Business Process Reengineering of Child Case Reporting and Approval Integrated With Weighted Triage

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Abstract: *This study aims to analyze and redesign the child case reporting and approval process at the Social Service Office of Batu City, which is still dominated by manual procedures. The Business Process Reengineering (BPR) approach is modeled using Business Process Model and Notation (BPMN) to identify process bottlenecks and formulate information technology–based solutions. Data were collected through field observations during an internship program, review of standard operating procedures, and short interviews with officers, then validated through the development of a web-based prototype consisting of a reporting portal and an internal dashboard. The redesigned process includes the implementation of digital ticketing and queue status, early validation and duplicate checking, requests for data correction, weighted triage (P1–P3), as well as electronic approval and automatic issuance of assignment letters. Evaluation results show an increase in throughput efficiency from 56.41% and 40.74% to 86.96% and 89.29%, along with a reduction in process time from 78 to 23 minutes and from 108 to 28 minutes. This redesign accelerates service delivery, organizes queues, and improves traceability without changing existing SOP provisions.*

Keywords: *Business Process Reengineering, BPMN, risk scoring, weighted triage, throughput efficiency*

1. Introduction

The transformation of public services encourages the reorganization of processes to achieve faster, more transparent, and measurable performance. Business Process Reengineering (BPR) using Business Process Model and Notation (BPMN) has been widely applied to reduce non-value-added activities, standardize workflows, and improve process and throughput efficiency across various organizational contexts [1], [2], [3], [4], [5]. In the national context, studies on BPR and BPMN report consistent efficiency improvements in library services, manufacturing processes, and internal corporate services [6], [7], [8]. Recent findings in local government institutions also indicate that process reengineering is able to eliminate non-value-added activities and significantly increase service efficiency [9]. In Indonesia, the implementation of BPR in public services has been reported to improve workflows and service performance in a measurable manner [10]. These findings provide a methodological foundation for restructuring social service processes in local government.

This study focuses on the child case reporting and approval process at the Social Service Office of Batu City, which is delivered through the Public Service Mall. Confirmation with staff and a review of the applicable Standard Operating Procedures indicate that the service involves sequential activities such as complaint reception, document verification, initial assessment, and inter-unit coordination, with an official completion target of seven calendar days. However, the current process has not yet reached optimal performance, as reflected in manual queue handling, repeated waiting stages during verification and registration, and limited service status visibility for

reporters. Previous studies on public complaint management emphasize the importance of standardized records and feedback mechanisms [11], while evidence from healthcare services shows that centralized service pathways and clear queue scheduling can reduce waiting time and improve process throughput [12].

In child protection services, early decision-making must consider risk levels to ensure that high-priority cases receive faster and more measurable responses. Studies on screening tools and risk assessment highlight challenges related to validity, reliability, and governance in child service contexts [13], [14], [15]. At the same time, the integration of BPMN with data-centric approaches and case management supports cross-unit decision tracking and consistent process control in public and healthcare sectors [16], [17], [18]. Literature on pediatric triage further demonstrates that digital or algorithmic triage models provide more objective and consistent prioritization, as shown in comparisons between Smart Triage and ETAT models [19], while qualitative studies in emergency departments emphasize the role of triage in managing high-risk case flows and optimizing resource utilization [20]. In addition, research on business process modeling and process governance indicates that internal prioritization mechanisms and process standardization can improve coordination and accountability without altering formally defined service stages or output timelines [4], [21], [22], [23], [24]. Based on this framework, the present study proposes weighted triage using risk scoring (P1, P2, P3) as an internal target for initial handling time at the complaint reception stage, while maintaining the official output deadline defined in the applicable Standard Operating Procedures.

The objectives of this study are to: (i) map and analyze the AS-IS process based on SOP validation to identify process bottlenecks; (ii) design a TO-BE process using a BPR and BPMN approach supported by a reporting portal and an internal dashboard without modifying SOP stages; and (iii) evaluate the impact of the proposed improvements using indicators of lead time, waiting time, document completeness, and throughput efficiency. The contributions of this article include a standardized AS-IS process model aligned with SOPs, a TO-BE design compatible with existing regulations, and quantitative evidence to support phased adoption within the Public Service Mall environment of the Social Service Office.

2. Methods

This study implements the Business Process Reengineering method, as illustrated in Figure 1.
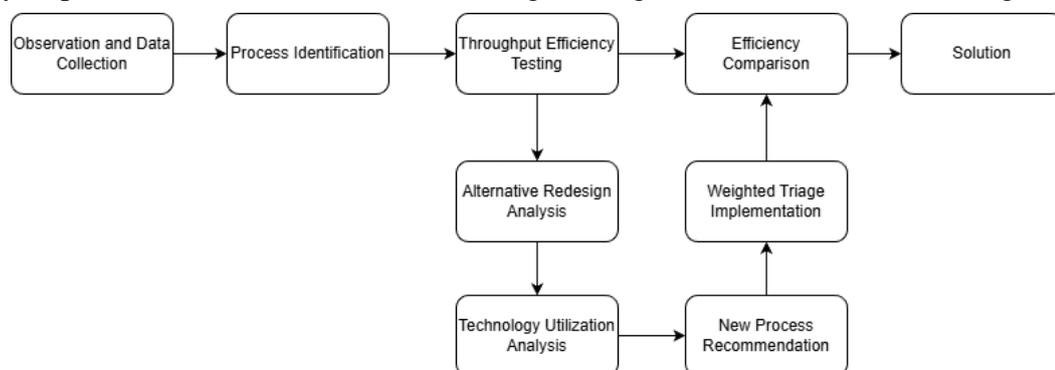

Figure 1. Business Process Reengineering (BPR) Method Flow

A. Observation and Data Collection
The study begins with direct field observations conducted during an internship at the Social Service Office of Batu City from 14 July to 12 September 2025 by following service workflows at the Public Service Mall. The observation focused on the child case reporting service and was conducted on three representative cases: a child case without identity documents, a child with disabilities, and a child in conflict with the law. Data were complemented by semi-structured

interviews with Social Service staff and a review of applicable Standard Operating Procedures (SOPs) to confirm activity sequences, actors, documents, and delay points such as queues, document returns, and inter-unit transfers. Activity durations were recorded through direct observation and validated through staff confirmation and alignment with documented procedures. All observed case data were handled confidentially using consent-based processing and anonymization for process analysis purposes only.

B. Process Identification
Observation and interview results are mapped into an AS-IS BPMN model based on validated Standard Operating Procedures. A single pool labeled "Social Service Office of Batu City" is used with three lanes: Reporter, Lobby Staff, and Service Counter Officer. The model captures activity sequences, queue points, document completion loops, and inter-unit delays. An AS-IS process table containing process steps, durations, and responsible actors is prepared as the basis for time measurement and problem identification.

C. Throughput Efficiency Testing
Throughput efficiency testing is conducted after completing the AS-IS process table to evaluate service effectiveness and efficiency. Throughput represents the total duration of one service cycle, while throughput efficiency compares non-delay processing time with total system time. This measurement serves as quantitative input for process redesign and is calculated using the following formula:

$$\text{Throughput Efficiency} = (\text{Non-Delay Processing Time}) / (\text{Total Time in the System}) \times 100\%$$

This analysis identifies stages with excessive time consumption, particularly those related to queues, document completion loops, and inter-unit transfers.

D. Alternative Redesign Analysis
This stage focuses on identifying improvement options based on the findings from throughput efficiency analysis. The main principles include eliminating non-value-added activities, shifting validation to earlier stages, reducing transfers to other units during document handovers, and standardizing decision-making. The results are presented in an AS-IS to TO-BE comparison table, with clear indications of elimination, automation, or simplification for each process step to ensure a more efficient, integrated, and accurate workflow.

E. New Process Recommendation
The TO-BE recommendations focus on eliminating non-value-added steps, automating repetitive activities, and applying information technology to improve workflow efficiency from report submission to verification, disposition, and approval. Weighted triage (P1–P3) is introduced as an internal target for initial handling time at the report reception stage to support case prioritization, while the official output deadline of seven calendar days remains unchanged. The outcome of this stage is a redesigned process model for comparison with the AS-IS condition.

F. Weighted Triage Implementation
Weighted triage is applied as an internal prioritization mechanism at the report reception stage to order complaint tickets based on urgency without modifying formal service stages or output deadlines. Each case is scored using four risk aspects: case type, emergency indicators, child age, and time since the incident, and mapped into three priority levels: P1 (very urgent), P2 (urgent), and P3 (normal). These priority levels serve as internal targets for early handling during verification and digital approval, improving consistency and reducing subjective bias under high queue conditions [19], [20]. From a process engineering perspective, triage functions as a queue management mechanism to reduce waiting time and maintain traceability through system log

records [10]. On the reporter side, only ticket numbers and process status are displayed, while priority labels are restricted to the internal dashboard.

Table 1. Weighted Triage Rubric

Aspect	Criteria	Weight
Case Type	Sexual violence	+40
	Severe physical violence	+30
	Child in conflict with the law	+25
	Child without identity	+15
Emergency Indicators	Life or safety at risk	+30
	Perpetrator living in the same household	+20
	Immediate need for shelter	+15
Age	< 5 years	+15
	5–12 years	+10
	13–17 years	+5
Time Since Incident	$\leqslant$ 24 hours	+15
	2–7 days	+8
	> 7 days	+0

The scoring formula is defined as the sum of scores from the selected aspects, expressed as: Total Score = (Case Type) + (Σ Emergency Indicators) + (Age) + (Time Since Incident).

Table 2. Score Mapping to Priority Levels and Initial Handling Time Targets

Priority	Score Threshold	Target Time
P1 (very urgent)	$\geqslant 70$	Triage $\leq$ 60 working minutes, e-approval $\leq$ 30 minutes
P2 (urgent)	40–69	Triage $\leq$ 1 working day
P3 (normal)	< 40	Triage $\leq$ 2 working days

G. Efficiency Comparison

The AS-IS and TO-BE processes are compared quantitatively using the throughput efficiency metrics defined in subsection C. The evaluation focuses on total lead time, waiting time, initial document completeness, and process cycle efficiency to assess performance improvements after redesign.

H. Solution

This study produces a web-based system prototype that implements the TO-BE design. The system supports complaint submission, automatic ticket generation, completeness validation, risk scoring, digital verification, and approval, serving as proof of implementation feasibility and a tool for monitoring process performance.

3. Results and Discussion

A. Observation and Data Collection

Observations were conducted during an internship at the Social Service Office of Batu City, focusing on child case services at the Public Service Mall and related internal activities. The observation covered three representative child case scenarios and followed the reporting process up to internal decision-making. Data were obtained through direct observation, supported by a review of the Standard Operating Procedures for Child, Elderly, Disability, and Homeless Services, as well as short interviews with officers. This stage identified activity sequences, actors, documents, queue points, and observed process durations, which formed the basis for AS-IS process mapping.

B. Process Identification

Based on the results of observations and interviews, the child case reporting process at the Social Service Office of Batu City experiences efficiency constraints due to manual activities and waiting queues. To analyze this process, the business workflow is visualized using Business Process Model and Notation (BPMN), as shown in Figure 2.
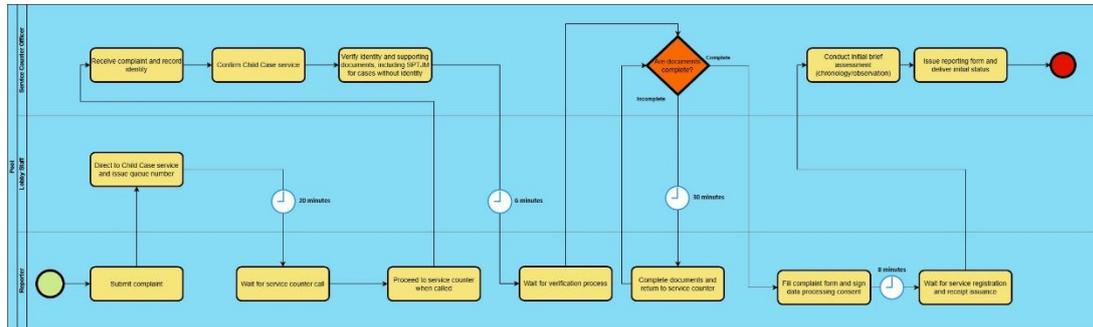

Figure 2. BPMN of Child Case Reporting Process (AS-IS)

C. Throughput Efficiency Testing

Table 3. AS-IS Process Based on SOP Validation

No	Process Flow	Time(minutes)	Actor	Category
1	Reporter comes to the Public Service Mall to submit a child case complaint	3	Reporter	VA
2	Lobby staff directs the reporter to the Child Case service and issues a queue number	2	Lobby Staff	NVA
3	Reporter waits according to the queue number	20	Reporter	NVA
4	Reporter is called to the service counter	1	Reporter	NVA
5	Service counter officer receives the complaint and confirms the Child Case service	7	Service Counter Officer	VA
6	Service counter officer verifies identity and supporting documents	8	Service Counter Officer	VA
7	Reporter waits for the verification process	6	Reporter	NVA
8	Service counter officer explains requirements and the SPTJM option for cases without identity	4	Service Counter Officer	VA
9	Service counter officer determines document completeness status (complete/incomplete)	0	Service Counter Officer	VA
10	Reporter completes missing documents and returns to the service counter	30	Reporter	NVA
11	Reporter fills in the complaint form and signs data processing consent	8	Reporter	VA
12	Reporter waits for service registration recording and issuance of the reporting form or receipt	8	Reporter	NVA
13	Service counter officer conducts an initial brief assessment (chronology/observation)	6	Service Counter Officer	VA
14	Service counter officer issues the reporting form (with registration number) and delivers the initial status	5	Service Counter Officer	VA

After the process mapping is completed, throughput is calculated based on the duration of each service stage. The total time consists of active processing time and waiting time. Active processing time refers to the execution duration of each step, while total time includes the entire duration of the process flow, including queues and delays.

Table 4. Total Time and Active Time

Process Stage	Total Time (minutes)	Active Time(minutes)
Complaint service process with complete documents	78 minutes	44 minutes
Complaint service process with incomplete documents	108 minutes	44 minutes

Based on the data in Table 4, throughput efficiency for the service process is calculated using the following formula.

$$Throughput\ Efficiency = 44/78 \times 100\% = 56.41\%$$

The first calculation represents the scenario in which the reporter has completed all required documents.

$$Throughput\ Efficiency = 44/108 \times 100\% = 40.74\%$$

The second calculation represents the scenario in which the reporter has not completed the required documents.

Based on the above calculations, the throughput efficiency at the child case reporting stage is 56.41% for the scenario with complete documents and 40.74% for the scenario with incomplete documents. These values indicate that a substantial proportion of the total service time is still consumed by delay activities, mainly originating from service counter queues (approximately 20 minutes), waiting for the verification process (approximately 6 minutes), delays during registration input and agenda number issuance (approximately 8 minutes), and document completion activities (approximately 30 minutes, conditional). This condition indicates that the process is not yet optimal and therefore requires business process reengineering to reduce waiting time. Proposed improvements include the implementation of digital ticketing and queue status, automated document completeness validation with digital information correction requests, automatic agenda number issuance, and weighted triage (P1/P2/P3) to establish service priorities without changing the SOP-defined output deadlines.

D. Alternative Redesign Analysis
The redesign analysis was conducted to improve the child case complaint service workflow at the Social Service Office of Batu City. This stage focuses on simplifying steps, eliminating non-value-added activities that do not increase service productivity, and automating repetitive tasks based on the findings from the previous throughput test. Activities are eliminated when they do not contribute to faster case handling or better data accuracy. Automation is applied to previously manual parts to reduce stage duration, decrease queues, and prevent repeated document returns.

Table 5. Process Improvement (AS-IS to TO-BE)

No	Process Flow	Recommended Process	Elimination / Automation Notes
1	Reporter comes to the Public Service Mall to submit a child case complaint	Reporter submits through the reporting website	Automation: add reporting website as an official channel
2	Lobby staff directs to Child Case service and provides a queue number	Ticket number and service order are generated automatically by the system	Automation: queue/ticket number. Elimination: manual numbering and repeated verbal directions
3	Reporter waits for the call based on the queue number	Website displays queue order and estimated time	Elimination: waiting without information
4	Reporter is called to the service counter	System proceeds automatically based on ticket number	Elimination: verbal/manual calling
5	Officer receives complaint and confirms Child Case service	Website data goes directly to the dashboard; officer performs a quick check and confirmation (no re-entry)	Elimination: manual/verbal intake
6	Officer verifies identity and supporting documents	Website form validates completeness (required fields/format) and performs basic duplicate checks (ID/name/date of birth) before ticket issuance	Automation: initial checks by system. Semi-automation: officer performs final confirmation. Elimination: simple returns due to minor missing/invalid data
7	Reporter waits for verification	Verification is processed in parallel on the dashboard; reporter receives a digital notification when completed	Automation: status notifications. Elimination: passive waiting at the counter
8	Officer explains requirements and SPTJM option for cases without identity	Requirements are shown in the form; SPTJM is generated digitally when needed (electronic signature)	Automation: requirements display and digital SPTJM. Elimination: repeated face-to-face explanations and paper filling
9	Officer decides document completeness	System provides an initial "Complete/Incomplete" decision from validation; officer confirms	Automation: initial completeness decision. Elimination: subjective decision-only approach
10	Reporter completes documents and returns to the counter	Reporter completes corrections via the website (re-upload/edit fields)	Elimination: physical back-and-forth to complete documents
11	Reporter fills complaint form and signs data processing consent	Auto-fill from account data and digital signature	Automation: digital form and consent. Elimination: paper form
12	Reporter waits for service registration recording and printing of reporting form/receipt	Registration/agenda number is generated automatically and a digital receipt is delivered	Automation: registration and receipt. Elimination: manual copying and repeated printing
13	Officer conducts brief initial assessment (chronology/observation)	Standard assessment template in dashboard plus chronology upload	Automation: standardized format. Elimination: non-uniform long narratives
14	Officer issues reporting form and delivers initial status	Dashboard actions: Verify, Request Correction (via website), Electronic disposition to Social Worker → Section Head/Division Head, Approve. Reporter status updates automatically	Automation: disposition and status update. Elimination: physical handover between units and chained manual approvals

E. Technology Utilization Analysis

The analysis shows that the information technology applied to the child case reporting and approval service at the Social Service Office of Batu City includes mobile phones, PCs or laptops, internet or Wi-Fi networks, and a web-based application consisting of a reporting portal and an internal dashboard. The reporting portal enables citizens to enter data, upload evidence, provide digital signatures, and trigger automatic ticket generation, completeness validation, duplicate checks, and weighted triage (P1/P2/P3). The internal dashboard supports officers in fast verification, online document correction requests, digital disposition and approval, as well as registration recording and report preparation. This technology implementation is expected to improve efficiency and accelerate case handling without changing SOP provisions.

F. New Process Recommendation

The new process recommendation focuses on the reporting stage up to internal approval (report submission to initial authorization). This scope is selected to ensure that the issuance of the reporting form is immediately followed by digital approval without physical document transfers, in accordance with the Output/Authorization column in the SOP. Subsequent service stages such as referral and rehabilitation are not discussed.

Table 6. Efficiency of Reporting–Approval Process (TO-BE)

No	Process Flow	Time(minutes)	Actor	Category
1	Reporter authentication and page loading on the reporting website	1	Reporter	NVA
2	Reporter fills in a dynamic form on the reporting website	6	Reporter	VA
3	System generates ticket number and initial status	Eliminated	Website	VA
4	System validates form and document completeness	Eliminated	Website	VA
5	System checks basic duplication (ID/name/date of birth)	Eliminated	Website	VA
6	System calculates urgency score and assigns P1/P2/P3 priority with internal target time	Eliminated	Website	VA
7	Officer conducts brief case review and clarification (if required)	5	Service Counter Officer	VA
8	System queues the ticket before internal handling	1	System	NVA
9	(Optional) Reporter corrects data or documents via the website upon request	5	Reporter	VA
10	System generates registration or agenda number and timestamp	Eliminated	Website	VA
11	System electronically routes the ticket to the Social Worker and Section Head or Division Head	Eliminated	Website	VA
12	Officer opens internal dashboard and loads case context	1	Officer / System	NVA
13	Section Head or Division Head provides digital approval or returns with notes	5	Section Head or Division Head	VA
14	System issues assignment letter or follow-up action list	4	Website	VA
15	System sends status notifications to the reporter and internal staff	Eliminated	Website	VA

Table 7. Total Time and Active Time

Process Stage	Total Time(minutes)	Active Time(minutes)
Complaint service without document correction	23 minutes	20 minutes
Complaint service with document correction	28 minutes	25 minutes

Based on the data in Table 6, throughput efficiency for the service process is calculated using the following formula.

$$Throughput\ Efficiency = 20/23 \times 100\% = 86.96\%$$

The first calculation represents the scenario in which the child case complaint service proceeds without document correction.

$$Throughput\ Efficiency = 25/28 \times 100\% = 89.29\%$$

The second calculation represents the scenario in which the service requires document correction.

The results show that throughput efficiency increases significantly due to the elimination of major delay sources in the reporting–approval stage. As presented in Table 6 and Table 7, the redesigned process reduces total processing time to 23 minutes for cases without document correction and 28 minutes for cases requiring correction. Although most non-value-added activities are eliminated, minimal system-related overhead such as authentication, internal ticket queuing, and dashboard loading is still considered to reflect realistic digital service conditions. Consequently, the throughput efficiency reaches 86.96% and 89.29%, indicating a high but non-absolute level of process efficiency.

G. Weighted Triage Implementation
The rubric in Table 6 is integrated into the digital reporting form so that priority scores are calculated automatically when a report is submitted. Triage results appear as P1/P2/P3 in the internal dashboard queue to organize officer workloads, while verification decisions remain recorded by officers and all status changes are logged in the audit trail. This implementation reduces waiting time at queue points and minimizes document return loops through early validation. In efficiency testing, the scenario without document correction reached a total processing time of 23 minutes, while the scenario with document correction reached 28 minutes, resulting in throughput efficiency values of 86.96% and 89.29% under the TO-BE design. These results indicate substantial efficiency gains while still accounting for minimal system-related overhead.

Weighted triage is triggered automatically upon report submission via the portal. Dynamic forms enforce minimum required inputs and provide emergency indicators to assign P1/P2/P3 priorities. Priority labels are shown only on the internal dashboard, while reporters see only ticket numbers and process status. This approach simplifies verification queues, accelerates digital approval, reduces repeated corrections, and automatically updates status and audit trails in accordance with SOP.

H. Efficiency Comparison
The throughput efficiency comparison evaluates performance improvements after implementing the recommended redesigned process for the child case reporting–approval service at the Social Service Office of Batu City. This analysis compares efficiency before improvement (AS-IS) and after the recommended process is applied (TO-BE).

Table 8. Efficiency Comparison

Process Flow	Initial Result	New Result	Initial Process Time	New Process Time
Complaint service without document correction	56.41%	86.96 %	78 minutes	23 minutes
Complaint service with document correction	40.74%	89.29 %	108 minutes	28 minutes

Table 8 shows that the redesigned process improves throughput efficiency from 56.41% to 86.96% for cases without document correction and from 40.74% to 89.29% for cases requiring correction. In addition, process time is reduced from 78 to 23 minutes and from 108 to 28 minutes, respectively, demonstrating the effectiveness of the proposed TO-BE design.

I. Solution

The solution stage produces a prototype website to improve the child case reporting–approval process at the Social Service Office of Batu City, developed using the Business Process Reengineering (BPR) approach and BPMN-based process redesign. The prototype includes a reporter portal and an internal dashboard that support case submission and status tracking for reporters, as well as faster verification and digital approval by officers.
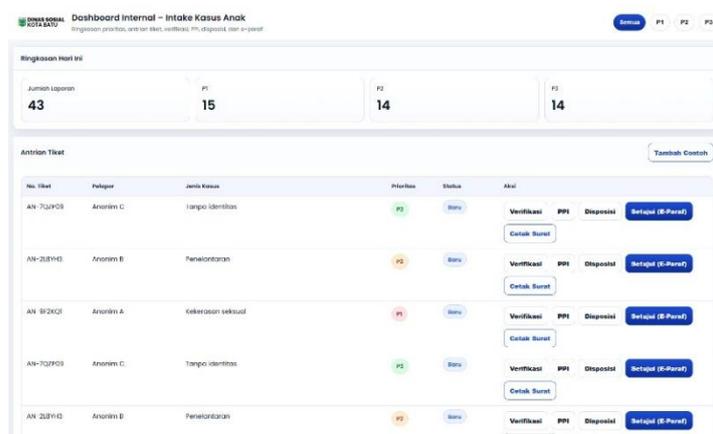

Figure 3. Reporter Portal

Figure 3 shows the reporter portal interface for submitting child case reports. The page provides dynamic forms based on case type, evidence upload, and automatic ticket number and queue status generation to allow reporters to monitor progress. National ID validation with an SPTJM option is available for reporters without identity, supported by brief input guidance. The interface is designed to be simple and informative to ensure ease of use and clarity of reporting status.
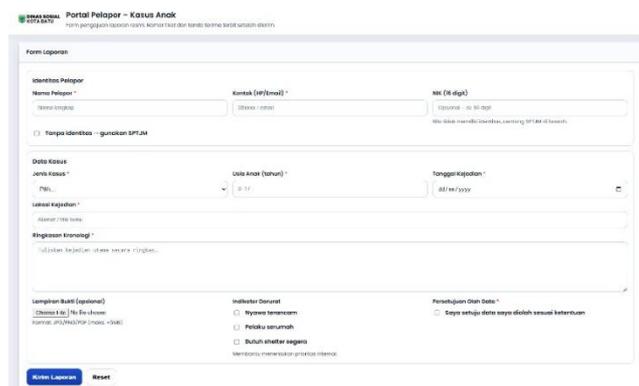

Figure 4. Internal Dashboard

Figure 4 presents the internal dashboard used to view reports and manage case queues. The dashboard displays a daily ticket table including ticket number, case type, priority, status, and action buttons for verification, correction requests, disposition, and digital approval (e-approval). The interface is designed to be simple and informative to support fast and well-structured case handling by officers.

4. Conclusion

This study analyzes and redesigns the child case complaint service at the Social Service Office of Batu City using a Business Process Reengineering (BPR) approach modeled with Business Process Model and Notation (BPMN). The results indicate an increase in throughput efficiency from 56.41% and 40.74% to 86.96% and 89.29%, accompanied by a reduction in process time from 78 to 23 minutes for cases without document correction and from 108 to 28 minutes for cases requiring document correction. Performance constraints caused by manual procedures are addressed through information technology–based solutions, including a web-based reporting portal, automated validation and duplicate checks, priority-based triage, and an internal dashboard. These improvements reduce manual waiting time while still accounting for minimal system-related overhead, resulting in faster workflows, improved queue organization, and better record traceability while maintaining existing service requirements. This study is limited to the reporting and initial approval stages and is based on a design-based TO-BE scenario derived from field observation of a representative case. Actual performance outcomes may vary depending on system implementation, workload conditions, and organizational readiness. Future studies may evaluate system performance under real operational conditions and multiple case observations.

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