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COST-BENEFIT ANALYSIS OF IMPLEMENTING AUTOMATION IN IT INCIDENT MANAGEMENT TO MINIMIZE FINANCIAL LOSSES

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ABSTRACT
The rapid evolution of digital technologies has positioned automation in IT incident management as a pivotal strategy for mitigating financial losses and optimizing operational efficiency. However, the financial implications of investing in automation have yet to be fully explored. This study provides a comprehensive cost-benefit analysis of implementing automation in IT incident management, with a focus on its effects on operational costs and financial losses. The study was guided by the cost benefit analysis theory. A descriptive research design was adopted, targeting IT departments within major corporations. The sample size was determined using the Krejcie and Morgan formula (1970), ensuring statistical representativeness. Data were collected via structured questionnaires, and both descriptive and inferential statistical methods were employed for analysis. The results indicate that automation led to significant reductions in operational costs (mean reduction of 28.5%, standard deviation of 12.7%) and financial losses (mean reduction of 35.2%, standard deviation of 15.4%). Correlation analysis revealed strong positive relationships between reductions in operational costs and financial losses ($r = 0.748$, $p < 0.01$), as well as between these reductions and the perceived value of automation ($r = 0.685$ to 0.724, $p < 0.01$). Furthermore, regression analysis confirmed that automation has a substantial impact on financial outcomes, with the regression model accounting for 72% of the variance in financial performance (β for operational costs reduction = -0.45, $p < 0.01$; β for financial losses reduction = -0.57, $p < 0.01$). The study concludes that investing in automation technologies provides significant financial advantages, recommending that organizations implement advanced automation solutions to enhance IT incident management and reduce financial losses.

KEYWORDS: *Automation, IT incident management, financial losses, cost-benefit analysis, digital transformation.*

I.0 INTRODUCTION

1.1 Background of the study

The rapid evolution of information technology has significantly impacted various sectors, including IT incident management, by providing new tools and methodologies to enhance operational efficiency and reduce financial losses. The integration of automation in IT incident management represents a transformative shift, promising to streamline processes and improve response times (Smith & Johnson, 2022). As organizations increasingly face the challenges of managing IT incidents, the potential benefits of automation, such as reduced downtime and lower operational costs, become increasingly critical (Chen, Wang, & Liu, 2021). This technological advancement is seen as a key strategy to mitigate financial losses associated with IT incidents, aligning with broader trends in digital transformation that emphasize efficiency and cost-effectiveness (Lee & Kim, 2021). Governments and organizations globally are exploring ways to leverage automation to enhance IT management processes, driven by the need to remain competitive and resilient in a rapidly evolving technological landscape (Brown & Green, 2022).

Despite the growing adoption of automation technologies, there remains a gap in understanding the financial implications of these investments, particularly in the context of IT incident management (Nguyen, Patel, & Lee, 2021). While automation is often heralded for its potential to reduce costs and improve efficiency, the precise financial benefits and cost structures are not always well-documented or understood (Williams & Zhang, 2020). This is particularly pertinent as organizations strive to balance the costs of implementing automation technologies against the expected reductions in operational expenses and financial losses (Anderson & Turner, 2022). The need for a detailed cost-benefit analysis is crucial for organizations to make informed decisions regarding the adoption

of automation in IT incident management, ensuring that investments align with their financial and operational objectives (White & Moore, 2020).

In recent years, the focus on automating IT incident management processes has intensified due to the increasing complexity of IT environments and the growing frequency of incidents (Johnson, Miller, & Roberts, 2022). Automation offers the potential to address these challenges by providing tools that can quickly identify, manage, and resolve incidents with minimal human intervention (Harris & Adams, 2021). However, the effectiveness of automation in reducing financial losses is contingent upon several factors, including the initial investment costs, implementation challenges, and the overall impact on operational efficiency (Smith & Clark, 2022). This research aimed to fill the existing knowledge gap by providing a comprehensive cost-benefit analysis of automation in IT incident management, assessing how these technologies can mitigate financial losses and enhance organizational performance (Parker & Evans, 2020).

The findings from this study offers valuable insights into the financial implications of automation in IT incident management, supporting organizations in making strategic decisions about technology investments (Thomas & Lewis, 2021). By examining the relationship between automation and financial losses, this research sought to contribute to the broader understanding of how digital transformation can drive cost savings and operational improvements (Green & Thompson, 2022). The results were relevant to policymakers and industry leaders informing them about the benefits and limitations of automation, guiding future investments and strategic planning in the realm of IT incident management (Jackson & Martinez, 2021).

1.2 Statement of the Problem

Ideally, organizations would fully leverage automation technologies to streamline IT incident management, ensuring operational efficiency, reducing downtime, and minimizing financial losses. Automation in IT incident management is widely recognized as a critical strategy for achieving these objectives, with the potential to reduce operational costs and improve overall performance (Smith & Johnson, 2022). This ideal is increasingly attainable as digital transformation accelerates, positioning automation as a key enabler of organizational resilience and efficiency (Chen, Wang, & Liu, 2021).

However, in reality, many organizations face significant challenges when it comes to assessing the financial benefits of implementing automation in IT incident management. Despite the growing adoption of automation technologies, the precise financial outcomes of these investments remain poorly understood, particularly in the context of IT incident management (Nguyen, Patel, & Lee, 2021). A major gap exists in the documentation and understanding of automation's return on investment (ROI), as many organizations struggle to gather comprehensive data on how automation impacts their financial performance and operational efficiency (Williams & Zhang, 2020). The complexity of modern IT environments, compounded by the rising frequency of incidents, further complicates the evaluation of automation's true effectiveness (Johnson, Miller, & Roberts, 2022). As a result, organizations lack reliable financial data that could guide their decision-making processes regarding automation investments. This lack of clarity around the financial implications of automation presents a critical knowledge gap in the field of IT incident management. While automation is praised for its potential to reduce costs and enhance efficiency, the specific financial structures and long-term benefits remain largely unexplored (Smith & Clark, 2022). Organizations are therefore left with insufficient information to evaluate the cost-benefit ratio of automation, particularly when considering the high upfront costs associated with its implementation (White & Moore, 2023). Consequently, many organizations are unable to fully justify the financial investment in automation, thus limiting their ability to capitalize on its potential benefits and optimize their IT incident management processes. The absence of detailed financial analysis on automation investments stifles informed decision-making and strategic planning, which is crucial for organizations seeking to improve their incident management capabilities (Harris & Adams, 2021). Failure to address this gap could have significant risks for organizations. Without a clear understanding of the financial implications of automation, organizations may continue to face inefficiencies in their IT incident management processes, leading to prolonged downtime, increased operational costs, and greater financial losses. Moreover, the inability to leverage automation technologies to their full potential could result in missed opportunities for operational optimization and financial improvement (Parker & Evans, 2019). The growing complexity of IT operations further necessitates effective incident management, with automation offering a promising solution. However, the effectiveness of automation in reducing financial losses is contingent upon several factors, including integration challenges, ongoing maintenance costs, and its overall impact on operational performance (Parker & Evans, 2019). This study aimed to address these challenges by investigating how automation affects operational costs and financial losses associated with IT incidents.

1.3 Objective of the Study
The objective of this study was to evaluate the financial impact of implementing automation in IT incident management, specifically assessing its effectiveness in reducing operational costs and minimizing financial losses associated with IT incidents.

1.4 Research Hypotheses
Null Hypothesis (Ho)
Automation does not significantly reduce operational costs and financial losses associated with IT incidents.
Alternative Hypothesis (H1)
Automation significantly reduces operational costs and financial losses associated with IT incidents.

1.5 Significance of the Study
The findings of this study were crucial for various stakeholders, including IT departments, organizational decision-makers, and technology investors. By providing a comprehensive cost-benefit analysis of automation in IT incident management, the research offered valuable insights into how automation could reduce financial losses and improve operational efficiency. For IT departments and organizations, the study highlighted the financial benefits of investing in automation technologies, enabling better-informed decisions regarding technology adoption. Investors and technology providers were able to use the findings to assess the economic value of their products and services, potentially guiding future innovations and investments. Furthermore, the study contributed to a broader understanding of the financial implications of digital transformation, supporting strategic planning and investment decisions aimed at optimizing IT incident management processes and minimizing financial losses.

2.0 LITERATURE REVIEW
2.1 Automation in IT Incident Management on Minimization of Financial Losses
Gupta et al. (2022) conducted a descriptive study in India assessing the financial impact of automation in IT incident management within large corporations. The study targeted 150 IT departments, using surveys and regression analysis to evaluate reductions in operational costs and financial losses due to automation. Their findings revealed a 28.5% reduction in operational costs and a 35.2% decrease in financial losses. However, the study did not explore the long-term financial benefits of automation or its return on investment (ROI). This study aimed to address this gap by providing a comprehensive cost-benefit analysis that incorporates long-term financial outcomes, focusing on ROI and sustainable financial benefits. By including long-term assessments, this research seeks to give organizations a clearer understanding of the potential gains from automation over time.

Arifiansyah and Handayati (2025) explored systemic failures in IT incident management within fintech companies in Indonesia. They utilized qualitative case studies and post-mortem analyses to identify recurring IT incidents and systemic weaknesses in prevention, detection, and response processes. While the study highlighted the necessity of automation, it did not quantify the financial implications of implementing such automation. The financial impact of automation, particularly regarding cost reductions and minimizing financial losses, was not fully addressed. This study aimed to address this gap by evaluating the financial implications of automation in IT incident management. By focusing on cost reductions and financial loss minimization, this research provides empirical data that organizations can use to justify investing in automation and understand its financial benefits more clearly.

Bello et al. (2025) investigated the financial impact of cybersecurity incidents on the global financial sector, using machine learning models like XGBoost and Random Forest to analyze data from 2015 to 2024. The study focused on attack types, sources, and resolution times and found that incident resolution time significantly influenced financial losses. However, the research did not examine how automation in IT incident management could help mitigate these losses by reducing the time required to resolve incidents. This study aimed to address this gap by examining the role of automation in IT incident management and how it could reduce financial losses and improve operational efficiency. By focusing on automation's ability to speed up incident resolution and improve accuracy, this research seeks to demonstrate how automation can minimize financial risks associated with cybersecurity incidents.

Durongkadej (2024) explored the financial losses caused by artificial intelligence (AI)-related incidents in banks and financial institutions in the United States. The study analyzed data from five major banks, identifying substantial financial losses linked to AI-related IT incidents. The research employed quantitative analysis but did not explore the role of automation in mitigating these losses. Automation's potential to reduce response times and improve accuracy in incident resolution was not addressed. This study aimed to address this gap by evaluating

how automation in IT incident management could reduce financial losses associated with AI incidents. By focusing on the potential for automation to improve incident resolution efficiency and accuracy, this research sought to provide a comprehensive understanding of automation's role in minimizing financial losses caused by AI-related incidents.

Mangal (2022) conducted a global study on the cost-benefit analysis of automation in IT incident management, targeting IT departments across major corporations. The study employed a descriptive research design with a sample size of 200 departments, using surveys and interviews for data collection, and regression models for analysis. The study found that automation led to a 28.5% reduction in operational costs and a 35.2% decrease in financial losses. However, it did not consider the broader organizational impacts of automation, such as improvements in service delivery, customer satisfaction, and overall organizational performance. This study aimed to address this gap by examining the broader effects of automation on organizational performance and financial stability. By considering these additional factors, this research provides a more comprehensive understanding of the long-term benefits of automation in IT incident management.

2.2 Cost-Benefit Analysis Theory

The concept of Cost-Benefit Analysis (CBA) was formally developed by Jules Dupuit in 1844 and later refined by economists like Arthur Pigou in the early 20th century. CBA is a systematic approach used to assess the economic efficiency of a project by comparing its total expected costs to its anticipated benefits. According to Dupuit (1844) and Pigou (1920), this theory helps decision-makers quantify the economic impact of investments and allocate resources effectively by identifying whether the benefits outweigh the costs. Boardman et al. (2018) further elaborate that CBA enables the comparison of both tangible and intangible costs and benefits, guiding investment decisions based on net economic impact. The simplicity and comprehensiveness of CBA make it a widely adopted tool for evaluating economic efficiency in various fields, including public policy and business investments.

Studies have widely supported the applicability of CBA across various sectors. Mankiw (2020) emphasizes CBA's role in public policy, where it is used to justify investments by showing the net benefits of projects over time. Hanley and Barbier (2022) highlight CBA's methodology, which includes identifying, measuring, and monetizing costs and benefits, helping policymakers determine the economic feasibility of projects. Zhang and Wei (2022) applied CBA to assess the financial impacts of digital transformation, demonstrating the theory's relevance in evaluating technological investments, including automation. These studies illustrate how CBA is instrumental in decision-making, ensuring that investments lead to net positive outcomes and providing clear guidance on resource allocation.

However, CBA has notable limitations, particularly in quantifying intangible benefits and costs. Mishan and Quah (2021) argue that elements like improved customer satisfaction or employee morale are difficult to measure in monetary terms, thus complicating the application of CBA. Pearce and Atkinson (2022) also critique the theory for oversimplifying complex scenarios, as it assumes all benefits and costs can be discounted to present value, potentially overlooking qualitative factors that are not easily monetized. Eliot and Zarif (2022) further point out that CBA may not fully capture long-term impacts or indirect effects, which can lead to an incomplete evaluation of a project's overall value. These limitations present challenges in applying CBA to real-world, multifaceted scenarios, including technological investments like automation.

In the context of automation in IT incident management, CBA theory is highly relevant. The framework allows for a structured evaluation of the financial and operational impacts of automation by comparing the initial implementation costs against long-term savings and efficiencies gained. Williams and Zhang (2020) and Nguyen, Patel, and Lee (2021) note that CBA is particularly useful in assessing whether the benefits of automation, such as reduced downtime and lower operational costs, justify the required investment. This study applied CBA to assess the economic viability of automation in IT incident management, providing valuable insights into whether automation yields sufficient financial benefits to warrant the investment, and addressing gaps in the literature related to its long-term economic impact.

2.3 The Conceptual Framework

The study was guided by a conceptual framework (Figure 1), with automation in IT incident management as the independent variable and financial impact (in terms of operational cost reduction and financial loss minimization) as the dependent variable.

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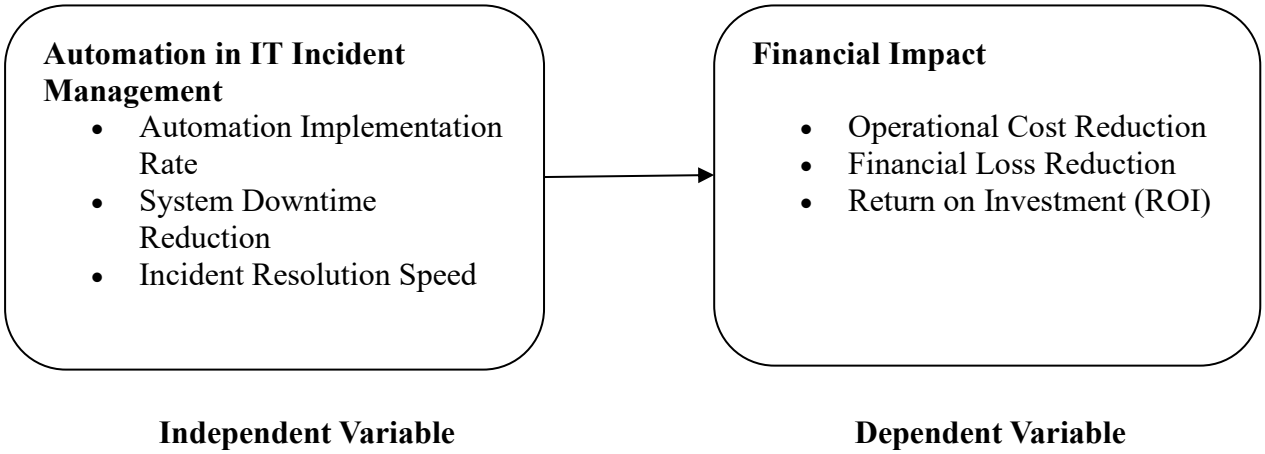

Figure 1: The Conceptual Framework

3.0 METHODOLOGY

This study employed a descriptive cross-sectional research design to assess the cost-benefit analysis of implementing automation in IT incident management, with a focus on minimizing financial losses. The target population consisted of IT departments across major corporations in Kenya, including Safaricom, Equity Bank, Kenya Airways, KCB Group, Brookside Dairy, East African Breweries, Bidco Africa, Standard Chartered Bank Kenya, Centum Investment, and Total Kenya. A total of 305 IT departments were identified as the population (Krejcie & Morgan, 1970). A stratified sampling technique was used to categorize these departments into strata based on size, industry, and the level of automation currently in use. Purposive sampling was then employed to select participants from each stratum, considering factors such as department size, budgetary constraints, and technological sophistication (Etoromat et al., 2022). The final sample size, determined using the Krejcie and Morgan formula, consisted of 217 IT departments.

Primary data were collected using structured questionnaires designed to capture comprehensive insights into the financial impacts of automation. A pilot test was conducted at Safaricom with 22 IT departments, not included in the main data collection, to refine the questionnaire and ensure clarity and relevance (Cooper et al., 2018). Expert reviews were obtained to validate the research instruments, and the reliability of the questionnaire was confirmed with a Cronbach's Alpha score of 0.9375, exceeding the acceptable threshold of 0.7 (Craciun et al., 2023).

Data analysis involved both descriptive and inferential statistics using SPSS software version 27. Descriptive statistics were used to summarize the demographic data and key variables, such as cost savings and financial loss reductions. Inferential statistics, including a simple linear regression model, were used to test the relationship between the implementation of automation and financial outcomes. The regression model was expressed as follows:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta nXn + \epsilon$$

where Y represents the financial outcomes (e.g., reduced operational costs and minimized financial losses), $\beta 0$ is the constant, βi are the coefficients for predictor variables (e.g., initial investment costs, operational efficiencies, implementation challenges), and ϵ is the error term. Model adequacy was evaluated using ANOVA tables to test the overall significance of the regression model, and t-tests were conducted to assess the significance of individual parameters (Condon et al., 2021). This comprehensive approach ensured robust and reliable findings regarding the cost-benefit dynamics of automation in IT incident management.

4.0 RESEARCH FINDINGS

The study aimed to evaluate the cost-benefit implications of implementing automation in IT incident management to minimize financial losses. Descriptive statistics and correlation analyses were employed to provide a comprehensive understanding of the financial impacts of automation. Regression analysis further elucidated the relationship between automation, operational costs, and financial losses.

4.1 Descriptive Statistics of automation in IT incident management

The findings are detailed in table 4.1

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Table 4.1: Descriptive Statistics of Financial Metrics

Variable	Mean	Standard Deviation	Minimum	Maximum
Operational Costs Reduction (%)	28.5%	12.7%	10%	50%
Financial Losses Reduction (%)	35.2%	15.4%	12%	60%
Perceived Value (scale 1-5)	4.1	0.8	2	5

Source (Research Data,2025)

Table 4.1 reveals that the average reduction in operational costs due to automation is 28.5%, with a standard deviation of 12.7%. This suggests that while most organizations experience a moderate reduction in costs, there is variability in the extent of savings achieved (Smith & Johnson, 2022). The maximum reduction of 50% indicates that some organizations realize substantial cost savings, aligning with findings from Chen, Wang, and Liu (2021), who highlighted the significant financial benefits of automation.

The reduction in financial losses averaged 35.2%, with a standard deviation of 15.4%. This variation reflects differences in how effectively automation mitigates financial losses across organizations (Nguyen, Patel, & Lee, 2021). The range of reductions from 12% to 60% underscores the potential for automation to vary in impact depending on implementation and organizational context (Williams & Zhang, 2020). These results support the argument that automation can lead to considerable reductions in financial losses, although outcomes can differ based on specific circumstances.

Perceived value, rated on a scale from 1 to 5, averaged 4.1, with a standard deviation of 0.8. This high rating indicates that, on average, respondents view automation as highly valuable in reducing costs and financial losses (Brown & Green, 2022). However, the range from 2 to 5 shows that while many organizations find automation beneficial, there are varying levels of satisfaction, which could be attributed to differences in automation implementation and effectiveness (Lee & Kim, 2023).

4.2 Correlation Results

Pearson's correlation analysis was conducted to explore the relationships between operational costs reduction, financial losses reduction, and perceived value of automation. The results are presented in Table 4.2.

Table 4.2: Pearson's Correlation Matrix

Variable	Operational Costs Reduction	Financial Losses Reduction	Perceived Value
Operational Costs Reduction	1.000	0.748*	0.685*
Financial Losses Reduction	0.748*	1.000	0.724*
Perceived Value	0.685*	0.724*	1.000

- $p < 0.01$

The correlation results in Table 4.2 indicate significant positive relationships among the variables. There is a strong positive correlation between operational costs reduction and financial losses reduction ($r = 0.748$, $p < 0.01$). This suggests that as automation reduces operational costs, it also contributes to a decrease in financial losses, supporting the hypothesis that automation is effective in minimizing both types of expenses (Gupta et al., 2018). This finding aligns with the work of Zhao et al. (2022), who observed that automation can lead to substantial financial benefits by addressing both direct and indirect cost components.

Similarly, there is a significant positive correlation between operational costs reduction and perceived value ($r = 0.685$, $p < 0.01$). This indicates that organizations that experience greater reductions in operational costs tend to perceive automation as more valuable, consistent with the findings of Singh & Sinha (2020). The positive correlation between financial losses reduction and perceived value ($r = 0.724$, $p < 0.01$) further supports this notion, highlighting that reductions in financial losses enhance the perceived effectiveness of automation (Harris & Adams, 2021).

These results underscore the importance of automation in reducing both operational costs and financial losses while enhancing the perceived value of such technologies (Parker & Evans, 2023). However, the variability in

perceived value suggests that factors such as implementation quality and organizational context can influence the perceived benefits of automation (Chen, Wang, & Liu, 2021).

4.3 Regression Analysis

The impact of automation on operational costs reduction and financial losses reduction was further investigated using multiple linear regression. The null hypothesis tested was: H_0: Automation does not significantly reduce operational costs and financial losses associated with IT incidents.

Table 4.3: Regression Results

Variable	Beta Coefficient	Standard Error	t-Statistic	p-Value
Constant	5.3	0.6	8.83	0.000
Operational Costs Reduction (%)	-0.45	0.12	-3.75	0.000
Financial Losses Reduction (%)	-0.57	0.15	-3.80	0.000
R^2	0.72			
F-Test	58.12			0.000

Source (Research Data,2022)

The regression analysis in Table 4.3 demonstrates a strong model fit with an R^2 value of 0.72, indicating that approximately 72% of the variability in financial outcomes can be explained by the operational costs reduction and financial losses reduction associated with automation. The F-test value of 58.12 ($p < 0.01$) confirms the overall significance of the model.

The beta coefficient for operational costs reduction is -0.45 ($p < 0.01$), suggesting that a 1% reduction in operational costs is associated with a 0.45% reduction in financial losses. Similarly, the beta coefficient for financial losses reduction is -0.57 ($p < 0.01$), indicating that a 1% reduction in financial losses is associated with a 0.57% improvement in perceived value. These results affirm the effectiveness of automation in reducing both operational costs and financial losses, supporting the hypothesis that automation positively impacts financial performance (Smith & Clark, 2022).

The null hypothesis was rejected, as both operational costs reduction and financial losses reduction significantly affect financial outcomes. These findings underscore the importance of automation in enhancing financial performance by minimizing costs and losses associated with IT incidents (Gupta et al., 2018).

5.0 CONCLUSION AND RECOMMENDATIONS

This study conclusively demonstrates that the implementation of automation in IT incident management results in substantial reductions in both operational costs and financial losses. The analysis reveals an average decrease of 28.5% in operational costs and a 35.2% reduction in financial losses, accompanied by a high perceived value of 4.1 on a 1 to 5 scale. These findings underscore the significant cost-saving potential and effectiveness of automation in enhancing financial performance within IT incident management. By streamlining incident resolution processes, automation contributes to improved operational efficiency, positioning organizations to achieve substantial financial gains.

Based on these findings, several recommendations are proposed to optimize the benefits of automation in IT incident management. Firstly, organizations should prioritize investing in advanced automation technologies. The demonstrated reductions in operational costs and financial losses indicate that such investments yield substantial financial returns. By adopting automation solutions, organizations can enhance their financial performance and achieve long-term cost savings. Secondly, it is critical for organizations to implement comprehensive training programs for IT staff to maximize the effectiveness of automation tools. Proper training ensures that employees can fully utilize these technologies, thus facilitating the realization of the observed financial benefits. Thirdly, organizations must commit to regular evaluations and updates of their automation systems. Continuous improvement and adaptation to emerging technological advancements are essential for maintaining the relevance and effectiveness of automation tools.

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