2025, Volume 05, No 02, pp.199-214, p-ISSN 2807-9450 e-ISSN 2808-4284

Jurnal Pendidikan Teknik Bangunan

Journal homepage: https://ejournal.upi.edu/index.php/JPTB

# Analysis of the Civil Engineering Laboratory Management System at Universitas Negeri Jakarta in the Context of ISO/IEC 17025:2017 Compliance and Institutional Development

*Abdhy Gazali.*[1*], *Mirara Khanza*[2], *Sittati Musalamah*[3], *Sekar Ayu Apriani*[4], *Annisa Nurrahmawati*[5,]

[1,3,4,5] Building Engineering Education, Faculty of Engineering, Universitas Negeri Jakarta, Jakarta, Indonesia

[2] Building Construction Engineering, Faculty of Engineering, Universitas Negeri Jakarta, Jakarta, Indonesia

[1*]abdhy.gazali@unj.ac.id,[2]mirarakhanza@unj.ac.id, [3]smusalamah@unj.ac.id, [4]sekarayuapriani_1503621063@mhs.unj.ac.id, [5]annisa_1503622048@mhs.unj.ac.id

## ABSTRACT

Universitas Negeri Jakarta (UNJ) was currently transitioning into a State University with Legal Entity status (PTN-BH), a change that demanded greater institutional autonomy, particularly in financial management. One of the key strategies to achieve this was through the commercialization of university laboratories, which held significant potential as providers of testing services for industry and the public. However, ensuring that laboratory management complied with international standards remained a considerable challenge. This study aimed to evaluate the extent to which the management system implemented in the Civil Engineering Laboratory at UNJ aligned with the requirements of ISO/IEC 17025:2017. The research employed a quantitative descriptive approach, with data collected through observations using self-assessment sheets covering general, structural, resource, process, and management system requirements. The analysis was conducted using a gap analysis method. The findings showed that the UNJ Civil Engineering Materials Testing Laboratory achieved an overall compliance score of 59.5%, which was categorized as low. This indicated that the laboratory still required substantial improvement, particularly in structural, process, and management system aspects, before proceeding to the accreditation stage. Strengthening these areas will be essential to enhance the laboratory's competitiveness and support the university's financial sustainability.

## ARTICLE INFO

**Article History:**
Submitted 5 September 2025
First Revised 20 November 2025
Accepted 26 November 2025
Available Online 30 November 2025
Publication Date 30 November 2025

**Keywords:**
Civil engineering laboratory; Gap analysis; Accreditation Readiness; Laboratory Management system; ISO implementation; Laboratory Assessment; Construction Material Laboratories.

## 1. INTRODUCTION

The development of the construction industry in Indonesia requires support from various sectors, including higher education institutions, which play a strategic role in producing qualified human resources, generating innovative research, and providing material testing services. In this regard, the presence of testing laboratories has become increasingly significant, as they serve as one of the entities that provide quality assurance for products. The need for quality assurance is no longer limited to the business sector but has now extended to the education sector. According to (Triregina et al., 2021), an educational laboratory is defined as an academic unit that can be utilized to support the Tridharma of Higher Education, namely education, research, and community service. To fulfil these purposes, laboratories must pay attention to planning and management governance to ensure quality standards. Laboratory quality is one of the key indicators that must be demonstrated as an effort to establish a credible and reliable laboratory (Ningsih et al., 2024).

In line with this development, internationally recognized standards such as ISO/IEC 17025:2017 serve as a benchmark for measuring laboratory quality readiness and ensuring testing and calibration competence. This standard focuses on the validity of test results, quality management systems, and the enhancement of laboratory credibility. According to (Fajriyani et al., 2024), internationally standardized laboratories can strengthen both the technical and administrative aspects of laboratory management. The implementation of ISO/IEC 17025:2017 significantly impacts service quality, customer trust and satisfaction, as well as management performance. Furthermore, such implementation enhances the competitive advantage of laboratories in comparison to others (Sandi et al., 2022).

In the context of public universities, educational laboratories—particularly in the field of civil engineering—are expected to serve as productive business units. This aligns with government policy requiring public universities with legal entity status (PTN-BH) to be self-reliant in terms of management, academic development, and financial sustainability, as stipulated in Government Regulation (PP) No. 26 of 2015 in conjunction with PP No. 8 of 2020 concerning the Structure and Funding Mechanisms of PTN-BH. Consequently, professionally managed laboratories can play an alternative role as revenue-generating units for universities.

To support Universitas Negeri Jakarta (UNJ) in achieving PTN-BH status and promoting the commercialization of technical laboratory units, (Alhammadi et al., 2025) highlighted the importance of laboratories obtaining formal recognition from the National Accreditation Committee (KAN) to demonstrate competence. Accreditation serves as a commitment to external stakeholders that the laboratory consistently provides high-quality services and reliable results. The consistent implementation of laboratory safety and operational procedures contributes to strengthened laboratory governance, which in turn enhances laboratory performance and reduces operational risks (Salwa et al., 2025). Additionally, accreditation boosts the confidence of laboratory personnel (Triregina et al., 2021).

Before undergoing the accreditation process, both testing and calibration laboratories must conduct an assessment of their readiness. Preliminary analysis of the current condition of the UNJ material testing laboratory indicates that it is still far from fully meeting ISO/IEC 17025 standards. Empirical evidence from interviews with laboratory staff revealed two fundamental aspects that remain unfulfilled and may hinder testing activities and future accreditation processes. Although the laboratory currently functions as an integrated facility, these two aspects—namely, Standard Operating Procedures (SOP) and Work Instructions (WI)—must be established. These documents represent the foundational level of quality documentation required by any organization to carry out laboratory practices (Hanifah et al., 2015).

Based on this background, a systematic analysis is needed to determine the level of conformity of the laboratory with ISO/IEC 17025:2017 standards in order to promote laboratory commercialization. The findings of this study will provide several recommendations for improving laboratory management systems to support UNJ in becoming a self-reliant and competitive PTN-BH.

## 2. METHOD

This study employs a quantitative descriptive approach, selected to objectively describe the level of conformity of the Civil Engineering Laboratory management system at Universitas Negeri Jakarta (UNJ) with the ISO/IEC 17025:2017 standard. The research scope is limited to the materials testing laboratory within the civil engineering cluster at UNJ. The study was conducted from March to July 2025.

Primary data were obtained through observations of management activities and a self-assessment instrument. The self-assessment instrument was aligned with the ISO/IEC 17025:2017 requirements and validated through an expert assessment process involving one laboratory quality management expert from the University of Indonesia and the head of the laboratory services unit at the Faculty of Mathematics and Natural Sciences (FMIPA), Pakuan University. To ensure more information, the researchers conducted interviews with the head of the materials testing laboratory and the laboratory technicians. From this quantitative data, using a self-assessment sheet, was then analyzed with a gap analysis method to determine the level of achievement for each clause of the ISO/IEC 17025:2017 standard. The data analysis steps included scoring each assessment item according to the criteria presented in **Table 1.**

**Table 1.** Scoring Criteria for the Instrument

| Score | Criteria |
|---|---|
| 1 | The laboratory does not understand the requirements and does not implement them. |
| 2 | The laboratory understands the requirements but has not implemented them. |
| 3 | The laboratory has implemented the requirements but has not documented them. |
| 4 | The laboratory has implemented the requirements and documented them. |

(Putri et al., 2019)

The scoring system using a smaller the better with values from 1 to 4. From a score of 1, which indicates that the laboratory does not understand the requirements, to a score of 4 that the laboratory implemented the requirements in the laboratory activity and documented the evidence. After assigning scores and calculating the total score, the results were compared to the maximum possible score and classified to provide a clear overview of the laboratory's readiness status. To clearly illustrate the laboratory's readiness level based on the total score obtained, the assessment categories are presented in **Table 2.**

**Table 2.** ISO/IEC 17025:2017 Conformity Assessment Categories

| Percentage Range | Category |
|---|---|
| **20% – 40%** | Very Low |
| **> 40% – 60%** | Low |
| **> 60% – 80%** | High |
| **> 80% – 100%** | Very High |

(Arti et al., 2023)

## 3. RESULTS AND DISCUSSION

The materials testing laboratory is one of the academic support facilities under the Civil Engineering cluster of Universitas Negeri Jakarta. Its current functions include serving as a venue for practicum activities, research, and the testing of construction materials such as concrete, cement, sand, gravel, and other building materials. To enhance credibility and expand collaboration opportunities with the industrial sector, the laboratory is currently preparing for accreditation by the National Accreditation Committee (KAN) in accordance with the ISO/IEC 17025:2017 standard. The materials testing laboratory has an organizational structure consisting of a laboratory head and technical staff (laboratory technicians). However, empirical observations and interviews with technical personnel revealed that the implementation of ISO/IEC 17025 standards has not yet been fully achieved or documented. The compliance assessment was carried out based on the five main clause categories in ISO/IEC 17025:2017, namely general requirements, structural requirements, resource requirements, process requirements, and management system requirements.

### 3.1 General Requirements

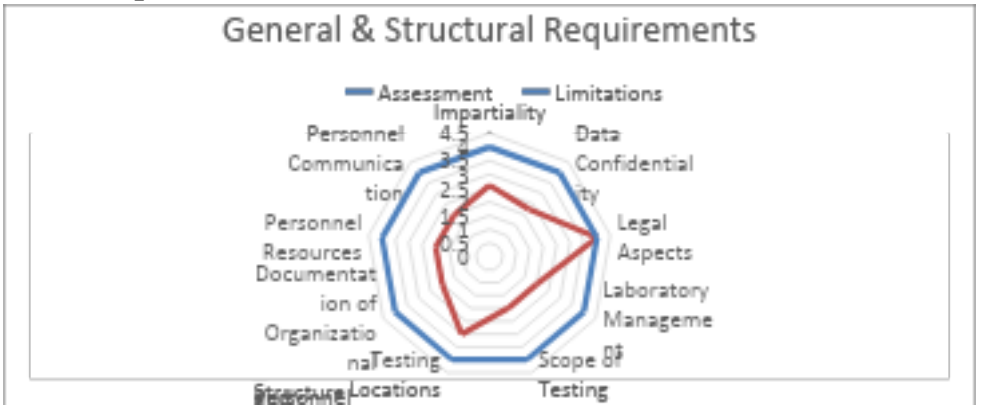


**Figure 1.** Gap Between General and Structural Requirements in Relation to ISO/IEC

17025:2017

As presented in **Figure 1**, a chart illustrating the achievement of general requirements, which include the indicators of impartiality and confidentiality of the laboratory towards external parties. Impartiality is defined as a commitment to being free from any conflict of interest with any party. The Impartiality indicator achieved 65% (13 out of a maximum score of 20), based on the laboratory's self-assessment using a 1–4 scale. This result indicates that the laboratory has not yet provided valid evidence of a formal commitment affirming impartiality with any party, even under commercial, financial, or other pressures. Furthermore, the laboratory has not conducted continuous risk identification related to impartiality, including risks arising from its activities or relationships. To improve this score, the laboratory needs to develop a written impartiality policy and implement a structured and continuous risk identification procedure.

For the confidentiality indicator, the achievement percentage is 56% (9 out of a maximum score of 16) from 1–4 scale, which is lower than the previous indicator. This is due to the absence of an enforced commitment to safeguarding client information, making the laboratory vulnerable to data breaches and potentially facing legal claims in the event of disputes. The laboratory has never processed the dissemination of client information through contractual or legal arrangements. Moreover, no evidence can be provided in the form of personnel statements committing to confidentiality (Non-Disclosure Agreement/NDA) concerning clients. The recommended solution is the immediate implementation of confidentiality agreements (Non-Disclosure Agreements) with clients and the integration of confidentiality clauses into all personnel employment contracts. External pressures from clients can threaten the confidentiality and integrity of laboratory data, particularly in the absence of formalized confidentiality commitments such as NDAs (Panagiotidou et al., 2025). The recommended solution is the immediate implementation of confidentiality agreements with clients and the integration of confidentiality clauses into all personnel employment contracts.

Overall, this general requirements clause obtained a total percentage of 61%, which falls into the "high" category.

### 3.2 Structural Requirements

The structural requirements clause encompasses legal aspects, laboratory organization and management, personnel responsibilities and authorities, the scope of testing activities, documentation of laboratory procedures, and personnel communication. The total percentage for this clause is 61%, placing it in the "high" category.

When broken down by indicator, the legal aspect achieved a perfect score of 100%, as the laboratory has been formally established through a Rector's Decree. The next highest percentage, following the legal aspect, is the indicator for the suitability of testing

facilities, at 75%.

This meets the ISO/IEC 17025:2017 requirement that testing locations may be permanent, temporary, mobile, or located at the customer's premises. However, this indicator did not achieve a perfect score because the testing facility arrangements have not yet been documented in the laboratory management policy.

Other indicators each scored 50%, indicating the need for documented policies outlining the relationships between management, technical activities, and support services within the organisation. In (Bilgin et al., 2023) reported that the initial gap for structural requirements was mainly caused by the lack of a clearly documented organizational structure and the absence of a designated technical manager. After corrective actions were taken, compliance improved due to clearer role assignments, strengthened responsibilities, and more systematic documentation. Nevertheless, some challenges remained, particularly related to the completeness of documentation. It is not necessary to create an entirely new exclusive organisational structure; rather, an update of job titles would suffice. Furthermore, the laboratory does not yet have a detailed list of testing parameters or laboratory management procedures such as environmental condition management, document and record control, and personnel management that align with the examples provided in ISO/IEC 17025:2017.

### 3.3 Resource Requirements

To illustrate the gap between the laboratory's current condition and the resource requirements of ISO/IEC 17025:2017, the comparison is presented in **Figure 2.**

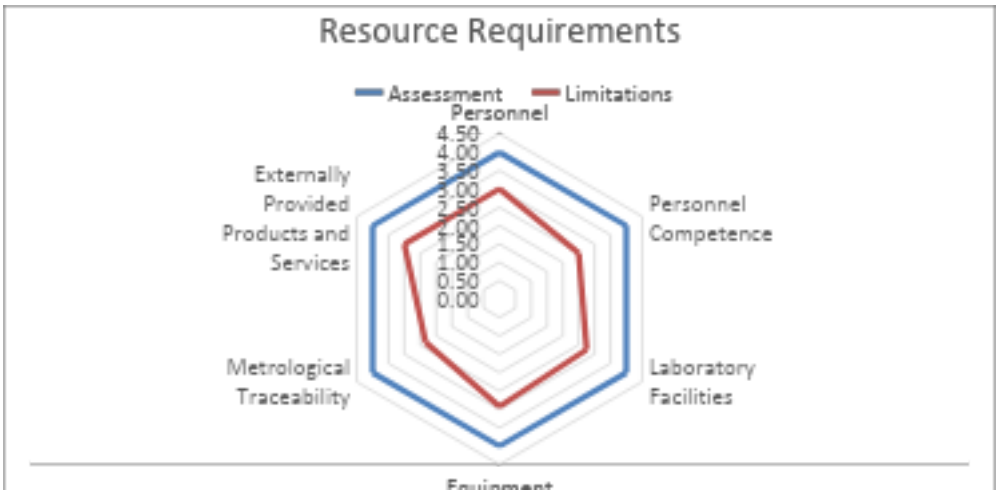


**Figure 2.** Gap Between Resource Requirements and ISO/IEC 17025:2017

The scope of conformity for the resource requirements clause includes personnel, facilities and environmental conditions, equipment, metrological traceability, and externally provided products and services, as seen at **Figure 2.** The highest conformity scores were achieved in the indicators for personnel and externally provided products and services, each scoring 75%, followed by the equipment indicator.

For the personnel indicator, the laboratory only needs to complete documentation of procedures and personnel records, such as assignment documents, selection, recruitment, training, supervision, competence monitoring, transfer/rotation, retirement, and resignation. These documents may include evidence of educational background, proof of training, proof of personnel experience in assigned fields, or official certificates from KAN or BSN for specific testing assignments. In addition, the laboratory needs to complete documentation for the review and approval of externally provided products/services. Furthermore, complying resource requirements poses challenges for Indonesian calibration and testing laboratories (Manikandan et al., 2024). The findings of this study are consistent with (Krismastuti & Habibie, 2022), who reported that laboratories in Indonesia continue to face challenges in resource requirements due to limited understanding and difficulties in integrating new procedures into existing documentation.

The equipment indicator obtained a conformity percentage of 73% from 38 out of a maximum score of 52, as the laboratory has not yet been able to demonstrate evidence of equipment handling procedures, including equipment storage and maintenance procedures. The laboratory needs to implement daily monitoring of equipment usage and return, and has yet to prepare calibration schedules and inventory forms for calibrated equipment.

The facilities and environmental conditions indicator achieved a score of 69%, meeting 11 out of a maximum of 16 points. This result shows that the laboratory still needs to improve several essential aspects related to room readiness and environmental control. Specifically, the laboratory must develop a comprehensive room condition checklist, establish clear access procedures for restricted areas, and complete the necessary access documentation for testing rooms to ensure controlled and traceable entry. Meanwhile, other indicators such as personnel competence and metrological traceability recorded scores below 65%, highlighting more substantial gaps in human resource capability and calibration management.

These findings reinforce the argument presented by (Panagiotidou et al., 2025), who emphasized that achieving full compliance with laboratory standards requires significant investments in equipment, calibration activities, structured training programs, and strong managerial commitment. Similarly, the results align with (Dzakwan et al., 2025), who found that well-designed training, adequate infrastructure, and consistent supervisory mechanisms are crucial for strengthening laboratory performance and enhancing readiness for accreditation. Overall, the current evaluation reflects both progress made and the critical areas that require strategic improvement to meet accreditation expectations.

### 3.4 Process Requirements

To illustrate the gap between the laboratory's current condition and the process requirements of ISO/IEC 17025:2017, the comparison is presented in **Figure 3.**

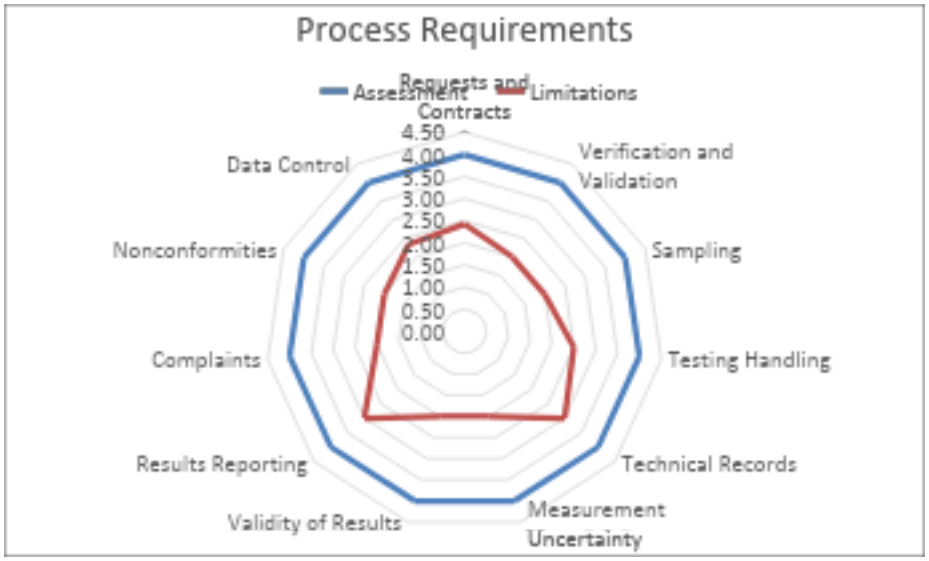


**Figure 3.** Gap Between Resource Requirements and ISO/IEC 17025:2017

As shown in **Figure 3**, the chart shows the gap between the laboratory's achievements and the requirements of ISO/IEC 17025. Overall, in terms of process requirements, the Civil Engineering Materials Testing Laboratory of UNJ has achieved a percentage of 57%, which places its performance in the "low" category.

Broadly speaking, many of the requirements in each indicator have not yet been implemented by the materials testing laboratory. For example, in the indicator for review of requests, tenders, and contracts, the laboratory does not yet have detailed records (forms/written contracts) to ensure that customer requirements, testing capabilities, and the fulfillment of customer requests are documented. The necessary documents include customer approval forms and forms for the review of tender and contract requests. Furthermore, if an event requires the review of a tender or contract after work has been carried out, the laboratory has not yet prepared a form for repeat testing requests from analysts or analyst record forms.

In the verification and validation of methods indicator, the percentage achieved was 50%. This is because laboratory staffs are considered to understand the requirements, as they have previously attended ISO/IEC 17025 training. However, nearly all the listed requirements in ISO/IEC 17025 have not been fully met. For instance, the determination of methods offered by the laboratory is entirely based on customer requests. In addition, documents such as work instructions for the testing process, method validation procedures, and method verification procedures are not yet available.

For the testing sample collection indicator, although services provided by the materials testing laboratory so far have been based on requests submitted directly to the laboratory, in the future, the laboratory needs to establish a procedure for test specimen collection, a sample collection planning form, and even a work instruction document for sample collection. In the same scope, after the sampling stage, for the handling of test specimens, the laboratory does not yet have a documented procedure for preventing damage, loss, or other deviations. If deviations occur during sampling, the laboratory should also prepare a sample receipt report form for archiving purposes.

The next indicator, technical records, requires the laboratory to systematically maintain all technical documentation generated during the testing process. At present, the laboratory must develop several key documents, including a record control procedure, detailed work instructions for analysts, and standardized analyst record forms to ensure consistency and traceability of data. In addition, for indicators related to test results such as measurement uncertainty and the validity of results—the laboratory does not yet have supporting documents. These missing documents include work instructions for measurement uncertainty, quality control procedures, internal quality audit procedures, and internal audit agenda forms. The absence of these documents indicates that the laboratory has not fully established a structured system to guarantee data accuracy, reliability, and audit readiness.

Similarly, for the customer complaints indicator, the laboratory still lacks an official, standardized complaint form, which is essential for documenting customer feedback and ensuring timely corrective actions. Furthermore, with respect to nonconforming work and data control, several important elements remain incomplete. These include forms for repeat testing requests from analysts, procedures for handling nonconforming work, procedures for controlling laboratory records, and documented procedures for data protection and backup. Without these documents, the laboratory risks inconsistencies in handling errors, potential data loss, and reduced accountability in the testing process.

Previous studies support these findings. (Panagiotidou et al., 2025) emphasize that fulfilling the process requirements of ISO/IEC 17025 demands comprehensive documentation, including validated test methods, standardized operating procedures, and systematic processes for method validation and verification. Their study demonstrates that the implementation of these documents significantly reduces the gap value and improves overall compliance levels. Moreover, the documentation and implementation phases also create opportunities to refine laboratory workflows through corrective and preventive actions, thereby strengthening both operational reliability and readiness for accreditation.

### 3.5 Management System Requirements

To illustrate the gap between the laboratory's current condition and the management system requirements of ISO/IEC 17025:2017, the comparison is presented in **Figure 4.**

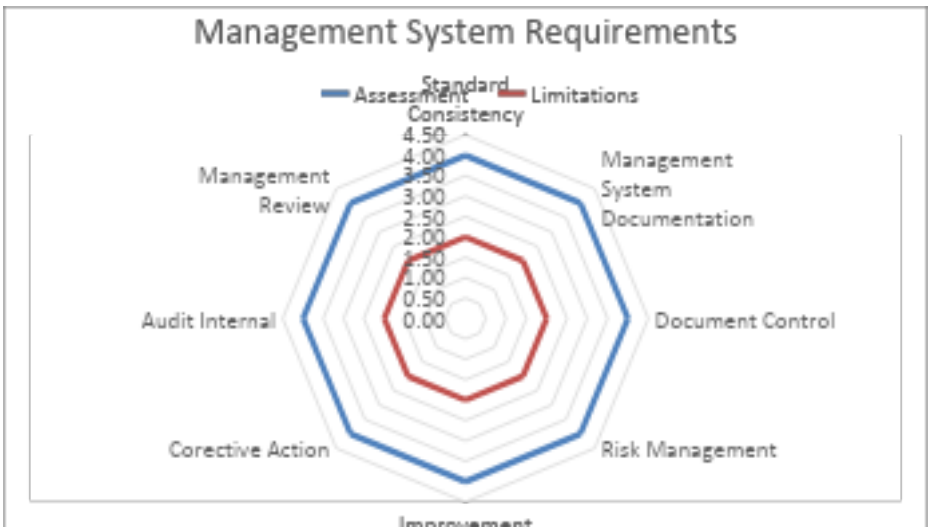


**Figure 4.** Gap Between Management System Requirements and ISO/IEC 17025:2017

Based on the analysis of the management system requirements clause, as shown in **Figure 4**, the materials testing laboratory obtained an overall average score of 50% of the maximum score. This value indicates that most of the requirements have not been fully implemented in the laboratory's activities. The lack of comprehensive understanding of the clauses and the laboratory's inability to meet certain requirements are the main reasons for not achieving the maximum score.

Observations revealed that key aspects of the management system, such as internal audits, management evaluations, and mechanisms for corrective and preventive actions, have not been carried out consistently and are not documented in accordance with the standards. These findings are consistent with previous studies, which emphasized that an effective Quality Management System (QMS) requires a virtuous cycle of measurement, results analysis, and the formulation of improvement action plans, supported by regular quality audits to ensure compliance and operational efficiency (Surono, 2024).

Therefore, to achieve the maximum score for this clause, the laboratory needs to prepare a comprehensive quality manual covering levels 1 to 4, namely: quality manual, quality procedures, laboratory work instructions, and supporting documents for testing activities, and to implement a continuous improvement cycle through systematic audits and management reviews.

To provide an overall overview of the laboratory's compliance with the ISO 17025 requirements, the summarized results are presented in **Table 3.**

**Table 3.** Summary Percentage of Compliance with Standard ISO 17025

| Standard Requirements | Max. Score | Score Achieved | Percentage fulfillment (%) |
|---|---|---|---|
| General | 36 | 22 | 61% |
| Structure | 28 | 17 | 61% |
| Resource | 120 | 83 | 69% |
| Process | 204 | 114 | 57% |
| Management System | 68 | 34 | 50% |
| **Total Score Achieved** | | | **59,5%** |

As shown in **Table 3**, the general requirements on impartiality and customer confidentiality achieved a score of 61%, indicating a "High" level of implementation, although several aspects still require improvement. Laboratory technicians reported that they understood and had begun applying these requirements; however, this commitment is not supported by a formal quality policy or an approved integrity statement. Without clear quality objectives, commitment cannot produce measurable outcomes.

This aligns with (Zhang and Bai, 2024), who emphasize that quality improvement depends on clear policy direction, and with (Maqbool, 2023), who warns that a QMS without strong commitment risks becoming a mere formality. Furthermore, ISO/IEC 17025:2017 underscores the importance of risk-based activities, requiring all personnel to understand potential risks associated with customer interactions.

As previously mentioned**,** the structural requirements clause encompasses legal aspects, laboratory organization and management, personnel responsibilities and authorities, the scope of testing activities, documentation of laboratory procedures, and personnel communication. The total percentage for this clause is 61%, placing it in the "High" category. According to **Figure 1**, the legal indicator received the highest rating among all indicators. However, after conducting interviews to validate this finding, it cannot be concluded that the laboratory fully complies with this indicator because it has not yet been officially established as an independent unit reporting directly to top management. Currently, laboratory operations still follow the university's bureaucratic structure.

Meanwhile, ISO/IEC 17025:2017 requires laboratories to be legal entities that are clearly distinguishable from other organizations and to establish a documented organizational structure. Structural weaknesses may reduce performance, create inconsistencies, and threaten the validity and impartiality of test results. In (Pangestu & Purnama, 2024) also emphasize that a clear organizational structure is essential for efficient workflows and effective coordination between divisions.

As illustrated in **Figure 2,** the highest conformity scores were achieved in the indicators for externally provided products and services, the score is 75%, followed by the equipment indicator received a score of 73%. The gap that has arisen has resulted in both indicators still not achieving maximum scores because the laboratory has not yet determined a standard procedure regarding equipment specifications. According to the head of the laboratory, the laboratory submits equipment requests to the head of study program based on the needs of the laboratory assistants or head of the laboratory. In addition, laboratory need to complete procedures related to handling, storage, use and maintenance of equipment and print them out for each equipment. These requirements are intended to ensure that users understand the proper use and control of equipment, so that undesirable events such as accidents do not occur.

This was also stated in (Yoon, 2021) research, which stated that equipment procedures should be displayed in a visible place before the experiment begins, so that users understand the correct steps and are aware of potential hazards. Another thing that must also be fulfilled by the laboratory is to establish procedures for checking equipment and complementing records related to the equipment. For the personnel indicator, the laboratory only needs to complete documentation of procedures and personnel records, such as assignment documents, selection, recruitment, training, supervision, competence monitoring, transfer/rotation, retirement, and resignation.

These documents may include evidence of educational background, proof of training, proof of personnel experience in assigned fields, or official certificates from KAN or BSN for specific testing assignments. In addition, the laboratory needs to complete documentation for the review and approval of externally provided products/services.

As presented in **Figure 3** and **Table 3**, the process requirements received scored 57%, which means that the laboratory's performance is still "low" category. Many of the requirements in each indicator have not yet been. For example, in the indicator for review of requests, tenders, and contracts, the laboratory does not yet have detailed records (forms/written contracts) to ensure that customer requirements, testing capabilities, and the fulfillment of customer requests are documented. The necessary documents include customer approval forms and forms for the review of tender and contract requests. Furthermore, if an event requires the review of a tender or contract after work has been carried out, the laboratory has not yet prepared a form for repeat testing requests from analysts or analyst record forms. In the verification and validation of methods indicator, laboratory staff are considered to understand the requirements, as they have previously attended ISO/IEC 17025 training. However, nearly all the listed requirements in ISO/IEC 17025 have not been fully met. For instance, the determination of methods offered by the laboratory is entirely based on customer requests. In addition, documents such as work instructions for the testing process, method validation procedures, and method verification procedures are not yet available.

For the testing sample collection indicator shows that services are still based on direct requests, and the laboratory has not yet established procedures for sample collection, planning forms, or work instructions. Similarly, after sampling, there are no documented procedures for preventing specimen damage or loss, nor a sample receipt report for recording deviations. For technical records, the laboratory must prepare record control procedures, analyst work instructions, and record forms. Documents related to measurement uncertainty and result validity are also lacking, including work instructions, quality control procedures, and internal audit documents. Customer complaints have not yet been supported by an official complaint form. Lastly, the laboratory still needs procedures and forms for controlling nonconforming work, repeat testing requests, data protection, and record backup.

Overall, management system requirements only received a score of 50%, indicating that the laboratory's performance is still in the "low" category. These results indicate that the materials testing laboratory does not yet fully meet the management system requirements. This non-compliance is evident in the absence of systematic documentation related to document control, quality record management, internal audits, and management reviews. This condition indicates that the laboratory does not yet have adequate mechanisms to ensure consistency, traceability, and continuous improvement.

In fact, organizations that continuously improve and focus on quality management systems are on of the keys to an organization's success in meeting customer satisfaction (Lepisto et al., 2024). Although document control and review practices are strongly linked to continuous quality improvement in laboratory performance (Ohn, 2024), the laboratory has never conducted an internal audit within a more independent laboratory framework. According to the head of the laboratory, existing audits have only been carried out for study program accreditation. In fact, internal audits can identify operational weaknesses, and their results support improvement efforts that add value to the organization (Rizkine Pramukti et al., 2022). Regarding management review indicators, the head of the laboratory stated that no management review agenda has ever been conducted because the laboratory is still dominated by academic activities. However, ISO/IEC 17025:2017 requires management reviews as a measure of the suitability, adequacy, and effectiveness of the laboratory's management system, and they must be carried out at least once a year.

The next step involves conducting an initial diagnosis and implementing corrective actions to assess the laboratory's readiness for ISO accreditation. Evidence from similar laboratory cases shows that adopting a structured improvement roadmap including a multi-level quality manual, standard operating procedures (SOPs), and corrective action processes can increase compliance levels from below 25% to over 75% (Gerônimo et al., 2020).

Therefore, strategic documentation development, periodic audits, and staff training

should be prioritized to close the existing compliance gap. Meeting the requirements to operate as a licensed testing laboratory and to support the commercialization of innovative products requires universities to invest in suitable equipment and additional management efforts. Equipment must align with specific testing standards relevant to each technology, ensuring that the laboratory can contribute maximally to both product commercialization and service quality (Rahman & Awang, 2024).

## 4. CONCLUSION

Based on the assessment of the Civil Engineering Materials Testing Laboratory at Universitas Negeri Jakarta (UNJ) against ISO/IEC 17025:2017, the laboratory's overall compliance level remains low, with an achievement score of 59.5%. This result indicates that the laboratory has not yet reached the required maturity to ensure reliable and internationally recognized testing services. Key gaps are found in structural, process, and management system components, particularly the absence of a comprehensive quality documentation system, which affects consistency, traceability, and conformity with standard requirements.

The analysis also shows that personnel understanding of ISO/IEC 17025:2017 remains limited, leading to inconsistent implementation across technical and managerial areas. These conditions highlight the need for improvements in managerial structure, documentation, and capacity building. Strengthening these aspects is essential not only for increasing compliance with ISO/IEC 17025:2017 but also for supporting UNJ's broader institutional goals as a state university with legal entity status (PTN-BH), where quality assurance and international credibility of academic resources are crucial.

## REFERENCES

Arti, R. M., Kurniawan, N. B., & Sugiyana, A. M. (2023). Review on the competency of evaluators at information technology product security testing laboratory based on SNI ISO/IEC 19896–3:2018. Business and Engineering Management 3(1) 192–202.

Belezia, L. C., & de Almeida, M. F. L. (2021). Self-assessment model for testing and calibration laboratories based on ISO/IEC 17025: 2017 requirements. *Journal of Physics: Conference Series*, 1826(1) 1-8.

Bilgin, H., Leti, M., Shehu, R., Özmen, H. B., Deringol, A. H., & Ormeni, R. (2023). Reflections from the 2019 Durrës Earthquakes: An earthquake engineering evaluation for masonry typologies. *Buildings*, *13*(9), 2227.

Dzakwan, A. A., Alfiyyah, J. R., Afifah, S., Muhammad, K., & Adhani, D. W. (2025). Students' understanding level of occupational safety and health and the feasibility study of UPI Building A. *Jurnal Pendidikan Teknik Bangunan, 5*(2), 153–164.

Fajriyani, D. F., Anwar, K., & Munawir, A. (2024). Analisis tingkat kepuasan masyarakat terhadap pelayanan laboratorium terakreditasi SNI ISO/IEC 17025: 2017 (studi kasus di buskipm). *Ranah Research: Journal of Multidisciplinary Research and Development*, *7*(1), 322-330.

Gerônimo, B. M., Benatti, C. T., Fenerich, F. C., & Lautenschlager, S. R. (2020). An audit approach to assess and improve the quality management systems of environmental laboratories. *Environmental Engineering and Management Journal*, *19*(7), 1033–1041.

Krismastuti, F. S. H., & Habibie, M. H. (2022). Complying with the resource requirements of ISO/IEC 17025:2017 in Indonesian calibration and testing laboratories: Current challenges and future directions. *Accreditation and Quality Assurance, 27*(6), 359–367.

Lepistö, K., Saunila, M., & Ukko, J. (2024). Enhancing customer satisfaction, personnel satisfaction and company reputation with total quality management: combining traditional and new views. *Benchmarking: An International Journal, 31*(1), 75-97.

Manikandan, V., Ramakrishnan, P. R., & Shanmugam, H. (2024). The advantages of adopting the ISO/IEC 17025:2017 lab management system in calibration and testing laboratories. *Indian Journal of Information Sources and Services, 14*(4), 131–135.

Maqbool, M. A., Altaf, F., & Bibi, S. (2023). Challenges encountered by quality management system ISO 9001: 2015 implementation at the universities. *Pakistan Languages and Humanities Review*, *7*(3), 594-602.

Ningsih, N. I. D., Astuti, P., Rosita, N., Rahmah, F. A., Permata, W., & Hatiningsih, F. (2024). Kesiapan perolehan akreditasi SNI ISO/IEC 17025:2017 menggunakan metode gap analysis pada laboratorium pengujian. *Jurnal Widya Laksana, 13*(2), 211–217.

Ningsih, N. I. D., Astuti, P., Rosita, N., Rahmah, F. A., Permata, W., & Hatiningsih, F. (2024). Kesiapan perolehan akreditasi SNI ISO/IEC 17025: 2017 menggunakan metode gap analysis pada laboratorium pengujian. *Widya Laksana, 13*(2).

Ohn, H. M. (2024). Internal audit techniques for testing laboratories: ISO/IEC 17025: 2017 perspective. *Accreditation and Quality Assurance*, *29*(3), 263-266.

Panagiotidou, E., Chountalas, P. T., Magoutas, A. I., Georgakellos, D. A., & Lagodimos, A. G. (2025). Systematic identification and validation of critical success factors for ISO/IEC 17025 implementation. *Administrative Sciences, 15*(2), 60.

Pangestu, A. G., & Purnama, P. H. (2024). Peran struktur organisasi dalam kunci sukses kinerja dan efisiensi karyawan koperasi laboratorium bisnis Politeknik Negeri Bandung. *Indonesian Journal of Public Administration Review, 1*(3), 9.

Rahman, M. A., & Awang, M. (2024). A critical analysis of ISO/IEC 17025 practices at unikl mitec laboratory towards improvement opportunities. *Malaysian Journal of Industrial Technology*, *8*(2), 79-93.

Rizkine Pramukti, S., Fadila, M., Oktari, Z., Putrajaya, F., & BRIN. (2022). Evaluation of internal audit according to ISO/IEC 17025:2017 in added value for organization. *Buletin Pengelolaan*

*Reaktor Nuklir*, *12*(1), 11–17.

Salwa, A. A., Ramadhan, M. A., & Anisah, A. (2025). Implementation of job safety analysis to reduce work accident risks in plumbing practice at the Building Engineering Education Study Program. *Jurnal Pendidikan Teknik Bangunan*, *5*(2), 113–128.

Sandi, Y. P., Saragi, S., & Sitanggang, M. L. (2022). Evaluasi penerapan ISO/IEC 17025:2017 terhadap kualitas pelayanan dan kepercayaan pelanggan yang berdampak pada kinerja manajerial laboratorium quality control PT XYZ. *Syntax Literate, 7*(1), 484.

Surono, S. (2024). Enhancing the excellence of quality management system auditors: a competency-based training model with instructional design strategic approaches and measurable outcomes. *Devotion: Journal of Research and Community Service*, *5*(8), 949-960.

Triregina, I., Ramdhani, E. P., & Sabekti, A. W. (2021). Kajian pemenuhan persyaratan struktural ISO/IEC 17025:2017 di laboratorium marine chemistry Universitas Maritim Raja Ali Haji. *Student Online Journal, 2*(1), 517–524.

Yoon, D. (2021). Operational process for r&d laboratory safety. *SAGE Open*, *11*(1), 2158244020988853.

Zhang, Z., & Bai, Y. (2024). Research on whether quality policies can promote the high-quality development of China's manufacturing industry. *Sustainability*, *16*(21).