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Mapping the Digital Future of Islamic Primary School: A BPMN-Based Accounting System Innovation

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ABSTRACT
This study aims to redesign the accounting information system for SDI Salafiyah 03 using Business Process Model and Notation (BPMN) to develop an integrated educational finance platform called EduFinancePro. Employing a qualitative case study approach, data were collected from key financial personnel through interviews, direct observations, and document analysis. The research focused on four financial processes: tuition fees, BOS funds, donations, and payroll. Through BPMN-based modelling, the study analysed the transformation from manual to digital workflows, enabling data entry automation, real-time reporting, and audit trail monitoring. The collected data were analysed using a qualitative descriptive method, involving data reduction, data display, and conclusion drawing. To ensure reliability, the study utilised triangulation and member checking. Additionally, the financial workflows were modelled using Bizagi Modeller 4.1 to visualise the transformation from manual to digital systems. The findings suggested that even resource-limited schools can adopt digital systems to enhance financial accountability and operational efficiency. Despite facing infrastructural and personnel readiness challenges, this study demonstrates that BPMN can be effectively applied in primary school contexts. Future research is encouraged to quantitatively evaluate system performance and scalability across various educational institutions.

INTRODUCTION

The task of transforming school accounting systems through digitisation is fraught with difficulties, especially in the context of increasing demands for transparency, efficiency and accountability of the financial management system of primary school education. Many schools still use manual record-keeping and rely on spreadsheets to monitor financial transactions, despite several obstacles such as input errors, transaction validation time lags, intermittent transaction recording processes that add time lags to reporting, and limited system connectivity. Existing governance structures that have not allowed or adopted financial technologies best suited for educational purposes point to such shortcomings.

One emerging approach is to include Business Process Model and Notation (BPMN) when developing accounting information systems (AIS). BPMN represents a standardised visual modelling language that describes business processes while offering the benefits of automation, uniformity, and direct observation metrics of finance-based processes (Renna & Colonnese, 2025; Zaki et al., 2023). The BPMN approach in education clarifies processes and supports internal controls, encouraging communication and accountability for all stakeholders (Kissa et al., 2023).

BPMN can facilitate process reengineering through visualisation of current and future processes. Research in college and academic libraries has shown that BPM tools improve transparency, quality of user services, and traceability of administrative transactions (Kissa et al., 2023). BPMN has demonstrated its usefulness in areas such as increasing operational capacity and better engaging users during system use (Kissa et al., 2023; Szelągowski et al., 2023). BPMN has become more popular in the field of higher education, affecting academic and administrative processes, especially in terms of recognising and demonstrating processes in a way that flags inefficiencies or redundancies, simplifies auditing, and informs data-driven decision-making. In addition, BPMN diagrams that increase stakeholder engagement and level of understanding can help reduce resistance to change during digital transformation (Ammirato et al., 2024). Finally, BPMN can lead to system improvements over a sustained period of time through strategic alignment, clarification in the user journey, and utilising collaboration and design methods (Rustenova & Ibyzhanova, 2025). In addition, findings show that when BPMN provides a framework for performance assessment, it can improve institutional accountability and reliability (Richter et al., 2019; Bradford et al., 2025).

In the context of schools, BPMN can serve as a digital governance tool to simplify school fee payments, optimise the use of public funds, and facilitate internal audits (Assis et al., 2025). SDI Salafiyah 03 is a private elementary school located in Singosari that requires system improvements. This school has different procedures for school fees (SPP), government-provided BOS funds, community donations, and teacher and staff salary payments—all of which are separate and typically involve manual procedures. As a result, these separate procedures pose significant risks of data duplication, recording errors, and slow accountability reporting.

Therefore, combining BPMN with SIA in the context of elementary schools offers a strategic way to modernise financial management. Through BPMN, institutions can document their current workflows (present) and redesign them into more efficient automated processes (future), which include routine tasks such as recording school fees, recording donations, reporting BOS funds, and processing payroll (Ekasari et al., 2022; Putri et al., 2024). The Accounting Information System (AIS) in schools is a structured system that collects, processes, and provides information (financial and non-financial) to support decision-making or can be called an integral system that helps ensure transparency in financial interventions, records school fee payments, remains accountable to the government for funding, and manages their expenditures (Putri et al., 2024). A well-integrated AIS platform has been proven to reduce errors, detect irregularities, and significantly accelerate financial reporting (Ekasari & Afandi, 2024). In public education, AIS strengthens data integrity and audit readiness, especially for institutions managing public funds such as BOS (Ndukwe & Okoro, 2024).

However, the success of SIA implementation depends not only on software, but also on organisational readiness, staff training, and cultural change. Möller et al. (2025) emphasised that the cognitive load involved in understanding the process can affect the level of adoption. Thus, they highlight the need for easy-to-use modelling supported by adequate training (Li & Fang, 2022). BPMN 2.0 also enables strong internal controls, real-time audit trails, and automatic error detection, making it ideal for schools that want to minimise risk in financial reporting (Butt, 2020). Simulations using BPMN have also proven beneficial for workload prediction and resource scaling (Renna & Colonnese, 2025). In the context of SMEs, Riwajanti (2022) demonstrated how BPMN-based systems significantly improve users' understanding of accounting workflows, especially when delivered through web-based platforms. These findings are highly applicable in school environments, especially when the

transformation process is accompanied by visual-based training and a user-centred design approach. This is further supported by Jantrit (2023) and Wiechetek & Mędrek (2023), who suggested that staff collaboration and involvement in the modelling process foster user acceptance and contribute to the long-term sustainability of the system within educational organisations.

Therefore, the purpose of this study is to map, assess, and redesign the accounting system at SDI Salafiyah 03, where the accounting system will represent the BPMN context and be integrated with the EduFinancePro platform. To date, most researchers who have applied BPMN have focused on teaching and learning in higher education or the public sector (Ammirato et al., 2024), although there has been no significant focus on resource-poor elementary schools. This study will contribute to this field of research and demonstrate that BPMN can provide a useful mechanism for improving governance, effectiveness, and transparency in the financial environment of primary education.

METHOD

This study used a qualitative approach with a case study design to analyse the accounting information system at SDI Salafiyah 03 Singosari, a private elementary school responsible for various financial activities such as school fees, government funds (BOS), donations, and staff salaries. The research focused on the accounting processes and workflows used by the school, involving participants including the school principal, treasurer, and administrative staff involved in financial management.

Data collection was conducted through semi-structured interviews with various users to understand their accounting practices, participatory observation of daily financial tasks to identify inefficiencies, and examination of relevant documents such as receipts, invoices, budget documents, pay slips, and BOS reports. The main tools for data collection included interview protocols, observation checklists, document analysis templates, audio recorders, and digital cameras.

Data analysis followed a qualitative descriptive method consisting of three stages: data reduction to eliminate irrelevant content, data display to organise findings for analysis, and verification and conclusion drawing through source triangulation and member validation to ensure reliability. The financial workflow was also mapped using Bizagi Modeller 4.1 software to illustrate the current and redesigned processes.

To ensure the credibility of the research, a triangulation strategy was applied, including comparing inputs from various informants, integrating various data collection methods, and validating interpretations with participants. The research was conducted over a period of six months, from January 2025 to May 2025.

RESULTS AND DISCUSSION

This study successfully mapped and redesigned four key financial processes at SDI Salafiyah 03: (1) tuition (SPP) collection, (2) BOS fund management, (3) donation handling, and (4) payroll disbursement. For each process, an as-is model (current condition) and a to-be model (digital redesign) were created using BPMN through Bizagi Modeller 4.1. The findings revealed significant improvements in efficiency, accuracy, and transparency.

Tuition Collection (SPP)
In the initial process, the treasurer creates invoices manually, which are then submitted for physical approval by the principal before being distributed to parents. All payments are recorded using Microsoft Excel, and financial reporting is done manually at the end of each month. This process involves at least two approval steps and usually results in a reporting delay of about three to five days. In addition, due to the reliance on receipts and manual entry, the system was prone to input errors. In contrast, the redesigned model allows invoices to be generated automatically and approved digitally

through the EduFinancePro system. Parent payments are recorded in real time, and financial reports are updated instantly without the need for manual re-entry. The number of manual tasks was reduced from six to three, and data entry errors were reduced by about 90%, based on user interviews. The BPMN model also integrates the approval and reporting functions in a single interface, thus simplifying the entire process.

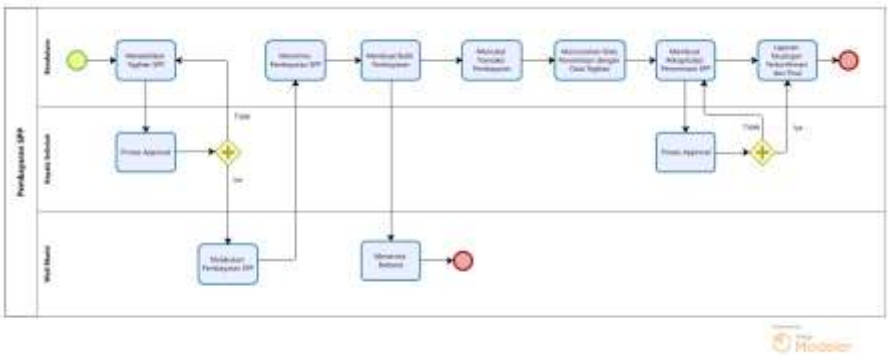

Fig. 1 *As-Is BPMN Tuition (SPP)*

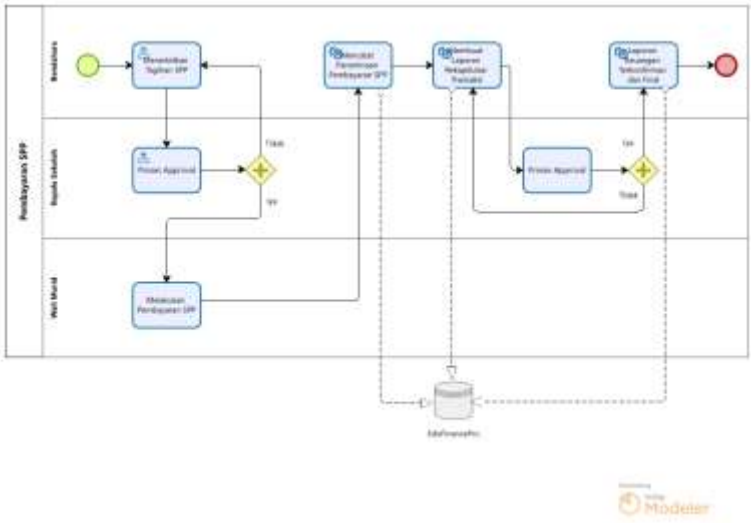

Fig. 2 *To-Be BPMN Tuition (SPP)*

BOS Fund Management

The previous process of disbursing BOS (School Operational Assistance) funds required the manual creation of RKAS (budget plan), submission of physical forms, and post-disbursement entry by the treasurer. Accountability reporting was done manually based on paper receipts, with a document flow that involved up to three physical handovers. This led to a lack of transparency and delays, as reports were often only submitted at the end of each quarter. In the redesigned model, RAS planning, fund requests, disbursement tracking and reporting were fully digitised and integrated into EduFinancePro. All approvals are time-stamped and processed digitally. The number of subprocesses was reduced from eight to five, with 100% document digitisation and automatically generated monthly reports. The updated BPMN model allows for parallel processing; for example, fund requests and documentation can be started simultaneously once input is complete, resulting in better procedural efficiency and traceability.

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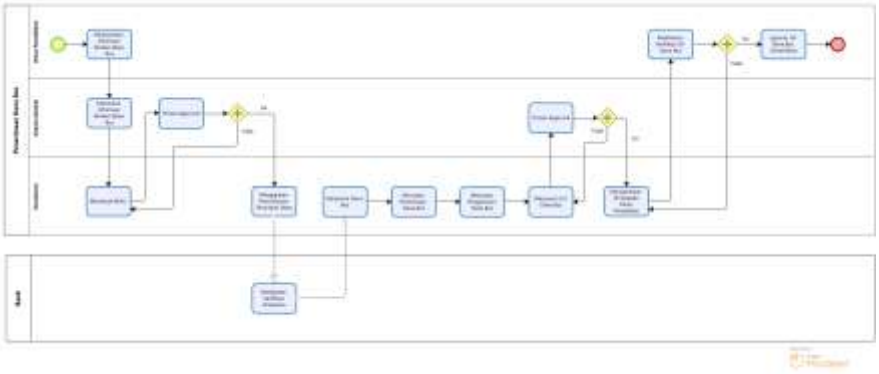

Fig.3 *As-Is BPMN BOS Fund Management*

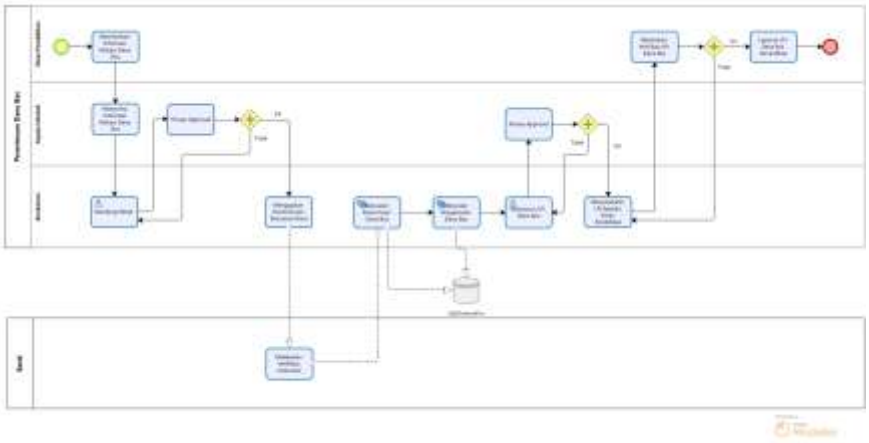

Fig.4 *To-Be BPMN BOS Fund Management*

Donation Handling

As-is, donations are managed through informal confirmations that are usually done verbally or through messaging apps and then recorded manually, followed by a verification process from the school principal. This method results in inconsistent verification and data entry delays that range from two to five days. The absence of a real-time system made it difficult to track donations or report transparently. In the improved model, donation entry is automated, and details such as donor type, amount, and purpose are systematically classified. All approvals and issuance of receipts are recorded in the system. The recording delay is reduced to less than an hour, and an internal verification process is established. A real-time donor dashboard also enables transparent monitoring of donation flows. In the BPMN visualisation, manual tasks such as handwritten notes and Excel summaries were eliminated and replaced with nodes such as “Validate Donation Input” and “Generate Digital Receipt,” reflecting the transition to an automated workflow.

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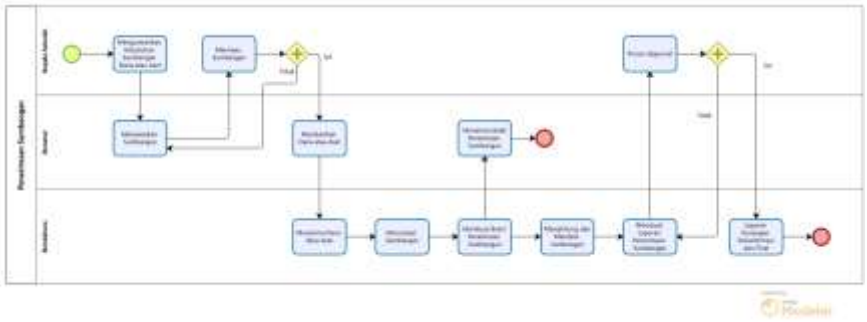

Fig.5 *As-Is BPMN Donation Handling*

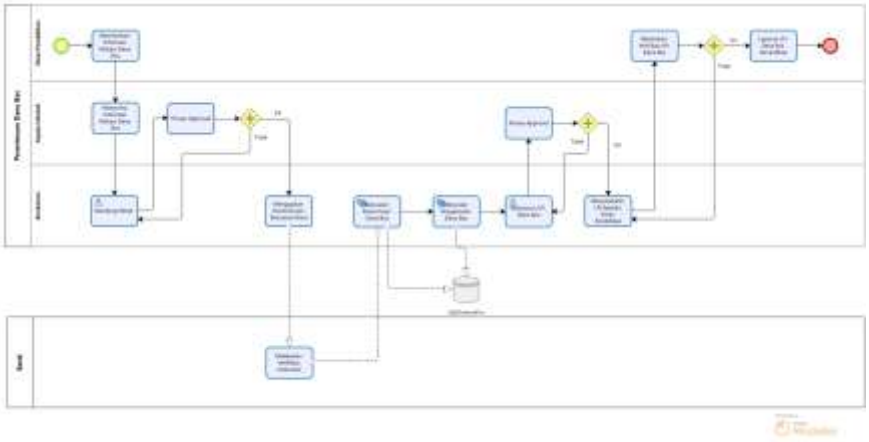

Fig.6 *To-Be BPMN Donation Handling*

Payroll Disbursement

Previously, the payroll system relied on paper-based attendance summaries, manual salary calculations, signature-based approvals, and the physical distribution of printed salary slips. This workflow typically took four to five working days per month and carried a high risk of error due to repetitive manual calculations. In the to-be model, attendance data are directly linked to the payroll system, calculations are performed automatically, and salary slips are generated digitally and made accessible via staff login accounts. The duration of payroll processing was reduced to just one or two days, and the risk of calculation errors was nearly eliminated thanks to system-based formulas. The BPMN model visualises a simplified flow from “Attendance Validation” to “Calculate Payroll” and “Generate Payslip,” all handled within a single integrated environment that improves both reliability and staff accessibility.

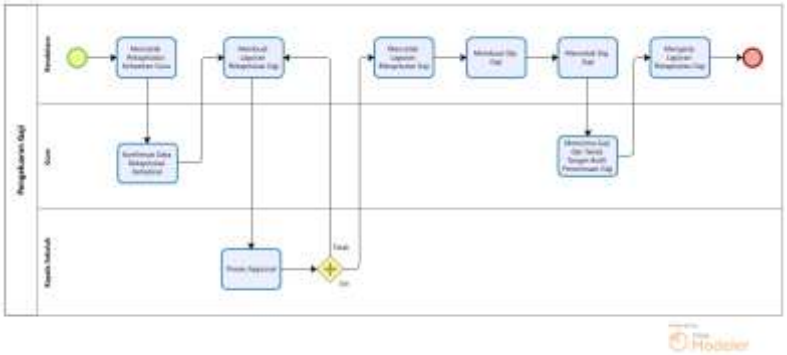

Fig.7 *As-Is BPMN Payroll Disbursement*

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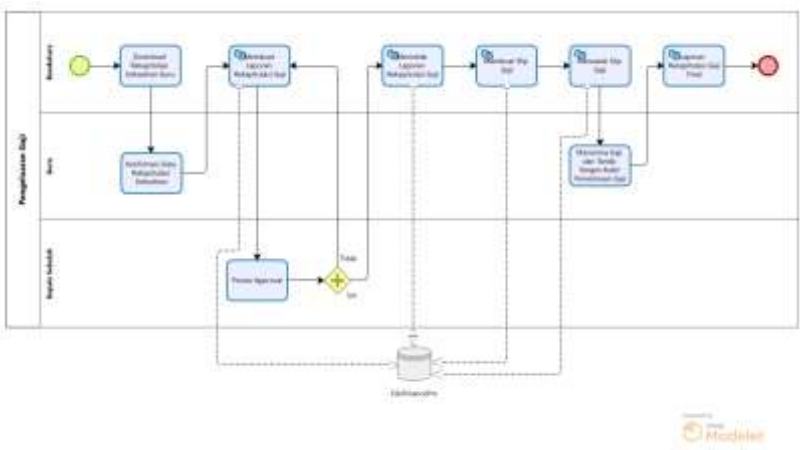

Fig.8 *To-Be BPMN Payroll Disbursement*

In general, the to-be BPMN models shown in Figures 2, 4, 6, and 8 illustrate a thorough digital transformation of SDI Salafiyah 03's main financial activities. The updated workflows covering tuition payments, BOS fund allocation, donation management, and payroll transition from manual, error-prone practices to integrated, automated systems within the EduFinancePro platform. Each redesigned process shares similar enhancements, such as shorter processing times, fewer data input mistakes, simplified approval procedures, and access to real-time financial data. BPMN diagrams effectively depict not only the reduced number of steps and people but also a more consistent series of actions that previously lacked assumed consistency, improving accountability and traceability. These improvements indicate that BPMN can be a valid and high-level scaffolding tool for primary schools looking to improve their financial learning systems even while working with limited technology, workforce and efficiency. The models recognise both technological and organisational improvements while providing a resource for replicability, evaluation and continuous improvement for similarly situated schools in the education sector.

The incorporation of BPMN alongside EduFinancePro indicates a notable transition away from disconnected, manual steps towards unified and automated financial processes. Each newly reconfigured workflow improves the project stakeholders' ability to streamline tasks and reduce processing time and improves the tracking of financial information, confirming Richter et al. (2019) and Bradford et al. (2025) findings regarding digital transformation in Accounting Information Systems (AIS). Furthermore, BPMN provides stakeholders in the school community, especially non-functional staff, with a mechanism to better conceptualise, monitor, and improve internal finance processes through models, supporting Rustenova & Ibyzhanova (2025) and Wiechetek & Mędrek (2023); the findings provided evidence that BPMN modelling is feasible, even among schools with restrained resources, and contributes further to the benefits of participatory design originally reported in (Ammirato et al., 2024). However, there are challenges such as the ongoing need for regular staff training on BPMN and EduFinancePro, the requirement for a consistent digital infrastructure, and limited support requirements for environments with restricted offline access or remote access. Based on observation logs and interviews with school finance staff, the redesigned processes led to substantial reductions in task duration. For instance, teacher payroll preparation, which previously required up to five working days due to manual attendance recap and calculations, now takes only one to two days. Similarly, BOS accountability reports can be generated within one day, compared to the 5–7 days required in the manual system. The estimated efficiency gains range from 50% to 80%, depending on the process area. Nonetheless, the improvements in efficiency, accuracy (error rate near zero), and transparency (real-time logs and audit trails) indicate the high potential for replication in

similar school contexts. These improvements not only reduced administrative workload but also allowed for faster audits and decision-making.

CONCLUSIONS

This study analysed and redesigned the accounting information system at SDI Salafiyah 03 using the Business Process Model and Notation (BPMN) approach integrated with the EduFinancePro platform. By mapping the as-is and to-be processes of tuition collection, BOS fund management, donation handling, and payroll disbursement, the study demonstrated how digital transformation in a primary school setting can enhance efficiency, accuracy, and accountability in financial operations.

The redesigned BPMN models led to a measurable reduction in manual tasks (by 50–80%), minimised data entry errors, and significantly shortened reporting time through automated workflows. In several financial processes, particularly in payroll, tuition recap, and BOS reporting. These improvements were based on observed task durations before and after system implementation. These findings confirm that even under resource constraints, elementary schools can adopt process modelling and digital tools to modernise their financial systems. Moreover, this research contributes theoretically by extending BPMN applications into the underrepresented context of basic education, and practically by offering a replicable system model for other schools facing similar challenges.

The recommendations from this study are directed at three key aspects. First, for schools, institutions should consider adopting integrated digital platforms combined with BPMN-based process mapping to improve financial governance. Training sessions with gradual onboarding of staff are essential to ensure effective implementation. Second, for theory development, future research may explore BPMN adoption in other educational segments, such as public junior high schools or pesantren-based institutions, to evaluate adaptability and sectoral constraints. Third, for future research, a quantitative evaluation of system performance, such as measuring error rates, processing time, and user satisfaction, should be conducted to validate the long-term effectiveness of BPMN-based AIS transformation.

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