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REDUCING INSTALLATION FAILURE THROUGH RCA: A CASE OF INDIHOME IN SEMARANG AND PEKALONGAN DISTRICTS

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Abstract

In the evolving digital economy, broadband installation performance plays a critical role in ensuring customer satisfaction and sustaining competitiveness in the telecommunications industry. This study analyzes the operational challenges affecting the new installation process of IndiHome—Telkom Indonesia's triple-play service (internet, IPTV, and telephony)—in the Semarang and Pekalongan Districts, which consistently reported the lowest service activation rates (Put in Service/PIS) from October to December 2024, averaging only 74.92%, below the corporate target of 85%. Utilizing the Root Cause Analysis (RCA) method and supported by fishbone diagram analysis, this research identifies "salah tagging" (inaccurate customer location input) as the most dominant disruption, with 798 recorded cases. Data were collected through internal performance reports, system logs, and semi-structured interviews with fulfillment and provisioning officers. The root causes of location tagging errors were categorized into six major areas: human, method, material, machine, environment, and measurement. Contributing factors include poor SOP adherence, incomplete customer data, GPS drift, and a lack of re-verification processes. Improvement recommendations were structured using the 5W+1H approach, suggesting solutions such as standardized tagging procedures, auto-validation systems, checklist-based verification, enhanced coordination between sales and technicians, and real-time monitoring dashboards. This study provides practical recommendations to enhance the reliability and efficiency of broadband service installations. The findings contribute to improving service quality, minimizing customer dissatisfaction, and ensuring higher operational excellence for PT Telkom Infrastruktur Indonesia, particularly in the post-pandemic digital acceleration landscape.

Keywords: telecommunications, broadband installation, IndiHome, root cause analysis

Introduction

In today's modern business environment, the telecommunications sector plays a crucial role in supporting various technologies and services, including voice calls, data transfer, video conferencing, and real-time collaboration. Businesses heavily rely on robust telecommunications infrastructure to grow and compete in a globally connected economy (Batuo, 2015). The increasing adoption of remote work or Work from Home (WFH) practices further highlights the importance of telecommunications in ensuring that employees remain connected and productive regardless of their physical location (Anwar, 2022). The expansion of home internet usage and the surge in online activities have become critical social and economic trends (Morgan & Ravindran, 2014). Since the COVID-19 pandemic, global internet consumption has increased significantly. In Indonesia, internet penetration reached 69,8 percent in 2020 with 190,92 million users, and this number continues to grow over time (Yusuf & Wibowo, 2022). As a result, the need for adaptive and reliable home network solutions is becoming increasingly important to meet the evolving demands of modern households.

Within this context, PT Telekomunikasi Indonesia (Telkom) plays an essential role in delivering telecommunication services across the nation. One of its key offerings is IndiHome, a residential broadband internet service. Previously managed under TelkomGroup, IndiHome is now operated by PT Telekomunikasi Selular (Telkomsel), while its network infrastructure is maintained by PT Telkom Infrastruktur Indonesia (TIF). TIF is responsible for developing and managing the fiber-optic infrastructure that supports not only IndiHome services but also provides wholesale connectivity to other operators through network sharing. However, during the pandemic, the sudden increase in internet usage revealed several operational challenges. Although the consumption of fixed broadband internet and the number of users increased, IndiHome experienced a 4,2 percent decline in market share compared to the previous year, signaling a growing level of competition in the fixed broadband market (Yusuf & Wibowo, 2022).

Quality plays a critical role in a company's operational strategy, as it is closely linked to customer satisfaction and loyalty (Zacharias, 2022). High service quality contributes to greater customer retention and

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long-term profitability, especially in a competitive industry such as telecommunications (Gupta et al., 2021). To maintain its competitive edge, PT Telkom introduced IndiHome's Triple Play service, which combines voice (telephone), data (internet), and video (IPTV) services into one integrated network access solution (Budhiman et al., 2021).

Among the various services provided by Telkom, the new installation process is particularly critical in ensuring customer satisfaction and supporting IndiHome's overall service performance. This process has become a key focus because the monthly target for successful Put in Service (PIS) has not yet been met. Several types of technical errors contribute to installation failures, including four main error codes that are further divided into 27 sub-error codes. These issues can reduce operational efficiency and risk lowering customer satisfaction, which may impact the company's reputation and long-term performance.

These installation challenges are not evenly distributed across all regions but tend to occur more frequently in specific areas. Telkom divides its operations into several regions and further into smaller districts to manage resources effectively and respond more efficiently to local issues. Regional IV, which includes Central Java and surrounding areas, is one such division. Within this region, each district operates under different operational conditions. Notably, the Semarang North Central Java District has shown the lowest installation performance. Based on Telkom's internal data, the average PIS achievement in this district from October to December was only 74,92 percent, below the corporate target of 85 percent. This figure also places the district behind Solo East Central Java (75,02 percent) and Yogyakarta South Central Java (78,58 percent), indicating that the Semarang district, which covers Semarang and Pekalongan, is experiencing more significant challenges.

To address these issues, it is necessary to conduct a deeper analysis to determine the root causes behind the installation performance gap. One method suitable for this purpose is Root Cause Analysis (RCA), which aims to identify the fundamental reasons behind a problem and provide solutions to prevent it from recurring (Kuswardana et al., 2018). In the case of the Semarang North Central Java District, RCA can help identify key factors such as procedural errors, human-related issues, resource limitations, or technical barriers that may be contributing to delays or failures in service activation. The results of this study are expected to benefit the company by enhancing operational efficiency, improving customer satisfaction, and offering long-term improvements to the service installation process.

Methods

This research adopts a descriptive and analytical approach aimed at identifying, analyzing, and solving operational inefficiencies in the IndiHome installation process at PT Telkom Infrastruktur Indonesia Regional IV, particularly within the Fulfillment Division of the Regional Operation Center. The research design integrates both qualitative and quantitative methods, involving data analysis, observation, and interviews to examine current operational challenges and develop actionable improvement strategies using Root Cause Analysis (RCA) as the primary analytical framework.

The research process was conducted in several systematic stages, as outlined in the research flowchart (Figure 3.1). It began with the identification of operational problems related to the delayed achievement of service targets for IndiHome installation requests. Following problem identification, a literature review was conducted to understand relevant theoretical foundations, including concepts of Root Cause Analysis, quality management, and commonly used analytical tools. A field study was then performed to observe operational activities directly and identify challenges faced during the fulfillment process.

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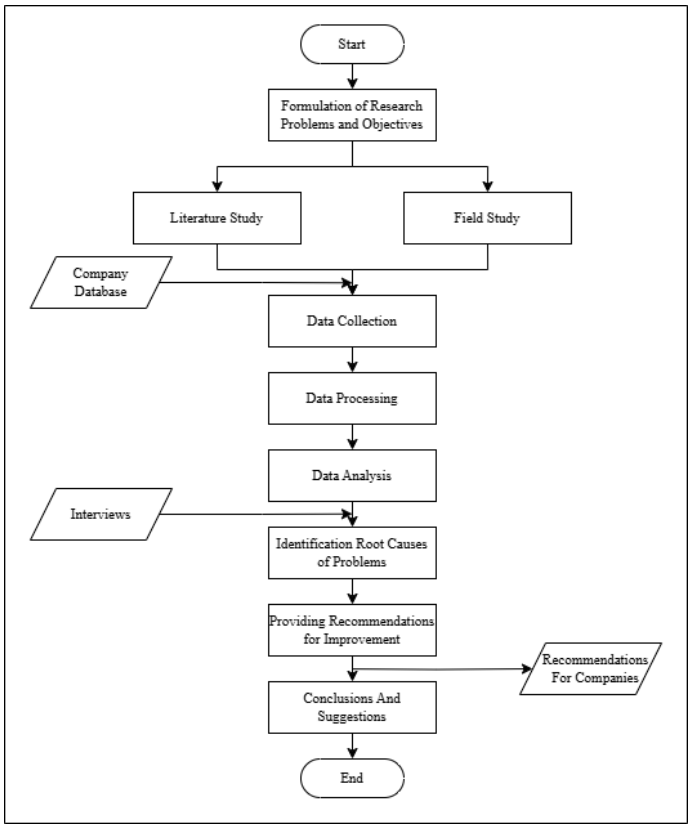

Figure 1
Research Methodology Flowchart

After gaining contextual understanding through observation and literature, operational data was collected from the company's internal systems. This included data on service request volumes, target versus actual performance metrics, and error or disruption logs. The collected data was analyzed statistically to detect trends and patterns indicating potential root causes of inefficiency. To further investigate, the study employed the Fishbone Diagram (Ishikawa Diagram) to categorize potential causes of problems across six major factors: Man, Method, Material, Machine, Environment, and Measurement.Based on the RCA findings, the study formulated solution proposals using the 5W+1H framework (What, Why, Where, When, Who, and How), ensuring that each recommendation addressed specific root causes and could be practically implemented. The proposed improvements covered procedural adjustments, resource optimization, and better coordination among divisions. The research concluded with a synthesis of the findings and their implications on enhancing the effectiveness and efficiency of service fulfillment at the company.

To support the validity and depth of the analysis, this study employed a combination of data collection methods, consisting of company database analysis, interviews, and literature review. Operational data was obtained directly from the company's internal database, which provided comprehensive and detailed monthly records concerning service targets and actual achievements across various operational regions. These records also included extensive customer order data and service timelines up to the "Put in Service" (PS) stage, thereby offering a full view of the order fulfillment process. In addition, the database contained documentation of service disruptions or technical errors that occurred during order processing, along with corresponding causes and corrective actions taken by the company. This set of data served as the primary input for both statistical evaluations and Root Cause Analysis. Complementing this quantitative data, semi-structured interviews were conducted with key personnel involved in service operations and management. These interviews were essential to gaining deeper insight into recurring operational challenges, uncovering root causes that may not have been captured in the recorded data, and understanding the internal practices or solutions that had already been applied in an attempt to improve service delivery. The qualitative input obtained through interviews added context and depth to the findings drawn from database analysis, ensuring a more accurate and nuanced interpretation of the problems faced by the organization. In parallel, a literature review was carried out to strengthen the theoretical framework of the study. This review involved examining relevant academic sources and external references that discussed concepts such as quality management, Root Cause Analysis, and service optimization. The insights from the literature informed the selection of appropriate analytical tools and frameworks used in the research while also providing guidance on industry standards and best practices.

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Together, these three data collection methods ensured a comprehensive and well-grounded approach to understanding the issues in service fulfillment and formulating viable improvement strategies.

The analysis stage involved both qualitative interpretation and quantitative processing of collected data. Statistical analysis was used to examine performance trends, identify anomalies, and detect inefficiencies in the order fulfillment cycle. The Root Cause Analysis method, supported by the Fishbone Diagram, was used to systematically identify and classify the factors contributing to operational challenges. Finally, the 5W+1H method was applied to structure targeted and feasible improvement recommendations based on the identified root causes. This comprehensive analytical approach ensured that the proposed solutions were evidence-based, relevant to the company's operational context, and aligned with the goal of enhancing service effectiveness and efficiency.

Results and Discussion

The data used in this analysis was sourced from Work Orders (WO) that recorded requests for Indihome unit installations during the period of October to December 2024 in Regional IV (Central Java). The scope of the analysis focuses specifically on the Semarang Jateng Utara area, which includes Semarang City and Pekalongan. A total of nine key attributes are included in the dataset, each providing important information related to order identification, geographic location, time of request, transaction type, service product, and technical issues that may have occurred during the installation process. The WONUM attribute acts as a unique identifier for each installation request, serving as a reference code within the customer service system. The NEW REGIONAL, NEW DISTRICT, and OLD DISTRICT attributes define the operational regions of each order, based on both the current and previous regional organizational structures. Notably, the dataset reflects the transition from the old Regional 4 (Central Java and Yogyakarta) into the newly merged Regional 3, which now encompasses Central Java, East Java, and Bali Nusa.

A crucial attribute in this analysis is the SUBERRORCODE, which indicates the reason behind delays or failures in installation. These codes reflect various obstacles such as unavailable Optical Distribution Points (ODPs), infrastructure limitations, system errors, or customer-related issues. Understanding the distribution and frequency of these codes is essential for identifying the most pressing operational bottlenecks in the installation process. The PRODUCT attribute shows that all data entries pertain to INDIHOME, Telkom Indonesia's triple-play service. The TRANSACTION attribute differentiates between Add-On (AO) for new installations and Address Change (PDA) for service relocations. Lastly, the TGL RE and BLN RE attributes indicate the date and month the request was logged in the system, covering the timeframe from October to December 2024. This structured overview of the dataset lays the groundwork for further analysis aimed at identifying the most frequent technical issues, evaluating performance across districts, and providing actionable recommendations to enhance service quality in the Semarang Jateng Utara area.

The problem was identified through analysis of the database from PT Telkom Infrastruktur Indonesia Regional IV. This study focuses on issues related to new Indihome unit installations in the Semarang and Pekalongan areas (part of the Semarang North Central Java District). These areas were selected as the research object because, based on average installation performance over the past three months (October to December 2024), Semarang North Central Java District recorded the lowest achievement rate compared to the other two districts in Regional IV. With an average success rate of 74,92%, this district ranked third, behind Solo East Central Java District (75,02%) and Yogyakarta South Central Java District (78,58%). Performance data for Semarang North Central Java District from October to December 2024 reveals that the installation success rate consistently fell short of the company's target of 85%. Specifically, the success rate was 73.79% in October, 75.89% in November, and 75.06% in December. Although there was a slight improvement from October to November, the performance still remained below target for three consecutive months. This indicates that there are persistent issues in the installation process that hinder optimal service delivery. The consistently subpar performance highlights the need for corrective action to improve efficiency and effectiveness in achieving the targeted installation rates.

Further analysis of the data on failed installation cases from October to December 2024 identified a wide range of issues, categorized into several major factors: technical problems, administrative errors, infrastructure constraints, and customer-related issues. The following bar chart illustrates the number of installation disturbances for new Indihome units in Semarang North Central Java District from October to December 2024, categorized by the type of issue encountered.

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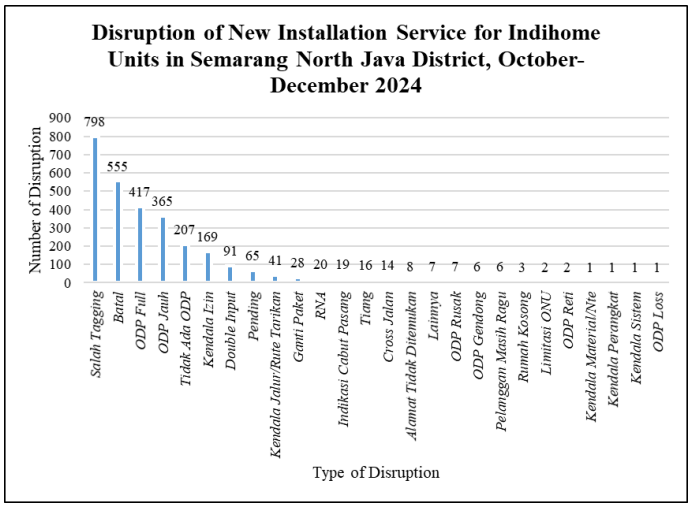

Figure 2
Disruption of New Installation Service Indihome Units

From a technical perspective, common issues include equipment and material shortages such as *Kendala Material*/NTE, *Kendala Perangkat*, and *Kendala Sistem*, as well as limitations related to Optical Distribution Points (ODP), including ODP Full, ODP *Gendong*, ODP *Jauh*, ODP Loss, ODP *Reti*, and ODP *Rusak*. These problems significantly hinder the progress of installations. Administrative obstacles such as *Kendala Izin*, *Salah Tagging*, and Double Input also contribute to delays, often due to inaccurate system inputs or missing documentation that result in postponed or unprocessed orders. Infrastructure challenges such as Cross *Jalan*, *Tiang*, and *Tidak Ada* ODP point to physical barriers or the lack of network access points in certain locations, making cable routing unfeasible. On the customer side, issues such as *Batal*, *Indikasi Cabut Pasang*, *Ganti Paket*, *Pelanggan Masih Ragu*, and Pending reflect changes in customer decisions or uncertainty about the service. Additionally, *Rumah Kosong* and RNA cases, where customers are not present during installation, further contribute to delays. These various problems indicate that installation delays are caused not only by technical limitations but also by external factors such as administrative procedures, infrastructure readiness, and customer responsiveness. For this reason, PT Telkom Infrastruktur Indonesia Regional IV must conduct a thorough evaluation to identify the most frequent and impactful issues and implement focused improvement strategies.

According to the problem frequency data from October to December 2024, the most frequent cause of installation failure in the Semarang North Central Java District was identified as *Salah Tagging*, with 798 reported cases. This made it the most dominant problem in the dataset. *Salah Tagging* refers to the incorrect input or placement of customer location coordinates during the IndiHome installation process. The impact of *Salah Tagging* is significant, as it not only delays the installation process but also increases the risk of customer dissatisfaction and order cancellations. To reduce the occurrence of this issue, it is crucial to conduct a comprehensive review of the system used to input customer coordinate data. To better understand the root causes behind *Salah Tagging*, a structured analysis was carried out using the Fishbone Diagram (Ishikawa Diagram). This method categorizes contributing factors into six key areas: Man (Human), Method, Material, Machine, Environment, and Measurement. The analysis was based on interviews with two personnel involved in the fulfillment and provisioning processes: Ms. Arie Sulistyaningrum (Off 1 FBB Fulfillment) and Ms. Rizka Nurhasanah (Off 1 FBB Access Provisioning). Their insights revealed that the high frequency of *Salah Tagging* results from both systemic weaknesses and behavioral patterns. These include poor data verification, the absence of standardized procedures, inconsistent device capabilities, and limited quality control mechanisms. Each of these six categories plays a significant role in the recurring issues. Based on this analysis, a Fishbone Diagram was created to visually represent the relationship between these root causes and the main problem, which is *Salah Tagging* in the IndiHome new installation process in the Semarang North Central Java District. The diagram below illustrates how the various factors contribute to this issue:

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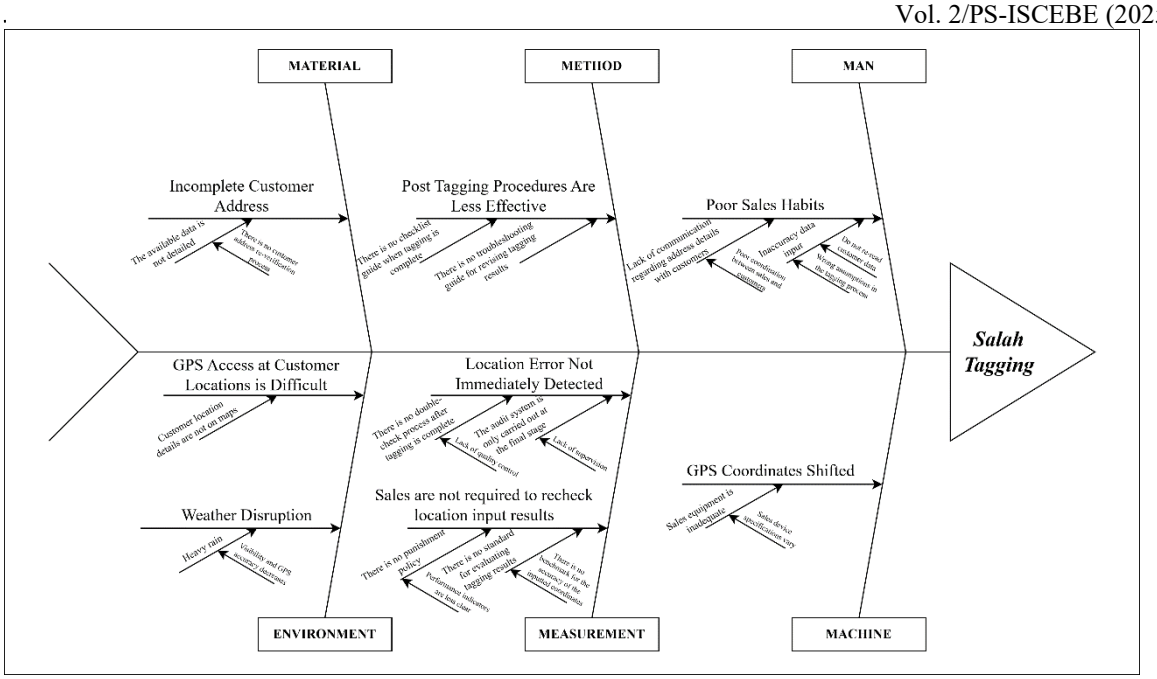

Figure 3
Fishbone Diagram *Salah Tagging* Disruption

Following the identification of root causes using the Fishbone Diagram, improvement efforts focused on eliminating or minimizing the contributing factors behind the high frequency of Salah Tagging incidents. To design effective corrective actions, the 5W1H approach was applied. This framework involves addressing six guiding questions: What is the problem? Why should it be resolved? Who is responsible? When will it be addressed? Where is it occurring? and How should it be handled? The table below presents a detailed breakdown of the proposed improvement initiatives based on the 5W1H framework.

Table 1 5W+1H *Salah Tagging* Disruption

No	What	Why	How	Who	When	Where
	What is the problem?	**Why should it dealt with?**	**How to deal with it?**	**Who is in charge?**	**When will it be implemented?**	**Where is it carried out?**
1	Poor sales habits	Causes installation delays and rework	Create daily SOPs and auto-validation for tagging data	Sales Supervisor	Immediately	Sales area & office
2	Post tagging procedures are less effective	Errors go undetected, causing workflow issues	Use tagging checklists, clear troubleshooting steps, and tagging confirmation	Quality Control Team	Within 2 weeks	Field & HQ
3	Incomplete customer address	Leads to mislocation and scheduling issues	Standardize address format, auto-verify entries, and ensure sales-technician coordination	Customer Service Team	1 month	All areas
4	GPS access at customer locations is difficult	Causes location inaccuracy	Allow manual location input with clear reference points	IT Team	3 months	Poor GPS areas
5	Weather disruption	Slows down installation, increases error risk	Use historical data and additional sensors for accuracy	IT Team	3 months	High GPS-interference areas

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No	What	Why	How	Who	When	Where
	What is the problem?	**Why should it dealt with?**	**How to deal with it?**	**Who is in charge?**	**When will it be implemented?**	**Where is it carried out?**
6	Undetected location errors	Delays processes and increases costs	Regular audits, restricted edits, and tagging cross-checks	Data Analyst Team	1 month	HQ & operations
7	No location recheck	Leads to repeated field errors	Enforce recheck policy, penalties, and dashboard tracking	Operations Manager	1 month	All areas
8	GPS drift	Misleads technicians and raises costs	Add location confirmation before data submission	IT Team	2 months	High-risk zones

Conclusion

The analysis of new IndiHome installation disruptions in Semarang and North Central Java District (Oct–Dec 2024) revealed that issues stemmed from technical, administrative, infrastructure, and customer-related factors. Among these, location tagging errors were identified as the most frequent and impactful cause. Root causes were mapped using a fishbone diagram, highlighting problems across human, method, material, environment, measurement, and machine aspects. To address this, targeted improvements were proposed, focusing on enhancing tagging accuracy. These include implementing standardized workflows, automated validation, clearer procedures, improved coordination, and robust control mechanisms such as audits, verification tools, and monitoring dashboards.

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