

Identification of Digitalization-Based Work Plans to Improve Time Performance in Railway Infrastructure Development Projects

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Abstract

The development of railway infrastructure projects in the development of the country is very important, however, the development of railway infrastructure still seems to be marked by the problem of delays. One of the causes of delays is a less than optimal work plan. This study aims to identify processes in the work plan at the control stage that can be digitized. The research method used was a pilot survey then in-depth interviews with each respondent, then the data was processed and analyzed. The research can be an improvement in the work plan at the Directorate of Railway Infrastructure, so that the digital-based work plan improves time performance in the construction of railway infrastructure.

Keywords

Infrastructure construction, delays, planning, and digitization.

1. Introduction

Construction project developments in all regions are continuously developed in order to create facilities that can be utilized by the community. (Sulaeman et al. 2007) One of the infrastructure buildings in the field of Civil Engineering that has an aspect of public interest is railway construction work. (Mulyadi et.al. 2013) Construction activities consist of various stages, of which the most decisive stages are the planning and implementation stages of construction. (Remi 2017) The construction of railway infrastructure construction projects in the development of the State is very important, however, it seems that the Construction of Railway Infrastructure is still colored by various problems in its implementation. (Author 2020) Many construction projects in various regions experience problems, namely the occurrence of delays in the construction project construction process. (Sulaeman et al. 2007).

The author also conducted an initial pilot study by conducting a survey to stakeholders in the Directorate General of Railways project. The survey was carried out to see aspects of delays that occur in Railway Infrastructure development projects. There are many aspects that affect the delay of the railway project and the most affecting, namely: The planning design is not good, the design is not in accordance with field conditions, many re-designs are carried out, preparation of old supporting data, and DED changes. Based on the pilot study that the author has conducted, it can be concluded that the work plan at the control stage in the Directorate of Railways Infrastructure is not optimal and there are still problems in its implementation.

Based on research conducted (Fahmi 2017) one of the problems is the preparation of work plans and based on the results of a research survey of 32 respondents, it was also found that the current work plan for the control phase of the railway project is still not optimal with a value of 56.3%. The stage of controlling the Work Plan process, namely the preparation and ratification of spectek documents, design criteria, basic designs, and DED in the railway sector is carried out by bringing hard copies of documents for assistance. As with the technical planning process, in the construction implementation process, technical guidance and field supervision carried out by government agencies are carried out manually (traditionally). So based on the literature study and pilot survey studies that have been carried

out by the author, it can be concluded that the current work plan cannot accommodate the problems that exist in the development process, so that development time is delayed and causes many problems.

So that changes are made in the development planning process in the Government Environment, especially at the Directorate of Railway Infrastructure by applying new work methods using digital technology, this digital technology allows stakeholders to coordinate quickly and effectively, so that the workflow becomes more optimal (Wawan, 2017). This research was conducted to find out what processes in the work plan at the control stage can be digitized and are expected to be able to become new knowledge about the process of digitizing information technology in the infrastructure project development work plan. It is also expected to encourage Ministries / Agencies to emulate the Directorate General of Railways of the Ministry of Transportation in implementing information technology in the work plan of the Government in Indonesia.

2. Literature Review

2.1 Railway Infrastructure

Infrastructure projects are the driving force of a country's economic growth (Haris 2005). According to the Routledge Dictionary of Economics (1995), infrastructure is the main service of a country that helps economic activities and community activities so that they can take place, namely by providing transportation and supporting facilities. The railroad construction project work begins with the initial project stage, namely the planning and design stage, then continues with the construction stage, namely the physical construction implementation stage, the next is the operational stage or the use and maintenance stage (Trijoko and Purnomo 2000). The Directorate General of Railways, is an implementing element at the Ministry of Transportation of the Republic of Indonesia, which is under and responsible to the Minister of Transportation and has the task of organizing the formulation and implementation of policies in the railroad sector. (Directorate of Railways Infrastructure 2020) The Directorate of Railway Infrastructure as a work unit under the auspices of the Directorate General of Railways, has a function to realize reliable railway infrastructure that is safe, comfortable, sufficient and supports rail operations. The Directorate of Railway Infrastructure has a very important role. strategic in terms of rehabilitation of railway infrastructure, development and improvement of railway infrastructure, restructuring and reform of railway institutions, supervision and guidance in the sector of railway infrastructure (Directorate of Railway Infrastructure, 2018).

Based on the main tasks and functions in the organizational structure as shown in Figure 1, the Railway Infrastructure Directorate has the following powers (Directorate of Railway Infrastructure 2018): Rehabilitation of railway infrastructure; Guidance, supervision, improvement of railway infrastructure development and support for Railway operations; Inspection of the quality of railway infrastructure; and Standardization of materials, systems, designs used for the procurement of railway infrastructure.

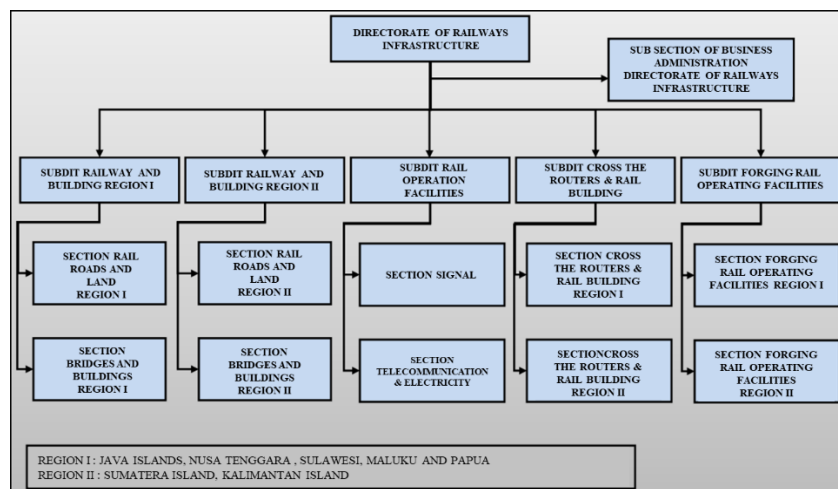


Figure 1. Organizational structure of the railway infrastructure directorate

2.2 Work Plan

In carrying out an activity, the organization needs a reference to regulate and control all activities that occur in the company. Therefore, every company, both private and government, should have a well-structured work plan to support smooth operations within the company. (Saputri 2017) According to Husein Umar (2009) "Work Plan is the selection of a set of activities and making decisions about what to do, when, how, and by whom. If the plan has been determined, then the related planning documents must be implemented."

Based on Government Regulation Number 20 of 2004 concerning Government Work Plans, Government Work Plans (RKP) are national planning documents for a period of 1 year. RKP is a guideline for the preparation and contains programs and activities that are: measurable and can be implemented.

2.3 Digitization

Information technology is a general definition for various types of technology that aim to help people live life easier and better in creating, changing, storing, communicating and / or disseminating information. (Irwansyah and Moniaga, 2014) Advances in technology allow automation in almost all fields. New technologies and approaches that combine the physical, digital, and biological worlds will fundamentally change the pattern of human life and interaction (Tjandrawinata 2016).

The current development of industry 4.0 has changed the stages of a job's business process, with each stage of work becoming faster, simpler and more efficient. This also applies to the construction sector, which is transforming towards digitalization. (Dewandaru 2020) Industry 4.0 as a phase of the technological revolution changes the way human activities are in scale, scope, complexity, and transformation from previous life experiences. Humans will even live in global uncertainty, therefore humans must have the ability to predict a very fast changing future. Each country must respond to these changes in an integrated and comprehensive manner. This response involves involving all global political stakeholders, from the public sector, private sector, academia, to civil society so that the challenges of Industry 4.0 can be managed into opportunities (Alfa 2018).

According to Brennen & Kreiss (2016) in Erwin et.al. (2020), digitization is the increasing availability of digital data made possible by advances in creating, transferring, storing and analyzing digital data, and has the potential to structure, shape and influence the contemporary world. Digital technology allows stakeholders to coordinate quickly and effectively, so that workflows are more optimal (Wawan 2017).

3. Methods

This research focuses on identifying, analyzing, evaluating and the best solution of a practice in the real world from the results of in-depth interviews and surveys. So that this research falls into the category of qualitative research. According to Strauss and Cobin in Creswell, J. (1998) what is meant by qualitative research is a type of research that produces findings that cannot be obtained using statistical procedures or other means of quantitative (measurement).

In this study, interviews were conducted directly with respondents to employees of the Directorate General of Railways, Ministry of Transportation, interviews were conducted to obtain information about the object of research. And the following are the target respondents who will be interviewed at the Directorate General of Railways, Ministry of Transportation to answer the formulation of the problem in this study. In this study, in-depth interviews were conducted with the respondents because this study was a qualitative study. In-depth interview is the process of obtaining information for research purposes by means of face-to-face question and answer between the interviewer and the informant or the person being interviewed, with or without using an interview guide, where the interviewer and the informant are involved in social life. relatively long (Rahmat 2009).

Credibility is a term used in qualitative research to replace the concept of validity. The credibility of qualitative research also lies in the success in achieving the purpose of exploring the problem. (Poerwandari 2001). Credibility becomes an important thing when questioning the quality of the results of a qualitative study.

After all the research data has been collected, data analysis is then carried out. The data collected is still raw data, so it needs to be rearranged so that it becomes valid data in research. Data analysis was carried out to answer the problem formulation in this study. Data analysis was carried out by combining the results of interviews and literature studies that the author had obtained. This was done to obtain data results that could better explain and answer the problem formulation in this study. Qualitative research does not have absolute rules in processing and analyzing data (Poerwandari 2001). The following are some of the stages in analyzing qualitative data according to Poerwandari (2001), namely: Data organization, coding and analysis, testing of allegations, analysis strategy and interpretation stage.

4. Data Collection

According to Patton (in Poerwandari, 2001), qualitative design has a flexible nature, therefore there are no definite rules in the number of samples that must be taken for qualitative research. The number of samples, as shown in Table 1, is very dependent on what is considered useful and can be done with the time and resources available. Data collection related to the Business Process at the Directorate of Railway Infrastructure with 32 activities carried out by the Directorate of Railway Infrastructure. Based on the Business Process the duties and functions of the Directorate of Railway Infrastructure are to regulate, control, supervise, develop and provide support & administrative services for the Directorate of Railways infrastructure.

The result of the pilot study is that the problem of a less than optimal work plan is in the control process in the railway infrastructure sector. A discussion was held with Internal Experts of the Directorate General of Railways, 6 activities were obtained to carry out further research processes related to the identification of activities that can be done with digitization.

Table 1. Respondents at the directorate general of railways, Ministry of Transportation

No.	Respondents
1.	Head of Sub Directorate of Roads and Buildings Region I
2.	Head of Sub Directorate of Roads and Buildings Region II
3.	Head of Sub Directorate of Railway Operation Facilities
4.	Head of Sub Directorate of Railroad Trackworthiness and Buildings
5.	Head of Sub Directorate of Train Operation Facility Feasibility
6.	Head of Section for Rail Roads and Land for Railways Region I
7.	Head of Section for Bridges and Railway Buildings Region I
8.	Head of Section of Rail Road and Land for Railways Region II
9.	Head of Section for Bridges and Railway Buildings Region II
10.	Head of Signaling Section
11.	Head of Telecommunication and Signaling Section
12.	Planning Section, Secretariat General of Railways
13.	PPK Railway Infrastructure Satker
14.	Staff of Sub Directorate for Regional Roads and Buildings I
15.	Staff of Sub Directorate of Pathways and Buildings Region II
16.	Staff of Sub Directorate of Railway Operation Facilities
17.	Staff of the Sub Directorate of Railroad Trackworthiness and Buildings
18.	Staff of Sub Directorate of Train Operation Facility Feasibility
19.	Railway Infrastructure Satker Staff
20.	Project Management Unit (PMU) Consultant Team
21.	Department of Transportation

5. Results and Discussion

The following Table 2 is the Work Plan for Control of the Railway Infrastructure Project at the Directorate of Railways Infrastructure which can be done by digitizing, There are 6 parts of the Work Plan in the railway infrastructure construction design that can be done with the digitization system, that is : Compilation and Preparation of Materials for Approval of Technical Specifications in the Railway Sector, Compilation and Preparation of Materials for

Approval of Design Criteria in the Railway Sector, Compilation and Preparation of Basic Design Approval Materials in the Railway Sector, Compilation and Preparation of Materials for Ratification of Detailed Engineering Design (DED) in the Railway Sector, Technical Utilization Permit, Preparation of the Technical Permit for the Construction of Special Railway Infrastructure and Public Trains.

Table 2. Work plan for the control of the railway infrastructure project development stage

Activities		Stages	
1	Compilation and Preparation of Materials for Approval of Technical Specifications in the Railway Sector (Railroad, Ground, Bridges, Tunnels, Station Buildings)	1.1	Director of Railway Infrastructure Reviewing requests for discussion on the preparation of materials for ratification of technical specifications in the field of railways
		1.2	Head of Sub-Directorate Checks requests for discussion of the preparation of materials for validation of technical specifications in the railroad sector
		1.3	Head of Section Review requests for discussion of the preparation of materials for validation of technical specifications in the railways sector
		1.4	Technical Analyst Studying requests for discussion of the preparation of materials for validation of technical specifications in the railways and preparing drafts of invitation letters
		1.5	Section Head and Technical Analyst Prepare a draft invitation letter for the discussion of the preparation of materials for technical specifications in the railway sector
		1.6	Head of Sub-Directorate Checks the draft invitation letter for meeting the preparation of materials for validation of technical specifications in the railroad sector
		1.7	The Director of Railway Infrastructure approves a letter of invitation to discuss the preparation of materials for validation of technical specifications in the railway sector.
		1.8	Meetings to discuss requests for discussion of the preparation of materials for validation of technical specifications
		1.9	Preparing Minutes of the Meeting for the Discussion of the Compilation of Materials for Ratification of Technical Specifications in the Railways sector
		1.10	Document Assistance Process for Design Criteria in the Railway Sector
		1.11	Completion of Materials for the Approval of Technical Specifications in the Railways
		1.12	The Applicant returns the results of the revision of the Draft Technical Specification Document in the Railways sector
		1.13	Head of Section and Technical Analyst Review the draft document for the preparation of materials for validation of technical specifications
		1.14	Head of Sub-Directorate Checks the draft document for the preparation of materials for validation of technical specifications and submits the results for approval
		1.15	The Director of Railway Infrastructure approves the document to prepare materials for validation of technical specifications in the railway sector
		1.16	Administration, through its Sub-Directorate, provides a Document Endorsement of a document for the preparation of materials for validation of technical specifications in the railroad sector

Activities		Stages	
2	Compilation and Preparation of Materials for Approval of Design Criteria in the Railway Sector (Rail Roads, Land, Bridges, Tunnels, Station Buildings)	2.1	Director of Railway Infrastructure Assesses the request for discussion of the preparation of materials for the ratification of Design Criteria in the Railway Sector
		2.2	Head of Sub-Directorate Checking the request for discussion of the preparation of materials for ratification of Design Criteria in the Railway Sector
		2.3	Head of Section Review requests for discussion of the preparation of materials for ratification of Design Criteria in the Railway Sector
		2.4	Technical Analyst Studying requests for discussion of preparation of material for ratification of Design Criteria in the Railway Sector and preparing draft invitation letters
		2.5	Section Head and Technical Analyst Prepare a draft invitation letter for a meeting to discuss the preparation of rural materials for the Design Criteria for Railways
		2.6	Head of Sub-Directorate for examination of the draft invitation letter to discuss the preparation of materials for ratification of Design Criteria in the Railway Sector
		2.7	The Director of Railway Infrastructure approves a letter of invitation to discuss the preparation of materials for validation of Design Criteria in the Railway Sector
		2.8	Implementation of the meeting to discuss requests for discussion of preparation of materials for approval of Design Criteria in the Railway Sector
		2.9	Preparing Minutes of Meeting for the Discussion of the Compilation of Materials for Ratification of Design Criteria in the Railway Sector
		2.10	Document Assistance Process for Design Criteria in the Railway Sector
		2.11	Completion of Materials for the Approval of Design Criteria in the Railway Sector
		2.12	The Applicant returns the revised Concept Design Criteria Document in the Railways sector
		2.13	Section Head and Technical Analyst Reviewing the draft document for the preparation of materials for the ratification of Design Criteria in the Railway Sector
		2.14	Head of Sub-Directorate Checks the draft document for the preparation of materials for ratification of the Design Criteria in the Railway Sector and submits the results for approval
		2.15	The Director of Railway Infrastructure approves the document to prepare materials for the ratification of Design Criteria in the Railway Sector
		2.16	Administration, through the Sub-Directorate provides a Document for Endorsement of Design Criteria in the Railway Sector
3	Compilation and Preparation of Basic Design Approval Materials in the Railway Sector (Rail Roads, Land, Bridges, Tunnels, Station Buildings)	3.1	Director of Railway Infrastructure Assesses the request for discussion of the preparation of materials for the ratification of the Basic Design in the Railway Sector
		3.2	Head of Sub-Directorate Checking the request for discussion of the preparation of material for ratification of the Basic Design in the Railway Sector

Activities		Stages	
		3.3	Head of Section Reviewing the application for the preparation of material for the ratification of the Basic Design in the Railway Sector
		3.4	Technical Analyst Studying the application for discussion of the preparation of material for the ratification of the Basic Design in the Railway Sector and preparing the draft invitation letter
		3.5	Section Head and Technical Analyst Prepare a draft invitation letter for a meeting to discuss the preparation of rural materials for the Basic Design in the Railway Sector
		3.6	Head of Sub-Directorate for examination of the draft invitation letter for the meeting to discuss the preparation of material for ratification of the Basic Design in the Railway Sector
		3.7	The Director of Railway Infrastructure approves a letter of invitation for a meeting to discuss the preparation of materials for the approval of Basic Design in the Railway Sector
		3.8	Preparing Minutes of the Meeting for the Discussion of the Compilation of Basic Design Ratification Materials in the Railway Sector
		3.9	Basic Design Document Assistance Process in the Railways sector
		3.10	Material improvement for Basic Design Approval in the Railways sector
		3.11	The Applicant returns the results of the revision of the Basic Design Document Concept in the Railways sector
		3.12	The implementation of the meeting to discuss the request for discussion of the preparation of materials for the approval of the Basic Design in the Railway Sector
		3.13	Head of Section and Technical Analyst Examine the draft document for the preparation of materials for the ratification of the Basic Design in the Railway Sector
		3.14	Head of Sub-Directorate Checks the draft document for the preparation of materials for the ratification of the Basic Design in the Railway Sector and submits the results for approval
		3.15	The Railway Infrastructure Director approves the document to prepare materials for the ratification of the Basic Design in the Railway Sector
		3.16	Administration, through its Sub-Directorate provides a Basic Design Ratification Document in the Railway Sector
4	Compilation and Preparation of Materials for Ratification of Detailed Engineering Design (DED) in the Railway Sector (Rail Road, Land, Bridges, Tunnels, Station Buildings)	4.1	Director of Railways Infrastructure Reviewing requests for discussion of the preparation of ratification materials Detailed Engineering Design (DED) in the Railway Sector
		4.2	Head of Sub-Directorate Checking requests for the preparation of materials for the preparation of validation of the Detail Engineering Design (DED) in the Railway Sector
		4.3	Head of Section Reviewing requests for the preparation of materials for the preparation of validation of the Detail Engineering Design (DED) in the Railway Sector
		4.4	Technical Analyst Studying requests for discussion of the preparation of ratification materials. Detail Engineering Design (DED) in the Railway Sector and preparing a draft invitation letter

Activities		Stages	
		4.5	Section Head and Technical Analyst Prepare a draft invitation letter for a meeting to discuss the preparation of rural materials. Detail Engineering Design (DED) in the Railway Sector
		4.6	Head of Sub-Directorate for examination of the concept of invitation letter for discussion of preparation of legalization materials. Detail Engineering Design (DED) in the Railway Sector
		4.7	The Director of Railways Infrastructure approves a letter of invitation to discuss the preparation of legalization materials for the Detail Engineering Design (DED) in the Railway Sector
		4.8	Preparing Minutes of the Meeting for the Discussion of the Compilation of Material for Ratification of the Detail Engineering Design (DED) in the Railways sector
		4.9	Detailed Engineering Design (DED) Document Assistance Process in the Railways sector
		4.10	Material Completion for the Endorsement of the Detail Engineering Design (DED) in the Railways sector
		4.11	The Applicant returns the results of the revision of the Detailed Engineering Design (DED) Concept Document in the Railways sector
		4.12	Implementation of the meeting to discuss requests for discussion of the preparation of validation materials for the Detail Engineering Design (DED) in the Railway Sector
		4.13	Section Head and Technical Analyst Examine the draft document for the preparation of validation materials. Detail Engineering Design (DED) in the Railway Sector
		4.14	Head of Sub-Directorate Checking the draft document for the preparation of materials for the ratification of the Detail Engineering Design (DED) in the Railway Sector and submitting the results for approval
		4.15	The Director of Railway Infrastructure approved the document for the preparation of the Detail Engineering Design (DED) approval in the Railway Sector
		4.16	Administration, through the Sub-Directorate provides a Detailed Engineering Design (DED) Validation Document in the Railway Sector
5	Technical Utilization Permit (Railroad and Railway Land, Bridges and Buildings, Railway Stations)	5.1	Director of Railway Infrastructure Receives disposition from the Director General Railways related to technical permit application utilization of railways, disposing and assigning the Head of Sub-Directorate for further processing
		5.2	Head of Sub-Directorate Receives and disposes and assigns Kasi to further process applications for technical permits for utilization
		5.3	Head of Section Receives and disposes and assigns the Inspector of Technical and Roadworthy Requirements to review the Data Supporting Technical Permits for utilization and drafting meeting invitations
		5.4	Technical Requirements and Roadworthy Examiner Examining the Supporting Data for Technical Permits and drafting meeting invitations
		5.5	Head of Section and Inspector of Technical Requirements and Roadworthiness Examine and initialize the invitation concept for discussion of the Technical Utilization Permit

	Activities	Stages	
		5.6	Head of Sub-Directorate Checks and initials approval for the draft meeting invitation to discuss the Technical Utilization Permit
		5.7	Railway Infrastructure Director Approves the invitation to discuss the Technical Utilization Permit discussion
		5.8	Implementation of the Technical Permit Discussion Meeting Utilization
		5.9	Inspector of Technical Requirements and Roadworthiness to Prepare Draft Field Review Assignments
		5.10	Head of Section Researches and initials approval of the concept of Field Review Assignment Letter
		5.11	Head of Sub-Directorate Checks and initials approval of the concept of Field Review Assignment Letter
		5.12	Director of Railway Infrastructure Gives Approval of Field Review Assignment Letter
		5.13	Conducting Field Reviews
		5.14	Inspector of Technical Requirements and Roadworthiness to Prepare Technical Utilization Permit Documents As well as conceptualizing official notes
		5.15	Head of Section Researches and initials approval of the Technical Utilization Permit Documents and the concept of official notes
		5.16	Head of Sub-Directorate Checks and initials approval of the Technical Utilization Permit Document and the draft official note
		5.17	The Railway Infrastructure Director gives approval for the Technical Permit for the Utilization of Rail Road and Railway Land
		5.18	Administration through the Sub-Directorate provides a Document Endorsement of a Technical Permit for the Utilization of Rail Road and Railway Land
6	Preparation of the Technical Permit for the Construction of Special Railway Infrastructure and Public Trains	6.1	Director of Railways Infrastructure Assesses the application for a technical permit for the construction of special / public railway infrastructure and assigns the Head of Sub-Directorate for Railway Tracks and Buildings to follow up
		6.2	Head of Sub-Directorate Reviewing the location and completeness of the application for technical permits for the construction of special/general railway infrastructure and assigning the Head of Railroad and Railway Land to follow up
		6.3	Head of Section Checking the location and completeness of the application for the technical permit requirements for the construction of train infrastructure specific / general fire and commission the Technical Analyst to examine and evaluate the application
		6.4	Technical Analyst Checks and evaluates the completeness of technical documents and drafts an invitation to a technical meeting to discuss the application for a special / general railway infrastructure development technical permit.
		6.5	Head of Section Check the concept of meeting invitation and submit it to the Head of Sub-Directorate for Railways and Buildings for the approval process
		6.6	Head of Sub-Directorate Checks the draft of invitation for technical meeting to discuss applications for technical permits for special / general railway infrastructure development and submits it to the Director of Railway Infrastructure for approval

Activities	Stages	
	6.7	The Railway Infrastructure Director approves an invitation to a meeting to discuss technical permits for the construction of special / general railway infrastructure
	6.8	Meeting to discuss technical permits for the construction of special / general railway infrastructure
	6.9	Head of Section Check the concept of assignment letter for the related survey plan and submit it to the Head of Sub-Directorate for Railways and Buildings for the approval process
	6.10	Head of Sub-Directorate Checks the draft survey plan assignment letter and submits it to the Railway Infrastructure Director for approval
	6.11	Approval of a location review / survey assignment letter
	6.12	The field survey was carried out by the Kasi and Technical Analysts
	6.13	Technical Analyst Prepares a technical permit document for the construction of special / general rail infrastructure and submits it to the Head of the Rail Road and Railway Land for the approval process.
	6.14	Head of Section Reviewing the preparation of the technical permit documents for the construction of special / general rail infrastructure and submitting to the Head of Sub-Directorate of Railway Tracks and Buildings for the approval process.
	6.15	Head of Sub-Directorate Checking the preparation of technical permit documents for the construction of special / general railway infrastructure and submitting it to the Railway Infrastructure Director for approval
	6.16	The Director of Railways Infrastructure approves the technical permit documents for the construction of special / general rail infrastructure and an official note submitting the requirements for the issuance of SK and Approval.

6. Conclusion

The implementation of Information Technology in the work plan of the Directorate of Infrastructure has not been used optimally, so the work plan has not been optimal. There are 6 parts of the Work Plan in the railway infrastructure construction design that can be done with the digitization system, that is:

- a. Compilation and Preparation of Materials for Approval of Technical Specifications in the Railway Sector (Railroad, Ground, Bridges, Tunnels, Station Buildings).
- b. Compilation and Preparation of Materials for Approval of Design Criteria in the Railway Sector (Rail Roads, Land, Bridges, Tunnels, Station Buildings).
- c. Compilation and Preparation of Basic Design Approval Materials in the Railway Sector (Rail Roads, Land, Bridges, Tunnels, Station Buildings).
- d. Compilation and Preparation of Materials for Ratification of Detailed Engineering Design (DED) in the Railway Sector (Rail Road, Land, Bridges, Tunnels, Station Buildings).
- e. Technical Utilization Permit (Railroad and Railway Land, Bridges and Buildings, Railway Stations).
- f. Preparation of the Technical Permit for the Construction of Special Railway Infrastructure and Public Trains.

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Biographies

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