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Analysis of the Implementation of Shear Wall/Core Wall Construction as the Implementation of Practical Work at the KYO Society Project, Surabaya

Bramantyo Haedar Hugo Irwanto[1], Anggi Rahmad Zulfikar[2]

[1,2] Building Construction Engineering Technology Study Program, Universitas Negeri Surabaya, Surabaya, Indonesia

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Abstract
This study aims to systematically describe the implementation process of Shear Wall/Core Wall structural works, quality management (Quality Control), and the application of Occupational Health and Safety (OHS) at the KYO Society Apartment Development Project in Surabaya, carried out by PT Wijaya Karya Bangunan Gedung Tbk. The research employed a descriptive qualitative approach through direct field observations, project document analysis, informal interviews, and the collection of primary and secondary data during the industrial internship period. The data analyzed included stages of structural work (formwork installation, reinforcement installation, concrete casting, and dismantling), work scheduling, equipment utilization, work volume records, and OHS documents such as Job Safety Analysis (JSA), lists of Personal Protective Equipment (PPE), and emergency response procedures.vThe results indicate that the implementation of Shear Wall/Core Wall works has complied with the shop drawings and the project's Standard Operating Procedures (SOPs). However, several on-site constraints were identified, such as adjustments to concrete casting schedules and equipment availability, which required technical coordination. From a Quality Control perspective, material inspection, dimensional checks, and concrete quality control were conducted in accordance with established procedures. The implementation of OHS at the project site has generally been well executed, as evidenced by the use of PPE, regular toolbox meetings, the installation of safety signage, and the presence of emergency response flowcharts. Nevertheless, supervision of potential hazards and worker discipline still require improvement. Overall, this study provides a comprehensive overview of structural work processes and OHS systems in high-rise building construction projects, which can serve as a reference for improving project management and occupational safety in the future.

1. Introduction

The rapid development of science and technology has driven all sectors, including construction, to continuously adapt and innovate. In the context of Civil Engineering, the construction process demands not only efficiency but also improvements in quality and safety standards. A construction project is defined as a series of temporary activities aimed at producing a building within specific constraints of time, cost, and quality, involving resources such as labor, materials, equipment, methods, information, and time (Nurdin & Feriska, 2023). Construction projects also possess distinctive characteristics, including limited duration, clearly defined end goals, non-repetitive activities, and resource requirements that vary according to the stages of work (Fitriyani et al., 2023).

To achieve project objectives effectively, project management is required, encompassing planning, organizing, implementation, and control of all involved resources (Silalahi et al., 2022). Proper construction management enables projects to achieve accuracy in quality, cost, and time simultaneously, as demonstrated in studies of high-rise building projects that emphasize the integration of technical supervision and resource control (Muliawan & Nasution, 2021).

In high-rise building projects, structural elements such as shear walls play a crucial role in resisting lateral loads caused by earthquakes and wind, maintaining structural stiffness, and enhancing overall building stability (Hossain & Bagchi, 2021). The performance of shear walls is strongly influenced by the accuracy of planning and on-site implementation, including concrete quality, reinforcement detailing, and the construction methods employed (Moretti, 2024).

*Corresponding author, email: Bramantyo.19039@mhs.unesa.ac.id
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Vocational education in Civil Engineering plays an important role in preparing students to meet the demands of the construction industry through hands-on learning activities such as practical training or industrial internships. Through field experience, students gain a direct understanding of construction work dynamics, including technical implementation, operational management, quality control, and the application of Occupational Health and Safety (OHS). Therefore, the practical work conducted at the KYO Society Apartment Development Project in Surabaya was intended to provide empirical insights into the implementation of Shear Wall/Core Wall construction works.

This study focuses on evaluating the conformity of construction implementation with technical planning, quality management standards, and on-site OHS practices. Accordingly, the objective of this study is to systematically describe the implementation process of Shear Wall/Core Wall works and to assess their integration with modern construction standards, thereby providing a comprehensive overview of the relationship between academic theory and real-world practices in the construction industry.

2. Method

This research employed a descriptive qualitative approach aimed at providing a systematic, factual, and accurate description of the implementation of Shear Wall/Core Wall works, project operational management, and the application of Occupational Health and Safety (OHS) at the KYO Society Apartment Development Project in Surabaya. The study was conducted at PT Wijaya Karya Bangunan Gedung Tbk. during February to August 2022 through an industrial internship program in the Quality Control Administration and Field Execution divisions, following the project's operational working hours.

The research subjects included internship students, field supervisors, Quality Control staff, field executors, the QSHE team, and construction workers. The research objects comprised the implementation process of Shear Wall/Core Wall works, work scheduling (action plan), equipment identification, work volume calculations, and OHS implementation including Job Safety Analysis (JSA). The data consisted of primary data obtained through field observations, daily documentation, informal interviews, and observations of PPE usage and safety procedures, as well as secondary data in the form of project documents such as shop drawings, action plans, equipment lists, work volume recapitulations, JSA documents, OHS SOPs, and other QSHE-related documents.

Data collection techniques included direct observation of work stages (formwork installation, reinforcement installation, concrete casting, curing, and dismantling), Quality Control activities, equipment usage, OHS implementation, and environmental management; photographic documentation and logbooks; project document studies; and informal interviews with supervisors, QC staff, QSHE teams, and field executors.

The research instruments included internship logbooks, QC checklist forms, equipment inspection forms, JSA forms, documentation cameras, shop drawings, toolbox meeting attendance lists, and simple measuring tools such as measuring tapes and water levels. Data analysis was conducted descriptively through data reduction, data presentation in the form of equipment tables, action plan tables, volume tables, JSA tables, and visual documentation, followed by conformity analysis of work implementation based on construction SOPs, shop drawings, OHS plans, and comparisons between planned and actual action plans. OHS analysis included identification of potential hazards at each work stage, evaluation of PPE usage, effectiveness of risk controls, and compliance with safety procedures.

Research conclusions were drawn from a comprehensive assessment of the conformity of construction implementation with quality standards, safety standards, and the appropriateness of construction methods. The research flow began with a preliminary study at the project site, followed by primary and secondary data collection, work observations, collection of QC and OHS documents, analysis of Shear Wall/Core Wall works and OHS documents, and finally the preparation of results and conclusions.

3. Result and Discussion

The results of this study describe the overall implementation of Shear Wall/Core Wall works at the KYO Society Apartment Project in Surabaya, covering technical construction aspects, operational management, material quality, and Occupational Health and Safety (OHS) practices. Data were collected through six months of field observations, analysis of technical project documents, informal interviews with professional staff, and a review of work procedures applied by the main contractor, PT Wijaya Karya Bangunan Gedung Tbk. Overall, the findings indicate that the construction works were carried out in accordance with planning standards, met technical requirements, and were supported by good OHS implementation, allowing the work to be completed without major incidents and with quality outcomes that complied with project specifications.

The first finding relates to the effectiveness of Shear Wall/Core Wall construction implementation based on the predetermined work schedule (action plan). Observations revealed that several work stages were completed earlier than planned. For example, formwork work scheduled from July 9 to July 22 was completed between July 12 and July 15. Similarly, reinforcement work initially scheduled for 14 days was completed in 10 days. Concrete casting, which required intensive coordination among the execution team, QC, and concrete suppliers, was carried out on schedule on July 20. This indicates that work productivity was at an optimal level, supported by the readiness of human resources, equipment, and effective coordination among project divisions. This efficiency also demonstrates that the climbing system method used in Shear Wall/Core Wall construction was properly implemented and provided added value in accelerating vertical structural works.

In addition to time efficiency, the study found that the availability and condition of construction equipment played a significant role in the success of the work. Based on equipment identification results, all major equipment such as tower cranes, bar cutters, bar benders, vibrators, and measuring instruments were available in sufficient quantities and in good condition. No significant equipment failures were observed during the observation period. Routine equipment maintenance by the project's mechanical team and the use of equipment by competent operators contributed to uninterrupted work progress. Thus, no significant obstacles related to equipment functionality or availability were identified.

The study also provides a detailed overview of the conformity between Shear Wall/Core Wall work volumes and technical planning based on shop drawings. Project volume recapitulation data indicate that all concrete volumes used for Core Wall elements across various floors were calculated accurately and complied with quality specifications. Concrete strength variations ranging from 25 MPa to 35 MPa were applied according to structural design requirements. This accuracy in volume calculation demonstrates that the contractor's measurement and material control methods were effective. No significant discrepancies were found between planned and actual volumes, indicating consistent and procedural quantity control.

From a material quality perspective, the study shows that concrete quality control was rigorously implemented through two main tests: slump tests and compressive strength tests. During all observed casting activities, slump values remained within the specified range of 12 ± 2 cm, indicating optimal concrete consistency neither too fluid nor too stiff allowing proper flow and compaction within the formwork. Compressive strength test results conducted by an external laboratory also met the specified design strengths at various concrete ages. This consistency ensures that the Shear Wall/Core Wall structures possess integrity and strength in accordance with design calculations.

Another key finding relates to the implementation of technical work procedures, including preparation, marking, reinforcement installation, formwork installation, concrete casting, formwork dismantling, and curing. During the marking stage, measurements were conducted by surveyors using total stations and other measuring instruments to ensure accurate alignment, wall positioning, and structural element placement. Observations showed that all marking activities were performed according to procedures, minimizing errors in subsequent stages.

During reinforcement work, cutting, bending, and assembly of reinforcement bars followed shop drawings. Reinforcement spacing, length, diameter, and quantity complied with structural requirements. Installation of spare pipes for the climbing system and placement of concrete spacers were also performed according to standards, ensuring readiness prior to formwork installation.

Formwork installation utilized a climbing system that accelerated construction and maintained neat structural results. All formwork installation processes, including squareness checks, tie rod installation, and verticality inspections, were conducted by field executors and QC teams through layered inspections. No major deviations were found during observations.

Concrete casting was carried out in segments without adding water to the mix. Concrete was poured using buckets operated by tower cranes and compacted using vibrators to prevent honeycombing. Quality supervision was directly conducted by the QC team to ensure compliance with safety and technical standards. Formwork dismantling was performed at least eight hours after concrete hardening, with consideration of worker safety and structural conditions.

Concrete curing was conducted using approved curing compounds for three consecutive days to maintain moisture and ensure optimal hydration. Observations confirmed consistent curing practices across all observed Shear Wall/Core Wall elements. In addition to technical aspects, the study found that OHS implementation at the project site was categorized as very good. Each work activity began with Safety

Morning Talks, SHE Talks, and Toolbox Meetings to communicate potential hazards and risk control measures. Workers were required to use ANSI-standard PPE, including helmets, safety shoes, safety glasses, gloves, safety vests, and full-body harnesses for work at height. Observations indicated a high level of worker compliance with PPE usage, reducing the risk of workplace accidents.

Emergency response mechanisms were established through emergency flowcharts and designated muster points. Safety signage such as evacuation routes, edge protection warnings, electrical hazard warnings, and other hazard indicators were clearly installed throughout the project area. Environmental management was also properly implemented through waste segregation into organic, inorganic, hazardous (B3), and residual waste, contributing to a clean and safe work environment.

Overall, the results demonstrate that Shear Wall/Core Wall construction was executed in accordance with construction management principles, technical standards, and OHS regulations. The work was completed efficiently, without significant deviations from plans, and achieved quality outcomes consistent with specifications. The combination of equipment readiness, worker competence, effective quality supervision, and strict OHS implementation were key success factors in this project.

The findings indicate that the implementation of Shear Wall/Core Wall works at the KYO Society Apartment Project in Surabaya aligns with technical plans and construction quality standards. Data analysis confirms that all construction stages from marking, reinforcement installation, formwork installation, concrete casting, to curing were executed in accordance with shop drawings and established work methods. This consistency supports findings from Polimedia Construction Journal, which emphasize that the success of shear wall construction is strongly influenced by accurate field execution and compliance with material quality specifications (Hidayat & Siregar, 2022).

The conformity of project outcomes with planning standards reinforces the view that shear walls are critical structural elements requiring strict supervision due to their role in resisting lateral loads and maintaining building stability (Gupta, 2021). Concrete quality during casting stages met slump and compressive strength requirements, supporting Widodo and Basith's (2020) conclusion that concrete quality significantly affects reinforced concrete performance, especially for vertical elements such as shear walls.

Time efficiency achieved in this project, particularly during reinforcement and formwork stages, demonstrates effective operational management. This aligns with Kusuma et al. (2021), who state that productivity improvements in reinforced concrete works depend heavily on team coordination, equipment readiness, and adaptive scheduling. The efficiency observed at the KYO Society project suggests optimal planning, equipment mobilization, and interdepartmental communication. Other studies also emphasize that construction management must balance speed and quality, particularly in high-rise projects (Arifin & Setyawan, 2020).

The implementation of Occupational Health and Safety (OHS) also showed highly positive results. Routine toolbox meetings, safety talks, and OHS inspections conducted by the QSHE team ensured worker awareness of hazards and risk controls. Safety practices such as PPE usage, safety lines, secured work zones, and emergency preparedness were effective in preventing accidents. These findings align with Saidu et al. (2023), who report that projects with strong safety cultures experience significantly lower accident rates. Moreover, Tamošaitienė and Činčikaitė (2022) highlight that safety management in high-rise construction must be systematic due to increased vertical work risks.

Consistent quality and safety controls also contribute to achieving planned structural performance. Jang et al. (2021) found that quality control in reinforced concrete works directly affects long-term durability and performance, especially for elements subjected to combined gravity and lateral loads, such as shear walls. The alignment between field data and design specifications in this study supports the view that quality management should be applied throughout the construction lifecycle, not only during casting or final inspections (Muliawan & Nasution, 2021).

Nevertheless, this study has limitations. Data were obtained from a single construction project and a specific internship period, limiting the generalizability of findings. Furthermore, recent studies suggest that performance assessments of reinforced concrete shear walls in seismic regions should include long-term reliability analysis to address uncertainties in seismic loading and material variability (Li & Kang, 2024). This indicates that while conventional controls were effectively applied in this project, risk-based approaches remain an area for future research.

Overall, this study confirms that strong integration of project management, quality control, and OHS significantly contributes to successful Shear Wall/Core Wall construction. These findings are consistent with literature stating that successful construction projects maintain quality consistency while ensuring productivity and worker safety (Rahman & Abdullah, 2021).

4. Conclusion

Based on the results and discussion of Shear Wall/Core Wall construction implementation at the KYO Society Apartment Project in Surabaya, it can be concluded that the research objectives—analyzing construction conformity, project operational management, and OHS implementation—have been achieved. This study demonstrates that all construction stages were executed in accordance with technical standards, shop drawings, quality control procedures, and OHS protocols, supporting the hypothesis that effective planning, coordination, and quality control enable successful vertical structural works.

The findings also show that time efficiency can be achieved without compromising quality or safety, in line with modern project management principles emphasizing the integration of productivity, quality, and safety. However, since the study focuses on a single project, further research with broader project coverage is recommended, including long-term structural reliability assessments and risk-based analysis approaches. Future studies may also compare alternative construction methods, digital construction technologies, and data-driven safety systems to enhance understanding of factors influencing quality and safety in high-rise building projects.

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