The Collaborative Governance in Digital Infrastructure Development in Indonesia: A Public Policy Perspective

Assoc. Prof. Dr. Mochammad Rozikin[1], Dr. (Can) Ary Budi Sulistyo2, Assoc. Prof. Dr. Choirul Saleh[3], Assoc. Prof. Dr. Hermawan[4], Assoc. Prof Dr.Dr. Bambang Slamet Riyadi[5*]

[1,2,3,4,]*Universitas Brawijaya.Jalan MT, Haryono No. 163 Malang City, East Java, Indonesia.*

[5]*Universitas Nasional, Faculty of Law. Jakarta and Lecturer in Doctoral Program of Law. Universitas Jayabaya Jakarta. Indonesia; E-mail: bambang.s.riyadi@jayabaya.ac.id*

Abstracts: This research aimed to understand The Collaborative Governance in Digital Infrastructure Development in Indonesia and its interesting implication due at the ontological level and sociological level based on public policy perspective. The problem was analyzed using a qualitative study. Data were collected through observation and documentation. Data were analyzed using interactive steps, such as data reduction, data display, and data verification, supported by triangulation. The results indicated that Digital Infrastructure Development in Indonesia and its implementation are needed for providing information to stakeholders. This result provided inputs for making better regulation and policy for state agencies as public officials and practitioners.

Keywords: Collaborative Governance, Digital Infrastructure, Development.

1. INTRODUCTION

Technology is a rapidly evolving field. The development of this technology has penetrated in all aspects of human life. This provides changes in all forms of aspects of human governance towards the digital era, where the emergence of digital technology develops with the existence of internet networks and the use of information technology in every aspect of life. This digitalization can be utilized in all aspects, such as in terms of the economy, politics, social and culture, defense to governance. Technological developments have an impact on increasing pressure on almost every organization to carry out digital transformation because there is competition that always adjusts to the latest technology. This has influenced consumers to be more demanding and set higher standards of satisfaction than usual, for example, better and faster service whenever and wherever and with any device (FitzGerald et al., 2013). This provides a view that there is currently an innovation underway that leads to the use of information technology and digitalization of all aspects giving a positive impact on almost all aspects of people's lives. Digital Transformation has actually been carried out since the 1990s by several digital service providers, where an observer of the development of information and communication technology in the United States, (Tapscott, 1996), stated that the world economic development is undergoing a change from the dynamics of industrial society based on steel, vehicles, and highways to a dynamic new economic society formed by silicon, computers, and networks. Digital transformation is also defined as the use of technology that radically improves the performance or achievement of company goals (Westerman, Calméjane, Bonnet, Ferraris, & McAfee, 2011). Digital transformation brings many challenges that organizations must consider more carefully than before (FitzGerald et al., 2013).

The main objective of implementing this digital infrastructure development is to develop the quality of telecommunications networks that have an impact on the welfare of the Indonesian people. In the realm of public administration, this development is in the paradigm of development administration, in which this paradigm develops based on administrative needs in developing countries, including Indonesia. In looking at existing governance in the implementation of governance that adheres to a digital transformation system in Indonesia, it is necessary to examine it through the perspective of the collaborative governance paradigm. Collaborative governance (Ansell & Gash, 2008) is an arrangement that regulates one or more public institutions together with non-state actors and stakeholders involved in a collective decision-making process that is formal, consensus-oriented, and deliberative aiming to make, implement, and manage public programs or assets.

There are several previous studies that have relevance to the current research. One of the relevant previous studies is research conducted by Samara et. al. (2022) examining the interactions between actors in the development of digital infrastructure in Macedonia. The research found that there are differences in regional development and differences in digital infrastructure owned by the region. In general, regions with advanced digital infrastructure will develop faster than areas with weak digital infrastructure (Samara, Andronikidis, Komninos, Bakouros, & Katsoras, 2022). Rachmatullah and Purwani (2022) have also conducted research entitled an analysis of the importance of digitalization and information technology infrastructure in government institutions. The research found that there are still problems faced by Indonesia in the process of digitizing and developing this information infrastructure. Therefore, it is necessary to better utilize and improve the quality of e-Government, as well as to even out the development of this digitalization. It is hoped that from this digitization, the process of delivering information and public services to the community will be effective and efficient (Rachmatullah & Purwani, 2022). Digital transformation and the resulting business model innovations have fundamentally changed consumer expectations and behavior, putting enormous pressure on traditional companies and providing a profound impact on markets. Based on the existing literature, three stages of digital transformation have been identified, namely the topics of digitization, digitization, and digital transformation. The research identifies and describes growth strategies for digital companies and the assets and capabilities needed to successfully transform digitally using a literature study research approach. Digital transformation requires a certain infrastructure and organizational structure and has consequences for the metrics used to calibrate performance. To make a transformation, should develop a non-complicated organizational structure and IT internalization combined with analytical functional skills (Verhoefa et al., 2021). Toukola and Ahola (2022) examine the possibility of using digital tools to increase stakeholder participation in urban development projects using qualitative research methods with a case study approach. Data was collected by conducting 17 semi-structured interviews and participation in four planning workshops in a medium-sized city in Finland. The results show that digital tools provide multiple opportunities for stakeholder participation and each tool is associated with certain benefits and tradeoffs that contribute to achieving goals. Moreover, the digital tools used positively affect project success and stakeholder satisfaction (Toukola & Ahola, 2022).

Technology Adoption and Public Service has significant positive effect on Job Competency (Purbiyantari, Zauhar, Suryadi, Hermawan, & Riyadi, 2023b), study about the human resource management and its implication resulting in inputs for making better regulation and policy (Toruan, Gusti, & Riyadi, 2023), the implementation of performance accountability system for government institution leading to better regulation (Priyambodo, Wijaya, Wike, Sujarwoto, & Riyadi, 2023a). Performance Accountability System for Government Agency resulting in inputs for making better regulation (Priyambodo, Wijaya, Wike, Sujarwoto, & Riyadi, 2023b), leadership and service categorized into several themes are useful for improving police policy and practice (Purbiyantari, Zauhar, Suryadi, Hermawan, & Riyadi, 2023a), user satisfaction has a positive and significant effect on Organizational Performance (Sinulingga et al., 2023). Other previous studies analyzed the Critical Success Factors (CSF) of Public Private Partnership (PPP) Indonesia and the results are categorized into several themes useful for improving policy (Syahruddin, Wijaya, Suryono, & Riyadi, 2023), Innovative Climate mediates effect of transformational leadership on Innovative work behavior and workplace spirituality mediates effect of information technology on innovative work behavior (Susilo, Astuti, Arifin, Mawardi, & Riyadi, 2023), and the collaboration between civilians and military in Indonesia have to be involved the related institutions and should be conducted for making better regulation (Tjahjono, Suryono, Riyanto, Amin, & Riyadi, 2023).

The rule of law and the rule of justice will be made in line with the state constitution and regulations to maintain checks and balances (Hermanto & Riyadi, 2020; Riyadi, 2017; Riyadi, Atmoredjo, & Sukisno, 2020). Even, the conclusion of proceedings is evidence of Indonesia's weak attitude toward offenders in terms of law enforcement. The magnitude of the conflict of interest, which causes settlements to frequently be based on political bargaining, abuse of power, and interests means the state must continue to exercise control over Indonesia's abundant natural resources (Riyadi, 2020b, 2020a; Riyadi, Wibowo, & Susanti, 2020). Along with cooperation, competence, and performance, more research is still required into the causes, processes, and results of conflict management. Intrapersonal, interpersonal, production, and political malfeasance resulted in financial and social losses. Both sides will require intervention. Performance, capability, and partnership are all interconnected. Partnership and performance relationships must be thoroughly mediated by capability. Capability, cooperation, and information

exchange must be regulated by conflict resolution if they are to be successful and have a significant influence. Job satisfaction has a positive and significant impact on work performance (Feriyanto, Assery, Saleh, & Suryaningsum, 2017; Hendriarti, Othman, Arif, Assery, & Jamal, 2022; Saleh, Assery, & Dzakiyullah, 2018; Saleh, Assery, Sabihaini, & Suryaningsum, 2017; Tannady et al., 2022).

In Indonesia, the process of digitalization in society has been progressing rapidly. Based on data released by the Indonesian Digital Report for 2022, there are 370 million connected mobile devices, 204 million internet users with a total population of 277 million indicating that the growth of connected mobile devices and internet users in Indonesia is not lower than the population growth. The time allocation to use internet per day is 8 hours, whether used related to work or not. This amount is greater than the allocation of working hours in general (Riyanto, 2022). The implementation of digitalization in Indonesia is growing rapidly. On the basis of the total population in the State of Indonesia, the existence of cellular connectivity connected to the internet network provided by network providers in Indonesia is recorded to exceed the existing population. This means that the Indonesian people in general have followed the digitalization process currently running in Indonesia. This can also be called a digital transformation process.

The Indonesian government has an obligation to support the implementation of digital transformation in Indonesia. The responsibility of the Government in encouraging the implementation of digital transformation in Indonesia has been emphasized in Law Number 11 of 2020 concerning Job Creation. This policy intends to encourage all elements of the state, both the government and business entities, to jointly encourage the acceleration of telecommunications growth in order to realize digital transformation, especially broadband, which is investment-friendly. In the telecommunications sector, Law Number 11 of 2020 regulates the role of the Central Government and Regional Governments in facilitating telecommunications infrastructure by providing facilitation to telecommunications operators and providing joint facilities as stipulated in Article 34 A of Law Number 11 of 2020. Further policies regarding the role of the Central Government and Regional Governments in facilitating telecommunications infrastructure are further regulated in Article 21 of the Government Regulation Number 46 of 2021 concerning Post, Telecommunications and Broadcasting and Article 33 of the Regulation of the Minister of Communication and Informatics Number 5 of 2021 concerning Telecommunications Operations.

In all the forms of the policies listed above, there is no policy that has been proclaimed by the Indonesian government to regulate how digital infrastructure is distributed. Various forms of policies that emphasize the importance of equitable distribution of digital infrastructure development are only a point in every program and product of government policies related to this digital transformation. This condition is one of the main problems in this research, where there is a need for a policy regulating how the process of equitable distribution of digital infrastructure development by the Indonesian government is continuous and sustainable, both SOPs and other basic provisions which form the basis for the direction of digital infrastructure in Indonesia. However, the problem with digital infrastructure in Indonesia is the uneven development of infrastructure, resulting in a digital divide in Indonesia. Many areas in Indonesia are still not covered by telecommunication services and there is also a digital divide in where the need for digital infrastructure has not been fulfilled in almost all existing regions (Hadiyat, 2014). The problem is also the provision of cable networks in the form of fixed broadband services. In Indonesia, fixed broadband penetration is still low. Based on data obtained from AMPD Research (2021), in 2020, the fixed broadband penetration in Indonesia was only 12.4%, far below Malaysia (38%), Thailand (44%) and Vietnam (58%). Indonesia's internet (mobile broadband) penetration should have reached 53.75% by the end of 2020. Provided that not all areas in Indonesia are covered by broadband networks, the government encourages the increase in cable and cellular mobile network-based infrastructure development.

Based on the discussions above, it can be seen that previous researchers have attempted to see how digital infrastructure development is implemented in various places. Technological advances in digital infrastructure affect the progress of development in a region. Therefore, digital infrastructure renewal is important in meeting the needs of change towards digital governance in an institution. The main aspect to note is the existence of a supporting infrastructure that is in line with the internalization of IT through functional analysis capabilities. For this reason, various forms of institutions must consider digital infrastructure, both companies and government institutions from

the national, regional to local levels as a form of fulfilling the needs for the effectiveness and efficiency of development in the region. Several previous studies focused on measuring the success of digital infrastructure development using e-Government theory as the main theory that became the research analysis. However, in this research, researchers tried to find how the development of digital infrastructure using collaborative governance theory. Based on the explanation above, the problems found in the Collaborative Governance in Digital Infrastructure Development in Indonesia can be identified. Referring to the problem identification, the research question is how is the Collaborative Governance in Digital Infrastructure Development in Indonesia?

2. LITERATURE REVIEW

2.1. Public Policy

Public policy is a complex pattern of interdependence collective choices, including decisions to act made by government agencies or offices. Dunn argues that public policy is a series of actions determined and implemented or not carried out by the government that has a purpose or is oriented towards certain goals for the benefit of the whole community. The implications of this understanding are: the first form is the determination of government action, which is not only stated but also implemented in concrete form, based on certain goals and objectives, and is essentially intended for the benefit of the entire community. Public Policy analysis is an intellectual and practical activity aimed to create, critically assess, and communicate knowledge about and within the policy process. The policy analysis process has 5 interdependent stages that together form a complex and non-linear cycle of intellectual activity. These activities are sequential in time and are embedded in a complex, non-linear and essentially political policy process (Dunn, 2012).

The development of public administration paradigm emphasizes the focus, locus, and value to be achieved. The classical bureaucracy focuses on organizational structure and management functions, locus focuses on the government bureaucracy and business organization, while values focus on efficiency, effectiveness, economical and rational. The neo-bureaucracy focuses on behavior-based decision-making processes, management, systems, and research, locus focuses on government bureaucratic decisions, and values focuses on efficiency, effectiveness, economics and rationality. The institutions focus on understanding bureaucratic behavior and making decisions that are gradual and incremental in nature. The human relations, focus and locus on organization, as well as values are participation in decision making, minimization of differences, status, openness, self-actualization, and increased job satisfaction. The public choices focus on providing services to the community. Moreover, the New Public Management (NPM) is concerning on human values and social justice focused on organizational design based on decentralization, democracy, responsiveness, participation, and providing services needed by the community (Frederickson, 1976).

Public policy is related to the extent of authority and responsibility of the government and stakeholders. The distribution of power is related to law and policy. It is important to pay attention to the aspirations of stakeholders and the restructuring of the political and economic role of the state. Ineffective public services will cause social, political and economic problems. Public policy focuses on the collaboration for solving problems and goals. Collaborative has a broad scope and focus on substance and process in solving problems effectively. Nonhierarchical mechanisms and participation will provide a better contribution to collaborative public management with practices in the future (Ikeanyibe, Eze Ori, & Okoye, 2017; Kapucu, Yuldashev, & Bakiev, 2009). Hood (1991) put forward the principles of New Public Management: direct professional management, explicit performance standards and measures, greater emphasis on output controls, a shift to desegregation of units in the public sector, a shift to greater competition in the public sector, an emphasis on private sector styles of management practice, and an emphasis on greater discipline and parsimony in the use of resource (Hood, 1991).

Based on epistemological and sociological description of several definitions of public policy theory for refining the research, it can be stated that the making of multi-policies on Digital Infrastructure Development in Indonesia is a part of public policy theory.

2.2. Collaborative Governance

Collaboration is a general term often used to describe a pattern of cooperative relations carried out by more than one party. There are many definitions of collaboration put forward by various experts with diverse points of view. The various definitions are based on the same principles, namely togetherness, cooperation, sharing of duties, equality, and responsibility. The collaborative governance breaks down this crucial factor with dialogue, trust, and commitment. The good collaboration depends on trust, commitment, and understanding. Public and private stakeholders should have a consensus-oriented decision making to solve the crucial factors at hand and still require the development of collaborative forums. The development of public policy has a paradigm shift in governance. This development studies the behavior of stakeholders and networks who collaborate in policy making (Ansell & Gash, 2008). Collaborative management between stakeholders is necessary in decision making. It is important to learn what the decision-making facilities are and how to influence stakeholders. Reducing uncertainty and social learning are needed to reduce the limitations and complexities that occur (Fernández-Giménez et al., 2019). Collaboration provides for joint system exploration between stakeholders based on policy and stakeholders and public-private partnerships. Knowledge of obstacles and actions to overcome disasters is needed to implement a variety of different policies (Emerson, Nabatchi, & Balogh, 2012).

Collaboration is an attempt to make rules governing public affairs, both directly and indirectly. These institutions share an interest in regulating non-state affairs. In carrying out collaboration, each party must have a formal attachment and have a strong commitment to what was agreed at the beginning. The tasks are fully entrusted to each party while continuing to carry out coordination in planning and implementing programs that concern the public interest. Ansell and Gash (2008) are more interested in using the term public agency, with the intention to include public institutions such as bureaucracies, courts, legislatures, and other government agencies at both the local, state and federal levels. Smith (1998) adds the opinion that collaboratives are represented by key interest groups. Connick and Innes (2003) define collaborative governance as representing all relevant interests. The interested parties are not only from the government, but also the private sector and citizens who have concern for an issue. This is as stated by Reilly (1998) describing collaborative efforts as a type of problem solving that involves government agencies and concerned citizens (Ansell & Gash, 2008; Connick & Innes, 2003; Smith, 1998).

This collaboration concept also implies that non-state stakeholders will have real responsibility for producing policies. Therefore, the stakeholders involved must be directly involved in decision making. This confirms the participation of stakeholders in all stages of the decision-making process. Therefore, decision-making in collaborative forums will gain a consensus that is more oriented to the public interest. In general, there are 4 (four) stages in collaborative governance namely assessment, initiation, deliberation, and implementation. Stakeholder collaboration is an attempt to make rules governing all stakeholders who take care of public affairs, both directly and indirectly. While the stages of collaborative governance consist of 3 (three) stages, namely initial conditions, collaboration processes, and outcomes (Parmar et al., 2010).

The collaboration process goes through three main stages, namely initial conditions, process, and outcome or benefits. The following is an explanation of the three stages: 1) Initial Conditions; 2) Collaborative Process; And 3) Outcomes (Usefulness). In the collaboration process there are 5 (five) main stages, namely: a. Phase I – Face-to-face dialogue. Face-to-face dialogue is a necessary but not sufficient condition for collaboration. In the face-to-face dialogue, there are often different views between stakeholders, each of whom wants to reinforce stereotypes and increase their antagonism, but this dialogue is necessary to build effective collaboration to reach a common consensus; b. Stage II – Building trust. Building trust is a time-consuming process and requires long-term commitment to achieve collaborative working. Therefore, if history shows that there is antagonism between stakeholders, then policy makers or stakeholders must find time to build trust again. If stakeholders are unable to build trust, then a collaborative process will not be possible; c. Stage III – Commitment to the process. Stakeholder commitment to collaboration is an important factor in the success of the collaboration process. However, implementing this commitment is sometimes full of dilemmas. For example, stakeholders must comply with the results of deliberations as a form of commitment even though the decision requires joining stakeholders with different views. Therefore, commitment requires trust so that the responsibilities of each stakeholder can be carried out properly; d. Stage IV – Common understanding. At some point in the collaborative process,

stakeholders must develop a common understanding. Shared understanding includes shared vision, common mission, common goals, shared ideology, clear goals, clear and strategic directions, alignment of core values, and alignment of problem definitions; and e. Stage V – Intermediate results. The literature shows that collaboration will occur when the goals and benefits of collaboration are concrete. With clear goals, the direction of the collaboration will be focused and directed so that all processes can be carried out optimally (Ansell & Gash, 2008).

Based on the epistemological and sociological description of several definitions of collaborative governance theory for refining the research, it can be stated that the making of multi-policies on Digital Infrastructure Development in Indonesia can be analyzed by the concept of collaborative governance.

2.3. Digital Infrastructure

Information and communication technology can also be called digital technology. Digital or also called digital technology is the opposite of the analog technology, namely the information obtained is discrete or can be calculated. Through electronic devices, such as computers, electronic signals are converted into digital data consisting of the numbers 1 and 0. Digital technology (digital information) is very different from physical technology (physical information), which has a fixed place and time. Digital technology (digital information) can be reproduced and easily distributed, can be stored in multiple places, can be generated, and communicated automatically (Nomura, 2007). Digitization is a conversion process from analog to digital using digital technology and data with an automatic operating system and a computerized system. Digitization is the media process from printed, audio, and video forms to digital form. Digitization is carried out to create document archives in digital form. Digitization requires equipment, such as computers, scanners, media source operators and supporting software. Digitization is the process of managing printed documents to become electronic documents. Digitization is the increasing availability of digital data that is made possible by advances in creating, transferring, storing, and analyzing digital data, and has the potential to structure, shape, and influence the contemporary world (Brennen & Kreiss, 2016).

Digital technology is divided into three parts, namely Digital Artifact, Digital Platform, and Digital Infrastructure. Digital Artifacts are components of digital technology, applications, or content that offer certain functions and values to their users. An example of a Digital Artifact is Digital Storytelling or a concept of telling stories in a digital form, for example, with images, audio, video, and animation and is complemented by narration and music to convey information to users. Meanwhile, digital platforms can be defined as software-based platforms that allow users to operate in an interface through the modules they operate. An example of a Digital Platform is cloud computing and social media or a medium that allows its users to communicate anywhere and anytime without being limited by space and time in one application. Digital Infrastructure is defined as tools and systems that enable users to communicate and collaborate. Digital Infrastructure involves several users to collaborate with each other and produce systems that are related to one another. An example of Digital Infrastructure is 3D Printing. It is a process for creating three-dimensional objects where layers of material are formed with computer control so that they can create almost any shape or object. In the 3D Printing process, it requires the involvement of several users with the division of tasks, namely the process of drawing on a computer and the process of running the machine to turn the image into a real product (Rippa & Secundo, 2019).

Digital infrastructure can be divided into: 1. Hardware. It is physical equipment used to process various digital information processes. This hardware is used to perform input and processing to produce activities in an information system; 2. Software. It is in the form of detailed instructions, programmed to control and coordinate the performance of hardware components on a computer in a running information system; 3. Storage Technology. It is a storage technology in the form of physical media and software to store and organize data in the running information system process; 4. Communication Technology. It is a communication technology in the form of physical equipment and software that connects various components in a computer and transfers data from 1 (one) physical location to another physical location. This technology can be connected in a network that can share various data such as voices, data, images or videos. Meanwhile, in this communication technology, there is also a network that connects 2 or more hardware devices to share data or resources (Laudon & Laudon, 2004)

Adaptive digital infrastructure involves balancing the following three areas: 1. Human Resources. It covers roles, skills, and organizational structures involving infrastructure life cycle processes. The use of information technology requires changes in the competency profile of the organization's human resources, competency in use, and adaptation to process of changes that occur as a result of the use of this technology. The application of technology is expected to improve the quality of the individual the work environment for human resources in the form of ease of work and increased work productivity; 2. Technology. It consists of hardware, software, and services that are part of the infrastructure. The technology used should meet established standards, be reliable, safe, have flexibility to develop, and be cost-effective; 3. Process. It consists of standards and information that defines the lifecycle of the infrastructure. Utilization of information technology will make various paradigms, assumptions and limitations of a process change so that businesses must review the process and make changes if necessary. The application of technology is expected to provide benefits in the form of optimization and effectiveness of business processes and support decision-making processes at the strategic and operational levels.

The components of the digital infrastructure are 3 parts, namely: Platform, Pattern, and Service. (1) Platform, is an organizing concept that groups technology components into technical layers. According to Robertson, in general, infrastructure components can be divided into the following three levels: a. Physical level, covering physical connection, data storage, and computing facilities which are divided into three layers, in the form of network equipment, storage media, and operating system servers; b. Functional level providing facilitation for entering, processing, managing, and exchanging data divided into three layers, consisting of the database layer, integrator layer, and application server layer; c. Interface level, connecting facilities between subsystems such as humans with systems, systems with systems. (2) Pattern, facilitates application system patterns to infrastructure planning based on the platform used. The use of relationship patterns between components is as a reference in designing application infrastructure. The pattern of application system architecture is the crystallization of knowledge, expertise, and experience in developing application architectures by reusing expertise. There are three basic patterns based on their use, including: a. Transactions, transactions that result in changes to data managed by the system; b. Publish, access information available online; c. Collaborate, namely information exchange transactions between users/applications. (3) Services provide digital infrastructure components that applications can share. Service is a general module that provides a specific business function or service. Services can be program modules, applications, or a combination of several applications that implement business functions or services. Services are built by adding interfaces to access the functions of one or a group of application systems. In measuring the success of adaptive digital infrastructure, Robertson and Sribar (in Arifin, 2021), revealed 3 characteristics of adaptive digital infrastructure, namely: 1. Efficient, has the ability to provide components that can be used together by various application systems. 2. Effective, provides the ease of integrating and conducting interoperable with all available infrastructure components. 3. Agility, provides the ease of making changes to information technology infrastructure components in an effort to replace, upgrade, or overhaul.

(Robertson & Sribar, 2002).

Based on the epistemological and sociological description of several definitions of digital infrastructure theory for refining the research, it can be stated that the making of multi-policies on Digital Infrastructure Development in Indonesia can be analyzed by the concept of digital infrastructure.

3. METHODOLOGY

This research used qualitative approach was because it was in line with the aims of the research to describe and understand the phenomena, events, social activities, attitudes, beliefs, and perceptions of people. Qualitative research can be applied when research problems need to be explored deeper because previous theories or concepts are unable to capture the complexity of the problem under study. A qualitative research approach produces descriptive data in the form of words or writings and behaviors that can be observed from the subject and object of the study itself (Creswell, 2013).

Data in this research were collected through observation and documentation. Related documentation was gathered from many sources, such as internet media and library documents. Data were analyzed using 3 steps, which were data reduction, data display, and data verification referring to the interactive model. Data reduction is to sort out the main data, data display is to present the data, and data verification is to conclude the main themes of the results (Miles & Huberman, 1994).

Validity and reliability used triangulation based on the observation and documentation analysis to obtain valid and reliable data coping credibility, transferability, auditability, and confirmability. Credibility was related to the truth aspect by means of triangulation to compare the results. Transferability shows the applicability of research to other studies that readers can understand the results of qualitative research. The report was made in a detailed, clear, and systematic manner. Auditability means that it can be tested by examining the entire research process, since designing case studies, determining data sources, collecting data, analyzing data analysis, and making conclusions, where all the process and results can be traced and presented. Confirmability relates to the objectivity that the research results are agreed and accepted (Creswell, 2009).

4. FINDINGS

Result analysis was conducted based on related documentation and news from the internet sources. Then data reduction, data display, and data verification were used to obtain theme as follows.

The first theme. The Government of Indonesia has made efforts to realize information technology/digital services in which these services are contained in Indonesian government policies regarding the development of digital technology infrastructure, including: 1. Presidential Regulation No. 96 of 2015 concerning Broadband Plans for 2014 – 2019; 2. Law No. 11 of 2020 concerning Job Creation; 3. Government Regulation No 46 of 2021 concerning Post, Telecommunications, and Broadcasting; and 4. Regulation of the Minister of Communication and Informatics No 5 of 2021 concerning Telecommunications Operations. Based on the regulations above, in principle, they emphasize the importance of the role of the coordination function between the Central Government, Regional Governments, and authorized agencies in realizing the availability of equitable infrastructure through facilitation policies and/or facilities provided to telecommunications operators in building telecommunications infrastructure. In implementing the policy of facilitation and/or providing convenience, the Regional Government and authorized agencies are required to coordinate with the Minister of Communication and Information Technology. The Central Government and Regional Governments provide facilitation and/or convenience to telecommunications operators to develop telecommunications infrastructure in a transparent, accountable and efficient manner. In the operation of telecommunications, the Central Government and Regional Governments may participate in providing joint passive telecommunications infrastructure facilities for joint use by telecommunications operators at an affordable cost.

The second theme. Facilitation provided to be used jointly by telecommunications operators, including: land, buildings, and/or passive infrastructure at an affordable cost. Provision of facilitation and/or convenience to telecommunications operators to carry out telecommunications infrastructure development in a transparent, accountable and efficient manner, including but not limited to: a. Granting the right of way, including but not limited to highways, roads, toll roads, areas along railroad tracks, and/or special areas in accordance with provisions of laws and regulations; b. Access to buildings and areas, including but not limited to telecommunications access installations to high rise buildings, airport areas, port areas, areas along railroad tracks, subways, business/office areas, residential areas, and other special areas in accordance with provisions of laws and regulations; c. Fees and/or levies based on reasonable costs and guarantee business certainty, including but not limited to licensing fees and Telecommunications utility leases at reasonable prices and in accordance with provisions of laws and regulations; d. Rental rates and/or use of assets owned by the Central Government or Regional Governments, including but not limited to rental rates for passive land, buildings and infrastructure at reasonable prices and in accordance with the provisions of laws and regulations; and e. Technical standardization and telecommunications technology, including but not limited to technical standardization in the context of interoperability.

The third theme. The distribution of digital infrastructure development in Indonesia is caused by the lack of intergovernmental coordination in the implementation of digital infrastructure development. Total government ICT spending on software continues to increase from year to year, where 65% of software (application) spending, including software licenses is used to build similar applications between government agencies. Meanwhile, based on a data center infrastructure survey conducted by the Ministry of Communication and Informatics in 2018, there were 2,700 data centers in 630 central agencies and local governments. It means that on average, there were 4 Data Centers in each government agency. Nationally, the utilization of Data Centers and hardware only reached an average of 30 percent of their capacity. This fact indicates that there is a lack of coordination between government agencies in the development of digital transformation resulting in duplication of ICT spending and ICT capacity exceeding needs.

In the rapid development of the service process both in business and government, an organization's digital technology must be flexible in order to accommodate changes quickly and efficiently. This is the focus of digital infrastructure development, which requires an infrastructure that is adaptive to changes in the business side. A fully adaptive digital infrastructure is one that is organized using a certain pattern to support the application of information and is easy to adaptable to circumstances. The need for adaptive digital infrastructure is how infrastructure can keep up with any changes in the business environment.

DISCUSSION AND CONCLUSIONS

Information technology is used so rapidly and massively, allowing people to have many user experiences related to easy access to information and ease of receiving services. This user experience is also owned by internal bureaucracy circles who always make comparisons of internal services with their experience when using services outside the bureaucracy, such as email, chat, marketplace, online shopping, or eBanking. The two experiences provide the impetus to make the digital organization a reality.

The key to success in conducting digital services lies in the availability of digital infrastructure/information technology in Indonesia. The meaning of digital infrastructure is technological resources, both physical facilities, information technology components, information technology services, and information technology management that support the entire organization in detail. With the existence of digital infrastructure that is in line with the needs of digital services, it is undeniable that the process of changing the form of services to digital or also known as digital transformation can run optimally.

The government must consider three factors in fulfilling the digital infrastructure requirements, the first factor is the HR factor. In this factor, it is necessary to look at the roles, skills, and organizational structures that exist in the infrastructure development process. Then second factor is the technology factor, where this technology is divided into 3 parts, namely hardware, software, and services. Then the 3rd factor is the process factor, which consists of standards and information directly related to the development of the digital infrastructure. In order to maximize the equitable process of digital infrastructure development in Indonesia, it is also necessary to implement the concept of collaborative governance.

Based on collaborative theory, of analyzing digital infrastructure development in Indonesia, it can be discussed that the collaboration process consists of 5 (five) main steps: a. Face-to-face discussion, which is necessary, but not a guarantee of effective teamwork. However, these discussions are necessary to develop successful collaboration in order to achieve an agreement. Face-to-face discussions between stakeholders are typically characterized by opposing perspectives, each of which seeks to build stereotypes and deepen enmity; b. Establishing trust. It requires work and commitment over time to create trust, which is necessary for teamwork. Therefore, if history shows that there is animosity between parties, policymakers or stakeholders must find time to reestablish confidence. If stakeholders are unable to build confidence, a collaborative process will not be viable; c. Process commitment. Stakeholder commitment to the collaborative process has a big impact on its success. However, keeping this promise can sometimes come with a lot of difficulties. For example, even when the option calls for bringing together parties with different points of view, parties are still expected to show commitment by

abiding by the conclusions of the discussion. Therefore, for the obligations of each stakeholder to be carried out properly, it is necessary to have trust for commitment; d. Common understanding. At some point during the collaborative process, stakeholders should reach consensus and a shared understanding of a common vision, mission, set of goals, philosophy, and strategic orientations; alignment of core values and problem definitions; e. Intermediate results. The literature asserts that when the goals and benefits of collaboration are clear, collaboration will occur. The partnership will be focused and driven with defined objectives, allowing all processes to be completed as quickly as feasible.

Based on the analysis and discussion of the research result above, it can be concluded that Digital Infrastructure Development in Indonesia and its implication required interaction and collaboration.

DATA AVAILABILITY STATEMENT

All relevant data are available in the article and the annexes.

REFERENCES

[1] Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. Journal of Public Administration Research and Theory, 18(4), 543–571. https://doi.org/10.1093/jopart/mum032

[2] Brennen, J. S., & Kreiss, D. (2016). Digitalization. The International Encyclopedia of Communication Theory and Philosophy, 1–11.

[3] Connick, S., & Innes, J. E. (2003). Outcomes of collaborative water policy making: Applying complexity thinking to evaluation. Journal of Environmental Planning and Management, 46(2), 177–197.

[4] Creswell, J. W. (2009). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (3rd ed.). California, Thousand Oaks: Sage Publication.

[5] Creswell, J. W. (2013). Qualitative Inquiry and Research Design: Choosing Among Five Approaches (3rd ed.). California, Thousand Oaks: Sage Publication.

[6] Dunn, W. (2012). Public Policy Analysis (Fifth). Upper Sadle: Pearson Education Inc.

[7] Emerson, K., Nabatchi, T., & Balogh, S. (2012). An integrative framework for collaborative governance. Journal of Public Administration Research and Theory, 22(1), 1–29. https://doi.org/10.1093/jopart/mur011

[8] Feriyanto, N., Assery, S., Saleh, C., & Suryaningsum, S. (2017). A little aspect of misbehavior in organization (Case study in Indonesia). Journal of Engineering and Applied Sciences, 12(15), 3870–3872. https://doi.org/10.3923/jeasci.2017.3870.3872

[9] Fernández-Giménez, M. E., Augustine, D. J., Porensky, L. M., Wilmer, H., Derner, J. D., Briske, D. D., & Stewart, M. O. (2019). Complexity fosters learning in collaborative adaptive management. Ecology and Society, 24(2). https://doi.org/10.5751/ES-10963-240229

[10] FitzGerald, E., Ferguson, R., Adams, A., Gaved, M., Mor, Y., & Thomas, R. (2013). Augmented reality and mobile learning: the state of the art. International Journal of Mobile and Blended Learning (IJMBL), 5(4), 43–58.

[11] Frederickson, H. G. (1976). The lineage of new public administration. Administration & Society. https://doi.org/10.1177/009539977600800202

[12] Hadiyat, Y. D. (2014). Kesenjangan Digital di Indonesia (Studi Kasus di Kabupaten Wakatobi). Jurnal Pekommas, 17(2), 81–90.

[13] Hendriarti, S. F., Othman, N. A., Arif, S. B., Assery, S., & Jamal, F. N. (2022). Talent Management Analysis of Indonesian Civil Advocates. Journal of Positive School Psychology, 6(2), 1106–1116.

[14] Hermanto, A. B., & Riyadi, B. S. (2020). Constitutional law on the discretionary of prosecutor's power against abuse of power implications of corruption culture in the prosecutor's office Republic of Indonesia. International Journal of Criminology and Sociology, 9(16), 763–772. https://doi.org/10.6000/1929-4409.2020.09.71

[15] Hood, C. (1991). All Seasons? the Rise of New Public Management (Npm). Public Administration.

[16] Ikeanyibe, O. M., Eze Ori, O., & Okoye, A. E. (2017). Governance paradigm in public administration and the dilemma of national question in Nigeria. Cogent Social Sciences, 3(1), 1–16. https://doi.org/10.1080/23311886.2017.1316916

[17] Kapucu, N., Yuldashev, F., & Bakiev, E. (2009). European Journal of Economic and Political Studies Collaborative Public Management and Collaborative Governance: Conceptual Similarities and Differences. European Journal of Economic and Political Studies, 2(1), 39–60.

[18] Laudon, K. C., & Laudon, J. P. (2004). Management information systems: Managing the digital firm. Pearson Educación.

[19] Miles, M. B., & Huberman, A. M. (1994). Qualitative Data Analysis. California, Thoussand Oaks: Sage Publication.

[20] Nomura, M. (2007). Analog Technology Trends and the Importance of Human Resources Development. Science & Technology Trends, 24, 20–37.

[21] Parmar, B. L., Freeman, R. E., Harrison, J. S., Wicks, A. C., Purnell, L., & De Colle, S. (2010). Stakeholder theory: The state of the art. Academy of Management Annals, 4(1), 403–445.

[22] Priyambodo, J. B., Wijaya, A. F., Wike, Sujarwoto, & Riyadi, B. S. (2023a). Implementation of Performance Accountability System for Government Institution: A Case Study in Indonesia. International Journal of Membrane Science and Technology, 10(2 SE-), 522–531. https://doi.org/10.15379/ijmst.v10i2.1288

[23] Priyambodo, J. B., Wijaya, A. F., Wike, Sujarwoto, & Riyadi, B. S. (2023b). The Analysis of Performance Accountability System for Government Agency: A Punishment Theory Perspective. International Journal of Membrane Science and Technology, 10(2 SE-), 532–541. https://doi.org/10.15379/ijmst.v10i2.1289

[24] Purbiyantari, W., Zauhar, S., Suryadi, Hermawan, R., & Riyadi, B. S. (2023a). Leadership and Service in the Police Context_A Qualitative Study. International Journal of Membrane Science and Technology, 10(2 SE-), 846–856. https://doi.org/10.15379/ijmst.v10i2.1390

[25] Purbiyantari, W., Zauhar, S., Suryadi, Hermawan, R., & Riyadi, B. S. (2023b). Transformational Leadership, Technology Adoption, and Public Service towards Job Competency. International Journal of Membrane Science and Technology, 10(2 SE-), 835–845. https://doi.org/10.15379/ijmst.v10i2.1389

[26] Rachmatullah, N., & Purwani, F. (2022). Analisis Pentingnya Digitalisasi & Infrastruktur Teknologi Informasi Dalam Institusi Pemerintahan: E-Government. Jurnal Fasilkom, 12(1), 14–19.

[27] Rippa, P., & Secundo, G. (2019). Digital academic entrepreneurship: The potential of digital technologies on academic entrepreneurship. Technological Forecasting and Social Change, 146, 900–911.

[28] Riyadi, B. S. (2017). Law of agrarian conflict and resolution effort: A claim dispute of Eigendom verponding Land. International Journal of Law, 3(80), 88. Retrieved from www.lawjournals.org

[29] Riyadi, B. S. (2020a). Culture of abuse of power due to conflict of interest to corruption for too long on the management form resources of oil and gas in Indonesia. International Journal of Criminology and Sociology, 9(61), 247–254. https://doi.org/10.6000/1929-4409.2020.09.23

[30] Riyadi, B. S. (2020b). Culture of abuse of power in indonesia from the perspective of criminology and law. International Journal of Criminology and Sociology, 9(2008), 274–284. https://doi.org/10.6000/1929-4409.2020.09.26

[31] Riyadi, B. S., Atmoredjo, S., & Sukisno, D. (2020). Underground space : The concept of property right based on theory of property rights perspective. International Journal of Law, 6(2), 26–34.

[32] Riyadi, B. S., Wibowo, B. R., & Susanti, V. (2020). Culture of corruption politicians' behavior in parliament and state official during reform government Indonesia. International Journal of Criminology and Sociology, 9, 52–62. https://doi.org/10.6000/1929-4409.2020.09.06

[33] Riyanto, A. D. (2022). Indonesian Digital Report. Retrieved from https://andi.link/hootsuite-we-are-social-indonesian-digital-report-2022/

[34] Robertson, B., & Sribar, V. (2002). The adaptive enterprise: IT infrastructure strategies to manage change and enable growth. Addison-Wesley Longman Publishing Co., Inc.

[35] Saleh, C., Assery, S., & Dzakiyullah, N. R. (2018). Supply chain: Partnership, capability and performance (A case study on service companies at Yogyakarta Indonesia). Journal of Engineering and Applied Sciences, 13(6), 5391–5394. https://doi.org/10.3923/jeasci.2018.5391.5394

[36] Saleh, C., Assery, S., Sabihaini, & Suryaningsum, S. (2017). Supply chain management in service companies (Case study in Indonesia). Journal of Engineering and Applied Sciences, 12(15), 3858–3860. https://doi.org/10.3923/jeasci.2017.3858.3860

[37] Samara, E., Andronikidis, A., Komninos, N., Bakouros, Y., & Katsoras, E. (2022). The role of digital technologies for regional development: A system dynamics analysis. Journal of the Knowledge Economy, 1–23.

[38] Sinulingga, M., Pantja Djati, SuyonoThamrin, Harlina Juni Risma Saragi, Bambang Slamet Riyadi, & Tri Ubayanto. (2023). Antecedents and Consequences of Smart Management Information System for Supervision to Improve Organizational Performance. International Journal of Membrane Science and Technology, 10(2 SE-), 816–824. https://doi.org/10.15379/ijmst.v10i2.1262

[39] Smith, S. L. (1998). Collaborative approaches to Pacific Northwest fisheries management: The salmon experience. Willamette J. Int'l L. & Dis. Res., 6, 29.

[40] Susilo, H., Astuti, E. S., Arifin, Z., Mawardi, M. K., & Riyadi, B. S. (2023). The Antecedents of Innovative Work Behavior in Village Owned Enterprises at East Java Indonesia. International Journal of Membrane Science and Technology, 10(2 SE-), 879–891. https://doi.org/10.15379/ijmst.v10i2.1318

[41] Syahruddin, Wijaya, A. F., Suryono, A., & Riyadi, B. S. (2023). A Qualitative Study : Critical Success Factors of Public Private Partnerships in Indonesia. International Journal of Membrane Science and Technology, 10(2 SE-), 511–521. https://doi.org/10.15379/ijmst.v10i2.1263

[42] Tannady, H., Hamdany, M. A., Anggreni, M. A., Assery, S., Sofyanty, D., Nawangwulan, I. M., & Jayanto, I. (2022). Meningkatkan Disiplin Kerja Pegawai dengan Motivasi Sebagai Variabel Mediasi. Jurnal Kewarganegaraan, 6(2), 3984–4002.

[43] Tapscott, D. (1996). The digital economy: Promise and peril in the age of networked intelligence. McGraw Hills.

[44] Tjahjono, B., Suryono, A., Riyanto, R., Amin, F., & Riyadi, B. S. (2023). The Dynamics and Governance of Civil-Military Collaboration on Disaster Management in Indonesia. International Journal of Membrane Science and Technology, 10(2 SE-), 825–834. https://doi.org/10.15379/ijmst.v10i2.1363

[45] Toruan, T. S. L., Gusti, D. P., & Riyadi, B. S. (2023). Human Resource Management of the Army Program in Indonesia. International Journal of Membrane Science and Technology, 10(2 SE-), 808–815. https://doi.org/10.15379/ijmst.v10i2.1261

[46] Toukola, S., & Ahola, T. (2022). Digital tools for stakeholder participation in urban development projects. Project Leadership and Society, 3, 100053.

[47] Verhoefa, P. C., Broekhuizena, T., Bartb, Y., Bhattacharyaa, A., Donga, J. Q., Fabiana, N., & Haenleinc., M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research Volume, (122), 889.

[48] Westerman, G., Calméjane, C., Bonnet, D., Ferraris, P., & McAfee, A. (2011). Digital Transformation: A roadmap for billion-dollar organizations. MIT Center for Digital Business and Capgemini Consulting, 1, 1–68

DOI: https://doi.org/10.15379/ijmst.v10i3.1553