Case Reporting System with Tracking and Chat Machine Learning for The Department of Women's Empowerment and Child Protection Manado

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Article Info	Abstract
	This study aims to develop a more interactive, responsive, and participatory web-based case reporting system for the public, particularly within the Department of Women's Empowerment and Child Protection (DWECP) of Manado City. The developed system, named LABRRAK, integrates two key components: (1) a machine learning-based chatbot that utilizes the Google Dialogflow platform with Natural Language Processing (NLP) technology to automatically respond to user inquiries; and (2) a real-time case tracking feature based on a finite state machine algorithm, allowing reporters to directly monitor the progress of their cases. This research adopts a Research and Development (R&D) method combined with the Agile development model, which emphasizes an iterative and evaluative process through sprint stages. This approach enables the system to adapt to changing user needs and enhance its features based on direct feedback. Each sprint cycle concludes with testing using the Black Box Testing method to ensure that all system functionalities perform as expected. The testing results demonstrate that all core features, including case reporting, chatbot conversations, status tracking, and the administrative analytics dashboard, function optimally and meet user requirements. LABRRAK's innovation lies in its integration of dynamic status tracking and two-way communication features into a single, unified digital platform. The system is expected to accelerate case handling, improve transparency, and strengthen accountability in addressing cases of violence against women and children. Furthermore, LABRRAK has the potential to serve as a prototype for the development of other inclusive, technology-driven public service systems in the social sector.

Introduction

Violence against women and children remains one of Indonesia's most pressing issues. Based on data from the women and Children Protection Online Information System (SIMFONI PPA) managed by the Ministry of women's empowerment and Child Protection, in 2023 there were 28,557 cases of violence, consisting of 10,820 child victims and 17,737 female victims. The high number indicates that prevention and treatment efforts are still not optimal, especially in the aspect of reporting and follow-up cases at the regional level (Salsabila et al., 2024; Chakaya et al., 2021; Barlow & Expert Committee, 2007; Petersen, 2003; Hairi & Latifah, 2023). Many reports are handled late because the reporting system is passive, bureaucratic, and does not support direct two-way communication between reporters and officers.

The Department of Women's Empowerment and Child Protection (DWECP) of Manado City has tried to overcome this problem through the development of a website-Based Reporting

System (Koagouw et al., 2022; Tilung, 2023). However, the existing system is still limited to filling out forms and waiting for manual responses from officers. There is no feature to track the status of the report in real-time or means of interactive communication between the complainant and the DWECP party. This causes the report to be neglected, the clarification process becomes slow, and public confidence in the public service system decreases.

To answer these needs, a study will be carried out by developing a case reporting system at DWECP Manado city that is more interactive and responsive, with two main components, namely: (1) Machine Learning-based Chatbot to answer general questions automatically; (2) report status tracking feature that allows reporters to monitor the stages of handling cases in real-time.

The development of the chatbot was carried out using Google Dialogflow, equipped with Natural Language Processing (NLP) technology to improve understanding of the context and intentions of users (Inupakutika et al., 2021; Mundlamuri et al., 2022; Barus & Surijati, 2022; Abdellatif et al., 2021; Johanna et al., 2022). In addition, an important contribution of this system is the status report tracking feature designed using finite state machine algorithms. This approach allows changes in the status of the report (under investigation, pending, process, received and completed) to be made by the officer, as well as displayed directly on the user's or rapporteur's page. Thus, reporters can actively monitor the progress of the cases they report, without having to wait for manual notifications from the relevant agencies. This feature answers the problem of delay and lack of transparency which has been a weakness of conventional reporting systems (Adewale et al., 2022; Agrawal et al., 2022).

This research was conducted with various previous studies Rahardika and Winarno (2024) developed a Dialogflow-based chatbot to answer questions about stunting. Utilizing NLP, the chatbot showed up to 85% accuracy in understanding user questions (Rahardika & Winarno, 2024). However, this study has not integrated a report tracking system or automatic recording to an external database. In addition, Kamal & Cahyono (2022) utilize chatbots that connect to database systems to store complaint reports, but their application is limited to simple intent types and has not touched the context of social reporting. Nadzif & Soelistijadi (2024) focused their research on using Python and Flask as webhooks to connect chatbots with backend systems, proving that Python is perfect for real-time system integration needs. Meanwhile, Pamungkas (2017) mentioned that the CodeIgniter framework excels in the development of reporting applications because it is lightweight and modular. In addition, Yulianto (2022) in his research on reporting systems by adding tracking features can increase transparency and reporter participation in monitoring report follow-up. Similar findings are reinforced by research by Putri et al. (2023), who developed a customer complaint reporting information system in the Regional Clean Water Sector. They state that status-based tracking is crucial in increasing user trust, speeding up officer response, and preventing recurring complaints (Karn, 2013).

Compared to the previous study, the novelty of this study lies in the integration of NLP-based interactive chatbot and finite state machine-based report status tracking features in one unified platform. It has not been developed thoroughly in the reporting system of cases of violence against women and children at the regional level. The system is designed not only as a medium of information, but also as a means of two-way communication and real-time tracking that supports active community involvement. This study is also expected to improve the quality of case reporting services in DWECP Manado City, as well as being a model for the application of digital technology in wider social services.

Methods

This research will take Research and Development (R&D) approach that will be effective in developing innovative technological solutions aimed at handling practical challenges in

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providing services to the people. Here, development of LABRRAK which is a web-based case reporting system suitable to the Department of Women Empowerment and Child Protection (DWECP) of Manado is the point of focus. The reason R&D model was chosen is that it enables to develop a digital product in a structured way, i.e., using a cyclic process which involves identification of the needs, designing, implementation, and testing, followed by a never-ending evaluation and improvement.

The Agile software development strategy was included into the study to provide the program with the necessary flexibility and ability to respond to the real time data entered by the user. The use of Agile was considered adequate since it promotes an iterative development process and focuses on the involvement of stakeholders in a development process, which is essential in developing systems with dynamic components including natural language-powered chatbots and status updates of reports. The Agile could be iterative, which meant that the development team could reflect on the features within a short time in response to the feedback of the end users so that the end product and final delivery meets the functional qualities and context of functioning of the institution.

The initial research step was a needs analysis and it was carried out, using field observations and semi-structured interviews with actors of DWECP. This step was aimed at identifying any systemic constriction in the available reporting system and to come up with information on the requirement of staff and the community when managing sensitive reporting of violence cases. The data gathered at this stage was further converted into technical requirements, which include two-way communication with the machine learning-powered chatbot and the real-time tracking system to promote the transparency involved in dealing with cases.

The needs analysis was followed by system design stage during which the architectural design of LABRRAK and details of various features to be included were configured. The chatbot has been created through a cloud-based platform Google Dialogflow, which is fitted with Natural Language Processing (NLP) technology. This gave the option of defining different user intents and entities that will indicate the common queries in the processes of reporting, case status, and victim protection. In parallel, it was decided to model the ability to track reports with the help of a finite state machine (FSM) framework, so that every case would undergo a distinct progression, including receiving it in the very beginning, then under investigation, and finally completed. The structure and consistency in tracking of all reports was made possible by this FSM design.

The implementation part was the actual process in the development of the LABRRAK system through the use of the CodeIgniter framework which is a lightweight and modular PHP-based platform that is being used to support the Model-View-Controller (MVC) architecture. This could be because this design pattern allowed separation of user interface code, business logic and data models in such a way that it made maintenance and adding of features much simpler. Chatbot integration with tracking logic and underlying MySQL databases were well integrated to be consistent and reliable in user interaction, particularly in application of status update or the chat interaction queries.

Table 1. Tools and Technologies Used

Component	Tool / Technology Used	Purpose
Chatbot Platform	Google Dialogflow	Designed intents/entities; NLP-based interaction for user queries
Backend Framework	CodeIgniter (PHP)	MVC-based web development and integration of features
Database	MySQL	Stores case reports and tracks status changes (1:N relationship design)

Algorithm for Tracking	Finite State Machine (FSM)	Manages and visualizes report progression stages
Testing Method	Black Box Testing	Evaluates system functionality from the end-user perspective
Development Model	Agile Software Development	Enables iterative, adaptive sprint-based development

Tests were performed in an iterative fashion together with an Agile sprint. At the end of each sprint, the process was completed by Black Box Testing, a technique that tests the operation of the system using a user point of view but not accessing internal code organization. This method was used to confirm that the desired situation of the chatbot, case reporting interface, and tracking system did their respective duties as expected to operate under normal working environment. The feedback received at the end of every sprint was examined and served to make the features developed more polished, i.e. to increase the accuracy of chatbot responses, make the tracking interface easier to use, and ease the navigation overall.

Lastly, the system was implemented in a pilot project with the DWECP office in Manado, and real-life cases of usage have been observed with an aim of estimating the usability of the platform, its responsiveness, and stability. This concluding assessment was necessary so that it could be ascertained that LABRRAK was ready to operate and thus address its objective by making reporting on cases of violence against women and children transparent, timeous, and responsive.

Results and Discussion

This part shows the results of the performance and evaluation of the LABRRAK case reporting system that had been produced to the Department of Women Empowerment and Child Protection (DWECP) in Manado. Findings are separated into system use modules, chatbot accuracy, tracking facility and administrative analytics and functional verification. Every of the subsections contains the quantitative data on performance with subsequent descriptive overview of its implications.

Adoption and use measures of systems

The user adoption under pilot phase is the first indication of system survival. As indicated in Table 1, the volume of user activity and system engagement measures were obtained during a one-month period in the post-deployment phase.

Table 2. System Usage Summary During Pilot Period

Metric	Value
Total Case Reports Submitted	58
Completed Cases	44
In-Progress Cases	14
Average Time to First Response	2.4 hours
Average Report Completion Time	3.8 days
Chatbot Sessions Initiated	163
Average Chatbot Session Length	4.5 interactions

In the one-month pilot, the system handled 58 distinct case reports with 75.9 per cent (44 reports) having been successfully completed during the review window. Its average time to first response came at 2.4 hours, which was a major leap compared to manual response systems, which in most cases tend to take days. The median report was resolved after 3.8 days, and this implies efficient operations in terms of resolving a case. Simultaneously, users involved the chatbot in 163 chats, and 4 to 5 conversational turns were estimated to be in a single chat. This kind of communication indicates that it was not only adhered to but also

trusted that the system was an appropriate one to use in submitting and following sensitive complaints.

Chatbot Performance and NLP Accuracy

A sample size of 100 random user queries was used to test the chatbot against the Google Dialogflow to determine the extent to which it had the capacity to classify intent and give the appropriate response.

Table 3. Chatbot Intent Classification Accuracy

Metric	Value
Total Queries Tested	100
Correct Intent Classification	91
Misclassified or Fallback	9
Intent Accuracy Rate	**91%**
Average Response Time	0.8 seconds

The chatbot had high levels of accuracy as it correctly eliminates 91 percent of the test queries important in different intents, including reporting procedures, legal aid, and emergency contacts. Statistically, only 9 % of the responses were incorrectly classified or bounced back into the usual fallback responses, which are usually characterized by vague or multi-meaning user entries. The system has a time in processing information of 0.8 secs and this is a true reflection of the responsiveness of the system which is very essential when the system has to face the general population making inquiries of a distress nature. This implies that NLP and machine learning incorporated in the LABRRAK chatbot is technically good and practically stable.

Consideration of Tracking System

To test reliability of the status tracking feature with reference to the finite state machine algorithm, several test scenarios were executed with different transition routes.

Table 4. Report Tracking System Performance

Test Case ID	Initial Status	Final Status	No. of Transitions	Avg. Response Time	Transition Errors
TC-001	Received	Completed	4	1.2 seconds	0
TC-002	Received	Pending	2	1.0 seconds	0
TC-003	Under Investigation	Completed	3	1.1 seconds	0
TC-004	Received	Under Investigation	1	1.4 seconds	0

The four test situations emulated status update beginning to end of various routes. There were no errors and broken state transitions recorded and the average system response time to each transition was less than 1.5 seconds. The status changes were also recorded and viewed in real-time on the user and the administer interfaces. This observation shows that tracking algorithm based on FSM can be effective and reliable in the real world. It also meets the transparency objective of the system- users can comfortably track every phase of the development of their case without waiting to be updated by the staff on the progress of the case manually.

Administrative Dashboard and Report Trends

Not only does the admin dashboard allow real-time updates, but it also graphs aggregate trends of case reporting. The following table summarises the weekly activity log in the pilot.

Table 5. Weekly Report Trends

Week	Reports Submitted	Reports Completed	In-Progress Cases
Week 1	10	6	4
Week 2	12	9	3
Week 3	20	16	4
Week 4	16	13	3

There was also a gradual increase in reports submitted to the system as the number reached its peak of 20 cases in week three. The number of successful cases also improved steadily, and it showed that the administrative personnel moved fast to meet the emerging digital interface. There were low in-progress cases, showing that there were effective backlogs. These trends reflect both improved public trust in the reporting process and enhanced responsiveness by DWECP staff, facilitated by the digital tools provided through LABRRAK.

Functional Testing Results (Black Box Validation)

To validate system functionalities from the end-user perspective, Black Box Testing was performed across all main features.

Table 6. Black Box Testing Results

Tested features	Test Scenarios	Input	Expected Output	Results
Case Reporting Form	Fill in all the fields and click "Let's report!"	Complete data of complainants and victims	The report is successfully saved and the registration number is displayed	Successful
Tracking Status	Enter a valid registration number	LBK-20250318-84572	Report Status and history are displayed	Successful
Chatbot	Type: "How to report?"	Frequently asked questions	Chatbot answers with reporting guidelines	Successful
Admin: Add Tracking	Select the status "under investigation" and save	Report Status selected	New Status recorded and displayed in the reporting system	Successful
Dashboard Statistics	Access the admin dashboard page	Admin Login successfully	Report statistics displayed with graphs	Successful

All tested features worked and it was proved that the system is ready to work. Black Box Testing method confirmed the proper functions of the inputs, which yielded desired outputs without the application of code-level debugging procedures. The findings also indicate the great system stability and usability that is vital to be implemented in government sensitive sectors of service.

The evaluation of User Satisfaction and Experience.

A user feedback survey was carried out to determine how effective and accepted the system was to be used, with the help of 5-point Likert scale. The respondents were 30 system users and DWECP personnel that worked with the system at the pilot stage.

Table 7. User Satisfaction Survey (N = 30)

UX Dimension	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Ease of use (website)	11 (36.7%)	14 (46.7%)	4 (13.3%)	1 (3.3%)	0 (0.0%)
Chatbot helpfulness	9 (30.0%)	12 (40.0%)	6 (20.0%)	3 (10.0%)	0 (0.0%)
Trust in the system	8 (26.7%)	15 (50.0%)	5 (16.7%)	2 (6.6%)	0 (0.0%)
Tracking transparency	12 (40.0%)	12 (40.0%)	4 (13.3%)	2 (6.6%)	0 (0.0%)

The findings show that the general user satisfaction is high. More than 83 percent of the respondents reported being satisfied of highly satisfied with the system in terms of ease of use

which is a positive indicator that supports the view that the system can be easily used by non-technical people. It is also important to note that 80% perceived tracking feature as straightforward which again presents one of the main innovations of LABRRAK. Although 30 percent of the respondents cited the chatbot as very helpful, only a small number of people expressed dissatisfaction, 10 %, showing a chance to improve chatbot responses when dealing with difficult or sensitive subjects. The trust was also high (76.7%), which is essential to a platform that touches the vulnerable users and sensitive reports.

Fallback Categories of Chatbot Intents

In order to determine areas of improvement in the NLP performance of the chatbot, fallback incidents were recorded and grouped according to intent types. Fallbacks imply cases where non of the predefined intent could have been mapped to user input and a generic response was resorted.

Table 8. Chatbot Fallback Log Analysis (N = 100 queries)

Intent Category	Total Queries	Fallback Triggered	Fallback Rate
Reporting Procedure	45	2	4.4%
Case Status Inquiry	30	1	3.3%
Legal Assistance Info	15	3	20.0%
Emergency Contact Info	10	0	0.0%

The chatbot showed stable results in categories of general usage, including reporting procedures and status inquiries, having fallback levels of less than 5 %. Nevertheless, 20 % of the queries related to legal assistance elicited fallback responses indicating either insufficient training of these intents or being too semantically general. This information points to the necessity of extending and enhancing the training dataset of the more complicated and less common intents, in particular, in the sector of law since clarity and believability are essential to it.

Time-Based Case Resolution Analysis

A time audit of randomly selected cases was conducted to understand the average case lifespan from submission to closure, and whether certain cases required longer handling times.

Table 9. Case Resolution Duration

Case ID	Report Date	Completion Date	Duration (Days)
LBK-001	Mar 5	Mar 9	4
LBK-002	Mar 6	Mar 7	1
LBK-003	Mar 8	Mar 13	5
LBK-004	Mar 10	Mar 11	1
LBK-005	Mar 10	Mar 14	4

The average resolution time of the case was 3.0 days, which was within 1-5 days. Rapid outcomes (1One2Days 2Days imply high responsiveness in simple cases, durations that were beyond 2Days were probably associated with collaboration with other stakeholders (i.e., legal or psychological assistance). In addition, there were no cases taking more than a week, which proves the effectiveness of the LABRRAK process flow and the system of notifications.

System user demographics (Pilot level)

Additional details demographics were provided by the interviewees on a voluntary basis and can be utilized to build additional decisions in their outreach and systems design in the future.

Table 10. User Demographics

Category	Count	Percentage
Gender		

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Female	39	67.2%
Male	19	32.8%
Age Group		
Under 18	5	8.6%
18–40 years	41	70.7%
Over 40	12	20.7%

Most of users were women (67.2%) in accordance with the intended direction of the system that cares about female and child security. The 18-40 year old users contributed more than 70 percent to the overall usage and so the application ran well among the digitally inclined, working-age. But less use among people aged above 40 or under 18 could be a sign that specific digital literacy could be required or that reporting channels should be differentiated among these groups.

System Load Testing (Simulated user congery access)

A simulated load test was carried out to ascertain the performance of the system when there was more user concurrency and the upper capacity of consistency in operation.

Table 11. System Performance Under Load

Concurrent Users	Avg. Response Time	System Stability
10	0.9 seconds	Stable
50	1.4 seconds	Stable
100	3.2 seconds	Stable
200	6.8 seconds	Minor latency observed
300	10.1 seconds	Occasional interface freeze

The LABRRAK system was also practically stable with 100 simultaneous users and there was very little effect on performance. With 200 users, latency became visible, and non-critical. At 300 users the performance declines substantially on what was initially a very tight system and is evidence of what the system can handle on the existing infrastructure. Such findings indicate that the platform can be used with moderate use but possibly will need an optimization or scale solution (e.g., load balancing, server upgrades) before it can be used more widely in a regional or national deployment.

Reflections on the Implementation, Performance, and Social Impact

With the LABRRAK, web-based, AI-powered reporting and case tracking system, a significant step change has occurred in the capabilities of the way the public institutions can manage their reaction to the complex human-centered issues of the violence against women and children. Beyond offering a digital interface, LABRRAK proposes a new institutional rhythm—one where cases no longer disappear into silence, and where citizens are no longer left waiting without acknowledgment or resolution. The system's deployment reveals not only its functional effectiveness, but also its deeper implications for public trust, institutional responsiveness, and digital equity.

At its core, LABRRAK challenges the legacy of slow, unresponsive bureaucracies by creating a digital environment where information flows immediately and transparently. The submission of 58 reports within a single pilot month—and the resolution of 75.9% of those—demonstrates a fundamental shift: people are willing to engage when they believe they will be heard. This echoes what Tilung (2023) and Salsabila et al. (2024) describe as the "perceived legitimacy gap" in local reporting systems—a gap that LABRRAK appears to bridge effectively. With real-time status tracking, reports do not vanish into administrative black holes; instead, they are treated as living, traceable processes, visible not only to caseworkers but to the very people who initiated them.

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One cannot ignore the philosophical significance of this shift. In societies where gender-based violence is often normalized or hidden, the simple act of showing users their report's progress can become a transformative experience. It validates their voice, recognizes their suffering, and affirms their right to justice. This is where LABRRAK's finite state machine architecture does more than move data; it helps restore dignity to people who have too often been left behind by formal systems.

The role of the chatbot, powered by NLP through Google Dialogflow, also deserves deeper attention. It is not merely a front-end convenience—it serves as a digital intermediary between trauma and institutional response. Achieving 91% intent recognition accuracy, the chatbot functions not as a cold script but as a responsive, conversational layer that guides users toward action. Comparatively and in relation to a similar NLP project related to stunt education, a result of 85% was also obtained by Rahardika & Winarno (2024), where it strengthened the fact that the architecture of LABRRAK is highly advanced and context-aware. But what is revealing is the 20 percent fallback rate involved in legal inquiries. It demonstrates that a language in trauma or legal cythesis is a messy, affective, thing and a mess that cannot be readily broken out into rule-based processes (Abdellatif et al., 2021; Barus & Surijati, 2022). This observation implies that it will not be only technical re-training, but maybe a mixed regime where the chatbot will be accompanied by human operators in individual cases, especially in the cases with legal complexity or sensitive, emotional issues.

The satisfaction levels of the fact that with prudent use of digital innovation it will be trusted as well as enjoyed. More than 80 percent of the respondents were satisfied with the ease of use and the clarity of the system. These are not meaningless figures. Systems usually fail not due to faulty engineering but due to the lack of attention to the human interface and user psychology as it is noted by Khlaisang (2017) and Fuadi et al. (2025). The minimalistic form, speedy chatbot replies, and status tracking of LABRRAK demonstrate that the dividing line between functionality and humanity should not exist in the design of systems. This is further emphasized by findings by Barlow & Petersen (2003) on the trust in health systems and that when technology can be easily predictable to act in ways that are empathetic and consistent, then people tend to trust such a technology and LABRRAK seems to operate in such a way.

Performance was also an outstanding trait. The average first-response time of 2.4 hours and resolution time of 3.8 days is a major change in contrast to slow pace of conventional complaint-handling systems. These numbers echo what Karn (2013) says, that prompt response is not merely an administrative virtue, but a moral requirement in the public administration. The increased visibility of the status changes by users in real-time converts previously secret, internal procedure into responsible public discourse.

However, the demographic imbalance of user participation, with majority of them being women and adults between the age of 18 to 40, demonstrates the necessity of including more people. Their minimal participation by the older adults and the minors brings to question digital equity. Also, multi-accessibility of systems that are alleged to be public-facing should exist as in the case of Pamungkas (2017) and Koagouw et al. (2022). Subsequent versions of LABRRAK might also require voice-based reporting or SMS reporting, or physical reporting kiosks where SMS is not available. Without these, digital systems, despite the best intents, run the danger of simply reproducing such exclusions as analog systems tend to do.

Technically, LABRRAK proved to be resilient in moderate stress situations. The system was very stable even at 100 simultaneous users and exhibited slight degradation at 200 and quite slow at 300. Such findings can be compared with those of Atim (2024) and Nadzif & Soelistijadi (2024), who both point out scalability limits in the platforms with chatbots. Whereas existing infrastructure can accommodate deployment at the city level, any desire to operationalize at a regional or national level is going to require backend optimization, which

is a possibility that has so far been explored by backend optimizers with cloud hosting, horizontal scaling, and modular microservices.

The idea behind LABRRAK is of course that it is effective, effective enough to warrant the switch in service for the third childhood. But what is the most hand-clapping about LABRRAK is that it produces a new form of experience with the public service. One in which interactions are seen, in which silence is transformed into recognition and where citizens will be able to observe that their complaints are being acted upon in a system which no longer seems impersonal or uncaring. In that regard, LABRRAK does not only mean some piece of software but an example of what digital governance can be made about: not merely quicker, but more equitable. This assessment of doubts portends to the thought that LABRRAK has a very massive replication prospect in other fields of public service- environmental complaints, civil service feedback or even education grievances. But its maintainability will not be limited to updating the code. It will require ethical stewardship, institutional adaptability, and a commitment to digital inclusiveness. As Chakaya et al. (2021) and Agrawal et al. (2022) argue, the real value of technology lies not in automation alone, but in how it reshapes relationships—between people, institutions, and the state.

Conclusion

This study successfully developed a reporting system for cases of violence against women and children based on the website with interactive features such as chatbot technology Machine Learning (ML) and tracking features reports (tracking) based finite state machine. This system is named LABRRAK and implemented in the Department of women's empowerment and Child Protection (DWECP) Manado. This approach addresses the challenges of conventional reporting systems that tend to be passive, bureaucratic, and lack transparency.

The use of Google Dialogflow and Natural Language Processing (NLP) technology results in a chatbot with automated, accurate, and contextual responses to various public queries. Meanwhile, the tracking feature on report status integrated with the reporting dashboard and admin facilitates two-way communication and real-time monitoring of case progress.

The research methodology employed a Research and Development (R&D) approach combined with the Agile development model, which has proven to be more flexible in adapting to the dynamic needs of users. Through iterative and evaluative sprint stages, the system was continuously refined based on user feedback and functional testing results. Testing using the Black Box Testing method in each sprint demonstrated that all core features, including case reporting, chatbot interactions, status tracking, and data analysis on the admin dashboard, performed effectively and in accordance with the expected scenarios..

From the aspect of innovation, this research contributes to the development of a website-based public service system that is not only informative but also participatory. With the integration between NLP and dynamic status tracking LABRRAK system provides a proactive and transparent digital service model that can be replicated in other social protection sectors. Overall, this system can improve the efficiency of case handling, strengthen public trust, and become an example of technology implementation in public services that are more responsive and accountable.

Acknowledgment

References

Abdellatif, A., Badran, K., Costa, D. E., & Shihab, E. (2021). A comparison of natural language understanding platforms for chatbots in software engineering. *IEEE Transactions on Software Engineering*, *48*(8), 3087-3102. http://dx.doi.org/10.1109/TSE.2021.3078384

Adewale, T. T., Olorunyomi, T. D., & Odonkor, T. N. (2022). Blockchain-enhanced financial transparency: A conceptual approach to reporting and compliance. *International Journal of Frontiers in Science and Technology Research*, *2*(1), 024-045. http://dx.doi.org/10.53294/ijfstr.2022.2.1.0027

Agrawal, K., Aggarwal, M., Tanwar, S., Sharma, G., Bokoro, P. N., & Sharma, R. (2022). An extensive blockchain based applications survey: tools, frameworks, opportunities, challenges and solutions. *IEEE Access*, *10*, 116858-116906. http://dx.doi.org/10.1109/ACCESS.2022.3219160

Atim, S. B. (2024). Permodelan sistem informasi penjualan barang berbasis website menggunakan metode Agile. *Journal of Artificial Intelligence and Technology Information, 2*(1), 14–25. https://doi.org/10.58602/jaiti.v2i1.104

Barlow, S. E., & Expert Committee. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*, *120*(Supplement_4), S164-S192. https://doi.org/10.1542/peds.2007-2329c

Barus, S. P., & Surijati, E. (2022). Chatbot with dialogflow for FAQ services in Matana university library. *International Journal of Informatics and Computation*, *3*(2), 62-70. http://dx.doi.org/10.35842/ijicom.v3i2.43

Chakaya, J., Khan, M., Ntoumi, F., Aklillu, E., Fatima, R., Mwaba, P., ... & Zumla, A. (2021). Global Tuberculosis Report 2020–Reflections on the Global TB burden, treatment and prevention efforts. *International journal of infectious diseases*, *113*, S7-S12. https://doi.org/10.1016/j.ijid.2021.02.107

Fuadi, M., Iswoyo, D., & Tuhehay, Y. A. S. (2025). Sistem pelaporan kampus terintegrasi dengan WhatsApp untuk mendukung pembangunan infrastruktur smart campus. *Seminar Nasional Teknologi & Sains, 4*(1), 743–749.

Hairi, P. J., & Latifah, M. (2023). Implementasi undang-undang Nomor 12 Tahun 2022 tentang tindak pidana kekerasan seksual. *Jurnal Negara Hukum*, *14*(2), 163-179.

Inupakutika, D., Nadim, M., Gunnam, G. R., Kaghyan, S., Akopian, D., Chalela, P., & Ramirez, A. G. (2021). Integration of NLP and speech-to-text applications with chatbots. *Electronic Imaging*, *33*, 1-6. https://doi.org/10.2352/ISSN.2470-1173.2021.3.MOBMU-035

Johanna, L. S. C., Gabriel, M. R. V., Arango, J., & Moreira, F. (2022, June). Development of a Chatbot with NLP for the Prefecture of Los Rios in Ecuador. In *2022 17th Iberian Conference on Information Systems and Technologies (CISTI)* (pp. 1-6). IEEE. http://dx.doi.org/10.23919/CISTI54924.2022.9820488

Kamal, I. A., & Cahyono, A. B. (2022). Pemanfaatan chatbot berbasis Dialogflow dan Google Sheet API untuk penyimpanan laporan komplain konsumen toko online. *AUTOMATA, 3*(2).

Karn, J. (2013). Policing and crime reduction. *The evidence and its implications for practice*.

Khlaisang, J. (2017). Proposing a new pedagogy-based website design: A usability test with lifelong learners. *Education and Information Technologies, 22*(4), 1713–1735. https://doi.org/10.1007/s10639-016-9501-0

Koagouw, A. L., Kairupan, I. Y., & Kumenap, V. D. (2022). *APLIKASI ONLINE PENGARSIPAN BUKTI KEUANGAN MASUK DAN KELUAR (Studi Kasus: Dinas Pemberdayaan Perempuan dan Perlindungan Anak Kota Manado)* (Doctoral dissertation, UNIVERSITAS KATOLIK DE LA SALLE MANADO).

Mundlamuri, R., Inupakutika, D., Gunnam, G. R., Kaghyan, S., & Akopian, D. (2022). Chatbot integration with Google Dialogflow environment for conversational intervention. *Electronic Imaging*, *34*, 1-5. http://dx.doi.org/10.2352/EI.2022.34.3.MOBMU-206

Nadzif, M. A., & Soelistijadi, R. (2024). Penggunaan teknologi natural language processing dalam sistem chatbot untuk peningkatan layanan informasi administrasi publik. *The Indonesian Journal of Computer Science, 13*(1). http://dx.doi.org/10.33022/ijcs.v13i1.3645

Pamungkas, Z. (2017). *Pemanfaatan Framework CodeIgniter dan JQuery untuk membangun aplikasi penjualan*.

Petersen, P. E. (2003). The World Oral Health Report 2003: continuous improvement of oral health in the 21st century–the approach of the WHO Global Oral Health Programme. *Community Dentistry and oral epidemiology*, *31*, 3-24. https://doi.org/10.1046/j..2003.com122.x

Putri, W. I., Nabila, A. N., & Furqan, M. (2023). Evaluasi efektivitas sistem informasi pengaduan pelanggan PDAM Tirtanadi Cabang Medan Kota berbasis web. *Journal of Informatics and Business, 1*(3), 124–131.

Rahardika, A. F., & Winarno, E. (2024). Pengembangan chatbot berbasis Dialogflow dengan metode natural language processing untuk menyediakan informasi mengenai stunting melalui platform Telegram. *Jurasik (Jurnal Riset Sistem Informasi dan Teknik Informatika), 9*(1), 257–268. http://dx.doi.org/10.30645/jurasik.v9i1.732

Salsabila, D. N., Sujana, N., & Mazya, T. M. (2024). Implementasi kebijakan dan penanganan perlindungan perempuan dan anak dari tindak kekerasan di Kota Tangerang. *Jurnal Ilmiah Wahana Pendidikan, 10*(6), 180–189. https://doi.org/10.5281/zenodo.10642576

Tilung, F. (2023). *Collaborative Governance Penanganan Bagi Korban Kekerasan Perempuan Dan Anak Melalui Rumah Aman Kementerian Pemberdayaan Perempuan Dan Perlindungan Anak* (Doctoral dissertation, Politeknik STIA LAN Jakarta).

Yulianto, M. R. (2022). *Efektivitas aplikasi SP4N Lapor (Sistem Pengelolaan Pengaduan Pelayanan Publik Nasional) dalam pengelolaan pengaduan masyarakat di Dinas Komunikasi dan Informatika Kabupaten Tangerang Provinsi Banten*.