

**Perceptions and Practices of Aligning Information Technology Strategy to
Operational Performance: A Qualitative Approach at
PT. PP SEMARANG DEMAK**



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BERITA ACARA UJIAN TUGAS AKHIR

TUGAS AKHIR BERJUDUL

**PERCEPTIONS AND PRACTICES OF ALIGNING INFORMATION TECHNOLOGY STRATEGY
TO OPERATIONAL PERFORMANCE: A QUALITATIVE APPROACH ATPT. PP SEMARANG
DEMAK**

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PREFACE

The author expresses his gratitude to Allah SWT for all His grace and blessings, enabling him to successfully complete his final project entitled "Perceptions and Practices of Aligning Information Technology Strategy to Operational Performance: A Qualitative Approach at PT. PP Semarang Demak." This final project fulfills one of the requirements for completing the International Undergraduate Program in Management, Faculty of Business and Economics, Universitas Islam Indonesia.

In preparing this report, the author received assistance, guidance, and support from various parties. Therefore, he would like to express his deepest gratitude and appreciation to:

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10. All lecturers and staff of the Management Study Program, Faculty of Business and Economics, who always provide abundant knowledge, guide and help the author during his studies.
11. Thank you for every challenge that has come my way during the process of writing this final project. All the difficulties, small failures, fatigue, and difficult steps have served as reminders that this journey is never easy. However, through it all, I have learned to stay strong, to get back up again, even when I was close to giving up many times.

12. Thank you also to myself—who still tries to be strong, who keeps going even though I often feel fragile, who chooses to finish everything even though my heart and mind are not always in the best condition. This journey may be full of tears and exhaustion, but that is precisely why each achievement feels more meaningful.

The author acknowledges that this report still has several limitations. Therefore, he gratefully accepts any constructive criticism or suggestions for future improvements. He hopes this report will be beneficial both to the author and to readers seeking to deepen their understanding of construction project management.

In closing, he hopes this report will serve as a useful reference for students, academics, and practitioners in the field of project management, while also making a positive contribution to the development of knowledge and its application in the construction sector.

Yogyakarta, 1 desember 2025

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ABSTRAK

This study aims to provide an in-depth understanding of how information technology (IT) strategies are aligned with operational performance at PT PP Semarang Demak (PPSD), the company responsible for developing and operating the Semarang–Demak Toll Road. The research is motivated by the increasing demands of globalization, which require organizations to enhance efficiency, service speed, and decision-making through strategic technological adoption. A notable phenomenon prompting this study is the fluctuation in traffic volume observed between January and April 2024, which led PPSD to develop technological innovations, particularly the Automatic Lane System (LOS) utilizing RFID to accelerate toll transactions and reduce congestion.

A qualitative approach with Eisenhardt’s case study method was employed. Data were collected through in-depth interviews with three key informants representing the Engineering, Operations, and Finance divisions, as well as direct observations conducted during an internship period from February 5 to June 4, 2024. Secondary data were obtained from internal company documents and relevant literature. Within-case and cross-case analyses were conducted to identify patterns related to perceptions, implementation practices, and challenges in integrating IT within PPSD’s operational environment.

The findings indicate that PPSD’s technological initiatives—particularly the RFID-based LOS system—are well-aligned with operational needs and have effectively enhanced efficiency, accelerated service delivery, and supported overall operational performance. Despite these advantages, several challenges remain, including limited employee technological competencies, technical disruptions caused by extreme weather, user misunderstanding, and potential technology mismatch when procurement decisions are not supported by thorough validation. The company mitigates these issues through competency development programs, user education, routine maintenance procedures, and the application of Proof of Concept (PoC) before technological investment.

Overall, the study concludes that the alignment of IT strategy plays a crucial role in improving operational performance at PPSD. Effective IT implementation provides operational advantages, enhances service quality, and offers valuable insights for the construction and infrastructure sector regarding the strategic use of technology to optimize project performance.

Keywords: information technology, operational performance, Eisenhardt case study, RFID, LOS, PT PP Semarang Demak.

ABSTRAK

Penelitian ini bertujuan untuk memahami secara mendalam proses penyelarasan strategi teknologi informasi (TI) dengan kinerja operasional pada PT PP Semarang Demak (PPSD), perusahaan yang mengelola pembangunan dan operasional Jalan Tol Semarang–Demak. Latar belakang penelitian berangkat dari dinamika era globalisasi yang menuntut perusahaan meningkatkan efisiensi dan kecepatan layanan melalui pemanfaatan teknologi. Fenomena fluktuasi jumlah kendaraan yang melewati ruas tol pada Januari–April 2024 mendorong perusahaan untuk mengembangkan inovasi berbasis TI, salah satunya program Lajur Otomatis (LOS) yang menggunakan teknologi RFID untuk mempercepat transaksi tol dan mengurangi kemacetan.

Penelitian ini menggunakan pendekatan kualitatif dengan metode studi kasus Eisenhardt. Data dikumpulkan melalui wawancara mendalam dengan tiga informan utama dari Divisi Engineering, Operations, dan Finance, serta melalui observasi langsung selama masa magang (5 Februari–4 Juni 2024). Selain itu, data sekunder diperoleh dari dokumen internal perusahaan dan literatur pendukung. Analisis dalam-kasus dan antar-kasus dilakukan untuk mengidentifikasi pola persepsi, implementasi, serta tantangan integrasi TI di lingkungan operasional PPSP.

Hasil penelitian menunjukkan bahwa teknologi yang digunakan PPSP—khususnya sistem LOS berbasis RFID—telah sesuai dengan kebutuhan kerja dan terbukti meningkatkan efisiensi, mempercepat layanan, serta mendukung kelancaran operasional. Namun, integrasi TI masih menghadapi hambatan seperti keterbatasan kompetensi SDM, gangguan teknis akibat cuaca ekstrem, kendala pemahaman pengguna, serta potensi *technology mismatch* apabila pemilihan teknologi tidak melalui proses validasi yang komprehensif. PPSP telah mengatasi tantangan tersebut melalui peningkatan pelatihan, edukasi pengguna, prosedur pemeliharaan rutin, dan penerapan *Proof of Concept* (PoC) sebelum investasi teknologi.

Secara keseluruhan, penelitian ini menyimpulkan bahwa keselarasan strategi TI memiliki peran penting dalam meningkatkan kinerja operasional PPSP. Implementasi TI yang tepat mampu memberikan keunggulan operasional, meningkatkan kualitas layanan publik, serta menjadi referensi bagi industri konstruksi dalam memanfaatkan teknologi untuk meningkatkan efektivitas proyek infrastruktur.

Kata kunci: teknologi informasi, kinerja operasional, studi kasus Eisenhardt, RFID, LOS, PT PP Semarang Demak.

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CHAPTER I

INTRODUCTION

1.1 Company Profile

PT PP Semarang Demak (PPSD) is a company engaged in the management, construction and operation of toll road infrastructure. PPSD was established on August 8, 2019 as a subsidiary of PT PP (Persero) Tbk, one of the leading State-Owned Enterprises (SOEs) in Indonesia. The company has a vision to become a leading toll road manager that contributes to sustainable infrastructure development. Its mission is to develop innovative transportation infrastructure, provide solutions to reduce congestion and flood risk in coastal areas, and contribute to regional and national economic growth.

PT PP Semarang Demak (PPSD) main project is the construction of the Semarang-Demak Toll Road, which is designed to reduce congestion on the Pantura route while addressing tidal flooding in the coastal areas of Semarang and Demak. This project has unique characteristics because it integrates the function of a toll road with a flood control embankment. The toll road is approximately 27 km long and is divided into two sections, namely Section I (Semarang City - Sayung) along 8.7 km which focuses on flood control, and Section II (Sayung - Demak City) along 16.31 km which serves as the main transportation route. With a significant investment value, this project is expected to improve connectivity between regions and encourage economic growth.



Image 1.1 Company Logo

Source: PT PP Semarang Demak

1.1.1 Vision

“Menjadi perusahaan pengelola jalan tol yang memberikan rasa aman, nyaman, dan memberikan manfaat bagi stakeholder Jalan Tol ruas Semarang Demak.”

1.1.2 Mission :

1. Melaksanakan pelayanan dan pemeliharaan dengan menerapkan sistem manajemen untuk menjamin kepuasan pihak-pihak yang berkepentingan
2. Mewujudkan ruas jalanTol Semarang Demak dengan kualitas Ekselen dan Pembiayaan yang sesuai rencana.
3. Melakukan kerjasama dengan mitra kerja yang saling menguntungkan dan kontinuitas.
4. Meningkatkan kompetensi dan kesejahteraan pegawai
5. Pengelolaan tata perusahaan yang baik (*Good Corporate Governance*)

1.1.3 Organizational Structure

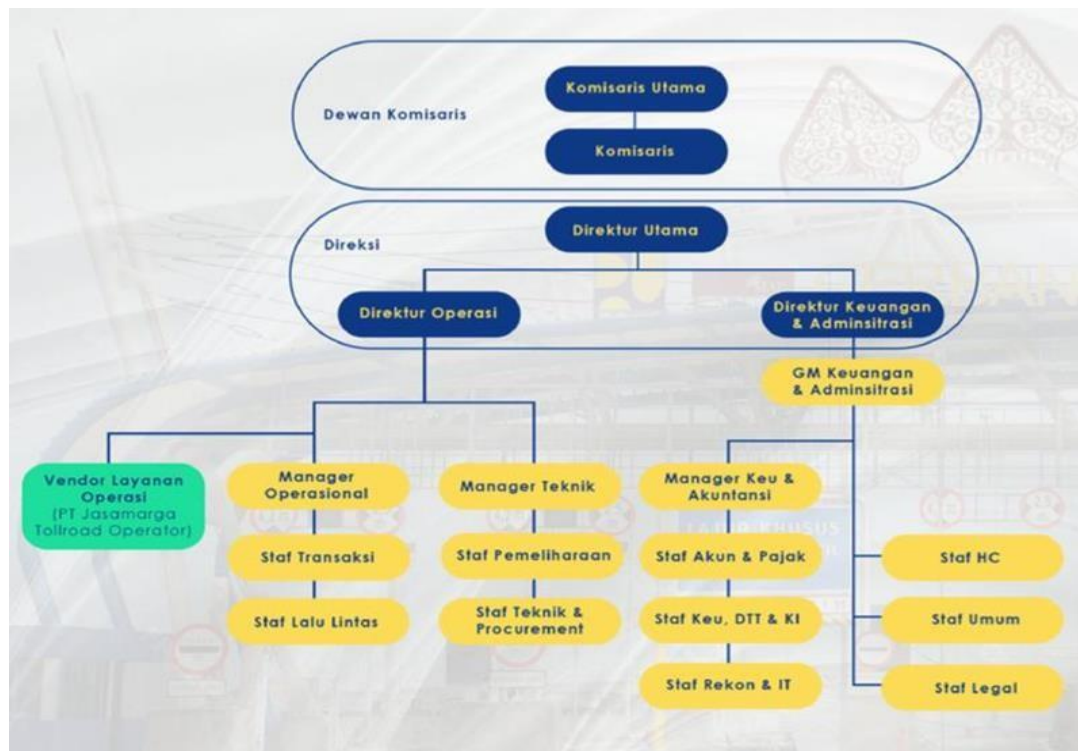


Image 1.2 Organizational Structure

1.1.4 Additional Information

1. Number of Employees: PT PP Semarang Demak has 21 permanent employees and for non-permanent employee, has more than 20 (company vendor)
2. Key Achievements :

- a) Toll Road Already in Operation PT PP Semarang Demak has completed the construction of the 16 km Semarang-Demak Section 2 (Sayung-Demak) Toll Road.
- b) This toll road has been officially operating since February 25, 2023 and helps reduce congestion and tidal flooding in Semarang and surrounding areas.
- c) Use of Environmentally Friendly Technology In its construction, the company uses bamboo for soil construction (bamboo mattress), which helps preserve the environment.
- d) Innovative Construction Techniques They also used advanced technologies such as slipform pavers and a very deep soil drainage system (PVD), which has never been used in other toll projects before in Indonesia.

1.2 Background

In the current era of globalization, business is growing rapidly with increasingly fierce competition (Meyer et al., 2023). Companies demand to be proactive to dynamic environmental changes by developing innovation strategies to survive (Ramadan et al., 2023). In addition, technological change is an important factor because it can improve operational performance (Hadikusuma, 2022). Technology is defined as human efforts to produce products or services by utilizing tools, processes, and resources (Agazu & Kero, 2024a) .

Companies from various sectors, including services, trade, and manufacturing, must align themselves with the development of information technology, which plays an important role in processing data into information (Meirina & Dewi, 2021). Information technology continues to develop following increasingly complex human needs.

One of the government-owned enterprises that follows technological changes is PT Pembangunan Perumahan Semarang Demak (PPSD), which is engaged in the construction of the 26.84 km Semarang Demak Toll Road, which is still continuing. several toll roads have been opened for toll users. The following is data on vehicles entering the Semarang Demak toll road in January 2024 to April 2024:

Table1.1 Number of Vehicles Entering the Semarang-Demak Toll Road from January to April 2024

Month	Total Vehicle
January2024	248.199
February 2024	255.492
March 2024	195.508
April 2024	341.338

Source: PT PP Semarang Demak (2024)

Based on data on the number of vehicles entering the Semarang Demak Toll Road from January to April 2024, it shows that the data has fluctuated or increased and decreased the number of vehicles entering the toll road. From January to February the number of vehicles increased, while in March it decreased, increased again in April due to the Lebaran homecoming, and decreased again in May. With the increase and decrease in the number of vehicles entering the toll road, the company issued a program called LOS (lajur otomatis). The LOS program is a member for toll road users. LOS is a company innovation using information technology.

The utilization of Information Technology in a business entity is inseparable from the need for decision making that requires fast and accurate information. This requires communication to use information to facilitate discussion between decision makers. The utilization of technology in the management of business entities is usually synonymous with the term Information Technology (IT) or Information and Communication Technology (ICT). These two terms are often used simultaneously in scientific and practical contexts, because they are developed through experience in technical fields, systems, both contain the same meaning (Budy et al., 2020) (Subaliii, n.d.).

Information and Communication Technology (ICT) emerged as a result of the fusion of computer and communication technologies in the mid-20th century (Perez, 2014). The rapid development of ICT is outpacing other technologies, but the mere adoption of technology is not enough to create a long-term competitive advantage. IT capabilities are needed to effectively manage, understand, and utilize information, resulting in a unique advantage that is difficult for other business entities to replicate (Benitez, 2018).

Organizational readiness and technological competence are internal factors, while competitive business pressures are external factors that influence e-business adoption decisions (Kusmantini, 2012). Creativity and innovation in marketing strategy are important approaches for business management in choosing IT investments carefully (Hadiyati & Lukiyanto, 2019). IT investment requires a

learning process and strategic integration in order to create sustainable competitiveness (Kusmantini, 2012).

The importance of operational efficiency in economic management is necessary to improve competitiveness and have a positive impact on the welfare of society. Technological innovations, both in the form of hardware and software, have brought about major changes in the way operations are conducted. With the right technology adoption, economic management can gain significant advantages in terms of efficiency, productivity, and resource management (Jange, 2023).

This research is expected to be able to answer how the influence of information technology can improve Operational Performance at PT PP Semarang Demak (PPSD). This effort is expected to be able to generate or obtain a sustainable competitive advantage due to the accumulation of experience and learning or due to the speed of adaptation to changes in the business environment.

1.3 Problem Formulation

The problem that occurred during the internship, namely the fluctuation of the increase and decrease in the entry and exit data of vehicles entering the Semarang Demak Toll Road from January 2024 to April 2024. So that the Company is looking for alternative ways to increase the number of vehicles entering the toll road in various ways, one of which is by repairing damaged toll roads, and making new innovations with information technology in the form of a. LOS system. LOS is a system as a member of toll road users.

1.3.1 Research questions

- 1 Is the technology used in accordance with the work needs at PT PP Semarang Demak?
- 2 What are the obstacles that arise when companies try to integrate information technology with operational activities, and how can they be overcome?
- 3 How does the information technology used by the company impact the smoothness and results of operational work?

1.4 Research Objectives

1. General objectives

- a) Understand the application of information technology at PT PP Semarang Demak in supporting company operations.
- b) Evaluate the effectiveness of technology in improving work efficiency and productivity.
- c) Assess the impact of technology on the smoothness and results of the company's operational work.

2. Specific objective

- a) Assess whether the technology used is appropriate and supports the work needs at PT PP Semarang Demak.
- b) Identify obstacles in information technology integration and how companies overcome them.
- c) Analyze the impact of the use of information technology on the smoothness and results of operational work.

1.5 Benefits

1. Benefits for PT PP Semarang Demak

- a) Assist companies in identifying the advantages and disadvantages of information technology used so as to increase operational efficiency and work productivity.
- b) Make it easier for companies to overcome technology integration obstacles so that work processes are smoother and well coordinated.
- c) Provide a basis for decision making for more appropriate technology development or investment in the future.

2. Benefits for the Construction Industry

- a) Become a reference or example of effective application of information technology in construction project operations, so as to improve work standards in the industry in general.
- b) Encourage wider application of technology to improve productivity, quality of work, and management of construction resources.

- c) Help reduce the risk of errors and project delays through the appropriate use of information technology.

3. Benefits to Government and Society

- a) Supporting the improvement of construction project efficiency which has an impact on faster and higher quality infrastructure development.
- b) Assist the government in encouraging the digitalization of the construction sector as part of national economic and technological development.
- c) Providing social benefits in the form of improved quality of infrastructure and public services resulting from more effective and efficient construction projects.

BAB II

LITERATURE REVIEW

2.1 Landasan Teori

2.1.1 Pengertian Inovasi (Understanding Innovation)

Innovation is the process of creation and development that results in new things, such as products, production processes, organizational structures, technologies, and overall institutional and system arrangements (Yeboah, 2023). This definition encompasses the utilization of ideas, knowledge, and technology in ways that can result in significant improvements in company performance (Wu et al., 2015). Innovation management is a complex phenomenon that includes the management of new things that can provide added value in the production, operational, or marketing process. Innovation management includes the process of developing, implementing, and managing innovative technologies, programs, and business models, all of which have an impact on changing the competitiveness of the company (Agazu & Kero, 2024).

Rapid technological, economic, and social changes pose challenges for businesses and society to adapt continuously. The development of information and communication technology is driving the utilization of digital data and the spread of the Internet. Globalization expands economic and social activities and changes the dynamics of innovation by presenting various factors that support competitive advantage.

Globalization not only expands the scope of economic and social activities, but also brings great influence to the development of innovation. With the increasing exchange of information, technology and cooperation between countries, companies have easier access to new ideas and global resources. This encourages companies to recognize and utilize various important factors that can improve efficiency, accelerate adaptation to market changes, and ultimately create a stronger and more sustainable competitive advantage. Innovation ecosystems have been the focus of widespread attention in academia across various disciplines, such as innovation, business economics, and sustainability (Sotirofski, 2024). Innovation plays a role as a driver of business progress through various forms, such as product and service innovation. Innovation in technology can help improve the efficiency and effectiveness of company operations, while innovation in organizations can drive increased productivity and competitiveness by supporting the implementation of new technologies.

Innovation performance plays a very important role in supporting the sustainability and growth of the company, because it reflects the results of innovation activities carried out. At the individual level, innovation performance is related to the creation of products, ideas or projects that have value and originality. Several studies have shown that individual factors and social relationships have a major influence on the achievement of innovation performance. Factors such as personal character, job satisfaction, and psychological state are considered key elements that influence innovation

success. In addition, the social network owned by individuals also contributes positively to the innovative behavior and innovation performance of the company as a whole. Meanwhile, at the organizational level, innovation performance reflects the success in implementing original new ideas (Zhang et al., 2023).

2.1.2 Kinerja Operasi (Operational Performance)

Operational performance is an effort to combine best practices and decisions to choose strategies in competition to attract customer attention (Budy et al.). Operational performance as a process that is broadly aimed at achieving delivery reliability, process flexibility, cost reduction, product or process innovation, and product quality. Operational performance as the ability of a manufacturer as a product maker to meet the standards of expectations established for customers (Jitpaiboon & Sharma, 2013).

A business entity is said to have quality competence if it can use the quality of the goods or services it produces to (Budy et al., 2020) :

- a) satisfy customer demand;
- b) make a difference between the products it produces and those of its competitors;
- c) Build a competitive advantage that exceeds all competitors.

2.1.3 Perceptions and Practices In Organizations

Postmodern organizations today allocate substantial resources to research and development (R&D) activities to create innovations, both radical and incremental. These innovations aim to provide a competitive advantage to the products or services they offer in the market. However, the development of new ideas, products or knowledge is not always aimed solely at improving the company's internal performance. In many cases, companies also leverage these innovations as economic assets by licensing the technology, skills, ideas or knowledge to other organizations. This strategy not only expands the reach of innovation, but also opens up new revenue opportunities from external collaboration and knowledge utilization across the organization (Parveen et al., 2023)

Outdoor-in or inbound OI refers to a form of cooperation between companies that aims to acquire knowledge from outside and apply it within the organization. This concept refers to the process of seeking and utilizing external knowledge to support the development and utilization of technology internally (Rabie et al., 2024)

2.2 Framework

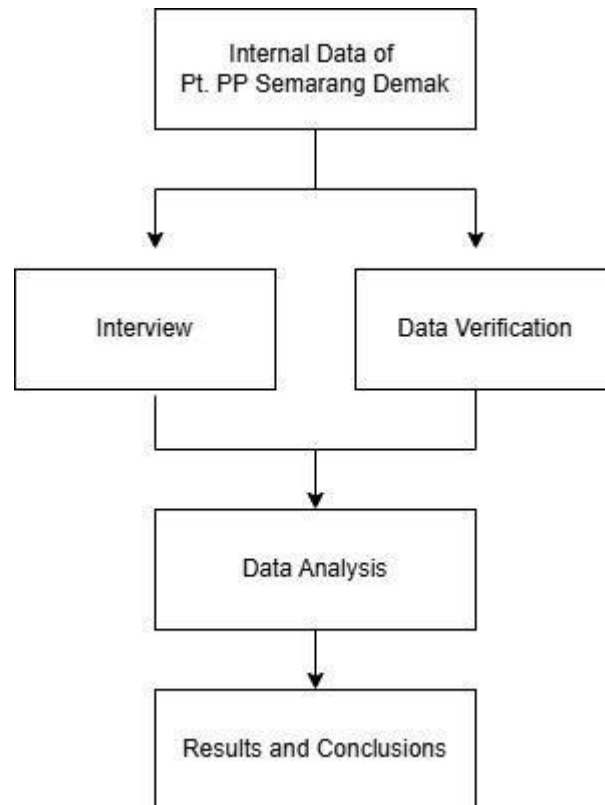


Image 2.1 Framework Process of Research

BAB III

RESEARCH METHODS

3.1 Research Approach

3.1.1 Types of Research

In qualitative research, methodology focuses more on the type of approach and research plan generally used by researchers in the field of social science or problems. The qualitative research approach is within an interpretive framework. This approach is adapted from constructivism theory, which states that knowledge is subjective because each individual has a different perspective and understanding based on their environment and experience (Creswell, 2018). The purpose of this methodology is to explain, assess, and summarize various data collection methods, while noting their advantages and disadvantages. (Yangka et al., 2018)

This research uses Eisenhardt's (1989) case study approach to examine the perceptions and practices of aligning information technology strategy with operational performance at PT PP Semarang–Demak. Initially, the research focused on exploring stakeholders' views on the role of IT, the process of aligning IT strategy with operational strategy, and its impact on project performance. Theoretical frameworks such as the Strategic Alignment Model were used to a limited extent as a guide without limiting the empirical findings.

Case selection was conducted through theoretical sampling involving three main units: Project Management, the Information Systems and Digital

Engineering Division, and Field Operations. These three units were selected because of their distinct roles in IT implementation and their contribution to operational performance. Data were collected through semi-structured interviews, field observations, and internal document analysis, allowing for an iterative and flexible analysis process.

Within-case analysis showed that Project Management and the IT Division had positive perceptions and a high level of strategic alignment, while Field Operations still faced challenges with digital literacy and system adaptation. Through cross-case analysis, a pattern was found that the stronger the IT strategy alignment between units, the greater the improvement in operational performance. Research reaches closure when the pattern of findings stabilizes and yields no new information. Overall, Eisenhardt's approach provides a more comprehensive understanding of the relationship between perception, IT strategy alignment, and operational performance in the context of construction project.

3.1.2 Approach Used

This research employs a qualitative case study approach, synthesizing the methodological principles proposed by (Creswell, 2018) and Eisenhardt, (2007) to achieve a comprehensive understanding of strategic alignment across organizational units. Creswell's framework informed the structuring of the research design, including delineating the case boundaries, developing data collection protocols, and establishing validity procedures. Simultaneously,

Eisenhardt's theory-building approach through case studies guided the analysis process, particularly through the application of internal and cross-case analyses.

The internal case analysis facilitated an in-depth examination of each unit—Project Management, IT Division, and Field Operations—thus enabling the identification of distinctive patterns related to perceptions, digital literacy, and operational practices. Furthermore, the cross-case analysis integrated findings across units to uncover convergent and divergent themes, supporting the emergence of broader patterns and theoretical insights regarding the interaction between IT strategy alignment and operational performance.

3.1.3 Conformity to Purpose

The selection of qualitative methods in this study is considered appropriate because it is in line with the main objective of the study, namely to deeply understand the perceptions, experiences, and views of respondents regarding the process of aligning information technology strategies with operational performance. The qualitative approach allows researchers to dig deeper into information through direct interaction with respondents, especially through interviews (Eisenhardt, 1989). This method is flexible, where questions can develop during the interview process according to the direction of the answers given, thus opening up opportunities to explore new things that are relevant but perhaps unexpected. In addition, this approach emphasizes understanding the context and meaning behind the actions or views of respondents, which cannot be explained by numbers or statistical data alone. Therefore, the qualitative

method is very suitable for use in this study because it provides a more holistic and in-depth picture of the phenomenon being studied.

3.2 Assessment Data Sources

This study utilized two types of data sources: primary and secondary data. Primary data was obtained directly through in-depth interviews with employees of PT PP Semarang Demak (PPSD) who play a role in operational activities and the implementation of information technology. This data captures the respondents' views, experiences, and perceptions regarding the process of aligning information technology strategy with operational performance. Furthermore, the researcher conducted field observations during the internship period (February 5–June 4, 2024) to gain a firsthand understanding of the company's work activities and operational conditions.

Secondary data was obtained from internal company documents and supporting literature. Company documents include vehicle traffic data on the Semarang–Demak Toll Road, project reports, and information on the LOS (Lajur Otomatis) program. Supporting literature included scientific journals, books, and other academic references relevant to the topics of information technology, operational performance, and management strategy.

These two data sources complement each other, strengthening the validity of the research findings and providing a comprehensive picture of the relationship between information technology implementation and improved operational performance at PPSD.

3.3 Data Collection Techniques

The data collection methods used in this study included in-depth interviews and direct observation, chosen to obtain a comprehensive overview of the implementation, challenges, and suitability of information technology at PT PP Semarang Demak (PPSD). In-depth interviews were conducted semi-structured with three key informants who held strategic positions and direct knowledge of the company's operations.

Table 3.1 Respondent List

No	Name of Interview	Divison	Interview Duration
1	R	Engineering Divison	20
2	H	Operations Division	25
3	F	Finance Division	20

Source: primary data, 2025

The first informant, R (Engineering Division), provided data on the technical aspects of system implementation, including how LOS devices and RFID sensors are tested and maintained, and how external factors such as weather affect operational stability. The second informant, H (Operations Division), provided empirical details about daily operational dynamics, including field workflows, officer responses to system disruptions, and the impact of technology on the effectiveness of road user services. Meanwhile, the third informant, F

(Finance Division), provided perspectives on cost feasibility, investment justification, and the risk of technology incompatibility that can arise if the technology does not align with business process requirements (Sieber et al., 2022).

The semi-structured interview process allowed researchers to explore in-depth information because questions could evolve based on the interviewee's answers. This approach yielded rich data, including real-life case studies, the interviewees' firsthand experiences, and new, unanticipated findings. For example, F emphasized the importance of needs analysis before technology procurement, while H highlighted challenges at the operations station when RFID reading errors occurred, and R explained the technical steps for handling device failures. This diversity of responses strengthened a comprehensive understanding of the various facets of IT implementation at PPSD (Käss et al., 2024).

In addition to interviews, direct observation was conducted during the internship to obtain empirical evidence on how the LOS system operates in the field, how officers handle vehicle queues, and how the technology devices function under real-life operational conditions. Observations also helped identify obstacles that might not have emerged in interviews, such as device instability due to heavy rain or users' lack of understanding of e-toll procedures.

CHAPTER IV

RESULT AND DISCUSSION

4.1 Research Findings

This internship research aimed to gain an in-depth understanding of the perceptions and practices of aligning information technology (IT) strategy with operational performance at PT PP Semarang Demak (PPSD), a key entity involved in the Semarang-Demak toll road project. A qualitative case study approach was used, with in-depth interviews as the primary data collection method. The researcher's intensive presence during the four-month internship, from February 5 to June 4, 2024, enabled direct observation and provided real-world context for the collected data. The study also analyzed internal company documents, such as data on the number of vehicles entering the Semarang-Demak Toll Road from January to April 2024, to support the findings.

From the collected data, several key aspects related to IT alignment with operational performance were identified. PPSD currently utilizes information technology, exemplified by the implementation of the Automatic Lane (LOS) program. This program is an IT-based innovation designed to serve toll road users. Furthermore, the company utilizes advanced technologies such as slipform pavers and a very deep soil drainage (PVD) system in its construction projects. This study seeks to assess the extent to which the technology used is appropriate and supports the work needs of the PPSD, as well as to evaluate its effectiveness in improving work efficiency and productivity.

The study also identifies various obstacles that arise when PPSD attempts to integrate information technology with operational activities. This study aims to understand how the company overcomes these obstacles, including the solutions implemented to ensure smoother work processes and better coordination. One significant issue identified was the fluctuation in the number of vehicles entering and exiting the Semarang-Demak Toll Road from January to April 2024. This fluctuation prompted the company to seek alternative ways to increase vehicle numbers, including repairing damaged toll roads and introducing an IT-based LOS system.

Furthermore, this study investigates how the information technology used by PPSD affects the smoothness and overall results of operational work. This includes an analysis of IT's contribution to operational efficiency, productivity, and resource management. The findings of this study are expected to inform decision-making for more appropriate technology development or investment in the future. The use of IT is crucial for decision-making that requires fast and accurate information, contributing to sustainable competitive advantage through accumulated experience and rapid adaptation to changes in the business environment. Finally, this study highlights the potential of PPSD's IT applications as a reference for the construction industry, encouraging wider adoption of technology to improve productivity, quality, and resource management. It also supports the government's digitalization efforts and contributes to improved infrastructure and public services.

In summary, this study aims to provide a comprehensive overview of how IT is perceived, implemented, and impacts operational performance at PT PP Semarang Demak, discussing current practices and future strategic directions.

4.1.1.1 Suitability of technology to work needs

The implementation of the Automatic Lane (LOS) program as an IT-based digital service demonstrates the company's active adaptation of technology to meet operational and public service demands. According to H (PPSD Operations Division), the technology used is aligned with the work requirements at PT PPSD, particularly in the transaction unit's OPS division, as it significantly supports smooth performance and time efficiency.

Furthermore, F (PPSD Finance Division) stated that the technology implemented by PT PP Semarang Demak reflects relevant innovation and supports operational needs. The LOS implementation demonstrates the company's commitment to adopting digital solutions to address on-the-ground issues, such as congestion caused by e-tolls. However, the effectiveness of this technology needs to be periodically evaluated to maintain its relevance to evolving needs. Therefore, PPSD continues to adapt its technology to achieve the highest efficiency and service quality. Furthermore, according to R (PPSD Engineering Division), the technology is aligned with the requirements of the Semarang-Demak Toll Road Section 2 (Sayung-Demak), utilizing RFID (Radio Frequency Identification)-based technology, which facilitates road users without tapping cards when passing through toll booths.

Based on input from various divisions at PT PP Semarang Demak, it can be concluded that the current technology aligns with the company's operational needs. The implementation of LOS and the use of RFID technology have been proven to increase work efficiency, simplify road user operations, and streamline service processes. However, evaluation and updates are still needed to ensure the technology remains relevant to future developments. With this commitment, PPSD is expected to continuously improve service quality and achieve optimal operational performance.

4.1.1.2 Barriers To Information Technology Integration And Their Solution

Obstacles in the implementation of information technology at PT PP Semarang Demak (PPSD) can be traced to several main factors conveyed by various related divisions. Based on a statement by H (Operations Division of PPSD), the challenges faced include limited human resource (HR) competency, the need for additional personnel with a deep understanding of technology, and the impact of climate and extreme weather on the performance of technology infrastructure. To respond to this, increasing HR training capacity through targeted and funding personnel with specialized expertise in equipment maintenance is a necessary strategic step. In addition, unspecified weather changes must be anticipated through capable technical preparations to minimize the risk of equipment damage.

In line with this, according to R (PPSD Engineering Division), although the technology used is aligned with operational needs, its

implementation still faces several obstacles. Obstacles from the user side, such as insufficient balance, lack of understanding of the ideal sensor reading distance, and the high cost of using the technology compared to conventional cards, are aspects that require serious attention. This emphasizes the importance of increasing education and outreach to road users, accompanied by continuous evaluation so that the technology can function optimally and support smooth service.

Meanwhile, F (Finance Division of PPSD) highlighted a more macro-level strategic obstacle, namely technology mismatch or technology incompatibility. Inaccurate technology selection can trigger budget waste, reduce operational efficiency, and hinder the achievement of performance targets. To prevent this, companies need to implement a systematic technology validation process through a comprehensive operational needs analysis, the establishment of measurable Key Performance Indicators (KPIs), and comprehensive business process mapping. More effective mitigation strategies include implementing a Proof of Concept (PoC) before making a full-scale investment and an in-depth cost-benefit analysis. With this approach, PPSD can ensure that the selected technology is truly relevant, provides optimal added value, and aligns with the organization's long-term goals.

Solutions to overcome the obstacles of information technology integration in PPSD include improving human resource competency through special training and additional energy savings experts in device maintenance, education and outreach to users to understand the procedures and proper use of technology, as well as the implementation of a systematic technology validation process through Proof

of Concept (PoC), operational needs analysis, business process recording, and the establishment of clear KPIs. In addition, anticipation of environmental conditions such as extreme weather is also necessary through technical preparation and routine maintenance to ensure technology devices continue to function optimally. With this integrated approach, information technology integration can run effectively, efficiently, and support the smooth operation of the company.

4.1.1.3 The Impact of Technology On The Smoothness and Results of Operational Work

The use of information technology (IT) has a significant impact on the smoothness of workflows and the quality of a company's operational results. According to H (Operations Division, PPSD), IT effectiveness depends heavily on the alignment of human resource competencies, equipment availability, and user knowledge of the applied technology. With careful planning and appropriate risk considerations, companies can maximize operational results and keep pace with technological developments to achieve optimal performance.

Similarly, F (Finance Division, PPSD) emphasized that real-time data integration, increased system capacity, and compatibility between technologies make IT a key factor in smooth operational processes. The right technology can improve output accuracy, reduce service quality, and improve resource efficiency, including reducing operational costs through better performance monitoring. Unfortunately, selecting the wrong technology can create new obstacles, increase costs, and reduce operational effectiveness.

Furthermore, according to R (PPSD Engineering Division), the use of technology such as RFID-based systems at toll gates helps road users eliminate the need for card tapping, resulting in more efficient operations and reduced congestion at toll booths. This demonstrates that selecting and implementing the right technology can directly impact process smoothness and the quality of operational services.

4.2 Discussion

The implementation of technology at PT PP Semarang Demak (PPSD) has essentially demonstrated a high level of suitability to the organization's work needs, as reflected in the views of three sources across divisions. H from the Operations Division emphasized that the technology used, particularly in the transaction unit, has significantly supported the smoothness and effectiveness of work through accelerated processes and increased time efficiency. This view is in line with the opinion of F from the Finance Division who assessed that the implementation of technology such as the Semarang Demak Automatic Lane (LOS) reflects the company's efforts to adopt digital innovations relevant to operational challenges in the field, especially in overcoming congestion caused by the limitations of the conventional E-Toll system. In addition, R from the Engineering Division emphasized that the RFID-based technology implemented on the Semarang-Demak Toll Road Section 2 has been in accordance with service needs, as it facilitates road users to pass without having to manually tap cards. Overall, the opinions of the three sources indicate that PPSD

has implemented technology that is relevant, functionally appropriate, and adaptive to operational dynamics.

Meskipun Although the technology meets work requirements, the integration process still faces a number of technical, operational, and strategic challenges. H identified limited human resource competency as a key obstacle, necessitating specialized training and additional maintenance personnel to ensure optimal operation of the technology. He also highlighted extreme weather conditions that can damage devices and require adequate technical preparedness. From a strategic perspective, F highlighted the risk of technological incompatibility, which can lead to budget wastage and failure to achieve operational targets if the adopted technology is not systematically validated. Therefore, he recommended comprehensive needs analysis standards, business process mapping, KPI determination, and Proof of Concept (PoC) as mitigation measures. Meanwhile, R highlighted user-driven challenges, such as insufficient E-Toll balances, a lack of understanding of the ideal RFID sensor reading distance, and the high cost of the technology compared to conventional cards. To address these challenges, intensive user education and ongoing evaluation of the technology's performance are needed to ensure optimal implementation and alignment with operational needs.

The information technology implemented at PPSD has been proven to significantly impact the smoothness of workflows and the quality of operational results, as long as it is supported by human resource readiness, capable devices, and user understanding. H emphasized that the success of technology

implementation is largely determined by the alignment between personnel capabilities, device readiness, and careful risk considerations. F added that technology enables real-time data integration, increased decision-making accuracy, operational cost savings, and improved service quality, thus making technology a strategic component that determines the effectiveness of organizational performance. R also emphasized that the use of RFID technology has succeeded in reducing congestion at toll gates and improving the smoothness of services without the need for card tapping, although the increase in LHR has not been significant. Overall, the three views above indicate that technology is not merely a supporting tool, but a crucial determinant in improving process smoothness, operational productivity, and the overall quality of company services.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Based on research findings obtained through in-depth interviews, direct observation during the internship period, and analysis of operational documents at PT PP Semarang Demak (PPSD), it can be concluded that the implementation of information technology has significantly contributed to improving the effectiveness and smoothness of the company's operational performance. The implementation of the Semarang Demak Automatic Lane (LOS) system and construction technologies such as slipform pavers and the PVD drainage system demonstrates that the company consistently adopts technology relevant to field needs. The three informants from the Operations, Finance, and Engineering divisions agreed that the technology used is on track to be appropriate, both in supporting daily operational activities, improving service accuracy, and accelerating transaction processes.

However, this study also revealed that technology integration is not without challenges. Limited human resource competency, unpreparedness for extreme weather conditions, technology mismatch with strategic needs, and obstacles stemming from road users—such as insufficient E-Toll balances or unfamiliarity with sensor reading distances—demonstrate that the digitalization process requires careful planning and ongoing evaluation. These obstacles have the potential to hinder the achievement of performance targets if not addressed systematically.

This study confirms that information technology plays a crucial role in improving service quality, operational productivity, and company managerial effectiveness. The success of technology implementation at PPSD is determined not only by the availability of equipment, but also by the organization's readiness to facilitate human resource competency, strengthen supporting infrastructure, and ensure technology alignment with the company's strategic needs. Thus, investment in IT not only provides efficiency but also strengthens PPSD's competitiveness in the increasingly digitalized toll road and construction industries.

5.2 Recommendations

Based on the analysis and research conclusions, several strategic recommendations can be put forward to support the strengthening of information technology integration at PT PP Semarang Demak. First, the company needs to improve the capacity and competency of its human resources through structured training programs, particularly for operational and technical personnel responsible for equipment management and maintenance. Comprehensive mastery of technology will ensure service continuity and minimize the potential for equipment damage due to human error.

Second, regular evaluation of the technology used must be conducted through systematic mechanisms such as operational needs analysis, establishing key performance indicators, and conducting Proof of Concept (PoC) trials before full-scale investment. This process will help the company avoid technology mismatches that can lead to budget wastage and hinder the achievement of

operational targets. A comprehensive cost-benefit analysis is a crucial step in ensuring that any new technology provides optimal added value.

Third, education for toll road users needs to be improved, particularly regarding the use of the LOS system and RFID technology. Dissemination of usage procedures, preparing E-Toll balances, and understanding the ideal sensor reading distance will contribute to smooth transactions and reduce potential queues at toll gates. This education can be conducted through digital campaigns, social media, and information dissemination at toll roads.

Fourth, companies need to ensure that their supporting technology infrastructure, including hardware and network systems, is designed to withstand external environmental conditions such as extreme weather. Routine maintenance and device quality upgrades are crucial for maintaining long-term technological reliability.

Finally, Public Service Providers (PPSD) are encouraged to continuously explore the latest digital innovations and utilize them strategically to strengthen their competitive advantage. The development of service applications, real-time monitoring dashboards, and automated reporting systems can facilitate managerial decision-making and improve the quality of public services. By implementing these recommendations, PPSD is expected to strengthen the effectiveness of information technology in its operations and continue to adapt to changes in the increasingly digital business environment.

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Attachment

Lampiran A Transkrip Wawancara

- Resource Person 1: R (Engineering Division)
- Resource Person 2: H (Operations Division)
- Resource Person 3: F (Finance Division)

Appendices 4 Daily Log Internship

Name of Company : PT PP Semarang demak (PPSD)

Name of student : Nurcholis Kurniawan

Date of start : 5 February 2024

Date of completion : 4 June 2024

Supervisor : Heni Farah diba

Internship attendance list

February- March

No	Date	Duration	Brief description of activity
1	5 Feb 2024	8 hours	Target exposure during apprenticeship
2	6 Feb 2024	8 hours	Survey of toll road locations and take documentation
3	7 Feb 2024	8 hours	Meeting together PPSD, JMTO, and PKTJ
4	12 Feb 2024	8 hours	Preparation of event drafts and PPSD tree planting agenda
5	13 Feb 2024	8 hours	safety morning learning 5 R (Ringkas, Rapi, Resik, Rawat, Rajin)
6	15 Feb 2024	8 hours	Notulensi meeting program go green PPSD
7	16 Feb 2024	8 hours	Pelaksanaa program go green dengan direksi dan karyawan PPSD
8	19 Feb 2024	8 hours	CSR ppsd kepada korban banjir di wilayah demak

9	20 Feb 2024	8 hours	Meeting Together BSI bank
10	21 Feb 2024	8 hours	Site visit bersama kepala deputi KPPIP di proyek tol semarang sesi 1
11	22 Feb 2024	8 hours	Membantu disertasi
12	23 Feb 2024	8 hours	Consultation with mentor operational
13	26 Feb 2024	8 hours	Mencari referensi judul
14	27 Feb 2024	8 hours	Learn to analyze journals with DK for needs TA
15	28 Feb 2024	8 hours	Continuing to analyze journal
16	29 Feb 2024	8 hours	Helping the team from USM do the making website

March- April

No	Date	Duration	Brief description of activity
1	1 mar 2024	8 hours	Help organize files financial statements
2	4 mar 2024	8 hours	Scanner data
3	5 mar 2024	8 hours	Print invoice

4	6 mar 2024	8 hours	Helps in making video for site documentation visit
5	7 mar 2024	8 hours	Help move PPSD monthly report into Excel
6	8 mar 2024	8 hours	Berkkontribusi dalam Acara Jasa Marga Toll Operated Di Auditorium
7	13 mar 2024	8 hours	DPR RI visit to the office PPSD and Site Visit
8	14 mar 2024	8 hours	Make a Plan quality management, safety, occupational health & environmental protection
9	15 mar 2024	8 hours	Melanjutkan Menyusun Rencana management mutu, keselamatan, kesehatan kerja & lindung lingkung
10	18 mar 2024	8 hours	Make a Plan quality management, safety, occupational health & environmental protection
11	19 mar 2024	8 hours	Make a plan toll road safety

12	20 mar 2024	8 hours	Continue make a plan toll road safety
13	21 mar 2024	8 hours	Scanner data
14	22 mar 2024	8 hours	Rekapitulasi LPP JMTO
15	25 mar 2024	8 hours	SPK Pengawasan Bangunan Pengganti
16	26 mar 2024	8 hours	Back up MC 02 Lapi ITB
17	27 mar 2024	8 hours	Scanner data
18	28 mar 2024	8 hours	Checking daftar peralatan dan perlengkapan keselamatan kesehatan kerja ruas tol semarang demak
19	29 mar 2024	8 hours	Meeting togethers BPKP

April- mei

No	Date	Duration	Brief description of activity
1	1 apr 2024	8 hours	retyping the format of the emergency response team task review
2	2 apr 2024	8 hours	retype the maintenance inspection plan PT. PP Semarang demak

3	3 apr 2024	8 hours	retyping the K 3 identification, assessment and control format
4	4 apr 2024	8 hours	retype the format of OHS and KJT goals, objectives, program
5	5 apr 2024	8 hours	retyped the emergency response plan flow chart
6	16 apr 2024	8 hours	retype emergency response readiness format
7	17 apr 2024	8 hours	retyping format emergency response readiness in the office
8	18 apr 2024	8 hours	retyped the emergency procedures structure
9	19 apr 2024	8 hours	retype stakeholder wishes and expectations
10	22 apr 2024	8 hours	meeting and halal bihalal with bank mandiri
11	23 apr 2024	8 hours	retyped quality management format, safety, environmental health & highway safety plan
12	24 apr 2024	8 hours	retyping Semarangh dEmak toll road product/service life cycle table

13	25 apr 2024	8 hours	Visit to PPSD office from smk 7 garut and visit to sayung toll gate
14	26 apr 2024	8 hours	Meeting between supervisor and supervisor through zoom meeting
15	29 apr 2024	8 hours	conducted research to the Sayung toll gate to ensure road user satisfaction in payment transactions through avisi and ensure that all classes of vehicles passing through are correct.
16	30 apr 2024	8 hours	helped create a new product display for PT PP Semarang Demak for the marketing field

Mey- June

No	Date	Duration	Brief description of activity
1	2 mey 2024	8 hours	print mc 3rd period August 1, 2022-December 28, 2023
2	3 mey 2024	8 hours	assist in checking March & April lpp reports
3	6 mey 2024	8 hours	Print BA inspection

4	7 mey 2024	8 hours	assist in checking the adjustment of monthly invoice monitoring data
5	8 mey 2024	8 hours	assisted in printing the latest data on the attendance status of officers for placement realization transactions and plan changes
6	13 mey 2024	8 hours	assist in taking meeting documentation
7	14 mey 2024	8 hours	at Sayung toll gate assisting in checking the vehicle AVC
8	15 mey 2024	8 hours	at Sayung toll gate assisting road users who have difficulty in printing receipts
9	16 mey 2024	8 hours	Assist in retrieving meeting documentation
10	17 mey 2024	8 hours	at the Sayung toll gate assisting in checking vehicle avc.
11	20 mey 2024	8 hours	at the Sayung toll gate assisting in checking vehicle avc.
12	21 mey 2024	8 hours	maintenance monitored the team in charge of cleaning up trash

13	22 mey 2024	8 hours	at Sayung toll gate assisting in checking vehicle avc.
14	27 mey 2024	8 hours	maintenance checking semarang demak toll road section
15	28 mey 2024	8 hours	at the sayung toll gate assisting road users who ran out of etol balance and directing them to the e-toll refill vendor.
16	29 mey 2024	8 hours	assisted in scanning pension fund data
17	30 mey 2024	8 hours	at the sayung toll gate assisting in checking vehicles
18	31 mey 2024	8 hours	assisted in scanning pension fund data
19	3 mey 2024	8 hours	seminar with delameta
20	4 mey 2024	8 hours	farewell with pt pp semarang demak

Image 1 Internship photo documentation

Attachment: Internship photo documentation



