Reengineering the Digital Attendance System Using Business Process Reengineering Approach at PT. Esa Solusi Mandiri (ESACO)

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Abstract: *This study aims to analyze and redesign the employee attendance process at PT Esa Solusi Mandiri, which is still conducted manually using paper-based forms and Microsoft Excel recapitulation. The Business Process Reengineering (BPR) approach is applied to identify value-added and non-value-added activities within the attendance process. Data were collected through semi-structured online interviews with one key informant responsible for attendance management, as well as documentation in the form of monthly attendance reports. The duration of each process stage was estimated based on interview results and administrative document analysis, resulting in a total cycle time of 190 minutes for the manual attendance process. Process efficiency was evaluated using Throughput Efficiency (TE) as an indicator of the proportion of value-added time. Based on this analysis, a conceptual design of a digital attendance process was developed, incorporating automated recording and real-time data access for HR and Finance departments. The results indicate that the proposed digital process has the potential to reduce the cycle time to 11 minutes and increase the TE value from 23.68% to 81.82%. These findings represent the potential improvement in administrative efficiency, given that the proposed digital process has not yet been implemented or tested in real operational conditions.*

Keywords: *Business Process Reengineering, Digital Attendance, Efficiency Analysis, BPMN, Administrative Processes.*

1. Introduction

Digital transformation is a crucial strategy for organizations to enhance operational efficiency and information management quality [1]. Administrative processes that are still conducted manually, especially those reliant on paper forms and Excel-based recaps, have the potential to cause delays in data processing, work duplication, and record-keeping errors, which impact subsequent processes such as payroll and performance evaluations [2], [3]. Several studies show that digitizing administrative processes can streamline workflows, reduce repetitive activities, and improve data transparency and consistency across divisions [4], [5]. In the context of comprehensive process improvement, Business Process Reengineering (BPR) is used as a systematic approach to redesign business processes by identifying value-added activities and eliminating those that do not contribute to organizational performance [6], [7], [8].

PT. Esa Solusi Mandiri, a company in the field of occupational safety and health (K3), still applies manual attendance processes using written forms and Excel files. This procedure creates various issues, such as delays in recapulation, data duplication, and the potential for input errors that affect payroll delays and other administrative processes [7], [9]. Additionally, the working conditions that require employees to travel for business trips further exacerbate the challenges in ensuring accurate attendance records [10].

PT. Esa Solusi Mandiri is an occupational safety and health (K3) service company with employees who have relatively high mobility. The attendance process, particularly for employees working outside the office, is still conducted manually and recapped using Excel files. Based on an online interview with an employee responsible for managing attendance and Excel data, it was discovered that the process involves submitting data separately, manual verification by HR, and re-entry before the data can be used by the Finance department. This situation often leads to delays in recapulation and increases the risk of data inconsistencies. These findings align with previous research stating that manual administrative processes tend to increase administrative workload and the potential for human error [2], [3], [5].

The documentation in the form of the company's monthly Absence Exception Report shows a high variation in employee attendance patterns. In this report, the Absence (Min) column represents the number of minutes of an employee's absence during a workday, where a value of 0 minutes indicates full attendance, while 540 minutes indicates a full day of absence. The data reveals that on several dates, some employees had an absence value of up to 540 minutes, while others had a combination of lateness, early departure, or partial absences. This data variation indicates the complexity of the attendance validation process that HR must undertake, especially when attendance records are incomplete or not properly recorded [3]. Although research on BPR and digitization of administrative processes has been widely conducted, most studies focus on government institutions, the education sector, or large-scale companies [7], [11], [12]. Research specifically examining the reengineering of the attendance process in medium-sized service companies, particularly in the K3 sector, remains relatively limited. Therefore, research is needed to comprehensively map the manual attendance process and redesign it using the BPR approach to enhance administrative efficiency [6], [8], [9], [13].

2. Literature Review & Methods
The significance of this study lies in its contribution to mapping and analyzing the manual attendance process in a safety and health (K3) service company using the Business Process Reengineering (BPR) framework. This section outlines the relationship of the research to previous studies, the characteristics of the data and research location, as well as the research methods and evaluation used to support the findings and conclusions of the study.

A. Literature Review
Business Process Reengineering (BPR) is an approach used to fundamentally redesign business processes with the goal of improving efficiency and organizational performance [6], [7]. In its application, BPR emphasizes identifying value-added activities and eliminating non-value-added activities that cause waste in time and resources [9], [14]. Business process modeling using Business Process Model and Notation (BPMN) is widely used in BPR research because it allows for a systematic depiction of process flows and facilitates process improvement analysis before implementing technology-based changes [6], [11]. Several studies indicate that digitizing administrative processes, including employee attendance, has the potential to reduce manual workload, enhance data consistency, and expedite verification processes across divisions [2], [3], [4]. However, most previous studies have been conducted in government institutions or large-scale organizations. Therefore, research on the implementation of BPR in medium-sized service companies, particularly in the K3 sector, remains relatively limited, and this study is expected to fill this gap [7], [12].

B. Data, Informants, and Research Location
This study was conducted at PT. Esa Solusi Mandiri, a service company in the field of occupational safety and health (K3) based in Indonesia. The focus of the research was directed at the employee attendance process used as the basis for attendance administration and the provision of data for human resource management purposes.

Primary data collection was conducted through a qualitative case study involving one key informant [15]. The informant was an employee responsible for managing attendance and recapping attendance data using Excel. The informant was selected purposively, with criteria involving direct involvement in recording, verifying, and providing attendance data for relevant departments (HR and financial administration). With this role, the informant had a comprehensive understanding of the running attendance process, although the study did not involve additional informants from field employees or management.

Secondary data were obtained from documentation in the form of a monthly attendance report (Exception Statistic Report) for the period from September 1 to 25, 2025. This report included attendance data for dozens of employees with hundreds of daily entries, containing information on arrival and departure times, lateness, early departures, and an Absence (Min) column indicating the duration of an employee's absence during a workday. This documentary data was used as supporting material to understand the flow, variation, and complexity of the attendance process and as the basis for process mapping, rather than as statistical data for quantitative testing.

C. Research Method and Evaluation

The research method used includes data collection, business process identification, throughput efficiency testing, analysis of improvement alternatives, and the development of business process recommendations. This study utilizes a case study approach, with the aim of understanding the attendance process in depth within a specific organization.

The stages of the research include:

1. Data collection through interviews and documentation,
2. Identification and mapping of the running attendance process using BPMN,
3. Activity analysis based on value addition and process time estimation,
4. Throughput Efficiency (TE) calculation as an indicator of the relative efficiency of the process, and
5. Development of conceptual recommendations for a digital-based attendance process redesign.

Evaluation is conducted by comparing the process structure and time estimates before and after process redesign. Throughput Efficiency (TE) values are used to show the proportion of value-added activities relative to the total process time as an indicator of potential efficiency, rather than as a measurement of the performance of an implemented system.

D. Limitations of the Study

This study has several limitations. First, data collection was conducted online and involved only one informant, so the understanding of the process heavily depends on the informant's perspective and is not supported by direct observations in the workplace. This condition may introduce bias in depicting the variation of the attendance process in the field. Second, the process time estimation was obtained from interviews and documentation of sample attendance reports, so it is subjective and may differ if empirical measurements are conducted directly. Third, this study did not include the implementation and post-implementation evaluation stages of the digital attendance system, meaning the findings are conceptual and analytical in nature.

3. Results and Discussion

A. Data Collection

The initial stage of the research involved the collection of qualitative data, which included an online interview with one employee representing the attendance management unit, as well as documentation in the form of an Excel-based attendance recap template. The informant was selected because they held direct responsibility for recording attendance and managing employee attendance data.

The analyzed documentation covered employee attendance data for the period of September 2025, used to understand attendance recording patterns, lateness, and absenteeism. This data was not used as inferential statistical data, but rather as a basis to understand the workflow, variations in conditions, and process time estimates within attendance administration activities.
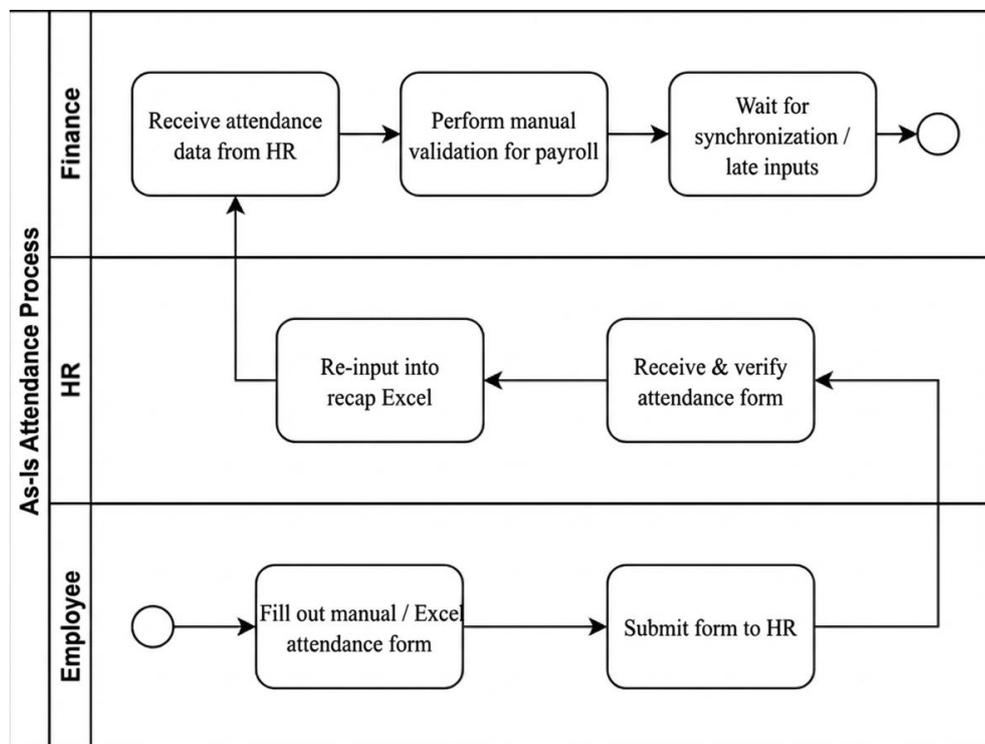
B. Mapping the Manual Attendance Process

Based on the interview results and documentation, identification and mapping of the manual attendance process were conducted using the Business Process Reengineering (BPR) approach and Business Process Model and Notation (BPMN) modeling[16]. This mapping represents the general flow of the attendance process at PT. Esa Solusi Mandiri, although variations in conditions such as differences in working hours, lateness, leave, and field employees exist in practice.

Table 1. Manual Attendance Process Map

No	Process Step	Time (minutes)	Process Actor	Category
1	Employee fills out manual/Excel attendance form	10	Employee	VA
2	Employee submits form to HR	5	Employee	NVA
3	HR receives & verifies attendance form	15	HR	VA
4	HR re-enters data into Excel recap	20	HR	NVA
5	Finance receives attendance data from HR	5	Finance	NVA
6	Finance manually validates for payroll	15	Finance	VA
7	Waiting for synchronization/input delays	120	Finance	NVA
Total Process Time		190		

The classification of value-added (VA) and non-value-added (NVA) activities was determined based on the interview with the informant and the conceptual BPR approach, reflecting the operational perspective of the company, although not all actors were directly involved.

Figure 1. BPMN Model of the Manual Attendance Process

The BPMN model shows that the manual attendance process heavily relies on document movement and re-entry by HR. These activities are the primary sources of time waste and increase the potential for record-keeping errors.

C. Throughput Efficiency Analysis of the Manual Process

The efficiency of the process is calculated using the Throughput Efficiency (TE) method, which is the ratio of value-added activity time to the total process cycle time, using the formula:

$$TE = \frac{Value\ Added\ Time}{Total\ Cycle\ Time}\ X\ 100\%$$

Based on Table I, the total value-added time for the manual attendance process is 45 minutes, with a total process time of 190 minutes. Therefore, we obtain:

$$TE = \frac{45}{190}\ X\ 100\% = 23{,}68\%$$

The TE value of 23.68% indicates that more than 76% of the process time is spent on non-value-added activities, particularly re-entry and waiting time, which suggests low efficiency in the manual attendance process.

D. Redesign Alternative Analysis

Based on the VA/NVA analysis and the TE value, activities that could potentially be eliminated, simplified, or automated according to Business Process Reengineering principles were identified.

Table 2. Analysis of Business Process Improvement

No	Process Step	Problem	Improvement
1	Employee fills out manual/Excel attendance form	Prone to errors & slow	Automation
2	Employee submits form to HR	Inefficient	Elimination
3	HR receives & verifies attendance form	Repetitive process	Simplification
4	HR re-enters data into Excel recap	Data duplication	Elimination
5	Finance receives attendance data from HR	Not real-time	Elimination
6	Finance manually validates for payroll	Time-consuming	Automation
7	Waiting for synchronization/input delays	Hindering the process	Elimination

This analysis indicates that the low efficiency of the process is primarily due to task duplication and delays in information flow between divisions.

E. Opportunities for Information Technology Utilization

The analysis shows significant opportunities for utilizing information technology, especially in the form of a cloud-based digital attendance system. This technology enables real-time attendance recording, automatic data integration, and direct access by HR and Finance without reliance on physical documents. However, the use of digital technology still involves supporting activities such as user authentication and the potential for system disruptions, which need to be considered in evaluating process efficiency.

F. Recommendation for Digital Attendance Process Design

As the final outcome of the research, a conceptual design for a digital attendance process was developed, illustrating the ideal condition of the process after the implementation of information technology.

Table 3. Digital Attendance Process Map (Conceptual Design)

No	Process Step	Time (minutes)	Actor	Category
1	Login & system authentication	1	Employee	NVA
2	Employee performs digital attendance	2	Employee	VA
3	HR verification via system	5	HR	VA
4	Synchronization & Finance data access	2	Finance	VA
5	Potential system delay/minor corrections	1	System	NVA
Total Process Time		11		
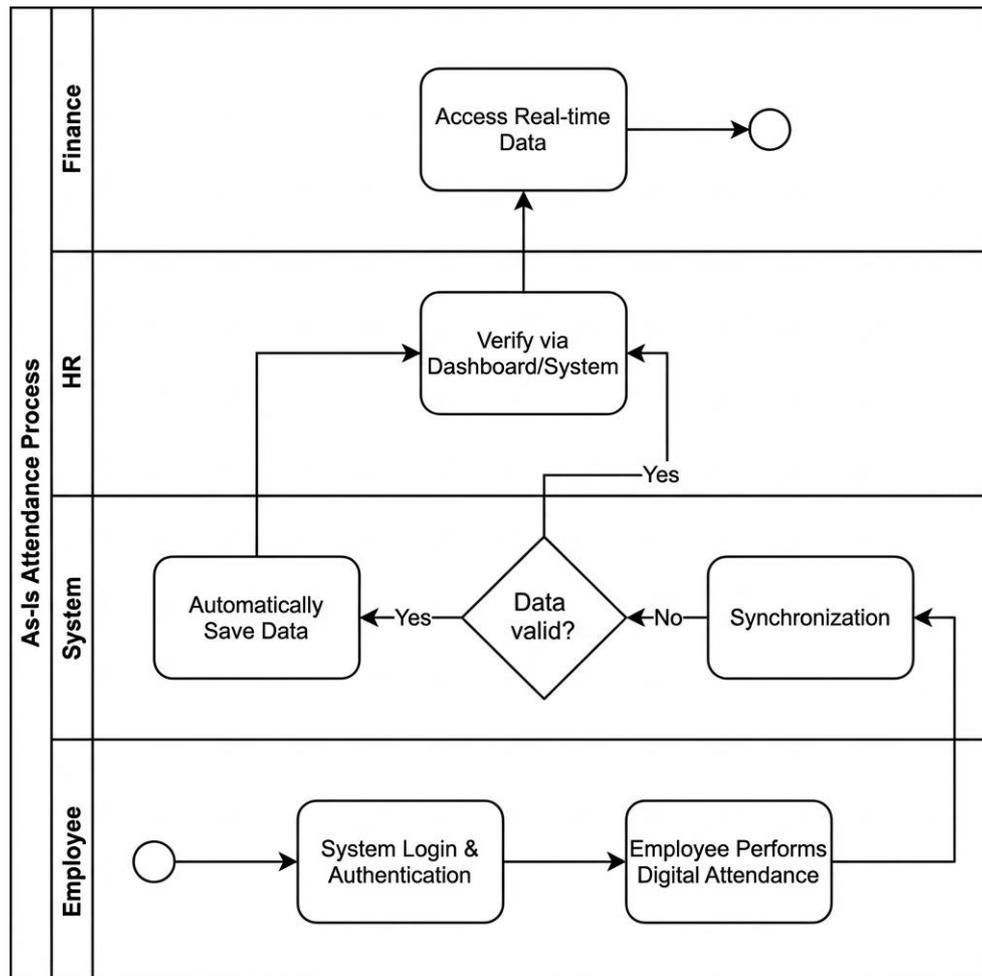
Figure 2. BPMN Model of Digital Attendance Process (Conceptual Design)

The BPMN model shows a simpler and more integrated workflow, with a significant reduction in non-value-added activities compared to the manual process.

G. Throughput Efficiency Analysis of the Digital Process

Based on the conceptual design of the digital process, the total process time is estimated at 11 minutes, with 9 minutes of value-added time. Therefore, the TE value is:

$$TE = \frac{9}{11} \, X \, 100\% = 81,82\%$$

This value indicates that the conceptual design of the digital process meets Lean efficiency standards (≥70%), although minimal non-value-added activities still exist.

H. Throughput Efficiency Comparison

Table 4. Throughput Efficiency Comparison of Manual and Digital Processes

Process	Total Time (minutes)	TE (%)	Remarks
Manual	190	23.68	High waiting time and input duplication
Digital (design)	11	81.82	Integrated, real-time, minimal NVA

I. Solution

The solution derived from this research is the conceptual design of a digital attendance system that automates the recording, verification, and data access processes. This design has the potential to improve the efficiency of the attendance administration process, although the implementation and performance evaluation of the system will be part of future research agendas.

4. Conclusions

This study demonstrates that the manual attendance process at PT. Esa Solusi Mandiri has a high level of inefficiency due to input duplication, reliance on physical documents, and long waiting times in the administrative flow. Through the Business Process Reengineering (BPR) approach and BPMN modeling, this research successfully identified non-value-added activities and developed a conceptual design for a simpler, more integrated digital attendance process. The Throughput Efficiency (TE) analysis shows that the manual process has an efficiency value of 23.68%, while the digital process design has the potential to increase efficiency up to 81.82% by reducing repetitive and non-value-added administrative activities. This improvement represents the potential for process performance enhancement, given that the proposed digital design has not yet been implemented and tested operationally. The study has limitations, including the use of time-based estimations, the involvement of a single informant, and data collection conducted online without direct field observation. Therefore, further research is recommended to implement the digital attendance system in practice and conduct post-implementation evaluations to measure process efficiency based on empirical data.

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