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Original Article

# Strategic Digital Transformation in Procurement: A Design Thinking Study at PT. Telkomsel

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**Abstract**

**Introduction**: This study investigates the strategic digital transformation of procurement processes at PT. Telkomsel. The objective is to enhance efficiency, transparency, and agility within a traditionally manual procurement system by leveraging a human-centred, design-minded approach aligned with organisational goals. **Methods**: A qualitative research design was adopted, involving in-depth interviews with eight key stakeholders across various organisational levels who are directly involved in procurement. The study applied the five iterative stages of design thinking—Understand, Define, Ideate, Prototype, and Test—to identify bottlenecks, co-create digital solutions, and develop a tailored e-procurement prototype. **Results**: The design thinking approach led to the identification of critical pain points and the development of a user-centric digital procurement system. The implementation of the prototype resulted in significantly reduced tender cycle times and enhanced communication across stakeholders. **Conclusion**: This study demonstrates that integrating design thinking into digital transformation initiatives can yield practical, strategic benefits. It reinforces the value of aligning technological innovation with organisational needs to drive efficiency and maintain a competitive advantage in procurement operations.

***Keywords**: Digital Transformation; Design Thinking; E-procurement; Procurement Intelligence*

## Introduction

The industrial sector is currently undergoing a profound transformation from Industry 4.0 towards Industry 5.0, presenting new operational and strategic challenges for telecommunications companies such as PT Telkomsel. In this rapidly evolving landscape, firms must continuously enhance operational efficiency to meet increasingly sophisticated and fast-changing consumer demands. A significant challenge faced by PT Telkomsel lies in its procurement process, where the extended tender cycle duration considerably hampers timely decision-making and responsiveness. The primary research problem centres on the inefficiencies inherent in manual procurement workflows, particularly the prolonged approval cycles that delay PT Telkomsel's ability to swiftly leverage market opportunities, ultimately diminishing their competitive positioning and overall organisational performance in a highly competitive telecommunications environment. According to Ali *et al.* (2025), Susantya *et al.* (2022), Chen *et al.* (2022), Sudrajad *et al.* (2023), and Nasution (2022), these operational challenges underscore the critical need for digital transformation strategies. Specifically, e-procurement systems have been shown to significantly enhance process efficiency and transparency, streamline operational

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activities, reduce administrative burdens, strengthen supplier relationships, lower costs, and better align procurement activities with overarching strategic business goals.

This study endeavours to devise an innovative e-procurement solution tailored to address these identified inefficiencies at PT Telkomsel through the application of advanced digital technologies. According to Hartana and Retnowati (2024) and Odike *et al.* (2025), the approach prioritises user-centred design principles facilitated by iterative feedback mechanisms— a methodology proven effective in comparable organisational contexts. According to Suryodiningrat (2024) sustained user support and training initiatives are integral to ensuring seamless technology adoption across all staff levels, regardless of varying digital literacy competencies. This research aims to provide actionable insights and practical guidance not only for PT Telkomsel but also for other telecommunications firms navigating the complex process of digital transformation in procurement, employing a comprehensive literature review coupled with empirical qualitative methods for data collection and analysis.

This paper is structured as follows: The Introduction outlines the study's context and problem statement. The Literature Review presents key theoretical foundations, including the Technology Acceptance Model, digital transformation, procurement, e-procurement, and design thinking. The Methodology section details the qualitative research design and data collection process. Results are organised according to the design thinking phases, highlighting findings from interviews, ideation sessions, prototyping, and usability testing. Finally, the Discussion and Conclusion sections elaborate on the implications of the findings, limitations of the study, and recommendations for PT Telkomsel and future research in procurement digital transformation.

## Review of Literature

### *Strategic Management*

Strategic management is a fundamental organisational process that enables firms to achieve excellence and sustainable growth by aligning their practices with clear, long-term objectives. According to Al Humeisat (2022), effective strategic management practices significantly contribute to organisational excellence, highlighting the importance of well-defined strategies in driving superior performance. Gupta (2020) explains strategic management as a comprehensive framework involving the setting of objectives, analysis of internal and external environments, strategy formulation, and execution to secure competitive advantage. This process equips organisations to adapt efficiently in dynamic and competitive markets.

Furthermore, according to Kocherbaeva and Samaybekova (2022), strategic management plays a pivotal role in guiding organisational development by steering growth and adaptation to changing environments through systematic decision-making. Empirical evidence from the banking sector presented by Demir, Mainardes, and Hambrick (2022) demonstrates that robust strategic management is directly linked to enhanced organisational performance. Collectively, these perspectives present strategic management as a continuous, dynamic process essential for navigating complex challenges, optimising resource allocation, and ensuring sustained success across sectors.

### *Technology Acceptance Model (TAM)*

According to Kalayou, Endehabtu, and Tilahun (2020) The Technology Acceptance Model (TAM) is one of the most common theoretical frameworks to explain and predict people's adoption of information systems. The Technology Acceptance Model (TAM), which is based on the Theory of Reasoned Action (TRA) developed by Ajzen and Fishbein in 1975, explains the determinants of consumer intentions to adopt new behaviour towards technology. According to Santi and Erdani (2021) and Virk, Salman and Bhaumik (2024), the key elements of the Technology Acceptance Model (TAM) are perceived usability and perceived value that influence technology acceptance directly or indirectly. Perceived usefulness is the belief that technology enhances performance, while perceived ease of use is the perception that technology is simple to use. According to Addy *et al.* (2024), these components must be understood and addressed in order to design effective systems that not only meet user needs but also enhance technology acceptance.

### *Digital Transformation*

Digital transformation is a strategic process that uses technological advancements to enhance an organisation's productivity, efficiency, and overall effectiveness. Kumar and Ganguly (2021) describe it as the integration of information technology, computing, communication, and networking to improve outcomes and boost customer engagement. Vial (2021) highlights that digital transformation requires fundamental changes in business models and organisational culture. Warner and Wäger (2019) emphasise their role in creating new value through innovation. Li *et al.* (2024) note that successful digital transformation depends on aligning technology with strategic goals. Mirković *et al.* (2019) stress the importance of adapting processes to leverage digital tools effectively. The European Commission (2024) points out that digitalisation supports sustainability and competitiveness across industries. Engesmo and Panteli (2020) further argue that collaboration between stakeholders is essential for overcoming challenges during this transition.

### *Procurement*

In the public as well as the commercial sectors, procurement is the suitable and effective acquisition of products and services. According to Martono (2018), buying—or procurement—is in charge of giving companies the tools they need to support their operations. Raw materials and supplies are among the items bought, leased, traded, or rented in this process. Effective procurement, according to Sudrajad *et al.* (2023), guarantees timely access to excellent resources at ideal prices, thus enhancing organisational efficiency, by means of which Chen *et al.* (2022) underline even further how digital procurement solutions may simplify these procedures, lower administrative load, and improve supplier relationships and openness. These points of view taken together emphasise the important part well-run procurement plays in enabling operational excellence.

### *E-Procurement*

According to Rampersad (2023), e-procurement is the complete process of acquiring goods or services through a centralised digital system that covers planning, implementation, and evaluation stages. Information and communication technology (ICT) is integrated into all procurement phases, including contract development, planning, notifications, and supplier selection. Moreover, e-procurement involves purchasing goods and services via internet platforms using online methods to streamline and enhance the efficiency of procurement activities.

### *Design Thinking*

Applied to business, society, and technology, design thinking—as Brown (2019) defines it—is an iterative, user-centred tool for solving problems. Beginning with a strong awareness of user demands, this method proceeds to produce original ideas, prototyping, and validation of them by testing. By stressing problem solving, this iterative approach not only satisfies consumer wants but also generates value for businesses. Most importantly, Design Thinking is a basic tool that guarantees solutions are in line with actual user needs and organisational environments, thereby enabling the practical implementation of digital transformation efforts and stimulating creativity in procurement. Suryodiningrat (2024) emphasises even more the need of design thinking in the evolution of digital systems, particularly for users with low digital literacy, as constant feedback guarantees accessible and efficient solutions, thus encouraging the acceptance of new technologies. Asif, Siddiqui, and Sharma (2024) also underline how design thinking applied in organisational settings stimulates team cooperation and innovation, thereby producing more user-centred goods and services. These points of view taken together highlight the need of a human-centred approach in innovation processes to increase usability, acceptance rates, and the general success of new technology or new business models, so directly supporting the strategic objectives of digital transformation and procurement modernisation.

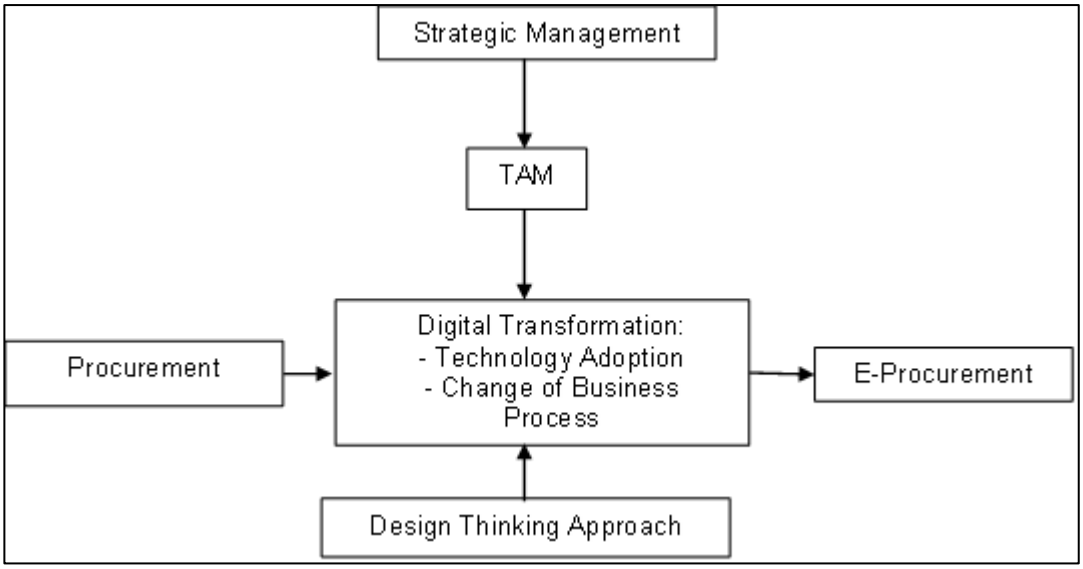


***Figure 1: Research Framework***

Figure 1, titled *Research Framework*, illustrates the transition from traditional procurement methods to e-procurement through digital transformation. The process begins with Procurement, representing conventional practices for acquiring goods and services. The study adopts the Technology Acceptance Model (TAM) as its primary theoretical foundation, offering a lens through which to understand the factors influencing the adoption of emerging technologies. Central to this transformation is Digital Transformation, encompassing both the integration of new digital technologies and the significant reconfiguration of business processes in line with strategic management principles to suit the evolving digital environment. This transformation is guided by a Design Thinking Approach, a cyclical methodology focused on understanding user needs, challenging existing assumptions, and generating innovative solutions. The culmination of this integrated approach is the implementation of E-Procurement, symbolising a fully digitalised and streamlined procurement system.

As a leading Indonesian telecom company, PT Telkomsel has long depended on traditional procurement practices that, although once successful, are now progressively out of line with the needs of a fast-paced, technologically driven sector. Conventional procurement approaches might include labour-intensive administrative chores, poor data transparency, and long processing times—all of which compromise operational effectiveness and strategic agility as informed by sound management frameworks. These difficulties make the company aware of the requirement to adopt a more current and strategically integrated procurement plan that aligns digital innovation with broader organisational goals.

The Technology Acceptance Model (TAM) helps the study structure to grasp customer impressions and interactions with new digital technologies (Santini *et al.,* 2025). The Technology Adoption Model clarifies the behavioural elements affecting technology adoption, especially the apparent usability and concrete benefits of the system, therefore providing a theoretical framework to assess the reactions of procurement employees to digital transformation initiatives.

This change is included within the larger framework of digital transformation at PT Telkomsel, which goes beyond the simple application of new technologies. It indicates a comprehensive strategic management-led organisational overhaul, including the use of digital tools and the reorganising of current corporate procedures to increase efficiency, openness, and flexibility. Digital transformation thus becomes a complicated endeavour involving not only technological elements, but also strategic alignment, cultural evolution, and organisational change management aimed at continuous innovation and competitive advantage.

The design thinking approach is strategically integrated into the research framework not merely as an instrument but as a foundational methodology to improve this shift. While design thinking stresses a

user-centric methodology that values empathy, continuous problem-solving, and creative exploration to guarantee that created solutions sufficiently answer user needs, TAM concentrates on technology adoption. This approach actively facilitates the practical implementation of digital transformation initiatives and drives innovation in procurement by ensuring solutions are aligned with real user needs and organisational contexts. By emphasizing empathy and iterative feedback, Design Thinking bridges the gap between theoretical understanding of digital transformation and its successful practical application. It encourages the group development of operational, user-friendly, and reasonably flexible solutions fit for effectively addressing actual procurement challenges, fostering a culture of continuous improvement, and contributing directly to strategic management objectives of enhanced efficiency, transparency, agility, and sustained competitive positioning in a rapidly evolving digital landscape.

**Methodology**

This study employed a rigorous qualitative research methodology aimed at comprehensively understanding PT Telkomsel's procurement procedures by delving deeply into the lived experiences of its personnel, elucidating the complex interplay of operational challenges, user perceptions, and organisational dynamics (Indrawati, 2018). Recognising that qualitative methods excel at capturing nuanced human factors and organisational behaviours that are often obscured in quantitative metrics (Sugiyono, 2021), the research design was fundamentally rooted in purposive sampling to strategically select participants who are intimately involved with procurement workflows. Out of a pool of 63 potential employees, eight key informants were meticulously chosen from three distinct organisational divisions directly engaged with initiating and overseeing procurement processes. These informants spanned multiple hierarchical levels—from general and department managers to officers and frontline staff—thereby ensuring a multi-faceted, comprehensive perspective that reveals the subtleties across decision-making, supervisory, and operational strata within the company.

Such careful inclusion criteria prioritised not only organisational roles but also substantive experience with the manual preparation of owner estimates (OE) and preliminary price estimates (HPS), thus positioning participants as credible knowledge holders whose insights genuinely reflect procurement realities. Conversely, exclusion criteria systematically ruled out employees without active procurement involvement or direct responsibility for OE and HPS processes, which helped maintain methodological rigour by mitigating noise from irrelevant data and enhancing results validity. This focus on relevant stakeholders was essential to accurately map procurement pain points, information asymmetries, and systemic inefficiencies that impede process effectiveness.

The qualitative inquiry was structured around the design thinking framework, a human-centred, iterative methodology that marries empathic understanding with creative problem-solving. This approach enhanced the research's depth by incorporating diverse data collection tools: in-depth semi-structured interviews generated rich narratives and contextual data; Employee Journey Mapping captured the step-by-step procedural realities and emotional responses of staff navigating procurement tasks; while Empathy Mapping distilled the nuanced feelings, motivations, and needs of managerial personnel. Together, these methods facilitated a holistic, empathetic view of procurement challenges, moving beyond superficial symptom identification toward uncovering root causes vital for sustainable improvement.

Each design thinking phase—Understand, Define, Ideate, Prototype, and Test—was rigorously applied to translate qualitative insights into actionable interventions. The Understand phase uncovered intricate organisational bottlenecks and real-world obstacles via thematic distillation of interview and mapping data. In the Define phase, the use of Point of View (PoV) tables synthesised stakeholder perspectives into precise problem statements, providing a clear foundation for ideation. Employing the brainwriting 6-3-5 technique during Ideate maximised creative input while balancing group dynamics, leading to a robust pool of diverse ideas that were methodically filtered for feasibility and relevance. The Prototype phase then operationalised these ideas into a tangible e-procurement application, developed in close collaboration with stakeholders and refined through iterative feedback loops.

The Test phase incorporated quantitative usability evaluation methods to complement the qualitative insights gathered throughout the research. Specifically, the System Usability Scale (SUS) was used to measure perceived usability of the prototype application, providing a standardised assessment of user satisfaction, ease of use, and intuitiveness across all participant groups. SUS scores range from 0 to 100, with scores above 68 generally considered above average usability and scores above 71.1 widely recognised as the minimum threshold indicating acceptable usability. Higher scores correspond to better user experience, with scores nearing or above 80 typically interpreted as satisfactory to excellent usability. Complementary to subjective usability assessment, objective task completion times were recorded for key procurement functions to evaluate operational efficiency gains. Variability in these metrics was carefully considered to identify potential learning curves or task complexity issues and provide informed recommendations for user training and iterative interface optimisation. This combination of qualitative and quantitative evaluation ensures a comprehensive understanding of the prototype's usability and functional effectiveness from multiple perspectives.

This methodological rigour and the strategic application of design thinking not only fostered deep user engagement but also anchored digital transformation efforts in real operational contexts, thereby enhancing adoption potential and facilitating meaningful organisational change. By privileging stakeholder voices across hierarchical levels and integrating qualitative richness with iterative prototyping, the study exemplified a holistic, adaptive research design consistent with Creswell and Creswell's (2022) vision for responsive qualitative inquiry. In sum, this approach enabled the distillation of complex procurement challenges into elegant, user-centred digital solutions, offering PT Telkomsel a viable pathway toward enhanced efficiency, transparency, and competitive agility in a rapidly evolving telecommunications landscape.

***Qualitative Data Analysis Procedures***

The qualitative data collected through in-depth interviews, Employee Journey Mapping, and Empathy Mapping were systematically analysed using a multi-step coding and thematic analysis approach to extract meaningful insights related to procurement processes and digital transformation challenges.

1. Data Preparation and Familiarisation

All interview recordings were transcribed verbatim to capture the full nuance of participants' responses. The research team thoroughly reviewed the transcripts multiple times to immerse themselves in the data, identifying initial patterns and gaining a comprehensive understanding of stakeholders' perspectives.

2. Coding Procedures

Open Coding: The data were initially coded line-by-line using an open coding approach. Researchers identified discrete units of meaning—such as specific challenges, needs, perceptions, or behaviours related to procurement practices. These codes described actions (e.g., "manual price estimation"), feelings (e.g., "frustration due to unclear approval"), and contextual factors (e.g., "lack of real-time market data"). Coding was performed manually and supported by qualitative data analysis software for efficient organisation and retrieval.

Axial Coding: Subsequently, related codes were grouped into categories reflecting broader conceptual domains. For example, codes related to delays, manual errors, and workflow complexities were clustered under a category like "Operational Inefficiencies." This process involved iterative discussion among researchers to refine categories and ensure they accurately represented the data.

Selective Coding: Finally, the analysis focused on core themes that aligned with the research objectives and Design Thinking phases. Themes such as "Need for Digital Automation," "Communication Barriers," "User Training Requirements," and "System Usability" emerged as central to understanding procurement challenges and solution potentials.

3. Thematic Analysis

An inductive thematic analysis approach was used to construct a coherent narrative from the coded data. Themes were developed by continuously comparing data segments across different informants and organisational levels (staff and managers). This comparative analysis helped identify both commonalities and differences in experiences and expectations, enabling a deeper understanding of the procurement digital transformation at PT Telkomsel.

4. Reliability and Trustworthiness

Inter-coder Reliability: To ensure consistent coding, two or more researchers independently coded a subset of transcripts. The coding results were then compared, and discrepancies were discussed and resolved through consensus, refining the codebook. This iterative alignment process improved coding consistency and analytical reliability.

Member Checking: Preliminary theme summaries and interpretations were shared with selected participants to validate accuracy and resonance with their experiences. Their feedback was used to clarify ambiguous points and confirm the credibility of findings.

Triangulation: The study incorporated methodological triangulation by analysing multiple qualitative data sources (interviews, journey maps, and empathy maps) alongside quantitative usability data (SUS scores and task times). This triangulation enhanced the robustness of interpretations through cross-verifying insights.

Audit Trail: Comprehensive documentation was maintained detailing all steps of data collection, coding decisions, thematic development, and revisions. This audit trail supports the transparency and reproducibility of the research process.

5. Integration with Design Thinking Phases

The thematic findings were directly applied to inform each stage of the Design Thinking process. For instance, insights into specific pain points and user needs shaped the Problem Definition phase, while identified usability concerns guided prototypes and Testing iterations. This iterative analysis-feedback loop ensured that the research maintained strong alignment with both participant realities and practical solution development.

## Results

### *Understand and Observe Phase*

PT Telkomsel is Indonesia's leading telecommunications company, serving millions of customers across the archipelago with a broad range of mobile and digital services. Operating in a highly competitive and fast-evolving sector, Telkomsel faces mounting pressure to improve operational agility, efficiency, and innovation to maintain its market leadership. Historically, the company has relied on conventional procurement processes, characterised by manual workflows, extensive approval hierarchies, and limited digital integration. These traditional methods have become increasingly insufficient to meet the rapid operational and strategic demands of the telecom industry and have exposed PT Telkomsel to significant challenges.

The main problem at PT Telkomsel is the currently prolonged tender cycle lengths. As illustrated in Table 1: The Global Tender Cycle Time may extend to 12 weeks. Although this timeline might appear reasonable initially, it poses significant risks to the organisation's competitive position, market entry timing, and overall acquisition costs. Figure 2, Current Procurement Process at PT Telkomsel, further elaborates that these procurement workflows are intricate and frequently burdensome, involving multi-stage procedures such as planning, Statement of Work (SOW) development, added reviews for IT-related requests, financial assessment and authorisation, budget allocation based on delegation authority, comprehensive sourcing phases when required, validation prior to purchase requests, and finalisation through issuing purchase orders. Such complexity often results in delays and increased operational expenses, underscoring the urgent need for a strategic digital transformation of the procurement function to enhance efficiency, transparency, and agility.

***Table 1: Global Tender Cycle Time***

| Tender Complexity | Tender Cycle Time (in Weeks) | | | | | |
|---|---|---|---|---|---|---|
| | Google | Grab | Kellogg's | Tier 1 Mfr. | Tier 1 Pharma | Tier 1 Energy |
| **Low** | 4-5 | 4-12 | 6 | 9-12 | 3 | 7 |
| **Medium** | 8-9 | 12-16 | 12-14 | 12-16 | 6 | 12 |
| **High** | **12-13** | **24** | **16** | **>16** | **18** | **24-36** |

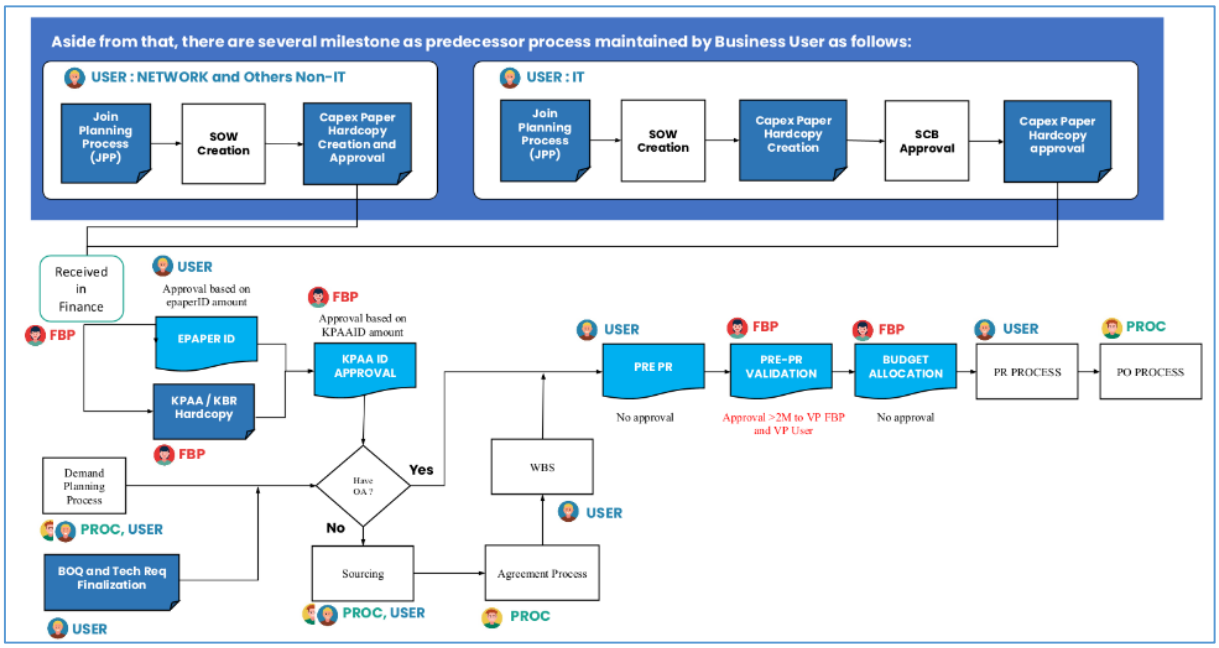


***Figure 2: Current Procurement Process in PT. Telkomsel***

In the Understand and Observe stage, the researcher conducted interviews with 8 informants, consisting of 4 staff-level informants and 4 manager-level informants that are listed in Table 2 Informants Data below, as explained in the Methodology part. This stage utilised the Employee Journey Map for staff-level employees and the Empathy Map for manager-level employees, which will provide a more comprehensive overview of user experiences in the process of preparing OE and HPS.

***Table 2: Informants Data***

| Name | Position |
|---|---|
| Participant 1 | General Manager Commerce, General Procurement and PO Management Division |
| Participant 2 | Manager Sales Procurement Department |
| Participant 3 | General Manager Integrated Procurement Area Division |
| Participant 4 | Manager Procurement Jabotabek Jabar Department |
| Participant 5 | Officer Procurement Jabodetabek Jabar Department |
| Participant 6 | Officer Marketing Procurement Department |
| Participant 7 | Staff Sales Procurement Department |
| Participant 8 | Officer General Procurement Department |

The results of the interviews exposed important problems resulting from the lack of a computerised system for creating Owner Estimates (OE) and Preliminary Price Estimates (HPS). Many staff members said that unclear policies for generating OE and HPS added to procurement process inefficiencies and increased the likelihood of mistakes. Many of the informants said they regularly relied on manual

techniques, which were time-consuming and prone to errors, in the absence of an integrated system, therefore complicating workflow and postponing decision-making within the procurement department.

***Define Phase***

In the Define stage, the researcher utilised a point-of-view table to articulate the problems from the various perspectives of the stakeholders involved in the preparation of owner estimates (OE) and preliminary price estimates (HPS). This table helped identify the needs and challenges faced by each party, both at the staff and manager levels. By organising this information, the researcher could gain a clearer understanding of the context and complexity of the issues at hand, as well as how each stakeholder experiences the impact of ambiguities in the estimation process.

***Table 3: Point of View***

| Insights | Needs | Point of View (PoV) | How Might We "…" |
|---|---|---|---|
| The informant faces issues in preparing Owner Estimates (OE) and Preliminary Price Estimates (HPS) due to the lack of a digital system supporting the manual process and difficulties in accessing real-time market data. | The informant needs a digital system to automate the preparation of Owner Estimates (OE), and Preliminary Price Estimates (HPS), as well as quick access to real-time market data to improve cost estimation accuracy. | The informant realizes that to improve efficiency in preparing Owner Estimates (OE) and Preliminary Price Estimates (HPS), a digital system is needed to replace the error-prone manual process, as well as real-time access to market data to avoid inaccurate decisions and communication challenges between the procurement team and users. | How might we create a system that effectively automates the preparation of Owner Estimates (OE) and Preliminary Price Estimates (HPS), provides real-time access to accurate market data, and enhances communication between the procurement team and users, so that informants can make faster decisions, reduce errors, and improve efficiency in the procurement process? |

Based on Table 3's Point of View, the study found that informants faced significant challenges in generating Owner Estimates (OE) and Preliminary Price Estimates (HPS) due to reliance on manual procedures and limited access to real-time market data. These insights highlighted the critical need for a digital system capable of automating OE and HPS preparation while providing rapid access to up-to-date market intelligence, thereby enhancing cost control and improving estimate accuracy. This need was further examined using the Point of View (PoV) framework, which helped clarify user perspectives, requirements, and challenges within the procurement process.

***Ideate Phase***

In the Ideate Phase, the researcher focuses on developing innovative ideas to address the previously identified issues in preparing Owner Estimates (OE) and Preliminary Price Estimates (HPS). Utilising the results from the How Might We (HMW) questions, the team conducts brainstorming sessions involving various stakeholders, including staff and managers. The 6-3-5 brainwriting process serves as the initial stage in addressing the identified problems. The 8 informants participate in this brainwriting process, providing numerous opinions as solutions to the main issues determined in the previous stage. There are 3 rounds, and in each round, members propose 5 ideas, resulting in a total of 120 ideas suggested to resolve the problems.

***Table 4: Step of Ideate Phase***

| Step | Description | Outcome |
|---|---|---|
| **Idea Generation** | Utilised the brainwriting 6-3-5 technique to generate a total of 120 ideas for procurement enhancement. | 120 initial ideas collected. |
| **Categorisation** | Grouped ideas into thematic categories to identify common themes and focus areas. | Organised ideas for clearer analysis |
| **Initial Filtering** | Eliminated impractical ideas that did not align with procurement objectives. | Reduced ideas to a manageable set. |
| **Evaluation** | Assessed remaining ideas based on feasibility, impact, user needs, and resource requirements. | Identified strengths and weaknesses of concepts. |
| **Ranking and Prioritisation** | Ranked ideas based on evaluation scores to prioritise the most promising solutions. | Established a shortlist of viable concepts. |
| **Summary Table Creation** | Created a summary table to visually represent the top concepts for further development. | Highlighted key solutions for prototyping. |

Based on Table 4, Steps of the Ideate Phase, The Ideate phase commenced with Idea Generation, utilising the brainwriting 6-3-5 technique to stimulate creativity, resulting in 120 preliminary ideas aimed toward procurement improvement. To comprehend this volume, categorisation ensued, classifying the concepts into thematic domains for enhanced analysis. Subsequently, Initial Filtering optimized the process by discarding unfeasible ideas that were inconsistent with procurement objectives, yielding a more manageable collection of thoughts. The surviving concepts were further evaluated for feasibility, impact, user requirements, and resource demands, thereby revealing their strengths and limitations. This evaluation guided the Ranking and prioritisation phase, during which ideas were assessed to identify the most promising solutions, resulting in a shortlist of feasible options. The most votes went to "the Development of an application for HPS/OE". A Summary Table Creation stage visually aggregated the principal thoughts for subsequent development, identifying key solutions prepared for the prototype.

### *Prototype Phase*

In Prototype Phase, the researcher focuses on developing a prototype of the proposed solution, namely the development of an HPS/OE application. After going through the ideation process and selecting the best ideas through dot voting, the team began to design and build an initial prototype of the application designed to automate the preparation of Owner Estimates (OE) and Temporary Estimated Prices (HPS). This prototype aims to provide easy access to real-time market data, as well as improve communication between the procurement team and users.

The prototype development process involved collaboration between the development team and stakeholders involved, including the sources who previously provided input. The team iterated based on the feedback received, ensuring that the application developed meets the needs of users and addresses the issues that have been identified. With this prototype, the researcher hopes to test the functionality and effectiveness of the application in improving efficiency and accuracy in the process of preparing OE and HPS, as well as reducing errors that often occur in manual processes.

### *Test Phase*

In the Testing phase, the researcher carefully checked how well the HPS/OE application prototype worked. The main goal was to see if the app was functional, reliable, and easy to use in real situations. To do this, the team asked the same people who helped create the app to try it out and share their feedback based on their experience using it. In addition to this, anonymous feedback from these participants was collected and summarised to capture honest and unbiased user perspectives. This anonymous input provided valuable insights into overall usability, efficiency improvements, emotional responses, pain points, and suggestions for further enhancement without the influence of social

desirability or stakeholder roles. The anonymous feedback table synthesises common themes such as appreciation for the system's ease of use, efficiency gains, and areas needing improvement like clearer user guidance and expanded training. This dual approach of engaged participatory testing complemented by confidential, aggregated feedback strengthens the validity and comprehensiveness of the usability evaluation, ensuring that the prototype development is well-aligned with real user needs and challenges.

***Table 5: Participant Feedback***

| Aspect | Participant Feedback Summary (Anonymous) |
|---|---|
| Overall Usability Perception | - The system is perceived as significantly easier and more efficient compared to the previous manual process.<br>- Interface is intuitive, enabling users to complete procurement estimation tasks with fewer errors and less confusion.<br>- Participants welcomed digital automation but emphasized the need for clear user guidance and training. |
| Task Completion Efficiency | - Most participants completed key tasks (cost estimation, report generation, etc.) more quickly than expected based on historic manual times, indicating improved operational efficiency.<br>- Some participants experienced longer times on certain tasks, highlighting typical learning curves or task complexity variations. |
| Key Pain Points (Prior to Digital) | - Manual preparation of Owner Estimates and Preliminary Price Estimates was time-consuming and prone to errors.<br>- Lack of real-time market data access reduced cost estimate accuracy.<br>- Approval and reporting processes were slow due to paper-based workflows and communication challenges.<br>- IT system issues (e.g., SAP technical problems) and multi-level approval delays were noted as barriers to efficiency. |
| Suggested Improvements | - Enhanced integration with real-time market data and automated price updates.<br>- Simplification and standardization of approval workflow within the system.<br>- Implementation of notification and reminder systems for pending approvals and updates.<br>- Training and onboarding support to reduce user hesitation and improve confidence in the application.<br>- Strengthening communication channels between procurement teams, management, and vendors. |
| Perceived Benefits Post-Implementation | - Improved transparency and traceability of estimate requests and approvals via the digital platform.<br>- Higher accuracy and efficiency in cost estimation and tender process preparation.<br>- More collaborative environment with better access to data and analytical tools.<br>- Increased user satisfaction when key KPIs such as lead time and error reduction are met. |
| Emotional and Cognitive Responses | - Reduced frustration and workload associated with manual document handling.<br>- Confidence in decision-making improved due to better data visibility and automation.<br>- Some initial anxiety around system changes addressed through early feedback and continuous iterative improvements.<br>- Positive outlook on future enhancements leveraging AI, data analytics, and workflow automation. |

During the testing sessions, users were asked to perform various tasks related to the preparation of Owner Estimates (OE) and Temporary Estimated Prices (HPS) using the application. The test results as listed in Table 5, SUS Score Result, measured using the System Usability Scale (SUS) shown in Table 5, revealed an average score of 87, significantly exceeding the success threshold of 71.1. This

high score suggests that the informants found creating Owner Estimates (OEs) with the application much easier than using the previous manual method.

***Table 6: SUS Score Result***

| User | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | SUS Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **U1** | 5 | 2 | 5 | 1 | 4 | 2 | 5 | 2 | 5 | 1 | 90 |
| **U2** | 5 | 1 | 5 | 3 | 5 | 1 | 5 | 2 | 5 | 1 | 92.5 |
| **U3** | 4 | 2 | 5 | 2 | 4 | 1 | 5 | 3 | 5 | 1 | 85 |
| **U4** | 5 | 1 | 4 | 1 | 4 | 1 | 4 | 1 | 4 | 2 | 87.5 |
| **U5** | 3 | 1 | 4 | 1 | 5 | 3 | 3 | 1 | 5 | 1 | 82.5 |
| **U6** | 3 | 1 | 5 | 2 | 5 | 1 | 4 | 2 | 4 | 1 | 85 |
| **Average of SUS** | | | | | | | | | | | **87** |

In addition, Table 6, Task Completion Time Data, presents notable findings regarding task completion time. On average, completing the task using the application required only 26 minutes and 17 seconds, whereas the manual procurement process typically takes between one to three days. This substantial reduction in processing time highlights the application's ability to streamline workflows and minimise delays inherent in traditional methods. By accelerating these critical tasks, the system not only improves operational efficiency but also enables faster decision-making and resource allocation within PT Telkomsel's procurement function, ultimately contributing to enhanced organisational responsiveness and competitiveness.

***Table 7: Task Completion Time Data***

| | Creating a Cost Estimate | Using the Personal Progress Feature | Adding Custom Parameters | Generating an Insight Report | Save Cost Estimates and Select Approver | Total Time |
|---|---|---|---|---|---|---|
| | Time (Minutes) | | | | | |
| **U1** | 5:12 | 4:45 | 3:32 | 4:10 | 2:28 | 20:07 |
| **U2** | 6:05 | 5:15 | 4:02 | 5:45 | 2:50 | 23:57 |
| **U3** | 7:10 | 6:30 | 5:15 | 6:05 | 3:00 | 28:10 |
| **U4** | 4:55 | 4:20 | 3:45 | 4:35 | 2:35 | 19:30 |
| **U5** | 8:15 | 7:05 | 5:50 | 6:20 | 3:10 | 30:50 |
| **U6** | 9:55 | 8:33 | 5:05 | 8:15 | 2:55 | 34:43 |
| **Average Time** | **6:55** | **6:05** | **4:35** | **5:52** | **2:50** | **26:17** |

## Discussion

This study's initial Understand and Observe phase revealed critical inefficiencies in PT Telkomsel's manual procurement processes, such as extended approval cycles, poor transparency, and communication gaps. These findings were derived from in-depth interviews with eight key informants, whose profiles and organistional roles are detailed in Table 2 Informants Data, ensuring comprehensive coverage of perspectives across staff and managerial levels. These results align with the literature emphasizing the need for digital transformation to enhance operational efficiency and transparency (Susantya *et al*., 2022; Chen *et al*., 2022). By applying design thinking's user-centric and empathetic approach in this phase, latent issues often overlooked in conventional assessments are surfaced. This groundwork is essential to improve procurement efficiency and transparency in traditional business settings by thoroughly understanding user pain points and organistional bottlenecks. Such deep user engagement, supported by the diverse informant data, enables the creation of solutions finely tuned to real operational challenges, a key factor in driving successful digital procurement modernisation.

During the Define phase, the identification of motivating factors and obstacles for PT Telkomsel's digital transformation became evident. The urgent need to improve operational effectiveness, achieve competitive advantage in a rapidly evolving telecom sector, and address evolving consumer

expectations were central drivers, consistent with the strategic imperatives discussed in the literature (Azura & Ghina, 2024; Hendayani & Fauzi, 2022). However, obstacles such as hierarchical decision frameworks, limited real-time data, and employee digital literacy gaps highlight typical challenges organisations face during digital transitions (Nasution, 2022; Suryodiningrat, 2024). This phase underscores that successful digital transformation requires strategic alignment, stakeholder engagement, and cultural readiness—elements that extend beyond technology adoption to include organistional change management. Recognising facilitators and barriers here provides a solid foundation for designing practical, user-centred interventions.

The Ideate phase exemplifies how design thinking fosters innovation and inclusive problem-solving through participatory techniques like the brainwriting 6-3-5 method. This approach increased idea diversity, mitigated groupthink, and boosted employee engagement, reflecting research that associates participatory ideation with higher ownership and success in complex systemic improvements (Sutoyo, Nugroho, & Windyastuti, 2023; Singh & Chan, 2022). By empowering diverse stakeholders to co-create innovative procurement solutions, PT Telkomsel cultivates a culture of continuous improvement and inclusivity critical for sustaining digital transformation success. This collaborative approach also positions the organisation to customise digital tools that are more accepted and effective, improving the efficiency and efficacy of procurement processes.

In the Prototype phase, the development of the HPS/OE application demonstrates concrete gains in automating cumbersome procurement tasks prone to delays and errors. The literature reinforces the idea that digital tools enhance agility, traceability, and compliance in procurement, while fostering supplier cooperation and risk reduction (Hikmah & Irjayanti, 2022; Mavidis & Folinas, 2022; Tricahyono & Ichwan, 2024). Grounding the prototype in user-centred design maximises usability and adoption, directly improving operational efficiency and transparency by reducing manual errors and enhancing real-time monitoring. This phase also exemplifies strategic management principles by aligning digital innovation with broader organistional goals of responsiveness and cost control, establishing a replicable benchmark for telecom firms embarking on similar digital procurement transformations.

Finally, the Test phase validates the application's functionality and user satisfaction through iterative usability testing with actual procurement staff, which is crucial according to best practices emphasizing ongoing feedback to guide digital transformation progress (Sutoyo, Nugroho, & Windyastuti, 2023; Masudin *et al*., 2021). The significant reduction in task completion time from days to minutes evidence the system's impact on efficacy and efficiency. This iterative, feedback-driven refinement embodies design thinking's foundational principle—continuous improvement—ensuring solutions remain aligned with user needs and operational realities. Such a methodological approach offers other telecommunications companies a proven framework to measure and enhance their procurement digitalisation efforts effectively.

Overall, integrating design thinking with the Technology Acceptance Model and strategic management concepts provides PT Telkomsel a holistic framework that not only facilitates technology adoption but also fosters organisational agility, transparency, and user empowerment. This study's approach underscores that design thinking can significantly improve procurement efficiency and transparency in companies relying on conventional methods by systematically uncovering user challenges and co-creating tailored digital solutions. Additionally, the digital transformation journey at PT Telkomsel is motivated by the need to overcome operational bottlenecks and stay competitive, yet it faces obstacles inherent to organistional culture and data limitations, which must be strategically managed. The iterative development and testing of digital procurement tools demonstrate tangible improvements in process efficiency and decision-making, offering a benchmark model for other telecom firms undertaking digital transformation in procurement to emulate and adapt based on user-centred innovation and strategic alignment.

**Limitation**

This study admits some limitations, mostly related to the small sample size during the testing phase—that is, just six volunteers from PT Telkomsel's procurement department. Such a tiny and homogeneous group could not be sufficient to fully represent the range of user experiences, demands, and difficulties

that exist between several departments or jobs inside the company. This restriction might restrict the generalisability of results and possibly ignore important insights required to maximise the design and operation of the digital procurement application. Incorporating a larger and more varied participant pool in future studies will help to improve validity and applicability over organisational settings.

## Conclusion

This research has identified several critical challenges within PT Telkomsel's procurement division, notably the complexity and lack of standardised procurement methods that create significant operational obstacles for staff. Employees often face difficulties in navigating the essential steps for preparing Owner Estimates (OE) and Estimated Prices (HPS), leading to confusion, inefficiencies, and increased risk of errors in cost estimation. These issues not only slow down the procurement process but also undermine the accuracy and reliability of crucial procurement decisions, thereby affecting the company's overall operational effectiveness and strategic agility.

To address these challenges, this study proposes the development and implementation of the HPS/OE application, a digital tool designed to enhance the preparation and management of cost estimates. By leveraging advanced estimation models and integrating real-time market data, the application empowers users to produce more accurate and timely estimates, significantly reducing preparation time from the traditional 1–3 days to approximately 26 minutes. This dramatic efficiency gain demonstrates the application's potential to transform procurement workflows and accelerate decision-making processes.

Beyond improving speed and accuracy, the HPS/OE application facilitates better communication and collaboration within the procurement ecosystem by providing a transparent, user-friendly platform for information sharing. Features such as automatic alerts and live dashboards keep all stakeholders informed of estimate statuses and progress in real time, reducing uncertainty and fostering a culture of accountability. By enhancing transparency and streamlining interactions between procurement teams and internal users, this digital solution contributes to more effective resource allocation and operational responsiveness.

Overall, the HPS/OE application represents a strategic digital innovation aligned with PT Telkomsel's broader digital transformation goals. It not only addresses immediate procurement inefficiencies but also embodies a scalable model for modernising procurement processes, improving organisational agility, and sustaining competitive advantage in the fast-evolving telecommunications industry. The success of this application underscores the value of integrating user-centred design and iterative development within strategic management frameworks, offering a replicable benchmark for other telecom companies undergoing similar digital procurement transformations.

Future research on the HPS/OE application should actively involve procurement and IT specialists throughout development. Engaging these experts will provide essential insights into best practices, improve cost estimation methods, and support the integration of advanced technologies. Their collaboration is crucial for creating innovative, user-centred features that enhance overall design quality and functionality. This approach will ensure the application effectively meets organisational needs and adapts to evolving procurement challenges.

## Recommendation

To ensure the successful implementation of the HPS/OE application, PT Telkomsel should establish a dedicated project team comprising representatives from procurement, IT, and management divisions. Led by an experienced Project Manager, this team will oversee all aspects of the project, coordinating efforts across departments to address technical requirements and operational needs. Their responsibilities will include developing a comprehensive proposal that outlines a cost-benefit analysis, detailed feature specifications, and a clear implementation plan. This proposal will be essential for securing management approval and obtaining the necessary budget allocation to support the deployment and integration of the application within existing systems.

PT Telkomsel should implement the HPS/OE application gradually, starting with pilot projects in select departments to identify challenges and ease the shift from manual to digital procurement. Strengthening IT infrastructure, cybersecurity, and data integration is vital for smooth e-procurement. Additionally, focussing on user-centred development by involving end users throughout the process will ensure the system meets their needs and promotes successful adoption across the organisation.

## Conflicts of Interest

The authors declare that they have no conflict of interests.

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