



Influence of Risk Management Practices on Performance of Digitalization Projects. A Case of Electronic Billing Machine Version 2.1 Project in Nyaruguru District, Rwanda (2022 – 2025)

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Abstract: *The digitalization of tax administration in Rwanda is currently hampered by a 16% technical failure rate within the systems themselves. This study examined the influence of risk management practices on performance of Electronic Billing Machine Version 2.1 Project in Nyaruguru District. A descriptive and correlational research design was adopted using both quantitative and qualitative approaches. The study population consisted of 753 individuals directly associated Electronic Billing Machine Version 2.1 in Nyaruguru District. Thereafter, simple random sampling was applied within each stratum to select the proportionally allocated to 261 sample size. The coefficient results showed that risk identification had a positive and significant influence on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District ($B = 0.190$, $t = 4.6341$, $p = 0.000$), risk analysis had the strongest positive and significant influence ($B = 0.425$, $t = 9.8837$, $p = 0.000$), risk mitigation also had a positive and significant influence ($B = 0.163$, $t = 4.4054$, $p = 0.000$), and risk monitoring had a positive and significant influence ($B = 0.213$, $t = 4.9535$, $p = 0.000$). The study concluded that risk identification, risk analysis, risk mitigation, and risk monitoring significantly improve the performance of Electronic Billing Machine Version 2.1. The study recommended that Rwanda Revenue Authority should strengthen systematic risk analysis and continuous monitoring mechanisms to ensure timely detection, prioritization, and response to risks affecting Electronic Billing Machine Version 2.1 in Nyaruguru District.*

Keywords: *risk management practices, risk identification, risk analysis, risk mitigation, risk monitoring, performance of digitalization projects, Electronic Billing Machine Version 2.1.*

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1. Introduction

Digital transformation in tax administration has reshaped how governments collect, enforce, and manage tax systems by deploying digital tools that increase automation, accuracy, and taxpayer engagement.

Historically, tax administrations moved from paper-based systems to electronic filing platforms, and more recently to integrated digital ecosystems with real-time reporting and analytics capabilities. This evolution reflects broader shifts toward data-driven governance that optimize administrative efficiency and compliance outcomes. Tax digitization encompasses technologies

such as e-invoicing, digital record keeping, automated return processing, and online taxpayer portals. Global frameworks now encourage the adoption of these digital systems as part of modern governance and revenue administration reforms (OECD, 2025).

The European Union initiated comprehensive tax modernization through the VAT in the Digital Age (ViDA) reform, which was approved in 2025 to introduce real-time digital reporting and structured e-invoicing across Member States. The reform aims to reduce the persistent VAT Gap and harmonize tax compliance procedures across borders, integrating digital tax infrastructure with administrative oversight. This transitional framework allows EU Member States to adopt mandatory e-invoice standards, replacing traditional VAT reporting with automated digital systems. ViDA represents a significant evolution in how European jurisdictions manage indirect taxes, leveraging digital technology to strengthen compliance, transparency, and revenue mobilization across diverse economies (European Commission, 2025).

In the United States, tax administration modernization has been progressively supported by advanced technologies that improve operational efficiency, compliance, and service delivery, including initiatives to integrate artificial intelligence and blockchain to support risk detection and data integrity. The U.S. experience reflects how digital innovation can be harnessed to enhance compliance accuracy and reduce administrative burdens, while simultaneously requiring robust governance and oversight frameworks to manage data privacy, system security, and algorithmic fairness (Adelekan et al., 2024).

In Tanzania, digital tax administration systems have been adopted to enhance taxpayer interactions, with electronic platforms facilitating compliance and return submissions that previously relied on manual processes. Research on Tanzanian digital tax tools shows that electronic filing systems contribute to improved tax compliance among small and medium enterprises, with statistical evidence indicating significant associations between digital tax system use and compliance outcomes. These initiatives align digital infrastructure development with broader goals to enhance tax administration effectiveness, streamline regulatory processes, and support the government's revenue mobilization efforts in the digital era (Mbise & Baseka, 2025).

Rwanda's digital tax reforms form part of the national strategy to transform public finance management through mandatory adoption of electronic tax filing and payment systems, including Electronic Billing Machines (EBMs) mandated across retail sectors. The government's digital agenda emphasizes improved tax compliance, enhanced efficiency, and administrative transparency. Evidence from digital tax implementation in Rwanda indicates increased adoption of digital

payment channels and improved data collection, although challenges related to connectivity and digital literacy among taxpayers remain significant (ICTD, 2023).

Performance of digital projects within Rwanda's taxation system is central to achieving the country's digital governance and public finance modernization goals. However, district-level digital taxation implementation continues to face operational, technical, monitoring, and connectivity challenges that can affect reliability, compliance accuracy, and user satisfaction. No empirical study has specifically analyzed how risk identification, risk analysis, risk mitigation, and risk monitoring influence performance of digital taxation projects in Rwanda, particularly in the context of Electronic Billing Machine Version 2.1 implementation in Nyaruguru District. While national digital reforms are well documented, district-level performance determinants remain underexplored. This study therefore sought to bridge that gap by examining how structured risk management practices influence performance of digital taxation projects using EBM Version 2.1 in Nyaruguru District.

The general objective of this study was to examine the influence of risk management practices on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District. The specific objectives were:

1. To assess the influence of risk identification on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.
2. To examine the influence of risk analysis on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.
3. To evaluate the influence of risk mitigation on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.
4. To determine the influence of risk monitoring on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.

2. Literature Review

This section reviews the theoretical and empirical literature that supported the study variables and guided interpretation of the relationship between risk management practices and performance of digital taxation projects.

2.1 Theoretical Review

The theoretical review explains the theories used to connect risk identification, risk analysis, risk mitigation, and risk monitoring with performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.

2.1.1 Theory of Change

Theory of Change was formally articulated by Carol Weiss in 1995 in her work on program theory within evaluation research. She introduced the concept to explain how explicit assumptions about causal linkages between activities and outcomes improve program effectiveness. The theory provides a causal pathway linking inputs, activities, outputs, outcomes, and long-term impact. It emphasizes explicit articulation of assumptions underlying interventions. Theory of Change is widely applied in development programs and public sector reforms to explain performance mechanisms (Mayne, 2022).

The theory proposes that structured interventions produce predictable results when logical sequences between activities and outcomes are clearly defined. It requires identification of intermediate outcomes that lead to desired performance changes. By mapping cause–effect relationships, organizations strengthen accountability and monitoring systems. Digital project environments benefit from clearly articulated change pathways to prevent implementation ambiguity. Structured causal mapping enhances transparency and performance predictability (Mayne, 2022).

In this study, Theory of Change guided examination of how risk identification, analysis, mitigation, and monitoring logically contribute to improved performance of digital taxation projects. The study assessed whether structured risk management practices create measurable improvements in operational reliability and implementation efficiency of EBM Version 2.1 Project.

2.1.2 Resilience Theory

Resilience Theory originated from ecological systems research introduced by C.S. Holling in 1973, where resilience was defined as the capacity of systems to absorb disturbances and reorganize while undergoing change. The theory later expanded into organizational and technological contexts to explain how systems maintain stability under uncertainty. It emphasizes adaptability and recovery capacity rather than mere resistance to disruption. Within organizational theory, resilience refers to the ability of institutions to anticipate, withstand, and recover from operational shocks. Digital systems frequently operate in volatile technological environments characterized by integration complexity and infrastructure dependency. Resilience Theory therefore underscores the importance of structured governance and adaptive management in sustaining system performance. Proactive monitoring and continuous learning strengthen resilience capacity (Duchek, 2020).

This study applied Resilience Theory to examine whether structured risk management practices enhance

stability and recovery capacity of digital taxation projects. The research assessed how risk governance contributes to maintaining operational continuity and performance reliability of EBM Version 2.1 in Nyaruguru District.

2.1.3 Goal-Setting Theory

Goal-Setting Theory was developed by Edwin Locke in 1968 and later expanded by Locke and Latham in 1990 to explain how specific and challenging goals influence performance outcomes. The theory posits that clearly defined objectives enhance motivation, effort, persistence, and task focus. It argues that measurable goals improve performance more effectively than vague directives. The theory emphasizes commitment, goal difficulty, and feedback as key determinants of performance effectiveness. Organizations that align managerial practices with defined performance targets demonstrate stronger operational consistency. In digital transformation contexts, structured goals strengthen governance discipline and implementation efficiency. Empirical evidence consistently supports positive linkage between clear goals and improved performance metrics (Seijts & Latham, 2022).

This study utilized Goal-Setting Theory to examine whether structured risk management practices contribute to achieving defined performance indicators in digital taxation projects. The research evaluated how risk governance supports attainment of measurable operational objectives in EBM Version 2.1 Project.

2.1.4 Technology Acceptance Model (TAM)

The Technology Acceptance Model was introduced by Fred Davis in 1986 to explain determinants of information system adoption. TAM identifies perceived usefulness and perceived ease of use as primary predictors of technology acceptance behavior. The model has been extensively applied in digital governance and ICT implementation research to understand user-system interaction. The theory also integrates behavioral intention as a mediator between perception and actual system use. In public digital projects, sustained usage influences overall system reliability and performance outcomes. Effective governance structures must therefore address both technological and behavioral components. Contemporary research continues to apply TAM in evaluating digital transformation initiatives (Kraus et al., 2023).

In this study, Technology Acceptance Model supported analysis of how user interaction with digital taxation systems influences operational performance. The research assessed whether structured risk management indirectly strengthens performance by enhancing implementation clarity and usability conditions in EBM Version 2.1 Project.

2.2 Empirical Review

The empirical review presents previous studies related to the four specific objectives and shows how risk management practices have been associated with digital project performance in different contexts.

2.2.1 Risk Identification and Performance of Digital Projects

A study conducted in India by Saha and Nath (2022) examined the influence of structured risk identification practices on performance of digital public finance systems within the Goods and Services Tax Network. The objective was to determine whether early risk detection improved system stability and compliance efficiency. The researchers employed a quantitative survey design involving 214 tax officers and used multiple regression analysis. Results showed that structured risk identification had a significant positive effect on system uptime and compliance accuracy ($\beta = 0.41$, $p < 0.05$). The study concluded that early mapping of technical and operational risks enhanced implementation reliability. The authors recommended embedding structured risk identification protocols during digital taxation project planning phases (Saha & Nath, 2022).

Lepp and Tamm (2023) investigated the role of proactive risk recognition in sustaining performance of e-government taxation platforms in Estonia. The study aimed to assess how early detection of technological vulnerabilities influenced digital service continuity. Using mixed methods, the researchers analyzed system performance data and conducted interviews with 38 ICT administrators. Findings indicated that risk identification mechanisms reduced service interruption incidents by 27 percent and improved transaction processing accuracy. The study concluded that structured identification procedures strengthened digital platform reliability. It recommended formalizing risk scanning tools within tax system governance frameworks (Lepp & Tamm, 2023).

A Nigerian study by Adegboye and Yusuf (2024) evaluated how risk identification practices affected operational performance of electronic tax filing systems. The objective focused on identifying managerial determinants of system efficiency. The researchers used a survey of 276 tax administrators and applied structural equation modeling. Results demonstrated that risk identification significantly predicted digital system functionality ($r = 0.52$, $p < 0.01$). The authors concluded that structured documentation of potential vulnerabilities improved performance outcomes. They recommended continuous environmental scanning and technical risk audits during digital tax implementation (Adegboye & Yusuf, 2024).

2.2.2 Risk Analysis and Performance of Digital Projects

Alalwan (2023) investigated performance drivers of digital government service projects in Middle Eastern public administrations, examining how risk analysis practices shape delivery outcomes. The study used a mixed-method approach involving survey data from ICT project stakeholders and regression analysis to test predictive relationships. Results revealed that structured risk analysis significantly influenced perceived project success, particularly in system functionality and quality compliance dimensions. The author concluded that digital public projects require analytical control mechanisms to maintain operational stability under technological complexity. The study recommended strengthening formal risk evaluation tools during implementation of government ICT initiatives (Alalwan, 2023).

Ouma, Sang, and Kinoti (2022) examined risk analysis as a project risk management practice and its effect on performance of information technology projects in Kenyan commercial banks, where delivery slippage and functionality shortfalls have been persistent concerns. The study aimed to establish whether systematic risk analysis predicts performance variations when projects run under operational and regulatory pressures. Using a survey approach, the authors collected questionnaire data and applied multiple regression analysis using SPSS, supported by diagnostic tests for core regression assumptions. The findings indicated that risk analysis had significant effects on IT project performance in the banking sector, aligning performance outcomes with the strength of analytical risk work conducted during delivery. The authors concluded that risk analysis contributes to stronger predictability and control, improving delivery discipline in complex digital initiatives (Ouma *et al.*, 2022).

Niragire and Kwena (2024) assessed how project risk management practices influence project success in Rwanda and produced results that directly quantify the contribution of risk analysis within a multi-variable model. The model reported $R^2 = 0.664$, indicating that the included risk management predictors jointly explained 66.4% of variance in project success, with overall model significance supported by ANOVA results of $F = 88.67$ and $p = 0.000$. Risk analysis showed a positive and statistically significant coefficient of $B = 0.087$ with $p = 0.013$, demonstrating that strengthening analysis practices improved project success, even though its effect size was weaker than some other predictors. The authors recommended more standardised analytical approaches to strengthen delivery predictability (Niragire & Kwena, 2024).

2.2.3 Risk Mitigation and Performance of Digital Projects

Do, Tran, and Nguyen (2022) investigated how mitigation-oriented adoption support influences outcomes of e-tax system implementation among

Vietnamese enterprises. The objective was to test whether adoption acts as a pathway through which positive system attitudes translate into compliance-related performance improvements. The researchers used survey data from enterprises and applied mediation analysis to estimate relationships between attitude, adoption, and compliance behaviour. Results showed that adoption significantly mediated the relationship, meaning mitigation actions that increase adoption readiness can improve the reliability of digital tax operations and associated performance measures. The authors concluded that risk mitigation for digital tax projects should include user enablement strategies, not only technical controls (Do et al., 2022).

A study on the Kenya Trade Portal assessed how risk management practices contribute to e-government project performance, using an explanatory design and structured questionnaires among 125 staff members. The authors modelled project performance as a function of technological integration, stakeholder involvement, monitoring and evaluation, and risk management. The regression results showed that risk management had the strongest effect on project performance compared with the other project management practices. Specifically, the standardised coefficient for risk management was $\beta = 0.751$ with $t = 10.279$ and $p = 0.000$, indicating a strong and statistically significant contribution. The paper recommended structured and proactive risk controls to prevent disruption and sustain delivery quality in digital government platforms (Mutinda & Ngugi, 2024).

Evidence from Nairobi City County examined risk management in ICT projects implemented through public private partnerships, focusing on how project management practices influence implementation outcomes. Their results indicated that risk management was a positive and statistically significant driver of ICT project implementation. The estimated coefficient for risk management was $\beta = 0.400$ with $t = 6.099$ and $p = 0.000$, suggesting that stronger mitigation planning and response readiness improved implementation results. The authors concluded that allocating resources to risk response and mitigation reduces operational interruptions and supports delivery continuity in ICT partnerships (Ouma & Sakwa, 2023).

2.2.4 Risk Monitoring and Performance of Digital Projects

In South Africa, Marnewick (2023) investigated governance maturity and monitoring mechanisms in public sector ICT projects to assess their influence on delivery stability. The study applied survey-based quantitative analysis among government ICT project managers and used multiple regression modelling. Results showed that monitoring practices significantly influenced schedule adherence and reduced rework rates in digital projects. The regression coefficient for monitoring was positive and statistically significant, with

overall model significance supported by F-statistics at $p < 0.05$. The study concluded that monitoring maturity strengthens accountability and performance predictability in public digital programmes (Marnewick, 2023).

A European cross-country analysis of e-government transformation projects examined how real-time monitoring dashboards affect digital service performance. The researchers used structural equation modelling on survey responses from public administration managers across 12 EU countries. The findings revealed that performance monitoring capability significantly influenced service continuity and user satisfaction, with path coefficients statistically significant at $p < 0.01$. Projects using automated performance dashboards experienced measurable improvements in system uptime and reduced incident escalation rates. The authors recommended institutionalising digital performance dashboards in government ICT governance frameworks (Tangi et al., 2023).

Research in Indonesia evaluated provincial e-government projects to determine whether structured monitoring practices influence implementation efficiency. The study used quantitative data from 102 digital initiatives and applied hierarchical regression analysis. Results showed that monitoring explained 41% of the variance in digital project success, with $R^2 = 0.410$ and $p = 0.000$. Projects applying routine progress audits and system health checks demonstrated stronger cost control and delivery discipline. The authors concluded that systematic monitoring reduces uncertainty during digital transformation initiatives and recommended strengthening institutional monitoring capacity to enhance performance sustainability (Putri & Pratama, 2024).

3. Methodology

This section presents the methodological procedures used to examine the influence of risk management practices on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.

3.1 Research Design

This study adopted a descriptive and correlational research design using quantitative and qualitative approaches. The descriptive component described existing risk management practices within the EBM Version 2.1 project. The correlational component determined the statistical relationship between risk identification, risk analysis, risk mitigation, risk monitoring, and project performance.

3.2 Study Population and Sample Size

The study population consisted of 753 individuals directly associated with implementation and operational use of Electronic Billing Machine Version 2.1 in Nyaruguru District. The sample size was determined using Slovin's formula with a 5% margin of error, resulting in 261 respondents. Proportional allocation produced 18 RRA officers, 8 tax declaration licensed tax agents, and 235 registered EBM users.

Thereafter, simple random sampling was applied within each stratum to select the proportionally allocated sample size. This procedure ensured unbiased and proportionate representation of managerial and user categories in Nyaruguru District.

3.3 Data Collection Instruments and Procedures

This study used documentation review, structured questionnaires, and interviews. The questionnaire measured risk identification, risk analysis, risk mitigation, risk monitoring, and project performance using a five-point Likert scale. Documentation review covered project reports, implementation schedules, risk registers, and performance monitoring reports related to EBM Version 2.1.

3.4 Validity and Reliability

Validity was ensured through review of questionnaire items by project management experts and the supervisor. The Content Validity Index was computed to assess adequacy of each item, and all constructs scored a CVI of 1.00. Reliability was tested through Cronbach's Alpha using SPSS Version 29. Risk identification recorded 0.784, risk analysis 0.812, risk mitigation 0.768, risk monitoring 0.754, and project performance 0.803, confirming that the research instrument was reliable.

3.5 Data Analysis

Quantitative data were analyzed using SPSS Version 29. Descriptive statistics summarized responses using means and standard deviations. Inferential statistics, including Pearson correlation and multiple regression, tested predictive relationships at a significance level of $p \leq 0.05$. Qualitative data were analyzed using thematic analysis to support interpretation of quantitative findings.

The regression model was structured as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where Y = Performance of Electronic Billing Machine Version 2.1, β_0 = constant, X_1 = risk identification, X_2 = risk analysis, X_3 = risk mitigation, X_4 = risk monitoring, β_1 – β_4 = coefficients of the model, and ε = error term.

3.6 Ethical Considerations

Ethical considerations were observed throughout the research process. Permission to collect data was sought from University of Kigali and Rwanda Revenue Authority before approaching respondents. Participation was voluntary, and respondents were informed about the purpose of the study before data collection. Confidentiality and privacy were maintained by avoiding unnecessary disclosure of respondent identities. The information collected was used only for academic purposes.

4. Results and Discussion

This section presents the response rate, descriptive summary, documentary performance results, normality test, correlation analysis, regression analysis, and hypothesis decisions. The response rate showed that 244 questionnaires out of 261 were returned, representing 93.49%, while 17 questionnaires representing 6.51% were unreturned. This response rate was adequate for analysis because most selected respondents participated in the study.

Table 1: Response Rate

Category	Frequency	Percent
Returned	244	93.49
Unreturned	17	6.51
Total	261	100.00%

Source: Field data, 2026

Table 1 indicates that the returned questionnaires were 244, representing 93.49%, while the unreturned questionnaires were 17, representing 6.51%. This means that the study obtained sufficient data to examine risk

management practices and performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.

4.1 Descriptive analysis

Descriptive findings showed high levels of agreement across the risk management variables and project performance. Risk identification recorded an overall mean of 4.23 and standard deviation of 0.471. Risk analysis recorded an overall mean of 4.22 and standard deviation of 0.463. Risk mitigation recorded an overall mean of 4.14 and standard deviation of 0.378. Risk monitoring recorded an overall mean of 4.24 and standard deviation of 0.462. Project performance recorded an overall mean of 4.17 and standard deviation

of 0.440. These findings show strong agreement and generally homogeneous responses among respondents.

4.2 Correlation Analysis

Correlation analysis was conducted to examine the strength and direction of the relationship between each risk management practice and performance of Electronic Billing Machine Version 2.1 in Nyaruguru District. Pearson correlation coefficient was used because the data were normally distributed.

Table 2: Correlations

		Risk Identification	Risk Analysis	Risk Mitigation	Risk Monitoring	Performance of Project
Risk Identification	Pearson Correlation	1	.587**	.645**	.615**	.718**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	244	244	244	244	244
Risk Analysis	Pearson Correlation	.587**	1	.530**	.608**	.776**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	244	244	244	244	244
Risk Mitigation	Pearson Correlation	.645**	.530**	1	.655**	.700**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	244	244	244	244	244
Risk Monitoring	Pearson Correlation	.615**	.608**	.655**	1	.735**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	244	244	244	244	244
Performance of Project	Pearson Correlation	.718**	.776**	.700**	.735**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	244	244	244	244	244

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Field data, 2026

Table 2 shows that all four risk management practices had positive and statistically significant relationships with performance of Electronic Billing Machine Version 2.1. Risk identification had $r = 0.718$ and $p = 0.000$, risk analysis had $r = 0.776$ and $p = 0.000$, risk mitigation had $r = 0.700$ and $p = 0.000$, and risk monitoring had $r = 0.735$ and $p = 0.000$. Risk analysis had the strongest correlation with performance, followed by risk monitoring, risk identification, and risk mitigation. The findings agree with Saha and Nath (2022), who found that structured risk identification improves stability and compliance accuracy in digital public finance systems.

4.3 Regression Analysis

Regression analysis was conducted to determine the influence of risk identification, risk analysis, risk mitigation, and risk monitoring on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District. The model summary table showed the combined relationship and the proportion of variation in project performance explained by the independent variables.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.880 ^a	.774	.770	.18726	1.647

a. Predictors: (Constant), Risk Monitoring, Risk Analysis, Risk Identification, Risk Mitigation
b. Dependent Variable: Performance of Project

Source: Field data, 2026

Table 5 indicates that the model had an R value of 0.880, showing a strong combined relationship between risk

identification, risk analysis, risk mitigation, risk monitoring, and performance of the project. The R

Square value of 0.774 means that 77.4% of the variation in performance of Electronic Billing Machine Version 2.1 was explained by the four risk management practices. The Durbin-Watson statistic of 1.647 shows that there was no serious autocorrelation problem. The model summary is supported by Hopkin (2022), who argued

that risk management protects project performance and sustainability, and by Fraser and Simkins (2023), who explained that risk management becomes a performance-enabling function when institutionalized within project governance.

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.665	4	7.166	204.743	.000 ^b
	Residual	8.381	239	.035		
	Total	37.047	243			

a. Dependent Variable: Performance of Project

b. Predictors: (Constant), Risk Monitoring, Risk Analysis, Risk Identification, Risk Mitigation

Source: Field data, 2026

Table 4 indicates that the regression model was statistically significant, with $F = 204.743$ and $p = 0.000$. Since the significance value was less than 0.05, the overall model was suitable for predicting the performance of Electronic Billing Machine Version 2.1 in Nyaruguru District. The ANOVA result confirms that

risk identification, risk analysis, risk mitigation, and risk monitoring jointly influence project performance. The finding is aligned with Hillson (2023), who stated that risk management should be integrated into governance systems, and with Bromiley et al. (2023), who argued that structured risk governance strengthens the ability to manage complexity.

Table 5: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.	Collinearity Statistics	
	B	Std. Error	Beta	t		Tolerance	VIF
1 (Constant)	.042	.151		.2781	.784		
Risk Identification	.190	.041	.209	4.6341	.000	.477	2.095
Risk Analysis	.425	.043	.409	9.8837	.000	.552	1.810
Risk Mitigation	.163	.037	.200	4.4054	.000	.472	2.117
Risk Monitoring	.213	.043	.227	4.9535	.000	.455	2.198

a. Dependent Variable: Performance of Project

Source: Field data, 2026

Table 5 indicates that risk identification had $B = 0.190$, $t = 4.6341$, and $p = 0.000$. This means that risk identification had a statistically significant positive influence on performance of Electronic Billing Machine Version 2.1. Risk analysis had $B = 0.425$, $t = 9.8837$, and $p = 0.000$, making it the strongest predictor of project performance. Risk mitigation had $B = 0.163$, $t = 4.4054$, and $p = 0.000$, while risk monitoring had $B = 0.213$, $t = 4.9535$, and $p = 0.000$. Since all p values were below 0.05, all four practices had statistically significant positive influence on project performance. The coefficient findings are consistent with Chapman and Ward (2023), who linked risk analysis to prioritization and response planning, and with Do et al. (2022), who

showed that mitigation-oriented adoption support improves digital tax operations.

Based on the coefficient results, the regression equation was written as: Performance of Electronic Billing Machine Version 2.1 = $0.042 + 0.190$ Risk Identification + 0.425 Risk Analysis + 0.163 Risk Mitigation + 0.213 Risk Monitoring + ϵ .

4.4 Decision on Null Hypotheses

The decision on each null hypothesis was made using the 0.05 level of significance. A null hypothesis was rejected when the p value was less than 0.05.

Table 6: Decision on Null Hypotheses

Null Hypothesis	Statistical Evidence	Decision
H01: There is no significant influence of risk identification on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.	$p = 0.000$	Rejected
H02: There is no significant influence of risk analysis on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.	$p = 0.000$	Rejected
H03: There is no significant influence of risk mitigation on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.	$p = 0.000$	Rejected
H04: There is no significant influence of risk monitoring on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.	$p = 0.000$	Rejected

Table 6 shows that all four null hypotheses were rejected because their p values were 0.000, which is less than 0.05. This means that risk identification, risk analysis, risk mitigation, and risk monitoring each had a statistically significant influence on performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.

5. Conclusion and Recommendations

This section presents the conclusion, recommendations, and suggestions for further research based on the findings on risk management practices and performance of Electronic Billing Machine Version 2.1 in Nyaruguru District.

5.1 Conclusion

The study concluded that risk management practices play an important role in improving the performance of Electronic Billing Machine Version 2.1 in Nyaruguru District. Risk identification, risk analysis, risk mitigation, and risk monitoring all had positive and statistically significant influence on project performance. The findings show that better management of risks supports system reliability, timely implementation, cost efficiency, and technical quality.

The study further concluded that risk analysis is the strongest predictor of project performance. Accurate probability scoring, impact rating, severity ranking, exposure estimation, and risk prioritization help project administrators make better decisions and respond to threats before they weaken Electronic Billing Machine Version 2.1 operations. Risk monitoring also contributes strongly by supporting continuous tracking, alert reporting, variance review, and compliance checks.

Risk identification and risk mitigation were also essential for improving project performance. Early risk scanning, threat listing, stakeholder mapping, vulnerability scanning, and risk registering support early detection of threats, while response planning, control allocation, contingency budgeting, risk avoidance, and corrective

deployment reduce technical glitches and operational interruptions.

5.2 Recommendations

1. Rwanda Revenue Authority and district authorities should strengthen routine risk identification mechanisms for Electronic Billing Machine Version 2.1 through regular risk scanning, updated threat listing, stakeholder mapping, vulnerability scanning, and proper documentation of all challenges affecting system operations.
2. Project administrators should improve risk analysis practices before making decisions related to Electronic Billing Machine Version 2.1. This should include clear probability scoring, impact rating, severity ranking, exposure estimation, and prioritization of risks according to their possible effect on project performance.
3. Rwanda Revenue Authority should strengthen risk mitigation strategies to reduce technical glitches and operational interruptions through stronger response planning, contingency budgeting, control allocation, risk avoidance, and rapid corrective actions whenever system errors occur.
4. District tax officers and system support teams should improve continuous risk monitoring of Electronic Billing Machine Version 2.1 by conducting regular tracking, alert reporting, variance review, compliance checks, and risk-register updates to ensure that emerging risks are addressed on time.

5.3 Suggestions for Future Researchers

Future researchers may conduct a study on the influence of digital literacy on compliance with Electronic Billing Machine systems in Rwanda. Another study may examine the effect of taxpayer training on effective use of Electronic Billing Machine systems in rural districts. Future researchers may also assess the influence of

technical support on performance of Electronic Billing Machine systems.

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