
4. Rehabilitation of inefficient facilities and infrastructure;
5. Facilitate the licensing of infrastructure development;
This aspect of Industrial Revolution 4.0 and the digital economy is an economic challenge in the 2020-2024 (Deguchi et al. 2020). This Industrial Revolution provides challenges and opportunities for future economic development. This industrial revolution gives a challenge and opportunity for onward economic growth. On the other hand, digitalization, automation, and the use of artificial intelligence in economic activity will increase the productivity and efficiency in modern production and provide conveniences for consumers. Digital technology also helps the development process in various areas, including education through distance learning, e-government, financial inclusion through fintech, and the development of MSMEs along with the development of e-commerce (Rojko 2017). However, on the other hand, the story of the Industrial Revolution 4.0 can potentially cause job losses worldwide. Studies from McKinsey estimated that 60 percent of jobs worldwide will be replaced by automation (Loeber 2018). In Indonesia, 51.9 percent of employment is estimated to be lost. In addition, the growth of online-based businesses and buying and selling activities has not been followed by efforts to optimize state revenues and supervise tax compliance on these transactions. This is important considering that digital is naturally a cross-country (Wood et al. 2015). The PPP system in Indonesia still can be regarded as conventional, meaning that it has not been entirely digitized and integrated through applications as a form of digitalization in this 4.0 revolution era (Basri et al. 2023). This becomes a new challenge when the COVID-19 pandemic occurs (Barreto et al. 2023) where all operational activities are limited so that PPP implementation in Indonesia is disrupted (Xu, David, and Kim 2018).

With such challenges, several government institutions use information technology(Vinh, Do, and Luc 2023) to implement PPP in their region. Nevertheless, regulation in Indonesia, mainly regulating PPPs, has yet to include information technology. The challenges during the pandemic made a higher need for digital and integrated PPPs, as was the case with several other countries that have used integrated applications to run PPPS, one of which is Singapore (Xu, David, and Kim 2018). Implementing the PPP process digitally in the form of an application will shorten the time and simplify the overall process. Besides that, the digital format of the PPP will also impact the value for money in the PPP scheme; the digital revolution will also cut the costs so that it is more effective. Using internet access and digitalization, of course, is a renewal of the PPP scheme; in addition to making it more accessible, digitization will become transparent in the PPP process.
Currently, the regulations regarding PPPs are regulated in President Regulation 38/2015, as well as Minister of PPN Regulation No. 2 of 2020 concerning the Procedures for Implementing PPP in the infrastructure development, and also several other implementing regulations covering government facilities, several others implementing regulation which covering government facilities, project preparation support and government guarantees. From such regulations, there has not been any regulation of the use of information technology in PPPs in Indonesia.

The object of this article is the use of information technology as one of the characteristics of the Industrial Revolution 4.0 in PPP projects. In this regard, the problem that will be studied is how information technology is regulated in the PPP process in Indonesia in the era of the Industrial Revolution 4.0.

Many articles on PPP have been studied but have not touched on the use of information technology and its regulation. Based on this, the novelty aspect of this article is regarding the use of information technology in PPP projects.

2 THEORETICAL FRAMEWORK

Public Private Partnership (PPP) scheme, known as Government cooperation with Business Entity scheme in Indonesia, opens more significant investment opportunities and provides long-term infrastructure development facilities far more optimal for the society (Report 2006). This scheme is regulated in President Regulation 38/2015, replacing President Regulation No. 67 of 2005 and its successor regulations. Article 1 number 6 of President Regulation 38/2015 has defined PPP as:

“Government and Business Entity Cooperation, hereinafter referred to as KPBU, is a collaboration between the government and Business Entities in the infrastructure development for the public interest by referring to the specifications previously determined by the Minister/Head of Institution/Head of Region/State-Owned Enterprises/Regional Owned Enterprises, which partly or wholly uses the resources of the Business Entity by taking into account the risk sharing between the parties.”

The article above's essential point is that PPP is a form of cooperation devoted to infrastructure development related to the public interest, covering the sharing of mitigation risk between the government and business entities to fulfill one another’s interests. Infrastructure development, as mandated in Article 1 number 5 President Regulation 38/2015, is an activity that covers construction to develop or increase infrastructure ability and infrastructure management activities, and infrastructure
maintenance to increase the benefit of the infrastructure itself (Kumar, Zindani, and Davim 2019; Zhou, San, and Liu 2023).

There is also a basic concept of PPP in Indonesia, which adopted from PPP has a definition according to Akintola and Mathias; PPP is a long-term agreement between private and government entities that aim to utilize resources, and the private entity can provide a facility or public services. The main principle in PPP is related to risk allocation, which is given from the Government to Private entities, and it will be assessed through a payment facility that is adequate under services that the project has produced. Furthermore, the Asian Development Bank has described PPP through (Adb 2014):

“A PPP refers to a long-term contractual arrangement between public (national, state, provincial, or local) and private entities through which the skills, assets, and/or financial resources of each of the public and private sectors are allocated in a complementary manner, to seek to provide optimal service delivery and good value, citizens.”

Thus, according to such a definition, PPP is a contract that is formed between public (government as State representative) and private entities, whereas skills, assets, and/or financial resources of each sector are being allocated to complement that both parties will mitigate risks to strive to provide optimal services to the society (Report 2006).

The classification of PPP characteristics is as follows (Marique Yseult 2013):

a. Long term;

b. More complex financing facilities;

c. The form of life cycle accountability managed by the private entities;

d. Performance-based returns;

e. Specifications based on results.

Regarding the PPP process in Indonesia, there are several parties in PPP legal relations according to President Regulation 38/2015, as follows:

a. **Government Contracting Agency (GCA)/Penanggung Jawab Proyek Kerjasama (PJPK)**

   PJPK is a party which may be in the form of a Ministry/Head of Institution/ Head of Region or State-Owned Enterprise or Region-Owned Enterprise as a representative of the government as an infrastructure provider or organizer who is responsible for infrastructure projects that have been mandated to Private Business Entity.
b. Private Business Entity /Badan Usaha Pelaksana (BUP)

A private Entity is a limited company or corporation that is established by a business entity (covers either State-Owned, Region-Owned, private business entity in the form of a Limited company, foreign legal entity, or cooperative) directly appointed by GCA or based on the result of winning bidders organized by the GCA. The selection of Private Entities follows the mandate of Article 16 Regulation of the Government Goods/Services Procurement Policy Agency Number 29 of 2018 concerning Procedures for Procurement of Business Entities Implementing infrastructure development through PPP on the Initiative of the Minister/Head of Institution/Head of Regions carried out through the auction stage (Tender one stage/two stages) or direct appointment.

c. Supporting Government Facilities

Supporting Government Facilities is a business entity as an institution that has represented the government to distribute supporting facilities for PPP project preparation to GCA in the form of a Project Development Facility (PDF) for the project to become adequate and safe to be conducted, thus ensure the financial certainty for a private entity who which to invest and/or contribute to providing services. The institutions representing Supporting Government Facilities are PT Sarana Multi Infrastruktur (PT SMI) and PT. Indonesia Infrastructure Finance (PT IIF).

(d. Infrastructure Guarantee Agency/Badan Usaha Penjaminan Infrastruktur (BUPI)

Infrastructure Guarantee Agency is a business entity as an implementing institution representing the government under the auspices of the Ministry of Finance to ensure the availability of funds for PPP projects if the private party does not receive payment facility rights from the GCA. Infrastructure Guarantee Agency in Indonesia is delegated to PT Penjaminan Infrastruktur Indonesia (PT PII) or Indonesia Infrastructure Guarantee Fund (IIGF) with the aim of not only providing guarantees for projects but also improving creditworthiness, especially bankability in PPP projects for the sake of certainty from the private entity as investors or organizers.

Besides that, other regulations which regulate PPP are Minister of National Development Planning/Head of the National Development Planning Agency Regulation Number 2 of 2020 concerning Amendments to the Regulation of Minister of National Development Planning/Head of Bappenas No. 4 of 2015 concerning Procedures for Implementing Government Cooperation with Business Entities in the infrastructure
development (Ministry Regulation 2/2020). Based on Article 10, PPP in Indonesia is carried out through stages, including:

1. **PPP Planning Stages**
   
   In the planning stages, GCA has the Ministry/Head of Institution/Head of Region planning the infrastructure activity cooperating with business entities. Furthermore, identifying and determining PPP also carries out PPP budgeting and finally categorizes PPP.

2. **PPP Preparation Stages**

   Preparation of PPP can be conducted along with the business entity or institution/organization based on an agreement. In the planning stages, the pre-feasibility study is followed by a plan for government support and government guarantees, continued by determining the procedure for returning the investment of the implementing business entity. Finally, land acquisition for the PPP will be conducted.

3. **PPP Transaction Stages**

   The transaction stages will be divided into two procurements. The first one is Private Entity procurement in KPU transactions, which consists of Private Entity procurement, signatory of PPP agreement, and fulfillment of financing for infrastructure development by the Private Entity. Second, procurement for business entities in the context of PPP is carried out after determining the location of the land required for the implementation of PPP.

4. **PPP Implementation of Agreement Stages**

   After the private entity is selected and signs the PPP agreement, the next stage is implementing the Agreement. PPP consists of preparation for the implementation of the PPP agreement and the performance of the PPP agreement. The stage of controlling the implementation of the PPP agreement will be conducted during the construction service provision until the PPP agreement has terminated.
2.1 THE INFORMATION AND TECHNOLOGY DEVELOPMENT IN INDONESIA: INDUSTRY 4.0 AND 5.0 FRAMEWORK

Industry 4.0 aims to create factories for manufacturing, where manufacturing environments are made intelligent through cloud computing capabilities, the Internet of things, and cyber-physical (Lee et al. 2015; Alrjoub et al. 2023). The distinct intelligent
manufacturing systems can change the physical world into a digital twin or a cyber twin and hence easily monitor and make effective decisions of the related processes (Hamzallari and Ortenca 2023). The cooperation with machines, sensors, and humans and real-time communication between them have made the task easier (Wang et al. 2016a, b). Thus, industry 4.0 aims to transform industrial value chains, business-related models, and production value chains by combining embedded and intelligent production systems (Schwab 2016).

Through the development of Industrial Revolution 4.0 and 5.0, which use new technology, including Information Technology (IT), robots, sensors for inspection systems, and maintenance, which require special skills, early detection of places that need to be repaired can be done. Therefore, unexpected accidents will be minimized, and time spent on construction work will be reduced, while at the same time, safety and productivity will be increased (Verlag and Nomos 2019).

The presence of data and information-based technology in the construction sectors influences the construction method and the perspective of the perpetrators. The workers involved in the industry must make the best use of technology while still considering the effective and efficient use of natural resources. This influence will also occur in the design of the building according to its function, including adjusting to natural conditions and the location of the building. For this reason, the technology that creates the design of buildings is planned to use an automatic system appropriate to the situation changes, including the construction materials. For instance, in facilities in an earthquake-prone location, an earthquake-resistant design is made to a particular scale, and supporting materials are selected (Vecchi, Veronica 2021).

In the economic law aspect, the government as regulator must be ready to face the Industrial Revolution 4.0 and 5.0, especially in infrastructure development. Governments may regulate the direction and course of the digital economy in an order that benefits the State and society, and infrastructure readiness also needs to be improved (Salgues 2018).

The usage of ICT according to CODE Theory in their book titled “Code and Other Laws of Cyberspace,” which was created in 1999, Lawrence Lessig stated that computer systems or computer software (or “West Coast code,” refer to Silicon Valley) regulates in the same way as the legal system (or “East Coast Code,” refer to Washington, DC). Lessig argues that there are four central regulators, namely law, social norms, markets,
and architecture, each of which has a significant impact on society and whose implications must be considered.

Furthermore, Lawrence Lessing stipulates that four constraints regulate this pathetic dot— the law, social norms, the market, and architecture—and the “regulation” of this dot is the sum of these four constraints. The government has a range of tools that it uses to regulate. Cyberspace expands that range. The code of cyberspace is becoming just another tool of state regulation. (Lessig and Lessing 2006):

In further developments, Lawrence Lessig, in his book “Code Version 2.0” which is a revision of the previous book “Code and Other Laws of Cyberspace,” states that (Lessig and Lessing 2006):

“The problems that cyberspace reveals are not problems with cyberspace. They are real-space problems that cyberspace shows us we must now resolve—or maybe reconsider.”

In *Cover Version 2.0*, Lessig explains how four different regulatory modalities interact to support or undermine a right, specifically, to describe how to regulate human behavior in cyberspace. The law regulates behavior in cyberspaces. Choices between values, choices about regulation, control, and the definition of freedom of space are all part of politics. Code codifies values, but most people think code is just a matter of manipulation issues. Or as if the code is better left to the market or left to be untreated by the government,(Lessig and Lessing 2006)

Such a statement implies that the problems that are caused by cyberspace are not problems of cyberspace itself but rather problems that occur in the real world shown by cyberspace, which must be sought to be resolved or may have to be considered Field(toffler 1990).

In his writings, Francis Lim states that “the technology development has its limit, in the sense of human welfare thanks to the rapid development of technology is not accompanied by the development of morality.” (Osinski et al. 2017) human experience and culture change due to the application of technology, which, in a sense, is an alien from the culture. However, this has become a kind of warning to be aware of the effect that technology brings.

Lessig argues that politics are the processes where we collectively decide how we must live. It does not mean that this is a space where we conduct collectivization; a collective may choose a freedom government. The point is different from the substance
of choice. The essence of politics is the process. Politics is a process in which we think about how things must be done. (Toffler 1970)

Norms are applied in the real world, and norms also regulate behavior in cyberspace. For instance, when we talk about politics that corners one party in social media, it will make us the target of ridicule; talking too much in online discussion forums might take you to be on a blacklist. In each case, a set of agreements/understandings limit how to behave and is again carried out through the threat of sanctions imposed by society. (Ray 2018)

Markets, indeed, regulate how to behave in the virtual world. It is necessary to define the access pricing structure, as if not done, the signal will be busy due to over-access (AOL learned this dramatically when it shifted from hourly to average rates). The location where internet sites can be accessed is a starting point for calculating access fees since online services have existed for some time. Advertisers reward popular internet sites since online services with fewer visitors will cause a reduction in revenue. These behaviors are all functions of market constraints and market opportunities. (Adam and Dzang Alhassan 2020)

Finally, “Code” is an architecture that regulates how to behave in the virtual world. Software and hardware make a set of settings for cyberspace, limiting how you can behave. The substance of these restrictions may vary, but they provide a certain experience for you to interact in cyberspace. In some places (online services like AOL, for instance), you must enter a password before you can gain access, while in others, you may access by going through an identification process or not. On some sites, the transactions you make generate a trail that links the sites’ addresses back to you automatically, while on other sites, it only happens if you want to. Furthermore, in other places, you can speak the language the receiver can only hear (through encryption); in others, encryption is not an option. “Code” or “Software” or “architecture” or “protocol” sets these features. They limit several behaviors by creating other behaviors that might or might not. This code embeds certain values or makes certain values impossible. In this sense, “code” is a rule governing the real world. (Verlag and Nomos 2019)

Laws, norms, markets, and architecture interact to develop an environment known by “netizens.” The creator of “Code,” “software,” “architecture,” or “protocol” is “architect.” The four of such modalities can be drawn as follows:
In his first book, Lesslig stipulates that several issues can be concluded from four modalities that first, they interact. Prohibitions imposed by one may also be enforced by the other, or another may weaken prohibitions imposed by one modality. Second, if we would like to understand how huge a person's freedom is at a certain time to do something, we must consider how all four modalities interact. Third, the four modalities are on one’s own; however, the law has a special role in influencing the other three. (Tolstolesova et al. 2021) Lesslig's statement strengthened in the second book, “Code Version 2.0,” which stipulates:

Lesslig, in his book "Code 2" explains the control architecture that occurs naturally on the internet. The Internet naturally has its architecture, and managing human behavior is difficult. (Lessig and Lessing 2006). The Internet is not to be architected by the State, but rather by the Internet users for them to do trades. The Internet was not created because of the government’s conspiracy but solely because of pragmatically, economically motivated changes. (Lessig and Lessing 2006) The government is also an important ally and a regulatory framework regarding the use of information technology in PPP projects can be created. In other words, the government can help trade and help itself, but the government still plays a big role in directing or changing people's behavior regarding the use of ICT. (Xu, David, and Kim 2018)

In Fig. 2, technology may harm norms and laws; they also may support them. Several constraints might affect the other; others make some impossible. Norms limit through stigma imposed by some communities; markets limit through price, which they determine; architecture limits through physical burden they give; and law limits through
punishment. We may call every constraint a “regulator,” and we may assume each of it is a different modality regulation. Each modality has its complex characteristic, and interaction between these four is also hard to draw. I have worked on this complexity in more detail in the appendix. For now, it is enough to see that they are connected and, in a certain sense, combined to produce regulations that are the subject of our sad point in certain areas. We may use the same model to describe the regulation of behavior in cyberspace.

Code software architecture, or protocol, has set these features chosen by the code writers. They limit several behaviors by making the other behaviors possible or not possible. Code attaching certain values or creating certain values becomes impossible. In this sense, it is also a regulation, and architecture’s code in real space is a regulation. Likewise, in real space, the four modality has regulated cyberspace.

Architecture, law, and customs maintain and represent whatever balance has been achieved in real space. As we build and inhabit cyber communities, we must create and maintain similar bargains, even though they will be embodied in software structures and electronic access controls rather than architectural arrangements.

Law, norms, market, and architecture interact to develop an environment that the “netizens” well know. Code writer, as Ethan Katsh stipulates, is an “architect”. However, how could we “create and maintain” the balance between these modalities? Which tools do we have to achieve different constructions? How can these mixed values of real space be carried over to cyberspace? How can the mix be changed if changes are desired?

Therefore, through the code theory, the PPP process, which is full of regulation and process, may be interpreted into a code outlined in Indonesia's PPP integrated information system. This integrated system related to several ministries and institutions is expected to make this system easier and faster for the PPP process.

3 METHODOLOGY

This article uses a normative juridical approach, namely research that performs data processing, which essentially means an activity to analyze written legal materials. This research method refers to the legal norms contained in laws and regulations as well as applicable legal norms, and the aim is to examine the PPP regulatory model in dealing with the era of the Industrial Revolution 4.0 and Society 5.0. Data collection techniques through Focus Group Discussions were carried out to obtain input regarding the urgency
of PPP regulation in the era of Industrial Revolution 4.0 and the PPP regulation model in the age of Industrial Revolution 4.0. In this activity, the author interviewed various PPP stakeholders in Indonesia, including GCA, Private Entities, Regulators, and Consultants. During the discussion, several things were discussed, including:

1. Obtaining complete, factual, and comprehensive information regarding the issues and challenges found in the PPP process, including the procurement of Business Entities in the PPP scheme practices that have occurred so far related to the mechanism, processes, and procedures for the procurement of PPP Business Entities; and
2. Obtaining complete information related to the strategies that may, will, and have been implemented to optimize the utilization of information technology development in the era of Industry Revolution 4.0 may accomplish the mechanism, processes, and procedures of the PPP Business Entities to be more effective and efficient.

4 RESULTS AND DISCUSSION

PPP is one of the alternative financings in infrastructure development to provide better public services, either quality and/or quantity; in addition to this scheme, the participation of business entities in infrastructure development through the PPP scheme or pattern is to accelerate infrastructure development where in its implementation in Indonesia. PPP is conducted under six principles: partnership, benefit, competition, risk control and management, effectiveness, and efficiency. The principle of partnership means that cooperation between the government and business entities is carried out based on the provisions of laws, regulations, and requirements that consider both parties' needs. The principle of benefit is the infrastructure development by the Government and Business Entities to provide social and economic benefits for the society. The principle of competition, namely the procurement of Business entity cooperation partners, is carried out through fair, open, and transparent selection stages. It pays attention to the principles of fair business competition. The principle of risk control and management emphasizes that cooperation in infrastructure development is carried out through risk assessment, development of management strategies, and mitigation of risk. The Principle of Effectiveness is that cooperation in infrastructure development can accelerate development while improving the quality of infrastructure management and maintenance.
services. The principle of efficiency is that the infrastructure development cooperation meets the funding needs sustainably through the private funds' support.

As for current developments, Indonesia, in its infrastructure development, is still developing ideas originating from the Industrial Revolution 4.0. The rapid development of technology, including the presence of human roles being replaced by the presence of intelligent robots, is considered to be able to degrade the role of humans. This is the background of the birth of Society 5.0.

The development era of Industrial Revolution 4.0 is marked by the increased connectivity, interaction, and the increasing convergence of boundaries between humans, machines, and other resources through information and communication technology. This revolution is a big leap in the industrial sector by fully utilizing information and communication technology in the production process and throughout the value chain to achieve the highest efficiency to create new and digital-based business models.

Information technology is critical and needed in PPP, mainly regarding stages implementation of Land Data Planning, GCA Fiscal capacity, return of investment mechanism, Preparation: Integrated market system sounding and consultation, Transaction: e-procurement and online contractual stages, Monitoring: online monitoring platform, project e-database.

The integration between ministries in implementing PPP needs to be addressed first. The determination of integration between ministries and ministries that lead the PPP needs to be stated in legislation. After integration between ministries, it can be implemented concerning the data centers, equitable internet access, and e-government.

Constraints that may be faced are the ministry's data input and integration processes.

In addition to the process side, the biggest challenges in PPP are planning, preparation, monitoring, basic validation in the regions, regulatory mechanisms, and conflict of interest between policymakers. The development needed is an information technology ecosystem, equitable internet access, one data policy, and e-government policy. The Presidential Regulation may be amended only with a note that it is necessary to ascertain who is responsible for organizing a PPP with an information technology system in Indonesia.

From the business perspective, information technology is needed to facilitate the PPP process. Still, if this information technology can be calculated as a cost burden, it is feared that it will increase the cost, which must be adjusted. Therefore, business actors
expect the implementation of information technology will only become a government system while business actors only use it to facilitate the process.

The use of information technology in PPP stages embodies the principle of PPP implementation in Indonesia. The development of information technology will accelerate the implementation of the PPP stage; as such, a PPP scheme will create alternative financing, often used by the Government and Business Entities.

These developments, as well as the challenges, are necessary to be addressed by the Government as the policy maker to provide legal basis and protection for people accessing information technology; it is not limited to the processes and stages of PPP, which currently has been widely used as an alternative financing scheme for infrastructure development. The legal basis and protection will provide certainty for the government and the society to innovate on PPP activities and stages; besides that, it will support the PPP stages to be implemented effectively by the principle mandated by President Regulation 38/2015.

The development of information technology in Indonesia’s PPP stages should be accommodated in the national law development, which is realized through the formation of legislation, Presidential Regulation, and Regulation of the Minister of National Development Planning/Head of National Development Planning Agency.

Furthermore, Presidential Regulation may be created based on the need for a ruling instrument in the administration of government power. Although it is not directly given a “mandate” by law, the rules that are reflected are general rules for specific matters deemed necessary to make a legal basis.

Referring to the formulation of the Presidential Regulation description above, it shows there is flexibility for lawmakers and initiators to be able to determine the form of choice of laws and regulations that follow the required needs with the following considerations:

1. Presidential Regulations have flexibility in determining the rules and norms to be drawn up, while government regulations are required to run in line with a particular law;

2. As a form of the President’s authority in exercising government power in determining the norms and rules, presidential regulations may implement the coordination function between ministries and/or agencies related to the norms and
regulations. This is a legal consequence since the ministries and/or institutions are under the President, who holds governmental power.

The explanation contained above is reflected in Article 13, Law No. 12 of 2011 concerning the Establishment Law and Legislation, which states that “The material for the content of the Presidential Regulation contains material ordered by law, material for implementing Government Regulations, or material to carry out the administration of government power.”

The contents of the Presidential Regulation to carry out the administration of government power are the authority of the President, which is following the 1495 Constitution as the holder of government power, the President may issue Presidential Regulations outside the orders of laws and Government Regulations for the realization of good governance. Thus, the authority possessed by the President includes the coordination function of institutions and/or agencies that have been delegated authority from the President to implement the Presidential Regulation.

As part of this research, we also resulted in the contents of the Draft Regulation of the Minister of National Development Planning/Head of the National Development Planning Agency on how the information technology in the PPP Process should be regulated, as follows:

1. PPP Stages

The implementation of PPP stages in Indonesia may utilize information technology customized to the needs and abilities of the Minister/Head of Institution/Head of Region/Directors of State-Owned Enterprises/Directors of Regional-Owned Enterprises as GCA.

2. PPP Project Identification

The implementation of the PPP identification project, especially in public consultation, may proceed through the utilization of technology information to reach out broadly and effectively to every society.

3. PPP Planning List Announcement

The announcement and dissemination of the PPP planning list may be conducted by utilizing technology information under the coordination between the Minister of Planning and the Minister/Head of Institution/Head of Region who identifies the infrastructure development to collaborate through the PPP scheme.

4. PPP Transaction Stages
The implementation of PPP transaction stages may utilize the information technology, which will be customized to the needs and abilities of the Minister/Head of Institution/Head of Region/Business Entity Director/Regional-Owned Enterprise director.

5. PPP Market Consultations

To support the expansion of the implementation market consultation scope, GCA may utilize information technology based on the needs and capabilities of the GCA.

After the laws and regulations have been regulated, a practice of PPP will be carried out using information technology will become necessary, which will be part of the e-government process in the PPP issues. However, in the PPP process, the private party, which is the implementing business entity, will participate in the process.

The results of FGDs’ relevant stakeholders, including GCA, discussed and resulted that the use of information technology in the PPP stage and its regulation in Indonesia is essential because information technology is the only tool and facility designed to collect data in a PPP, as described in Table 1:

Table 1. FGD Result for the Use of Information Technology in PPP

<table>
<thead>
<tr>
<th>The Usage of Information Technology in PPP</th>
<th>GCA</th>
<th>Private Party</th>
<th>Procurement Institution</th>
<th>Supporting Government Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urgency</td>
<td>Utilizing information technology in supporting the implementation of PPP in Indonesia is very significant, in particular regarding: • Planning • Preparation • Transaction</td>
<td>Implementation and/or utilizing information technology in supporting the implementation of PPP in Indonesia is significant in several stages: planning, preparation, and transaction. Request for Proposal online use of information technology to the private party from the construction stage until handover of assets and reporting.</td>
<td>It is significant especially in PPP transaction stages, covering pre-qualification stages, announcement and qualification results through electronic and virtual data rooms. Basically all of the PPP process needs one information system in a comprehensive and integrated manner accompanied by the collection of paperless PPP documents to facilitate the implementation and efficiency of PPP.</td>
<td>The significance of implementing and/or utilizing information technology is on the planning aspect; website development, the usage of “microsoft office” platform to do qualitative and quantitative analysis, project screening, transaction; the usage of data room, monitoring; developing e-monev which supported by limited liability company under the government.</td>
</tr>
<tr>
<td>Challenges</td>
<td>• Uneven availability of information technology in all regions • The costs incurred are quite expensive • Data security risk, procurement documents, and private party proposals are “confidential” • Maintenance risk • Human Resources</td>
<td>• Uneven availability of information technology in all regions • Legal certainty of the use of information technology in the PPP stages</td>
<td>Challenges in the use of information technology are particularly related to: • Uneven availability of information technology in all regions • Human resources and funding • Information systems that are not yet centralized and integrated (integrated data) • The process of identifying PPP stages that do not need to use information technology requires time and more intense discussion The information system is not yet ready to implement the policy on the use of information technology in the PPP stage.</td>
<td>The challenges in the use of information technology, particularly related to uneven availability of information technology in all Indonesian regions, especially related to the consensus of ministries/agencies, it becomes a challenge if you want to apply information technology in the PPP stages, because each stage is in a certain ministry/institution.</td>
</tr>
</tbody>
</table>
### Information Technology policy in PPP

The policy on utilizing information technology in the era of Industry Revolution 4.0 needs to be supported by the readiness of PPP regulation related to stakeholders’ role in implementing PPP through information technology, by recommending the establishment of Ministry of Finance regulation. Policies in the use of information technology in the industrial revolution 4.0 need to be supported by the readiness of PPP regulations related to the role of stakeholders in supporting the optimization of the use of information technology in Indonesia PPP transaction since the Institutions are the most confusing element in PPP, especially for investor side, therefore it need a leading sector/champion which leads the PPP in Indonesia.

### Implementation of ICT in PPP Processes

- Information technology 4.0 in supporting efficiency, effectiveness, and transparency in supporting PPP stages in Indonesia
- Regulation is required for the use of information technology in PPP
- Information technology can support PPP transaction stages to be more accountable, effective and efficient.

Rules for the use of information technology in the PPP processes are needed, not only in the procurement activities of business entities but also in other processes in PPP.

- There are no detailed arrangements for the use of information technology in the PPP process
- Uneven distribution of information technology in all regions of Indonesia the number of parties involved in PPP, the GCA and private party’s mindset towards PPP can be improved by changing the normative explanation of the PPP method into an interactive and interesting form
- Disintegration and management of information data becomes a challenge, especially if information technology in the PPP stage is applied integrally

### Implementation information technology in supporting Indonesia PPP

The implementation and/or utilization of information technology in supporting PPP implementation in Indonesia is significant in the PPP transaction stages, including pre-qualification activities.

- Planning
- Website development

<table>
<thead>
<tr>
<th>Source: Prepared by Authors (2023)</th>
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<tbody>
<tr>
<td>in supporting Indonesia PPP implementation is significant enough especially for planning aspects, transaction, monitoring, and evaluation, developing PPP procurement platform, progress report which needs to be put into the platform. Significant in the stages: Planning, Preparation, Transactions (performing request for proposals) procurement auctions for business entities, technical specifications, licensing documents, construction and operations, construction until asset handover announcements &amp; results of qualifications electronically, and virtual data rooms. Basically all PPP processes require a comprehensive and integrated information system accompanied by the collection of paperless PPP documents to facilitate the implementation and efficiency of PPP.</td>
</tr>
</tbody>
</table>
| - The usage of “Microsoft office” platform in conducting qualitative and quantitative analysis
- Project screening
- Transaction
- The usage of data room, monitoring; development of e-money |
From each PPP process in Indonesia, the researcher provides an analysis of the process that can utilize IT, which will be further described in the following scheme:

![Figure 3. PPP Process through utilizing PPP Information Technology](image)

The unintegrated IT platform and IT Ecosystem are obstacles to using information technology, especially in PPP. In the current condition, there is an authority in each stakeholder to the implementation of PPP stages. This can be solved and simplified using an integrated ICT (Tolstolesova et al. 2021).

PPP practices may refer to Australia. Australia has implemented PPP under the authority of the Ministry of Finance, which creates several PPP standards and procedures, including the contract model in various types of infrastructure. The Australian Ministry of Investment lists PPP investments under the coordination of the Ministry of Finance (Victoria Partnership).

If Indonesia adopts Australia's PPP system while simultaneously solving various shortcomings and obstacles in PPP, then PPP in Indonesia would need integration within one ministry to direct and guide other ministries in PPP implementation, including the use of information technology.

Information technology is critical and needed in PPP, especially in the implementation of the Land Data Planning stages, GCA Fiscal Capacity, Return on Investment Mechanism, Preparation Integrated market sounding and market consultation, Transaction: e-procurement and online contractual, Monitoring: monitoring platform online, project e-database.
The integration between ministries in implementing PPP needs to be addressed first. The determination of integration between ministries and ministries that lead the PPP needs to be stated in legislation. After integration between ministries, it can be implemented concerning the data centers, equitable internet access, and e-government. Constraints that may be faced are the ministry's data input and integration processes.

In addition to the process side, the biggest challenges in PPP are planning, preparation, monitoring, basic validation in the regions, regulatory mechanisms, and conflict of interest between policymakers. The development needed is an information technology ecosystem, equitable internet access, one data policy, and e-government policy. The Presidential Regulation may be amended only with a note that it is necessary to ascertain who is responsible for organizing a PPP with an information technology system in Indonesia.

From the business side, IT is needed to facilitate the PPP process, but if this IT can be calculated as a cost, it is feared that it will add the cost burden, which must be adjusted. Therefore, business actors hope that the implementation of IT will become a system from the government, while business actors only use it to facilitate the process.

5 CONCLUSION

The usage of information technology in the PPP process is the answer to the PPP process, which is considered long and highly complex. With an integrated PPP information technology system, the principles of effectiveness and efficiency will be fulfilled, and the PPP process will be clean and transparent. This PPP process is essential for the public interest and infrastructure needs, and for implementing business entities, it will make it easier to carry out work and transactions.

Establishing this PPP information technology system must also be based on regulations in Indonesia, and it is necessary to have regulations that contain and require the use of information technology in the PPP process. From this research, we also suggest a regulation model that the government should regulate the use of information technology in the PPP Regulation by amending the Presidential Regulation and implementing regulations of PPP in Indonesia.

The use of information technology in the PPP process starts from the planning stage to the agreement's implementation. In the planning process, there is an analysis of resources and costs that can use artificial intelligence in calculating it; besides that, in the
planning process, online meetings may also be conducted, which can record all processes and the preparation process.

Meanwhile, information technology could be accommodated in the transaction stage with a data room, e-procurement in selecting the business entity, network planning, and website for the winner's announcement. An e-monev report may be implemented in the PPP last process, but the report management also may be accommodated through information technology.

**ACKNOWLEDGEMENT**

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