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Implementation and Impacts of ITIL Service Operation Within The Telecommunication Industry

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ABSTRACT

The rapid development of technology has significantly altered the human mindset in performing daily activities, one of which is the utilization of information technology services. In Indonesia, the utilization of information technology has become a widespread and vital necessity, prompting both the government and private enterprises to implement and develop their information technology services. The aim of using information technology is to shorten the time and distance between entrepreneurs and customers. To achieve this goal, Information Technology Service Management (ITSM) is needed, especially in the telecommunication industry. A literature review, which studies several case studies, is crucial to further understand the effectiveness of ITSM itself. Based on that perspective in mind, this research focuses on the role of ITSM and ways that the industry uses to determine its level of performance. This research shows that the most used method in the industry is by using maturity level models. Additionally, it is found that utilizing ITSM, especially in service operation, helps telecommunication industry to keep their competitive advantage in the market. With this research, it is hoped that it will serve as a reference for certain industries, especially the telecommunications industry.

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1. INTRODUCTION

The rapid development of technology has significantly altered the human mindset in performing daily activities [1]. This is due to technology's ability to accommodate humans in accessing, processing, and storing information with high speed and efficiency [2] [3]. The presence of information technology not only alters the way we interact with the world [4] but also aids in significantly enhancing efficiency and productivity [5]. Moreover, technology utilization optimizes not only internal processes within organizations but also all business processes and operational aspects as a whole [6]. The implications of these technological advancements can be observed in the development and delivery of information technology services [7] [8], as well as in the role information technology plays within organizations, from managing business processes to interacting with potential customers and providing customer service [9]. In Indonesia, the utilization of information technology has become a widespread and vital necessity, prompting both the government and private enterprises to implement and develop their information technology services [10] [11]. This is evidenced

by government policies related to the implementation of an electronic-based government system [12] [13] [14] [15] and the continuous adoption of information technology by private enterprises within their business processes [16].

The aim of using information technology is to shorten the time and distance between entrepreneurs and customers [17], which can reduce the gap between demand and supply [18]. To achieve this goal, management of IT services or what is known as Information Technology Service Management (ITSM) is necessary. Additionally, ITSM also helps organizations in decision-making [19]. ITSM is a comprehensive framework that assists IT service providers in enhancing service management practices and delivering value to customers by improving service quality [20]. One of the most effective best practices from ITSM that has been proven and is used internationally is ITIL (Information Technology Infrastructure Library) [21] [22] [23]. In its implementation, ITIL focuses on the continuous assessment and enhancement of the quality of IT services in line with the needs of the organization and its customers [24]. Furthermore, ITIL also provides comprehensive guidance for organizations in planning, implementing, and maintaining IT services to support core business processes. Based on ITIL v3, the five domains within the service lifecycle as depicted in Figure 1 are as follows: (1) service strategy, which includes long-term strategic planning related to IT services aligned with business needs and organizational goals, (2) service design, which includes the design of IT services aligned with the service strategy, (3) service transition, which includes the development and change of IT services with minimal risk and disruption, (4) service operation, which includes the management and maintenance of IT services, and (5) continual service improvement, which includes continuous monitoring and evaluation of IT services at all stages of the service lifecycle [25].

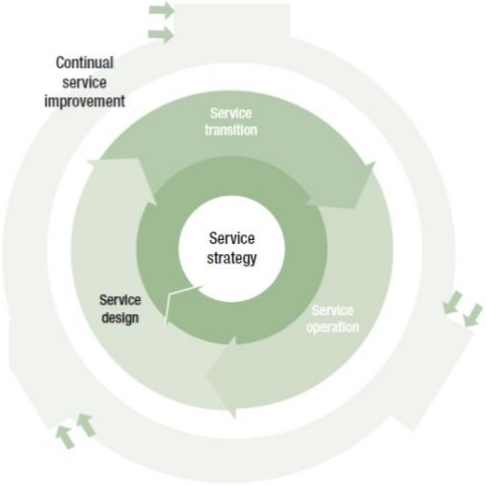

Figure 1. ITIL v3 Service Lifecycle [26]

Service operation is a domain that includes all operational-related aspects of IT services [27]. This field focuses on how IT services are implemented and managed, ensuring the delivery of value to the audience [28]. This domain is also used to improve all operational aspects related to management and IT service operations and ensure that every service runs smoothly in accordance with all of the business needs [29]. The scope of processes in service operation includes event management, incident management, request fulfilment, problem management, and access management [30] [31]. It is essential to note that one of the most important aspects in this domain is ensuring the seamless operation of all IT service components. In case of any disturbance or problems arising in the services provided, not everyone is affected by it in the same way. Some users might be unimpeded and able to use the services as if nothing ever happened, while others might not be able to use it as they did before or lose access and completely cannot use the services that were once available [32]. These problems are crucial aspects to consider, especially in the telecommunication industry, as they could serve as a competitive advantage [33]. Unfortunately, not every company in the industry utilizes the ITIL framework, resulting in unoptimized services given to the customer. An unoptimized service could cause companies to lose their advantage and lose their place in the market [34].

Some research had shown that by utilizing ITIL framework, specifically service operation has become one of the main reasons for survivability in the telecommunication industry [35]. One way to measure the maturity of a service is by determining the value of the maturity level of every business process of the company [36]. This measurement is done in order to find out how well the IT services perform and help organizations to identify areas that might need improvement and to increase the maturity level to the highest possible level [32] [37]. Each maturity level indicates the company's ability to exploit and manage their IT services to achieve their business goals [38]. According to ITIL v3, maturity level consists of six main levels: (1) level zero or

non-existent maturity level, (2) level one or initial maturity level, (3) level two or repeatable maturity level, (4) level three or defined maturity level, (5) level four or managed maturity level, and (6) level five or optimized maturity level [39]. Each of the mentioned levels possesses unique characteristics and requires a different type of analysis to help organizations and companies achieve overall effective, efficient, and optimized business processes [40].

Based on the introduction, this paper will explain how service management plays such a crucial role in the service operation domain, especially the telecommunication industry. This review will include discussions on the implementation and management of service operation in an organization and how it impacts the organization's overall business processes.

2. METHOD

To explore and investigate further on the discussion, a qualitative approach is used to gain a deeper understanding and analysis of a specific issue [41]. Qualitative research focuses on getting an understanding from the subject or topic researched. Results from research that utilized qualitative approach tend to be descriptive [42]. The qualitative method also emphasizes the suitability and relevance of the data to the topic researched [43]. So that, drawing conclusions or interpretations from the acquired data can be done easily [44]. In this case, the research will utilize a qualitative method and a systematic literature review approach, which involves literature studies to gather data or information relevant to the specific topic [45]. The research will commence by first determining the main topic to be discussed. Subsequently, literature studies and data collection will be conducted through Google Scholar, encompassing various journal articles. The gathered data will then undergo a comparative analysis to uncover answers to the research problems. The results of the analysis will be organized into the main discussion of this journal, followed by conclusions. Figure 2 illustrates the research flow from beginning to end.

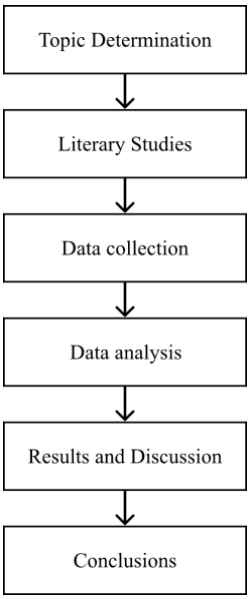

Figure 2. Research Flow

3. RESULTS AND DISCUSSION

Findings upon the research are divided into two sections. The first section would provide an overview of all the findings found in the previous research, and the following section would provide an analysis based on the information from the previous section.

3.1. Previous Research

Mahardhika *et al.*, did research through interviews and observations to identify the underlying causes of the issues that occur and to evaluate the management of Base Transceiver Station (BTS) monitoring services towards the Network Monitoring System (NMS) units. *Badan Aksesibilitas Telekomunikasi dan Informasi* (BAKTI) utilizes the PRTG app but faces data discrepancies affecting payments. This research assesses BAKTI's service management with ITIL v3 using service operation domain. The form of evaluation conducted is by analyzing the current conditions of the NMS unit and assessing the maturity level of the BTS monitoring

service management. BAKTI provides financial reports on component availability and signs SLAs with providers. The results show the maturity level in Service Operation averaging 1.93, with an average expectation score of 2.76, indicating a gap score with the average value of 0.84. The average maturity result suggests a Repeatable level, signaling a need for extensive improvement, with many activities and processes requiring clear definition and documentation. Therefore, the authors recommend implementing clear SOPs, defining service desk functions, documenting actions, and establishing incident models [46].

Santoso and Wijaya conducted research on IT service practices using ITIL v3 within the Service Operation domain. The paper discusses the analysis of IT services at GraPARI Salatiga by interviewing employees like Mr. Andy and observations of daily operations. GraPARI, a Telkomsel service center, utilizes apps such as Digital Smart Care (DSC) and Customer Relationship Management (CRM) to handle complaints and number transfers. Adhering to standards like ITIL enhances business value. GraPARI Telkomsel employs CRM for customer service efficiency. Processes like event management, incident management, request fulfilment, problem management, and access management ensure smooth operations and prompt issue resolution, with secure data backup for service continuity. The author finds a lack of on-site technical or IT staff, necessitating assistance from the center when application issues arise, leading to delays in resolution. Hence, the authors recommend assigning dedicated IT experts to each GraPARI office to promptly address application problems [47].

Mahdalena and Cholil did research on service operation domain due to frequent connection failures. To facilitate the research, questionnaires were mostly distributed to parties related to operational aspects. All results will be averaged using a maturity level model and will serve as a reference for decision regarding the issue. From this research, it is noted that recording and documenting issues and solutions, as well as assessing customer satisfaction, are necessary [48]. On the other hand, Mujahid and Legowo conducted research on behalf of the internal stakeholders. Similar to previous research, the steps taken are almost identical. However, in this research, gap analysis is conducted to identify discrepancies between the current maturity level or current condition and the desired maturity level. From this research, it can be seen that gap analysis will determine the impact of the gap on the overall business process [49].

Yandri *et al.*, did an evaluation on corporate governance that implements IT by using Fuzzification method and ITIL framework to produce an accurate evaluation. This study provides not only evaluation on the corporate governance, but as well as giving recommendations on what the future maturity level should be or reach. Such methods are necessary to distinguish between opportunity and risks pertaining to the existing business processes. The study obtained necessary data for the maturity assessment through a questionnaire. The results of maturity level obtained are as follows; level of maturity in service strategy is 2.73, level of maturity in service design is 2.47, level of maturity in service transition is 2.82, and the level of maturity in service operation is 2.58. After obtaining the results, fuzzification and defuzzification is done in order to check if the data the validity of the data used. The study shows that the input of the data used, and the recommended future maturity level were proven to be valid and that the level of maturity needs an improvement for further optimization that directly impacts on customer satisfaction. The latter point further emphasizes the need for improvement of the business processes in each subdomain [50].

A case study was conducted on an Internet Service Provider (ISP) by Fahrurrozi Lubis and Muharman Lubis in 2020. This study focuses more on the how the public service is delivered and assessing ISP company as a whole as it could be a solution or serve as a core competency and a competitive advantage for ISP companies to gain benefits, such as higher revenue. The author stresses the challenges in integrating IT services with the objective of the company in mind. This is crucial as it is important to maintain the consistency of the organization and to prevent poor service delivery due to inconsistency. This study utilizes a qualitative approach and was categorized into 4 main criteria in assessing the quality and maturity within NetHost. In addition to the approach, the authors determine the level of maturity through four (4) groups of people. Each of these existing groups provide their own maturity assessment on each sub domain. The result from each group varies, hence producing a variety interpretation which at times could cause difficulty in deciphering the reasons why such diverse results occur. The conclusion reached in this case study indicates that there is a need for the company to focus on increasing the consistency of the services provided and to continually improve their services in order to differentiate themselves in the market [51].

Another study similar to the previous company was done by Krismayanti *et al.* Instead of service delivery, this study focuses on the usage of 5G technology. This study used a qualitative approach to assess the maturity level by spreading an online questionnaire using Google Forms. This study assessed the level of success or the technological advances as well as measuring the level of efficiency at Telkomsel branch in Palembang. The questionnaire uses *Likert Scale* to look for the median of each subdomain from all of the responses by a total of 51 samples or respondents. The maturity level in some sub domains are below of what seems to be ideal in accordance to gap analysis and ITIL v3, such as the level of service strategy regarding 5G network reachability is 2.35, the level of service strategy regarding the availability of this particular network

is 2.45, the level of service operation is 2,51. These results indicated that 5G networks are not distributed evenly around the city, not all smartphones that are used have the option or able to use this type of network and oftentimes people that did used 5G faced an issue or trouble whilst using it. Other than the issues mentioned, overall, the company obtained a maturity level of 3.65 or level four (managed) [52].

The study, conducted by Mbeka and Wausi focused on telecommunication companies in Kenya, specifically targeting IT service managers and service management agents from nineteen organization using a random sampling. The researcher employed a multiple linear regression analysis to examine the relationship between ITIL practices and its impact on IT service quality aspects, utilizing primary data from questionnaires using the random sampling and secondary data from literature reviews. The result indicates that service level management, change management, incident management, problem management, and access management practices all significantly and positively contribute to improvement of IT service quality, supported by various associated benefits [34].

Arianti and Dewa conducted a study to assess the performance of information system service management within the MyTelkomsel application. The analysis revealed a current maturity score of 4.03 and expected maturity score of 4.18 for the service operation domain positioning it at Level 4 of maturity level, with identified gap analysis of 0.14 that indicated effective operational management. The recommendations formulated by this study are to focus on achieving Level 5 of maturity level, so that the existing processes can reach the best practices through continuous improvement [53].

Another study was done by Lubis *et al.*, which was conducted at PT. Inovasi Tjaraka Buana, an Internet Service Provider (ISP) company focused on analyzing and improving service operations, particularly incident management and problem management. The study utilized a qualitative approach to examine incident management and problem management workflows, highlighting the significance of well managed service operation for ensuring business continuity, and recommending the implementation of ITIL practices to enhance efficiency and effectiveness [32].

3.2. Literature Review

Analysis of journal articles conducted can be mainly classified into two main categories: (1) implementation of ITSM in the telecommunication industry; and (2) assessment and measurement models.

3.2.1. ITSM Practices

The preceding research outlined has demonstrated that organizations may adopt ITSM process differently. This indicates that a universal approach to implementing ITSM across different organizational settings does not exist. Factors like the size of organizations, its corporate culture, and its level of technological advancement can impact how ITSM processes are tailored and embraced to meet specific goals and needs. However, it is important to note that each domain in ITSM has its own distinct role, as evident in previous research regarding service operation domain. Organizations that focus on service operation domain will continuously strive to maintain and uphold service continuity. In the event of issues posing a threat to service continuity, organizations conduct research within this domain to obtain recommendations regarding the issues faced. Table 1 lists the contributing factors to the service operation domain research in the telecommunication industry.

Table 1. Previous Research Methods

Study	Factors
[46]	Discrepancies in Base Transceiver Station (BTS) monitoring availability values between different monitoring applications, affecting Service Level Agreement (SLA) justification and payments.
[47]	The lack of human resources and local expertise, leading to dependency on central support, operational disruptions, and challenges in problem resolution.
[48]	Connection failures due to inadequate operational aspects.
[49]	Disruption on workflow, such as time wastage, technical constraints, lack of efficiency, system complexity, and insufficient training.
[52]	The 5G network in the area is heavily unevenly distributed in some areas, resulting in inefficiency, and needing improvements in performance.
[51]	An adequate training program before conducting an assessment by people in groups is needed to avoid huge gaps in scores and intangible results.
[50]	The performance of each cycle in ITIL is expected to improve significantly if ITSM was implemented correctly as proven through calculations and a simulation.

[34]	The demands for IT services are becoming increasingly complex and escalating.
[53]	Users were not aware of new features, frustrated with app instability after updates, and felt the AI assistant was unhelpful.
[32]	The company's drastic user and coverage area growth overwhelmed their incident handling process.

The table indicates frequent concerns regarding the fluidity of services in the telecommunication industry, in which it might influence both internal and external aspects in various ways. These issues lead organizations to conduct research to understand and identify their root causes. This is where the utilization of ITSM, particularly in service operation domain, becomes crucial. Previous research outlined has shown that understanding the issues within service operation domain provides valuable insights that will serve as a reference for recommendations to organizations. This reference provides a solid foundation for the telecommunication industry to thrive despite the fierce competition. By optimizing recommendations derived from service operation domain research, the telecommunication industry can identify significant areas for improvements and perform relevant actions to enhance the quality of services that they provide. Furthermore, the use of ITSM in service operation domain allows organizations to improve internal efficiency, optimize resource allocation, and reduce the risk of future service disruptions. As a result, developing and implementing ITSM best practices will not only increase the competitiveness of telecommunication industry, but also allow them to remain relevant and adapt to dynamic market changes effectively.

3.2.2. Assessment and Measurement

To identify the root causes, there are several assessments and measurements that need to be conducted. Generally, organizations will utilize maturity model to measure the performance of the organization's business process. However, some organizations will employ different methods and even a combination of other methods. Most of the research regarding service operation domain in the telecommunication industry focus on improvements that could further increase the service capacity and efficiency, consequently impacting the customer's level of satisfaction and the company's survivability. Table 2 lists the various methods used to assess and measure the performance of service in the telecommunication industry.

Table 2. Methods for Assessing and Measuring Performance

Study	Maturity Level Models	Gap Analysis	Fuzzification	Multiple Linear Regression
[32]				
[34]				✓
[46]	✓	✓		
[47]				
[48]	✓			
[49]	✓	✓		
[50]	✓	✓	✓	
[51]	✓			
[52]	✓	✓		
[53]	✓	✓		

From the table above, it is shown that there are various methods that can be used, depending on the analysts' preferences and existing standards in the field. As mentioned in the preceding section, one approach to assessing a company's flexibility and resilience is by administering a maturity level test to each of the business processes involved. Maturity level models typically define a staged progression of an organization's capability in a specific process area. These models typically have six levels, with each level representing an increasing level of the company's capacity to utilize and oversee their IT services effectively to accomplish their business objectives. While the specific description of a maturity model may vary, the underlying structure within the telecommunication industry often exhibits a remarkable degree of consistency. This consistency allows organizations to benchmark their performance against industry standards and identify areas for improvement. Table 3 shows the descriptions of each level in maturity level models and the maturity level for ITIL service operation domain in the telecommunication industry.

Table 3. Maturity Level for Service Operation Domain in Telecommunication Industry

Maturity Level	Description	Study
Level 0 (Non-existent)	IT services are entirely absent, with no awareness of the need for IT solutions	-

Level 1 (Initial)	IT services are chaotic, ad-hoc, and undocumented, relying on individual skills and knowledge	-
Level 2 (Repeatable)	IT services are based on past project experiences, with some level of adherence and occasional documentation	[46], [49], [52]
Level 3 (Defined)	IT services are standardized, documented, and integrated across the organization, forming part of training and project culture	[50], [51]
Level 4 (Managed)	IT services have quantitative quality plans, with data collected and analyzed regularly for process evaluation and risk management	[48], [53]
Level 5 (Optimized)	IT services are continuously improved using tools and techniques, with a focus on preventing defects, innovation, and consistent error analysis	-

Reviewing the maturity level distribution of service operation within telecommunications industry provides valuable insights into the current state of ITSM practices. The results reveal an emphasis on level 2 (Repeatable), level 3 (Defined), and level 4 (Managed), with no organizations on level 0 (Non-existent), level 1 (Initial), and level 5 (Optimized). This suggests that most telecommunications industry have effectively established the service operation domain and made a substantial advancement in ITSM practices, with three studies found companies at level 2 (Repeatable), while only two reached level 3 (Defined) and 4 (Managed). In the telecommunications industry, those at level 2 rely on past experiences and occasional documentation to address issues, while those at levels 3 and 4 use standardized processes and data analysis for issue resolution. However, the absence of organizations at level 5 (Optimized) suggests that the average telecommunications industry still has opportunities to improve service quality and operational efficiency. Table 4 shows the impact of ITIL service operation domain in the telecommunication industry.

Table 4. Impact of ITIL Service Operation

Impact	Study
This study revealed that the impact of using ITIL in the MyTelkomsel apps can help the company to improve the quality of its IT services. This is because ITIL is a framework that provides best practices for IT service management. By following the ITIL guidelines, MyTelkomsel can ensure that its IT services are well-designed, implemented, and managed. This can lead to improved customer satisfaction, reduced costs, and increased efficiency.	[32]
This study shows that adopting and implementing ITIL framework significantly improves the quality of IT services. It suggests that organizations focusing on full adoption of ITIL are likely to attain improved IT service quality. This indicated a positive impact of using ITIL on enhancing IT service quality within organizations.	[34]
This study shows that if BAKTI manages to implement in each domain of ITIL successfully, it would greatly optimize their fluidity of service significantly. If ITIL was successfully implemented, each domain in ITIL would increase by on average 1 in terms of score. As BAKTI had not implement ITIL fully, the authors had given some recommendations, such as to do an assessment from a variety of methods other than ITIL, to gain a deeper understanding and various perspective as a reference on what is truly happening.	[46]
This study shows that the implementation of ITIL v3 Service Operation at GraPARI Telkomsel Salatiga has improved IT service management by identifying operational strengths and areas for improvement. However, the study revealed a shortage of in-house IT expertise, leading to reliance on centralized support for problem resolution, potentially impacting service delivery. Recommendations include allocating dedicated IT experts to each office to streamline problem resolution and enhance service delivery, underscoring the importance of strategic resource allocation to address operational challenges effectively.	[47]
The results from the assessment found that the current state of service that PT Telkom Aksel provided was not optimized. The maturity test result (as is) done various domains of service operation shows that by adopting and implementing ITIL, the company may achieve a higher maturity score and overall, a more optimized, and efficient workflow as the current problem the company face (system error, human error, and so on) would be greatly reduced, further eliminating waste in terms of time, cost and room for small/minor errors.	[49]
The data used in this research is proven to be valid and through the assessment, the company gains not only an insight on what level of service	[50]

they provide currently, but also on what areas they might need to improve. If the recommendations were executed and implemented in the company, not only would the company level up their services, but also further increase their productivity as it optimizes the processes within the business.	
While technology may be an important factor within the telecommunication industry, NetHost as a business and their IT have a common goal to improve the quality of their services. It is found that by adopting ITIL, they are able to maintain a clear line of consistency. This results in reduce possible risk and further increasing their resilience within the industry, as well as differentiating between customers' wants and needs and continual improvements.	[51]
By adopting ITIL v3 framework, this study shows that PT Telkom in Palembang would improve their CRM significantly. This enable them to further gauge their success and how advance are they hold in terms IT (compared to the others within the industry), which have a direct impact on effectivity and efficiency of the company.	[52]
This study showcases that implementing ITIL at PT. Inovasi Tjaraka Buana brings a significant benefit to the company's business continuity. By implementing ITIL, the company can improve its ability to handle incidents and prevent them from recurring. This will lead to more efficient IT services and reduce disruption caused by incidents.	[53]

From the table above, it can be concluded that any method utilized for assessment and measurement has one universal objective, namely, to gauge the performance of each business process within the organization. The results of the measurement can then provide insights into whether the company needs to improve its services in terms of flexibility, effectiveness, or both, or if the company correctly implements ITIL v3, thereby holding a competitive advantage within its industry. On the other hand, by combining multiple assessment and measurement methods, organizations can also gain a deeper understanding of the issues they face. Although this research may have the same purpose, employing a combination of approaches provides more in depth and insightful perspectives. This has proven to be very beneficial, especially in the telecommunication industry, where competition is intense, and innovation is key to success. In addition, utilizing multiple methods not only helps organizations stay ahead in a competitive market but also enables them to meet and even exceed customer satisfaction.

4. CONCLUSION

The review of research emphasizes the critical role of service management in the telecommunication industry, essential for ensuring uninterrupted service delivery and addressing operational challenges. Through assessments of service maturity levels and adherence to ITIL practices, organizations can streamline operations and enhance customer satisfaction, crucial for maintaining competitiveness. Each domain in ITSM has its own distinct role, as evident in previous research regarding service operation domain. In other hand, telecommunication industry, particularly that focus on service operation domain, will continuously strive to maintain, and uphold service continuity. In the event of issues posing a threat to service continuity, the telecommunication industry will conduct research within this domain to obtain recommendations regarding the issues faced.

The telecommunication industry employs diverse research methods, from maturity level models to regression analysis, showing a commitment to improving service operations. While many companies have achieved commendable maturity levels, there's still room for growth, especially in optimization and innovation. This underscores the crucial role of IT service management (ITSM) in identifying and addressing operational challenges, enabling organizations to enhance service quality and remain competitive. The distribution of maturity levels within the telecommunication industry underscores both strengths and areas for improvement. While standardized processes approaches prevail, there's an evident opportunity to advance towards higher levels of optimization and efficiency. Ultimately, continuous improvement and innovation are essential for staying competitive in the dynamic telecom landscape. By leveraging insights from assessment methods and fostering a culture of ongoing improvement, companies can enhance service quality, meet customer expectations, and drive business success in an increasingly competitive environment.

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