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Reducing Time Spent On Digitizing Quality Assurance and Control in Multifamily Construction Projects Using Safetyculture (Iauditor)

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Abstract **-** This study evaluates the implementation of the digital platform Safety Culture (iAuditor) to optimize quality assurance and control (QA/QC) processes in multifamily construction projects, reducing time requirements and errors associated with traditional methods. Using a quasi-experimental approach, manual processes (pen-and-paper) were compared with real-time digital workflows, demonstrating that the tool eliminates redundant steps such as transcriptions and scanning, saving up to 60 minutes per inspection. Results showed significant improvements in efficiency, accuracy, and data accessibility, though challenges remain in externally coordinated activities. The proposed solution included staff training and customized digital form templates, highlighting its potential as a replicable model for the construction industry.

Keywords **-** Digitalization, Quality Control (QC), Multifamily Construction, Operational Efficiency, Inspection Time, Automated Processes

1 INTRODUCTION

Digitizing quality inspections in construction is essential for improving operational efficiency and reducing costs, yet implementation remains challenging due to the sector's reliance on traditional, repetitive, and error-prone methods. These inefficiencies often cause delays and hinder productivity, with quality control personnel spending 28% to 41% of their daily work hours generating reports (Duarte-Vidal et al.) [1]. This issue is particularly critical for mid-sized firms seeking digital solutions without straining key resources. In response, tools like SafetyCulture (iAuditor) offer a viable path forward by enabling real-time documentation and centralized communication. Mobile applications have been shown to enhance efficiency; for instance, Rolfsen and Lassen highlight how the app "Capture" reduced task management time significantly [2]. Building on this, our study applies to the iAuditor platform to optimize quality control processes in mid-sized construction companies. The focus is on reducing documentation time and improving the handling of observations during inspections. The methodology involves configuring the tool and training staff, creating a standardized and practical digital inspection model tailored to local industry needs. This model also aims to serve as a replicable framework for broader sector adoption.

2 METHODOLOGY

For the execution of this research, the Safety Culture (iAuditor) platform was implemented, enabling real-time data capture, storage, and processing, facilitating inspection tracking and corrective action implementation. Mobile devices with Android and iOS operating systems were used as support for field data collection, along with computer equipment for data analysis and processing.

The sample evaluated for this research includes the projects indicated in Table 1. Additionally, information extracted from Projects 1, 2, and 3 was used for recording, analysis, determination, and presentation of the identified issues, verifying the necessary information for the research. Therefore, Project 3 was selected as the scenario for implementing the proposal due to its lower level of digitalization compared to the other projects.

Table 1: Industry Experience of Respondent Companies

	Professionals surveyed per project evaluated		
Characteristic	Project 1	Project 2	Project 3
Type of company	Median	Median	Median
Time of experience as a construction company in the market	13	10	16
Type of project	Multifamily housing		

Furthermore, Table 2 demonstrates that the interviewed professionals possess extensive experience in project management, including quality control inspections and quality assurance for multifamily construction projects. Additionally, the inspection supervisor involved in Scenario 3 was interviewed. This approach ensured reliable data collection for subsequent analysis.

	Professionals surveyed per project evaluated	
Characteristic	Project manager	Site supervisor
Number of professionals interviewed	5	4
Average years of experience in the field of family project construction	10+ years	10+ years

Table 2: Respondent Professionals Count

This study compared traditional and digitized quality inspection processes through interviews and time data analysis from three projects, highlighting clear efficiency gains with iAuditor. The implementation involved configuring the platform for real-time data capture and training staff. The research followed four stages: analyzing the traditional process, identifying its limitations, designing a tailored digital workflow, and evaluating results. The findings demonstrate that digitization significantly improves quality control in construction.

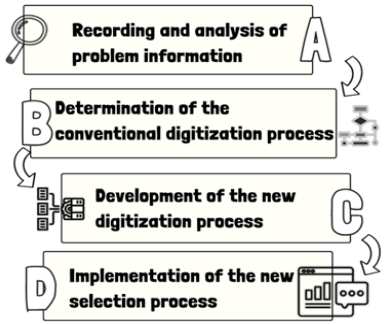

Fig. 1: Study Methodology

To assess the impact of the new process, comparative analyses of timeframes were conducted before and after digitization, and structured surveys were administered to staff to measure system acceptance and effectiveness. The results provide clear insight into the impact on time reduction and the efficiency of the quality inspection process.

3 RESULTS

3.1 Data Recording and Analysis

During the information recording and analysis phase, the traditional quality inspection and control methods used in multifamily housing construction projects were documented. This analysis established an initial baseline to assess the degree of digitization in these processes.

The reviewed data indicates that the use of digital tools for managing quality documentation in construction remains limited. Only 18.18% of projects utilize mobile devices and digital forms for field data recording, while 45.45% continue to rely on traditional pen-and-paper methods, and 9.09% follow alternative protocols that do not involve direct digitization. These figures highlight the dominance of manual practices, which contribute to a high reliance on manual transcriptions, an increased risk of human errors, and overall inefficiencies in data processing.

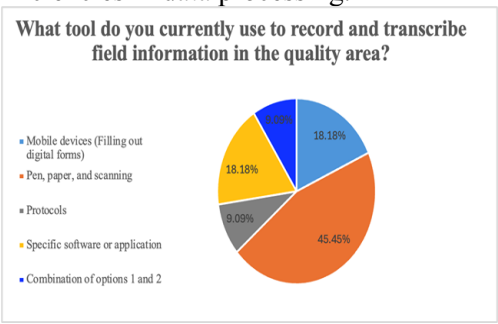

Fig. 2. Tools Employed in QA/QC Processes

Fig. 2 presents the tools currently used by surveyed professionals in their projects. The low digital tool adoption rates (shown in Fig. 2) contrast sharply with the results in Fig. 3, where over 90% of professionals report some degree of digitization in their quality assurance and control (QA/QC) processes.

This apparent contradiction stems from two key factors:

Field Implementation Gap: While digital methods may be incorporated into workflows, they often represent an additional step rather than a full replacement of manual processes.

Partial Digitization: Many projects maintain hybrid systems where digital tools coexist with traditional methods, particularly for:

- On-site inspections
- Immediate corrections
  Backup documentation

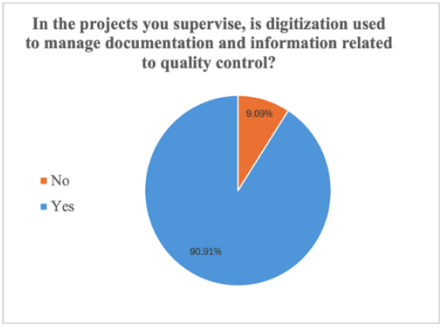

Fig. 3. Implementation Status of Digital Documentation Systems.

Based on this information, it is evident that digitizing construction records is perceived as an additional task that must be completed after each field inspection. This directly impacts the total time invested in quality control processes, as shown

in Fig. 4. The figure demonstrates that the transcription and digitization process add between 1 and 2 extra hours per day for most respondents (64%). Only 36% of respondents report this additional process takes less than one hour daily. This increase in time expenditure presents a significant challenge to operational efficiency and underscores the need for more fully integrated digital tools for quality assurance and control on construction sites.

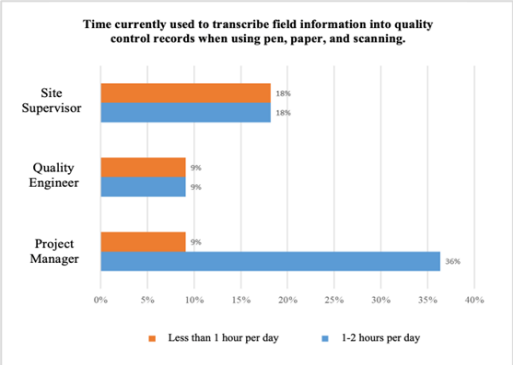

Fig. 4: Manual-to-Digital Processing Time.

The analyzed data underscores the importance of optimizing digital tool integration from the field inspection phase onward. This change could significantly reduce the time and effort dedicated to data transcription, thereby minimizing human error risks and improving quality control precision in multifamily housing projects.

3.2 Conventional Digitization Process Assessment

The quality inspection process involves several stakeholders, including the Resident Engineer, Technical Office Manager, Site Supervisor, and Quality Engineer. It follows a sequential workflow starting with activity schedule reviews, followed by field inspections, coordination for corrective actions, and report preparation. Final validations are made by senior staff. This traditional process relies heavily on manual steps and multiple reviews, making it time-consuming and resource intensive.

Fig. 5: Current QA/QC Digitization Workflow Diagram

Based on the described scheme, the average time required to digitize the documentation generated during each inspection is calculated, using document scanning as a measure of digitization. As shown in Fig. 6, this process can take between 1 and 2 additional hours during the workday. The collected data indicates that this extra time is a reality for 81% of the respondents, who must dedicate this time to scanning and digitally organizing the information after each inspection.

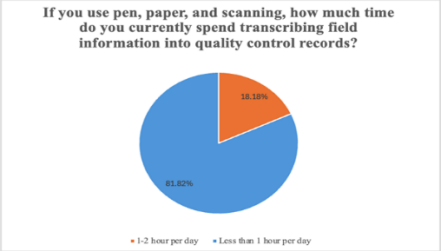

Fig. 6: Time Dedicated to Digitization

The incorporation of this additional step in the process represents a considerable challenge in terms of efficiency, as each inspection must go through a digitization process before being integrated into the quality management system. This reliance on post-inspection digitization also increases the risk of data transcription errors and delays the availability of information for subsequent levels of review and approval. In summary, although scanning contributes to the digitization of documentation, the additional time it requires highlights the need to adopt direct digitization methods that integrate records in real time and eliminate redundant processes, thus optimizing the workflow in the quality management of multifamily housing construction projects.

3.3 Development of the New Process

The new digitization process uses the SafetyCulture iAuditor platform to streamline quality inspections via mobile devices, eliminating manual transcriptions and enabling real-time data capture. It includes the use of customized digital forms, pre-inspection device checks, and cloud-based storage for instant access and collaboration. This approach improves inspection efficiency, reduces errors, and speeds up report delivery, enhancing overall quality management in construction projects.

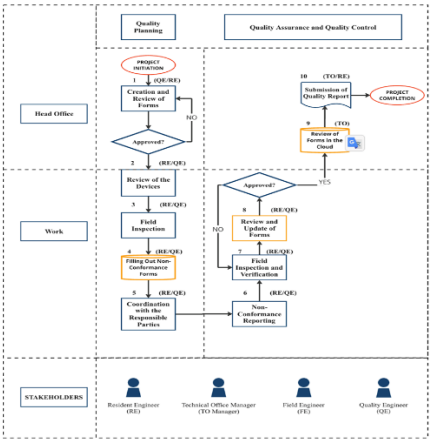

Fig. 7: Optimized Digitization Process for Construction Quality Management

3.4 Implementation of the Proposal

The proposal will be implemented in Project 3, as it has a weaker quality assurance and control system compared to the other two projects evaluated. For this implementation, the activities selected are the formwork removal after the pouring of columns, walls, and beams, since—according to the schedule and the verification conducted by the Resident Engineer—these tasks are of the highest priority and require more rigorous quality control. Below is the simulation within the digital platform SafetyCulture iAuditor, showcasing the inspection using digital forms.

3.4.1 Step 1. Account Creation and Role Assignment:

In this step, user accounts are created on the SafetyCulture iAuditor platform, and specific roles are assigned to each member of the inspection team. The roles determine the functions and permissions of each user, ensuring that everyone has access to the necessary tools to perform their tasks according to their responsibilities.

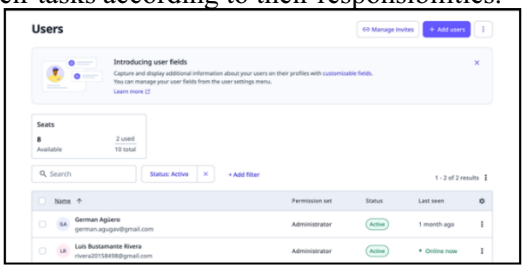

Fig. 8: Users Section of the Platform

3.4.2 Step 2. Creation of Forms:

The necessary digital forms are designed for each inspection start or activity, customizing them according to the specific requirements of the project. The forms must contain all the required fields to ensure proper data collection during the inspection.

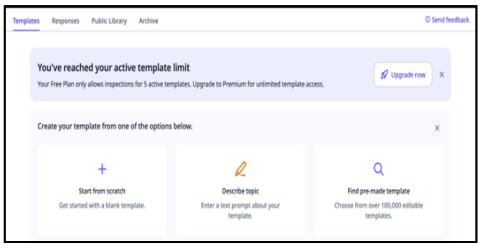

Fig. 9: Form Creation Section

3.4.3 Step 3. Review of the Checklist for Each Task in the Application:

Before starting the inspections, the checklists for each task are reviewed to ensure they are complete and accurate within the platform. This ensures that all critical aspects are evaluated and properly recorded during the inspections.

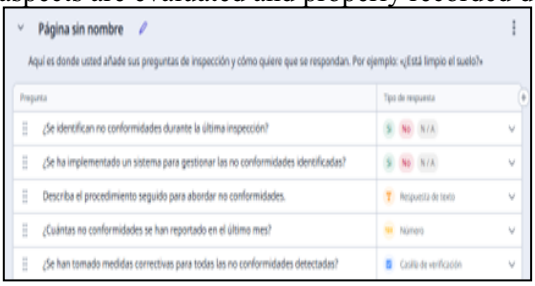

Fig 10: Checklist for Inspections.

3.4.4 Step 4. Start the Inspection Using the Digital Form:

The inspection is started in the field using the digital form loaded on the platform. Inspectors fill in the form fields in real time while reviewing the areas of the site, eliminating the need for paper records and improving the efficiency of the process.

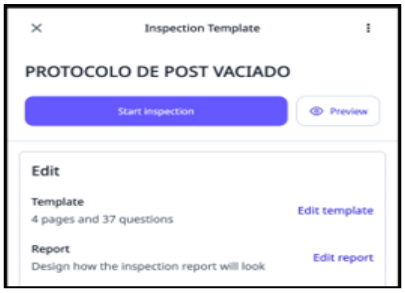

Fig. 11. Completed Template Ready for Inspection.

3.4.5 Step 5. Add Images and Digital Signature:

During the inspection, inspectors can add images of the inspected areas to visually document the state of the site. Upon completion, a digital signature is applied to validate recorded information and ensure its authenticity.

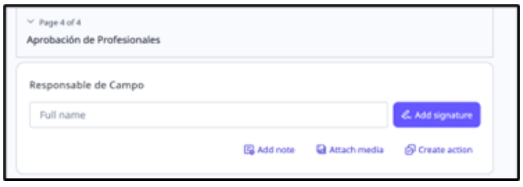

Fig. 12: Section to Attach Images and Request Stakeholder Signatures.

3.4.6 Step 6. Verification and reporting to stakeholders:

Once the inspection is complete, the relevant stakeholders (such as the Resident Engineer or the Head of the Technical Office) review the digital form to verify the entered data. After any necessary adjustments, the final report is electronically submitted, eliminating the manual transcription process and streamlining the distribution of information.

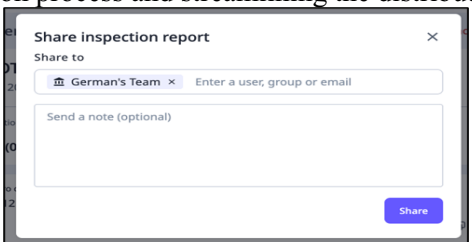

Fig. 13: Shared Form Access Functionality

4 ANALYSIS AND INTERPRETATION

The results reveal that quality control in multifamily housing projects still relies heavily on manual methods, with only 18.18% using digital tools and 45.45% depending on paper-based processes. Digitization is often treated as an extra task, adding 1–2 hours of work daily for 64% of respondents. This highlights the inefficiency and error risk of current methods.

The proposed solution, using SafetyCulture iAuditor, addresses these issues by enabling real-time data capture and centralized access, reducing manual transcription, errors, and delays. The redesigned process improves efficiency and documentation accuracy, with implementation prioritized in a high-need project.

5 VALIDATION

Following the implementation of the proposed technology in the project for the inspection of the post-concrete pouring task, a significant improvement in time reduction is evident, especially in activities such as printing protocols and digital transcription. In the traditional process, data transcription took approximately 60 minutes due to the manual capture of data recorded on paper. With the digitized process, this task is eliminated, as the protocols are completed in digital format from the start, avoiding information duplication and saving time significantly (See Fig. 14).

Fig. 14: Before-After Comparison of Inspection Digitization Times

A time comparison showed increased efficiency in quality control activities after digitization. The time to fill out protocols dropped from 10 to 8 minutes due to simplified procedures and mobile data entry. The project engineer now completes inspections and photo documentation simultaneously on one device, streamlining the workflow. Review and approval times by the resident engineer also improved, decreasing from 8 to 5 minutes, thanks to easier access, better organization of digital documents, and automated notifications.

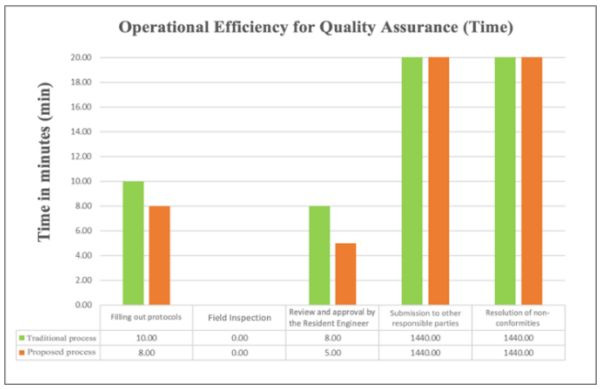

Fig. 15: Inspection Phase Digitization Time Reductions

On the other hand, Fig. 16 shows that, despite improvements in data entry and approval, some activities such as field inspection, sending information to other responsible parties, and resolving non-conformities do not show time variations. This is due to external factors, such as the availability of other responsible parties, coordination in the field, and the time

required to assess, and resolve detected non-conformities. These results highlight the opportunity to further optimize these stages through greater integration of collaborative tools and improvements in communication flow between teams.

Fig. 16: Before-After Analysis of Process Times.

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