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Development and Pilot Evaluation of DICT-EAAS: A Web-Based Employee Attendance and Accomplishment System for Document Workflow Automation

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ABSTRACT

This paper presents the development and pilot evaluation of the DICT Employee Attendance and Accomplishment System (DICT-EAAS), a web-based platform for improving attendance-related Daily Time Record (DTR) and accomplishment-document workflows. In the participating Department of Information and Communications Technology (DICT) Region 2 offices in Santiago, Cauayan, and Nueva Vizcaya, attendance is already captured through a biometric scanner that exports a PDF file. However, employees still prepare official DTRs, accomplishment reports, adjustment slips, and supporting files through separate applications. This fragmented workflow may cause delays, encoding errors, formatting problems, and makes submission tracking harder to manage. DICT-EAAS was developed to bring these tasks into one process through biometric attendance PDF upload, automated DTR generation in the required format, accomplishment report creation, adjustment slip preparation, PDF compilation, reviewer routing, and administrator monitoring. The main feature of the prototype is the DTR generator, which converts the biometric attendance PDF into the required employee DTR format. The system was developed using a layered web architecture with a React + Vite frontend, Laravel backend, Python-based document processing module, relational database, and file/template storage. A closed-ended pilot survey was completed by six DICT employee users: three from Cauayan, one from Santiago, and two from Nueva Vizcaya. These respondents used employee accounts to test the DTR-generation and related document-preparation workflow. During the employee-account try-out, the reviewer and administrator processes were explained to them, and the related dashboards were also demonstrated during the DICT office presentation. Using an adapted ISO/IEC 25010-based five-point survey instrument, the pilot obtained an overall mean of 4.78 (SD = 0.35) and Cronbach's alpha of 0.972. Functional suitability received the highest mean (4.94), followed by performance efficiency (4.83). The findings suggest that DICT-EAAS is useful for organizing attendance-related document handling, especially official-format DTR preparation, but larger role-based and longer-term validation is still needed.

Keywords: attendance system, biometric attendance, daily time record, document workflow automation

INTRODUCTION

In many offices, attendance capture is already digital, but the documents that follow are still prepared through separate files or applications. In the participating DICT offices, the biometric scanner produces a PDF attendance record, yet employees still have to transfer the entries into official Daily Time Record (DTR) forms and prepare accomplishment reports and adjustment slips in other files. This takes time, increases the chance of encoding and formatting errors, and makes file control more difficult. When deadlines are tight, the lack of one connected process also makes it harder for employees, reviewers, and administrators to track submission status and accountability.

Recent studies show that digital attendance and document management systems can improve monitoring, reduce manual work, and support more reliable record handling. In the Philippine setting, QR-based attendance systems have improved monitoring accuracy and reduced manual errors, while digital attendance and accomplishment

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

reporting platforms have shown the value of linked reporting processes [2, 4]. Other Philippine studies on document management also point to the benefits of shared repositories, routing visibility, and automated tracking in institutional work [1, 5, 8, 9]. These studies show the value of digital attendance and document systems, but many of them cover only one part of the workflow. Some focus on attendance monitoring, others on accomplishment reporting, and others on routing or tracking. In the DICT offices involved in this study, the work does not stop after attendance capture. The biometric scanner produces a PDF record, the DTR must still be prepared in the official format, related documents must be completed, and the full set must move through review. The gap, therefore, is not the absence of digital tools in general. It is the lack of one connected workflow that starts with the biometric attendance PDF and carries the process through DTR generation, accomplishment reporting, adjustment handling, file compilation, and review.

ISO/IEC 25010 continues to be widely used in software quality evaluation, including studies on automation and information systems [7, 11]. Recent work on digital transformation in higher education and public institutions also points to the importance of usability, quality assurance, maintainability, and security when new systems are introduced [3, 6, 10, 12, 13].

In response to this need, the study developed and pilot-tested the DICT Employee Attendance and Accomplishment System (DICT-EAAS). The system was designed to convert biometric attendance PDFs into standardized official-format DTRs, support accomplishment report generation, prepare adjustment slips, compile the required files, and route the document set for review and monitoring. Its main contribution lies in the post-attendance workflow: after the biometric device produces the attendance PDF, the system helps employees prepare the DTR and related documents in one connected process. Specifically, the study aimed to: (1) develop a web-based system for processing attendance and accomplishment documents; (2) describe its major modules, workflows, and design artifacts; and (3) gather initial pilot feedback on the developed system using selected ISO/IEC 25010 quality characteristics.

METHODOLOGY

This study used a developmental research approach for the design, development, and pilot testing of DICT-EAAS. System development followed the System Development Life Cycle (SDLC), particularly the stages of planning, analysis, design, implementation, and pilot evaluation. Requirements were identified through project meetings and stakeholder consultations with the participating DICT offices in Santiago, Cauayan, and Nueva Vizcaya. These consultations confirmed the main workflow problem: although attendance is captured through biometric devices, the exported PDF record still has to be manually transferred into official Daily Time Record (DTR) forms before accomplishment reports, adjustment slips, and the complete document set can be prepared. Other concerns raised during consultation included fragmented file handling, delayed submission, and limited visibility of review status.

During the analysis phase, the study team prepared an Entity-Relationship Diagram, use case diagrams, and activity or workflow diagrams to represent the system requirements and the interaction of the three main user roles: employee, reviewer, and administrator. The design phase translated these requirements into a modular web-based solution. The implemented modules included biometric attendance PDF upload, automated generation of employee-specific DTRs based on the required office format, accomplishment report creation, DTR adjustment slip generation, PDF compilation, submission to a reviewer, approval or return-for-revision actions, notifications, and administrative monitoring.

The prototype follows a layered web architecture. The React + Vite frontend provides the browser-based interface where employees, reviewers, and administrators log in, upload biometric attendance PDFs, prepare documents, submit files, and monitor workflow status. The Laravel backend serves as the main application and API layer. It handles authentication, role-based access, reviewer assignment by office, document routing, notifications, activity logs, and file requests. For document-processing tasks, Laravel calls a separate Python module. This module parses the uploaded biometric attendance PDF, extracts time entries, generates official-format DTRs and related report files from templates, and merges the outputs into submission-ready PDFs.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

Structured records are stored in the relational data layer, while uploaded and generated files are kept in the file and template layer.

For the closed-ended pilot survey, the study included six completed responses from DICT employees who used assigned employee accounts. Three respondents were from the Cauayan office, one was from the Santiago office, and two were from the Nueva Vizcaya office. The accounts they used focused mainly on the DTR generation and document-preparation process, which was the main workflow tested in the pilot. Since the number of respondents was small, the paper reports the office distribution only as a general summary. It does not include names, email addresses, detailed office-by-office comparisons, or individual response patterns.

Before answering the evaluation form, the respondents were first briefed about the purpose of the pilot and were guided in using the employee-side features of the system. They tried the main tasks, such as navigating the system, working with attendance-based records, generating the DTR, preparing related documents, checking the status of submissions, and completing the document-preparation flow. Although the reviewer and administrator accounts were not evaluated as separate survey groups, their roles were also explained to the six respondents so they could understand what happens after an employee submits documents. This included how documents are reviewed, approved, returned for revision, monitored, and managed. The reviewer and administrator dashboards were also shown during the DICT office presentation, where DICT Region 2 representatives and office personnel gave comments and suggestions for improvement.

The evaluation instrument was anchored on the ISO/IEC 25010 product quality model and was constructed by adapting relevant items from several prior ISO/IEC 25010-based software evaluation studies rather than adopting one questionnaire in full [7], [14], [15], [16]. The wording of the final items was adjusted to match the actual modules, workflow, and office use of DICT-EAAS. The instrument contained 29 closed-ended items grouped into a system-features category and selected ISO/IEC 25010 quality characteristics, namely functional suitability, performance efficiency, compatibility, reliability, security, and usability. A five-point rating scale was used, and mean scores were interpreted as follows: 4.21-5.00 = Very High, 3.41-4.20 = High, 2.61-3.40 = Moderate, 1.81-2.60 = Low, and 1.00-1.80 = Very Low. Open-ended items were also included to capture encountered problems, useful features, and suggestions for improvement.Closed-ended responses were summarized using mean and standard deviation, while Cronbach's alpha was computed to examine the internal consistency of the instrument. Item-level means and category-level summaries were prepared in a de-identified workbook. To protect privacy, the public/display version of the data excludes names, email addresses, timestamps, and row-level responses. Open-ended responses were reviewed and summarized descriptively. Participation was voluntary, and results were reported only in aggregate form.

System Design and Main Features

The database structure of DICT-EAAS places the users table at the center of the workflow and links it with office locations, positions, submitted documents, notifications, messages, shared PDFs, and activity logs. This design supports role-based access, office-level reviewer assignment, and document traceability from preparation to submission and review.

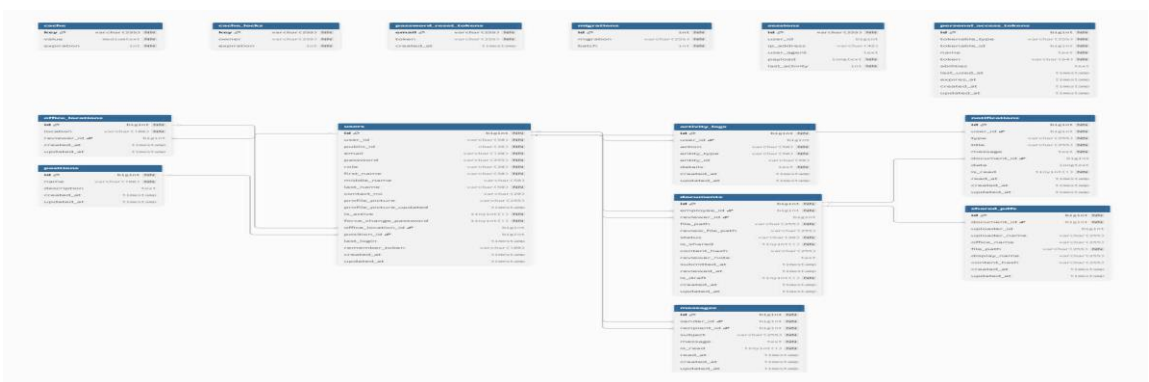


Figure 1. Entity-Relationship Diagram of the implemented DICT-EAAS database structure.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

The use case models show a clear division of responsibilities across the employee, reviewer, and administrator roles. Employees prepare and submit documents, reviewers inspect and decide on submissions, and administrators manage users and monitor overall system activity.

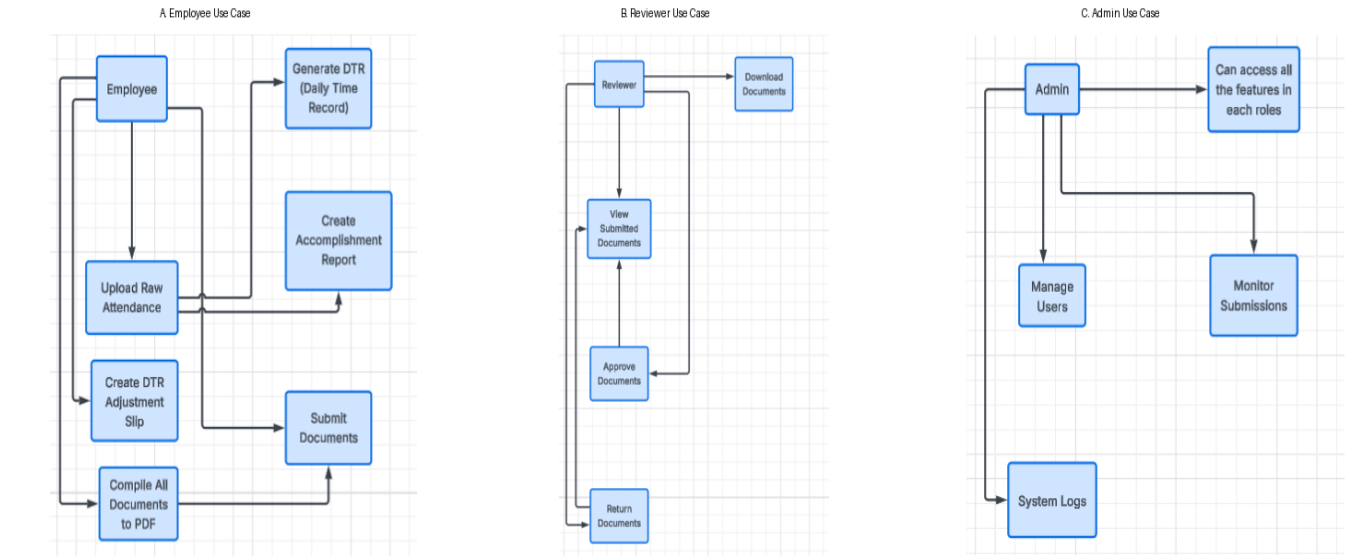


Figure 2. Selected use case views for employee, reviewer, and administrator roles.

The workflow model shows how DICT-EAAS turns the existing biometric-attendance-to-document process into a continuous digital process. Instead of manually re-encoding the PDF attendance export from the biometric scanner into office-specific DTR forms, an employee uploads the attendance PDF to the system, which extracts and converts the record into the required individual DTR. The employee can then generate the accomplishment report, prepare an adjustment slip when needed, compile the required files into a single PDF, and submit the package for evaluation. Reviewers can inspect, approve, sign, or return the document set for revision, while administrators can monitor submissions, statuses, and user actions.

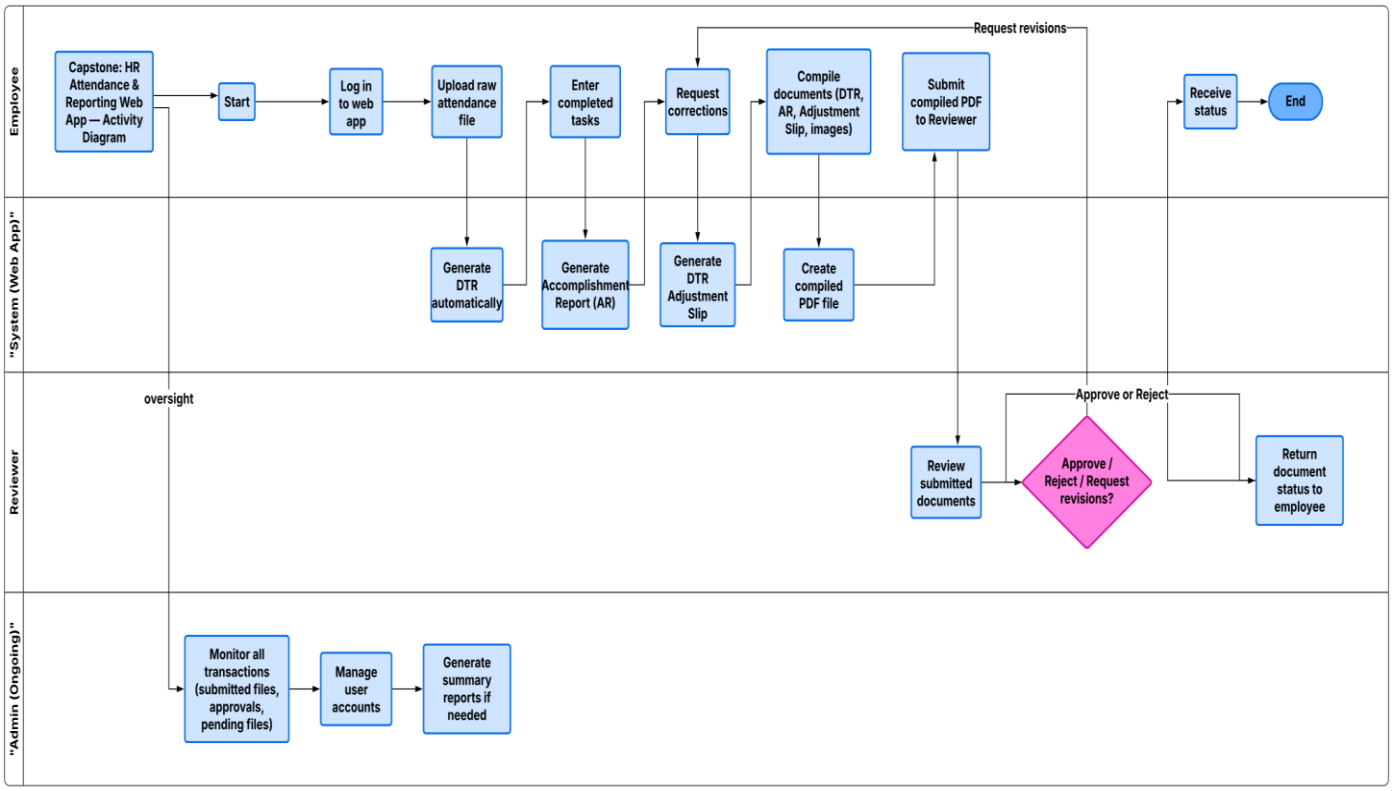


Figure 3. Activity diagram of attendance-derived document processing and approval workflow in DICT-EAAS.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

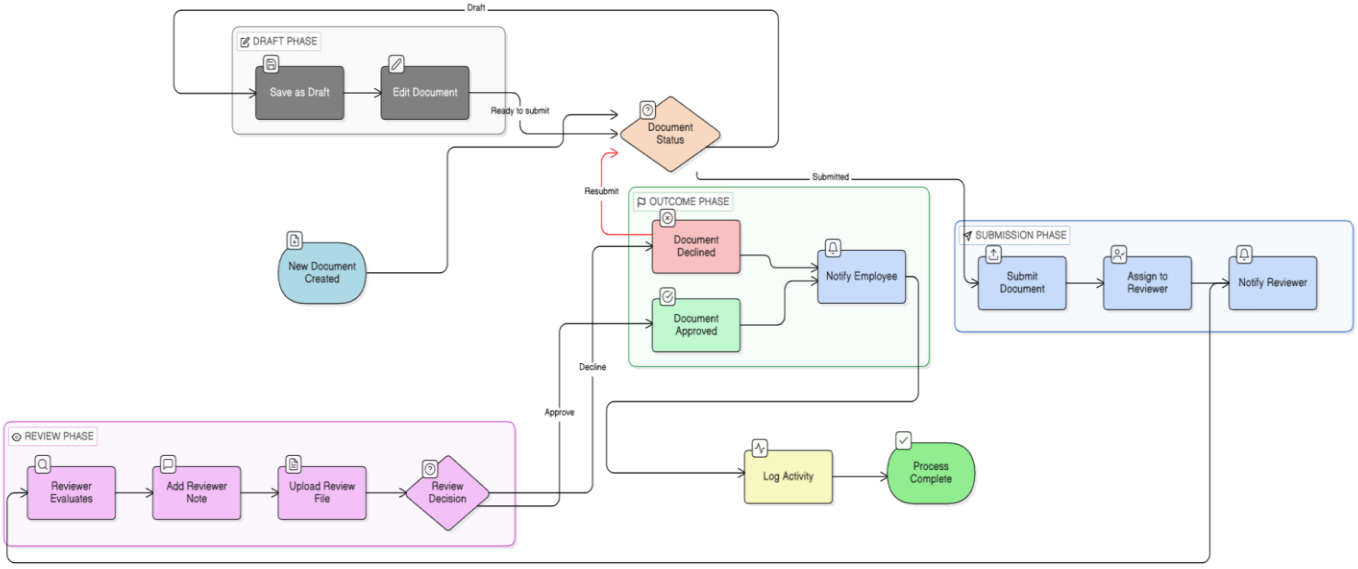


Figure 4. System flow showing draft, submission, review, and outcome handling in DICT-EAAS.

Prototype System Architecture

Figure 5 presents the prototype architecture through an icon-based view of the main system components and their interactions. On the left, employees and administrators access the system through the web interface and upload the biometric attendance PDF generated by the existing scanner. At the center, the React + Vite frontend sends requests to the Laravel backend, which manages authentication, role-based access, reviewer assignment by office, document routing, notifications, and audit logging.

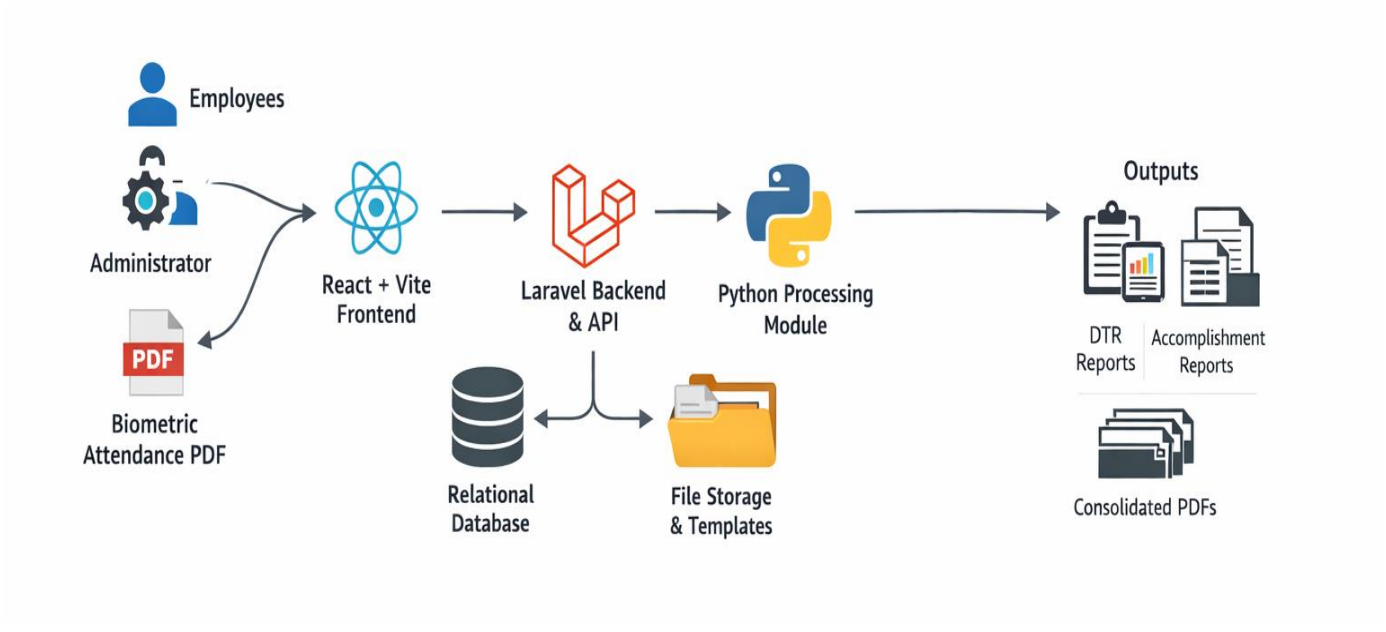


Figure 5. System architecture of the DICT-EAAS prototype.

As shown in the figure, Laravel serves as the coordinating application layer between the browser-based interface and the document-processing services. Whenever attendance conversion or report generation is requested, Laravel calls a separate Python module to parse the uploaded biometric PDF, extract time entries, prepare official-format DTRs and related report files from templates, and merge the outputs into submission-ready PDFs. Structured records such as users, office assignments, submissions, notifications, and activity logs are stored in the relational database, while uploaded files, generated documents, and reusable templates are kept in file storage. This setup keeps the presentation layer, workflow control, document processing, and storage functions clearly separated within the prototype.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

The main modules of the system are summarized in Table 1.

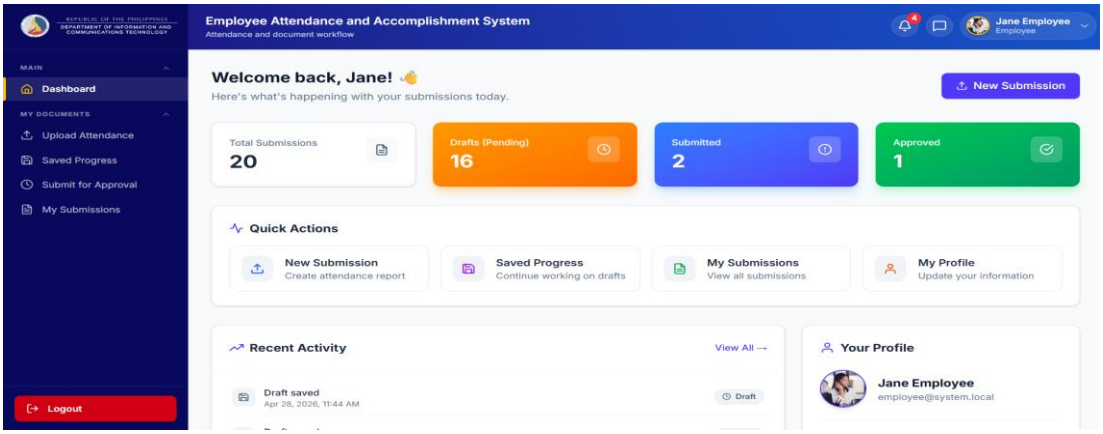
Module	Primary Function	Main User(s)	Output / Result
Biometric Attendance PDF Upload and DTR Generation	Uploads the attendance PDF exported from the biometric scanner and converts it into an employee-specific Daily Time Record using the official format.	Employee	Generated official-format DTR for review or download
Accomplishment Report Generator	Creates a standardized accomplishment report from user-supplied task details.	Employee	Formatted accomplishment report
DTR Adjustment Slip	Prepares correction requests for attendance discrepancies.	Employee	Adjustment slip document
PDF Compiler	Combines the generated DTR, accomplishment report, adjustment slip, and supporting attachments into a single submission-ready PDF.	Employee	Compiled PDF submission package
Submission and Review Workflow	Routes compiled documents to the assigned reviewer and records approval actions.	Employee, Reviewer	Approved, returned, or pending submission
Administrative Monitoring	Tracks user accounts, submission status, and system activities.	Administrator	Monitoring dashboard and audit visibility

Table 1. Core modules of DICT-EAAS and their functions.

To clarify the processing dependencies, the biometric attendance upload, DTR generation, and PDF compilation modules rely most directly on the Python document-processing module. Account control, reviewer assignment, routing, notifications, activity logs, and monitoring are mainly coordinated through Laravel and the relational database.

Interface Views

Figures 6 to 8 present selected interface screenshots captured from the implemented React frontend for the employee, administrator, and reviewer roles.



ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

Figure 6. Employee dashboard of DICT-EAAS.

The employee dashboard is the main working page for regular users in the web interface. It shows a summary of total submissions, drafts, submitted files, and approved documents. It also provides quick access to common actions such as creating a new submission, continuing saved work, checking submitted files, and updating profile information.

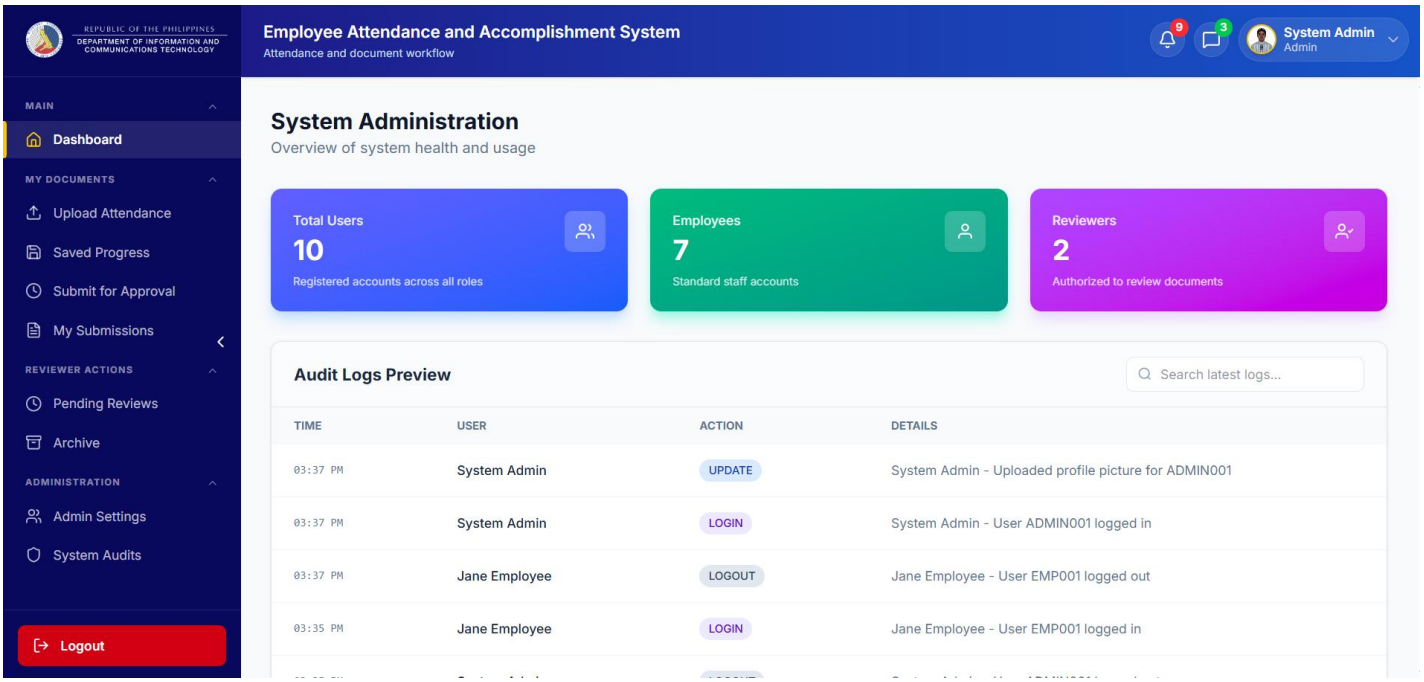


Figure 7. Administrator dashboard of DICT-EAAS.

The administrator dashboard supports platform monitoring and control. It summarizes the number of users by role and shows recent audit log entries. This view helps the administrator track activity, review access records, and oversee daily system operations.

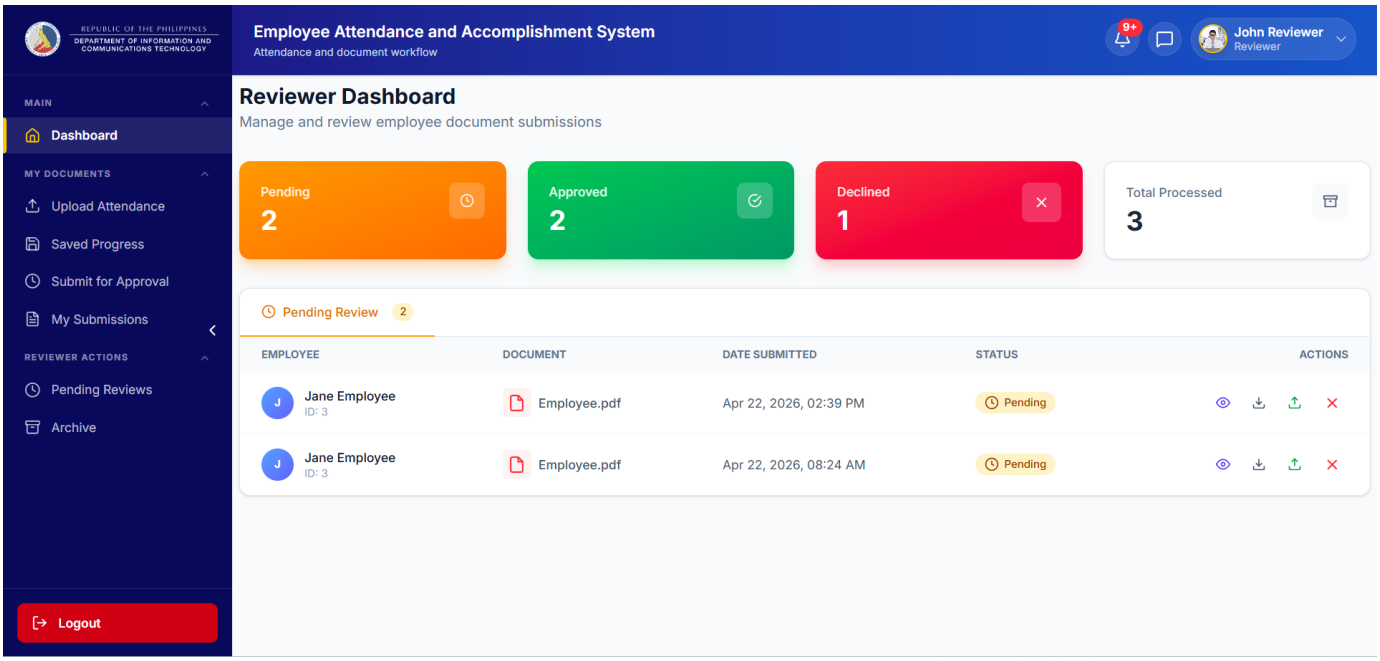


Figure 8. Reviewer dashboard of DICT-EAAS.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

The reviewer dashboard shows the pending, approved, declined, and total processed submissions for the assigned reviewer. It also displays the pending review list with actions for viewing, downloading, approving, uploading, or declining submitted documents. This view supports the review and decision stage of the document workflow.

RESULTS

Task Completion and Observed Issues

During the try-out, all six employee-account respondents completed the guided walkthrough and submitted usable evaluation forms. The walkthrough covered DTR generation and related document preparation. No major task failure was reported during the guided walkthrough, although no separate assistance log was prepared for each participant.

Since the try-out was guided, the study does not claim that the users completed the tasks without help. This is treated as a study limitation. One respondent mentioned minor areas for improvement, such as bullet formatting in the accomplishment report, the default DTR download type, and some layout details. These were treated as minor revisions, not serious errors. The item on raw attendance upload and DTR generation received a mean of 5.00, showing that the DTR generator was the most useful feature of the prototype.

During the employee-account try-out, the reviewer and administrator workflow was explained to the respondents so they could understand the full document process after submission. The reviewer and administrator dashboards were also shown during the presentation to the participating DICT offices. DICT Region 2 representatives and office personnel gave comments and suggestions for improvement. However, the survey ratings came only from the six employee-account respondents. For this reason, the results mainly reflect hands-on testing of the employee DTR workflow, while the ratings related to reviewer and administrator functions should be understood as feedback based on the explained and demonstrated workflow.

The survey was completed by six DICT employee users: three from Cauayan, one from Santiago, and two from Nueva Vizcaya. All categories received very high ratings. The overall mean was 4.78, with a standard deviation of 0.35 based on respondent-level mean scores. The pilot instrument also had a Cronbach's alpha of 0.972. Since only six employee-account respondents joined the evaluation, the findings should be read as early feedback on usability and practical fit, especially for DTR preparation, and not as proof of full deployment effectiveness.

Category	Items	Mean	SD	Interpretation
System Features	9	4.81	0.32	Very High
Functional Suitability	3	4.94	0.14	Very High
Performance Efficiency	3	4.83	0.41	Very High
Compatibility	2	4.58	0.66	Very High
Reliability	3	4.78	0.40	Very High
Security	5	4.67	0.52	Very High
Usability	4	4.79	0.51	Very High

Table 2. Pilot testing summary based on the survey workbook (n = 6).

Note. Category means were computed from the closed-ended item ratings under each dimension. Category SDs are based on respondent-level category mean scores.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

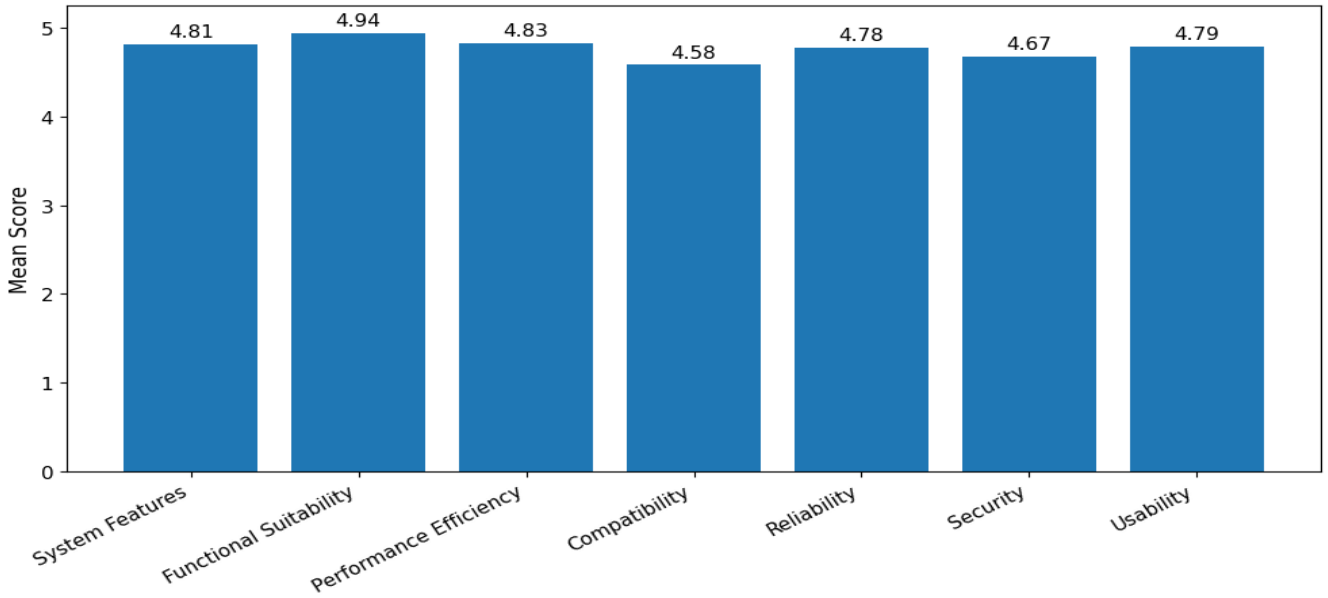


Figure 9. Mean pilot scores by quality category based on the employee-account survey (n = 6).

Among the rated dimensions, functional suitability obtained the highest category mean (4.94), suggesting that users found the system able to perform its intended tasks appropriately. Performance efficiency followed with a mean of 4.83, while system features received a mean of 4.81. Usability (4.79), reliability (4.78), and security (4.67) also received very high ratings. Compatibility obtained the lowest mean (4.58), but it remained within the very high range. At the item level, raw attendance upload and DTR generation received the highest possible mean (5.00), which further supports the DTR generator as the prototype's most useful feature during the employee-account pilot.

DISCUSSION

The pilot results suggest that DICT-EAAS fits the immediate document workflow needs observed in the participating DICT offices, especially the employee-side preparation of DTRs. Its practical value is not in attendance capture alone, since attendance data are already generated through the existing biometric device. The stronger value is in what happens after the biometric export: the system helps convert the attendance PDF into the official DTR format, prepares related documents, compiles files, and supports routing for review. In this sense, the DTR generator is the strongest feature of the prototype because it directly reduces the repetitive transfer of attendance entries into the required DTR form.

The quantitative findings show strong early user acceptance among the six employee-account respondents. Functional suitability received the highest category mean, which indicates that respondents found the system able to perform the tasks expected of it during pilot use. Performance efficiency, system features, usability, reliability, and security also received very high ratings. Compatibility obtained the lowest mean among the measured dimensions, but it still remained within the very high range. Taken together, these results provide initial support for the practical fit of the prototype in its intended office setting, while still requiring caution because the survey was small and role-specific ratings for reviewers and administrators were not separately collected.

The open-ended feedback generally supported the survey results. Most comments did not report major difficulty during the try-out. The few issues raised were practical and specific, such as bullet formatting in the accomplishment report, the default DTR download type, and minor user-interface polishing. In the positive comments, respondents pointed to the usefulness of automatic time-log extraction, DTR and accomplishment report generation, and the clarity of the interface. These comments show that the prototype was understandable and useful for the employee DTR workflow during the pilot.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

The findings are also in line with earlier work showing that attendance systems, records systems, and document-tracking platforms become more useful when they reduce repetitive manual handling and make workflows easier to follow [1, 5, 8, 13]. DICT-EAAS differs from QR-based attendance systems that focus mainly on capturing attendance [2] because it starts after the biometric attendance record has already been produced and then handles the official DTR and related document workflow. It also differs from systems centered mainly on attendance and accomplishment reporting [4] because it connects the DTR output with compilation, routing, and reviewer handling. This does not yet establish broad organizational impact, but it shows a clear and practical workflow-integration contribution.

Limitations

This paper should be read as a development and pilot validation study. The survey involved only six employee-account respondents from the participating offices: three from Cauayan, one from Santiago, and two from Nueva Vizcaya. Because of this small sample, the results provide only early user feedback and should not be generalized. The survey mainly reflects the employee DTR-generation and document-preparation workflow. The reviewer and administrator workflow was explained during the employee-account try-out and shown during the DICT office presentation, but these roles were not separately evaluated through hands-on testing by independent reviewer and administrator respondent groups. The evaluation also used mainly descriptive statistics and internal consistency results, which are suitable for an initial prototype check but not enough to prove wider organizational impact. Since the guided try-out was done with the developers present, some ratings may have been influenced by assistance or familiarity with the team. Future validation should include longer unsupervised use, independent evaluators, separate role-based respondents, a more balanced office distribution, and measures such as time saved, error reduction, and submission speed.

CONCLUSION

DICT-EAAS was developed as a practical response to a workflow in which biometric attendance data are already available, but the preparation of official DTRs and related documents remains separate and largely manual. By combining biometric attendance PDF upload, automated official-format DTR generation, accomplishment report preparation, adjustment slip creation, PDF compilation, reviewer routing, and administrative monitoring, the system addresses the main operational issues identified during planning and analysis. The strongest evidence from the current pilot is on the employee-side DTR preparation workflow, where the raw attendance upload and DTR generation item received the highest rating. Overall, the findings support the practical pilot value of DICT-EAAS for attendance-related document workflow automation in the participating DICT offices, while broader validation through larger, role-based, and longer-term use remains necessary.

Future Work

Future work should expand the evaluation to a larger group of employee, reviewer, and administrator users across the participating offices. A follow-up study may also deploy the system for a longer period of unsupervised use, then compare the results with the guided pilot. Practical measures such as average time to prepare a DTR, number of formatting corrections, submission turnaround time, and reviewer return rates should be collected. Technical improvements may include direct biometric scanner integration, stronger compatibility testing across browsers and devices, mobile-responsive views, and continued refinement of the accomplishment report and DTR download options.

Ethical Considerations

Administrative permission to conduct the study and pilot implementation was obtained from the participating DICT offices before the system try-out and data collection. The activity was conducted as a workplace-based pilot system evaluation under agency approval and coordination. Participation was voluntary, and the purpose of the study was explained before the activity.

The data are not shared publicly because they include sensitive internal workflow information, pilot evaluation records, and system-related materials from the participating offices. To protect the respondents, names, email

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue IV, April 2026

addresses, timestamps, individual response rows, job titles, and office-by-person details were not included in the manuscript. Results were reported only in aggregate form, including office distribution, category summaries, item-level findings, and de-identified feedback themes.

Conflict of Interest

The authors declare no conflict of interest related to this study.

Data Availability

The data supporting the findings of this study are not publicly shared in raw form because they include sensitive internal workflow materials, pilot evaluation records, and system-related documents used with agency permission during the development and initial validation of DICT-EAAS. A de-identified aggregate summary was prepared for reporting and possible review. This summary contains category results, item-level means, office distribution counts, and de-identified feedback themes, but does not include names, email addresses, timestamps, individual response rows, job titles, or office-by-person details. Additional supporting materials may be made available by the corresponding author upon reasonable academic request, subject to agency approval and applicable institutional restrictions.

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APPENDIX A

Pilot Evaluation Summary of DICT-EAAS

Because the pilot involved only a small number of respondents, this appendix presents only summarized item-level results. It does not include names, email addresses, timestamps, individual responses, job titles, office-specific personal details, or identifiable comments. The results are based on six employee-account respondents who completed the pilot evaluation survey. Mean scores were interpreted using the following scale: 4.21-5.00 = Very High, 3.41-4.20 = High, 2.61-3.40 = Moderate, 1.81-2.60 = Low, and 1.00-1.80 = Very Low.

Table A1. Summary of De-identified **DICT-EAAS pilot evaluation results (n = 6)**

Item Code	Category	Item Statement	n	Mean	SD	Interpretation
SF1	System Features	Raw Attendance Upload and DTR Generation works efficiently	6	5.00	0.00	Very High
SF2	System Features	Accomplishment Report generation is accurate	6	4.67	0.52	Very High
SF3	System Features	DTR Adjustment Slip is easy to use	6	4.83	0.41	Very High
SF4	System Features	PDF Compiler works properly	6	4.83	0.41	Very High
SF5	System Features	Shared Attendance PDF Repository is useful	6	4.83	0.41	Very High
SF6	System Features	Document Submission process is smooth	6	4.83	0.41	Very High
SF7	System Features	Reviewer/Admin approval process is efficient	6	4.83	0.41	Very High
SF8	System Features	Admin Monitoring is effective	6	4.83	0.41	Very High
SF9	System Features	Role-Based Access Control is properly implemented	6	4.67	0.52	Very High
FS1	Functional Suitability	System meets required functions	6	5.00	0.00	Very High
FS2	Functional Suitability	System performs accurately	6	4.83	0.41	Very High
FS3	Functional Suitability	System supports intended tasks	6	5.00	0.00	Very High
PE1	Performance Efficiency	System responds quickly	6	4.83	0.41	Very High
PE2	Performance Efficiency	System runs smoothly	6	4.83	0.41	Very High

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PE3	Performance Efficiency	System handles multiple users	6	4.83	0.41	Very High
C1	Compatibility	Works with other systems	6	4.67	0.52	Very High
C2	Compatibility	Allows smooth data sharing	6	4.50	0.84	Very High
R1	Reliability	Operates without errors	6	4.67	0.52	Very High
R2	Reliability	Available when needed	6	4.83	0.41	Very High
R3	Reliability	Recovers quickly from failures	6	4.83	0.41	Very High
S1	Security	Protects sensitive data	6	4.67	0.52	Very High
S2	Security	Prevents unauthorized changes	6	4.67	0.52	Very High
S3	Security	Verifies user identity	6	4.67	0.52	Very High
S4	Security	Tracks user actions	6	4.67	0.52	Very High
S5	Security	Protected against threats	6	4.67	0.52	Very High
U1	Usability	Easy to learn	6	4.83	0.41	Very High
U2	Usability	User-friendly interface	6	4.67	0.82	Very High
U3	Usability	Tasks are easy to complete	6	4.83	0.41	Very High
U4	Usability	Provides good user experience	6	4.83	0.41	Very High