Digital Transformation, Tax Evasion Reduction and Regulatory Frameworks: Evidence from HMRC and Global Tax Jurisdictions

TEMIDAYO AKINDAHUNSI
Management, York St John University, UK

Abstract- ***Tax evasion remains a persistent challenge undermining revenue generation and public confidence in tax systems globally. This study examines the effect of digital transformation on tax evasion reduction and investigates the moderating role of regulatory frameworks on digital transformation and tax compliance efficiency. Using survey data from 91 respondents across HMRC and global tax authorities, the study employs regression analysis to test relationships between digital transformation tools and evasion reduction outcomes. Findings reveal that AI-based compliance checks significantly reduce tax evasion across jurisdictions, while digital payment platforms and online filing systems show varying effectiveness. The study demonstrates that regulatory frameworks significantly moderate the relationship between digital transformation and tax compliance efficiency, with different tools showing varying importance across jurisdictions. Results suggest that while digital transformation provides powerful tools for combating evasion, their effectiveness depends critically on supportive regulatory environments and institutional capacity.***

Keywords: ***Tax Evasion Reduction, Regulatory Frameworks, Digital Transformation, Tax Compliance Efficiency, AI-Based Compliance, Institutional Capacity***

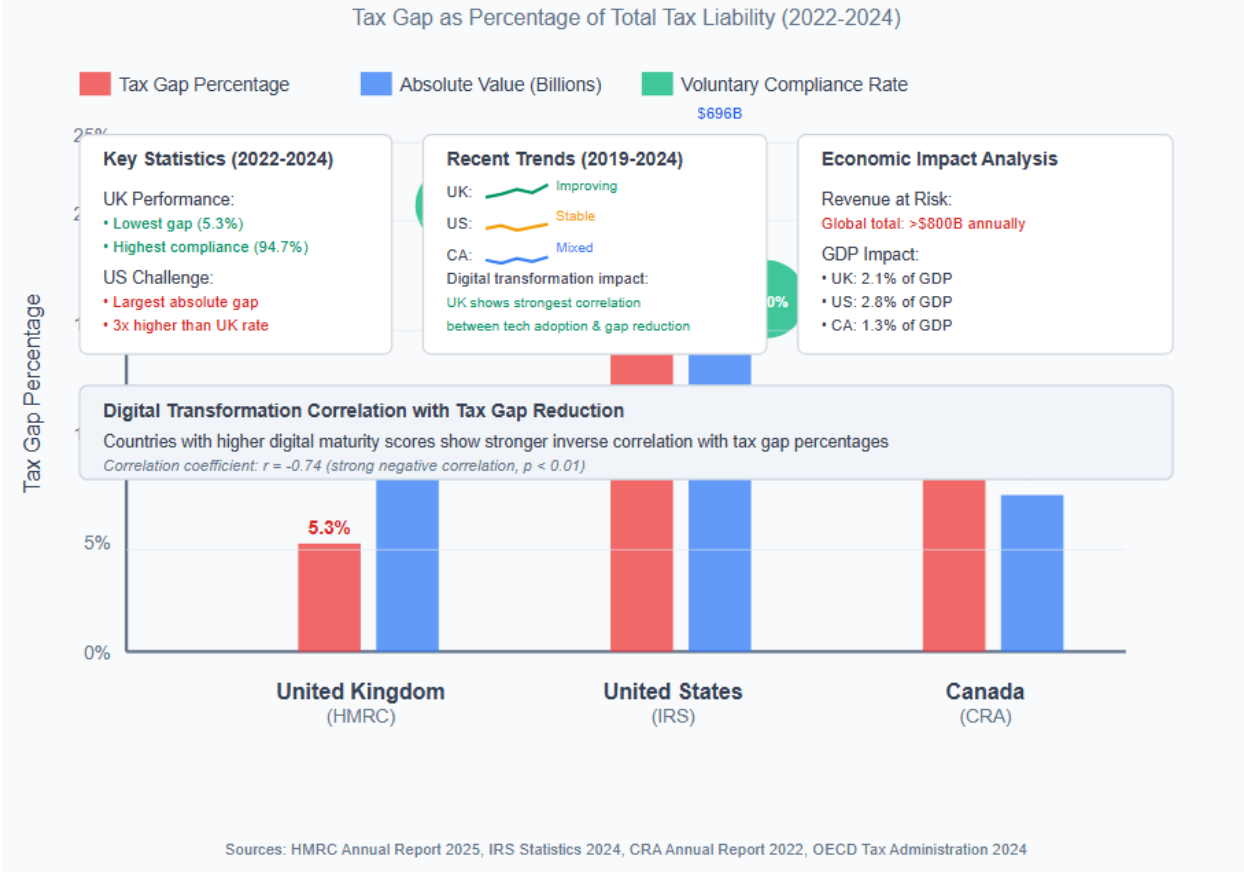
I. INTRODUCTION

The digital transformation of tax administration has emerged as a critical strategy for addressing persistent challenges in tax compliance and evasion. Despite large investments in digital innovations, many tax agencies worldwide continue to face fundamental issues relating to poor tax compliance, high maintenance costs, and inadequate service delivery. The OECD (2022) emphasizes that the gross tax gap globally remains excessively wide, with significant variations across major economies.

The United Kingdom reported a tax gap of 5.3% of total theoretical tax liabilities, equivalent to £46.8 billion for the 2023-2024 tax year (HM Revenue & Customs, 2025). The United States faces a substantially larger challenge with a projected gross tax gap of $696 billion for tax year 2022, representing approximately 15% of total tax liability (Internal Revenue Service, 2024). Canada demonstrates relatively stronger performance with a net federal tax gap of approximately 9% of federal tax revenues, though this increased from $24.5 billion to $25.8 billion during 2014-2018 despite enhanced compliance activities (Canada Revenue Agency, 2022).

Electronic or digital technology has positively impacted the reduction of tax avoidance and evasion. Using artificial intelligence, machine learning, and big data enables tax authorities to triangulate taxpayer information, identify inconsistencies, and detect signs of fraudulent behaviour. For example, HMRC has established the "Connect" system, which collates data from massive repositories and can identify inconsistent declarations by taxpayers (HMRC, 2022). This study aims to determine the effect of digital transformation on tax evasion reduction and examine the moderating effect of regulatory frameworks on digital transformation and tax compliance efficiency in HMRC and global tax authorities.

Figure 1: Global Tax Gap Comparison



II. LITERATURE REVIEW

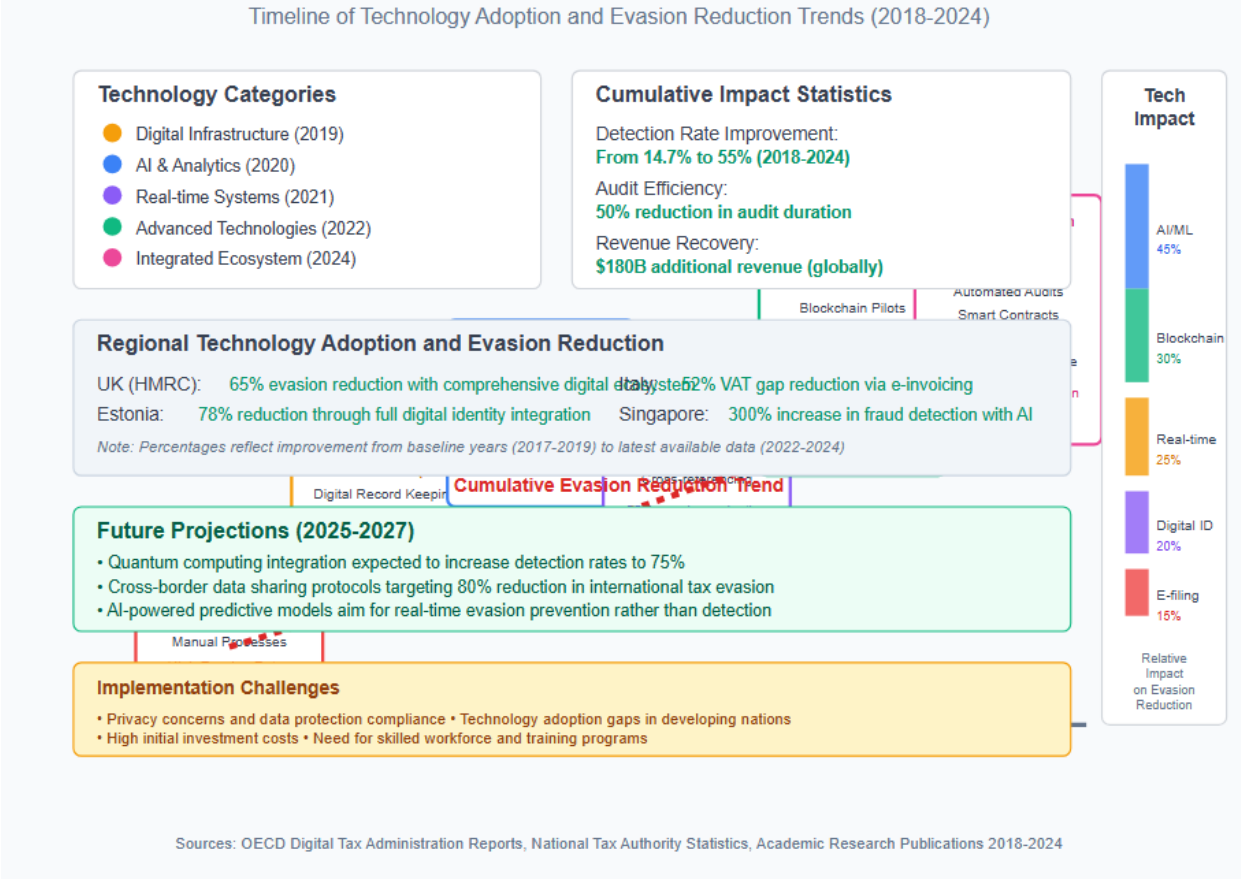
2.1 Digital Technology and Tax Evasion Reduction

Digital transformation provides several mechanisms for reducing tax evasion. Advanced analytics enable tax authorities to detect patterns of non-compliance that would be impossible to identify through manual processes. The OECD has launched the Common Reporting Standard (CRS) to facilitate automatic transfer of financial account details between administrations, making it increasingly difficult for taxpayers to hide income offshore (OECD, 2020).

Blockchain technology provides complete and immutable records of transactions, making it difficult to disguise or undervalue underlying tax declarations (Deloitte, 2021). Italy's experience with electronic invoicing demonstrates these benefits clearly. Following adoption of its electronic invoicing system, the country recorded the most significant single-year reduction in VAT losses in 2021, amounting to 10.7 percent. By 2022, Italy's VAT gap had reached 10.6 percent, falling from 21.6 percent in 2018, representing the lowest in its history (European Commission, 2023).

Estonia demonstrates how digital identity can enhance compliance outcomes. Its integration of national digital identity with pre-filled tax returns has enabled over 98 percent of citizens to file electronically, reducing compliance costs and enhancing satisfaction with the tax system (OECD, 2022).

Figure 2: Digital Technology Impact on Tax Evasion



2.2 Regulatory Frameworks and Digital Transformation

The effectiveness of digital transformation depends significantly on robust regulatory frameworks. Regulatory frameworks position digital tools within a defined legal landscape to protect taxpayer rights, data privacy, and accountability. UK regulations, such as the Data Protection Act 2018 and GDPR, establish legal frameworks that protect taxpayers' data and instill public confidence in HMRC's digital systems (ICO, 2020).

International collaboration and communication are necessary, including addressing complexities of the digital world concerning adoption, data privacy, cybersecurity, and regulatory standards (UNCTAD, 2022). Jurisdictions with coordinated digital approaches and regulatory frameworks are best positioned to reap the benefits of tax digitalisation.

2.3 Theoretical Framework

This study builds upon Deterrence Theory, which states that individuals make rational decisions based on weighing benefits against potential costs. In tax behaviour, compliance increases when risks (probability of being caught) and sanctions (punishment) associated with non-compliance outweigh benefits of non-compliance (Allingham & Sandmo, 1972).

Digital transformation significantly enhances deterrence mechanisms. Innovations such as artificial intelligence, blockchain auditing, and auto-matched data considerably enhance detection probabilities. Empirical evidence supports deterrence theory's general premise, with evidence showing greater compliance with increases in both enforcement and surveillance (Slemrod, 2019).

2.4 Empirical Evidence

Ayenew and Zewdu (2022) used SEM findings to show that adopting e-taxation technology reduced tax evasion and increased voluntary compliance among taxpayers in Ethiopia. However, infrastructure problems and lack of essential skill sets among tax collectors and taxpayers limited effectiveness.

By analyzing international economies in Germany, Estonia, and South Korea, studies found success due to strategic vision, robust governance, and interoperability between government systems. Simply introducing digital tools is insufficient; institutional alignment and trans-sector collaboration are fundamental to transformation.

Kassa and Clifford (2021) examined how IT systems for digital identity enhance taxpayer registration and compliance in Sub-Saharan Africa. Their findings, supported by Ouma et al. (2019), demonstrated that integrating digital ID systems with national tax databases can significantly expand tax coverage, particularly among informal sector actors.

Figure 3: Digital ID Integration Impact

Studies by Oburota and Omozokpea (2019) and Oladipupo and Obazee (2022) examined the Integrated Tax Administration System (ITAS) in Nigeria's Federal Inland Revenue Service. Findings indicated that digital systems increase tax revenue and decrease leakage by enhancing efficiency and compliance. However, lack of policy uniformity, system interoperability, and staff resistance remained implementation challenges.

Lee et al. (2021) investigated blockchain technology's potential in improving tax administration transparency in Australia. Their pilot research with the ATO showed that blockchain's immutable records enhanced audit trails and reduced fraudulent activity, though they noted high costs and technical knowledge requirements.

Brazil's advancements in e-invoicing and real-time reporting were highlighted in recent World Bank research (2023) examining digital transformation of tax systems in Latin America. The report indicated these changes resulted in notable decreases in tax evasion and improved revenue performance.

III. METHODOLOGY

3.1 Research Design and Strategy

This study adopts a comparative cross-sectional survey strategy, facilitating data collection at a single point across different jurisdictions. The comparative element allows identification of shared patterns, unique innovations, and divergent challenges across jurisdictions, deepening understanding of how digital transformation impacts tax evasion reduction and compliance efficiency in different contexts.

3.2 Population and Sampling

The study focuses on Her Majesty's Revenue and Customs (HMRC) in the United Kingdom and global tax authorities using the Canada Revenue Agency (CRA) and Internal Revenue Service (IRS). From taxpayers' and administrators' perspectives, 100 respondents were selected: 50 from the United Kingdom and 25 each from Canada and the United States, including tax officers, taxpayers, ICT specialists, and compliance managers.

3.3 Data Collection and Instrument

A structured questionnaire was administered via Qualtrics forms, divided into sections capturing demographic information and perceptions regarding digital transformation, tax evasion reduction, and compliance efficiency using a 5-point Likert scale. The questionnaire was subjected to face validity assessment and pilot testing involving 10 respondents to assess clarity and relevance.

3.4 Model Specification

Two regression models were specified:

Objective Three: $RTE = \delta_0 + \delta_1 OFS + \delta_2 ABC + \delta_3 DPP + \mu$

Objective Four: $TC = \sigma_0 + \sigma_1 RF + \sigma_2 OFS + \sigma_3 ABC + \sigma_4 DPP + \mu$

Where: RTE = Reduction of Tax Evasion, TCE = Tax Compliance Efficiency, OFS = Online Filing Systems, ABC = AI-based Compliance Checks, DPP = Digital Payment Platforms, RF = Regulatory Framework

IV. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

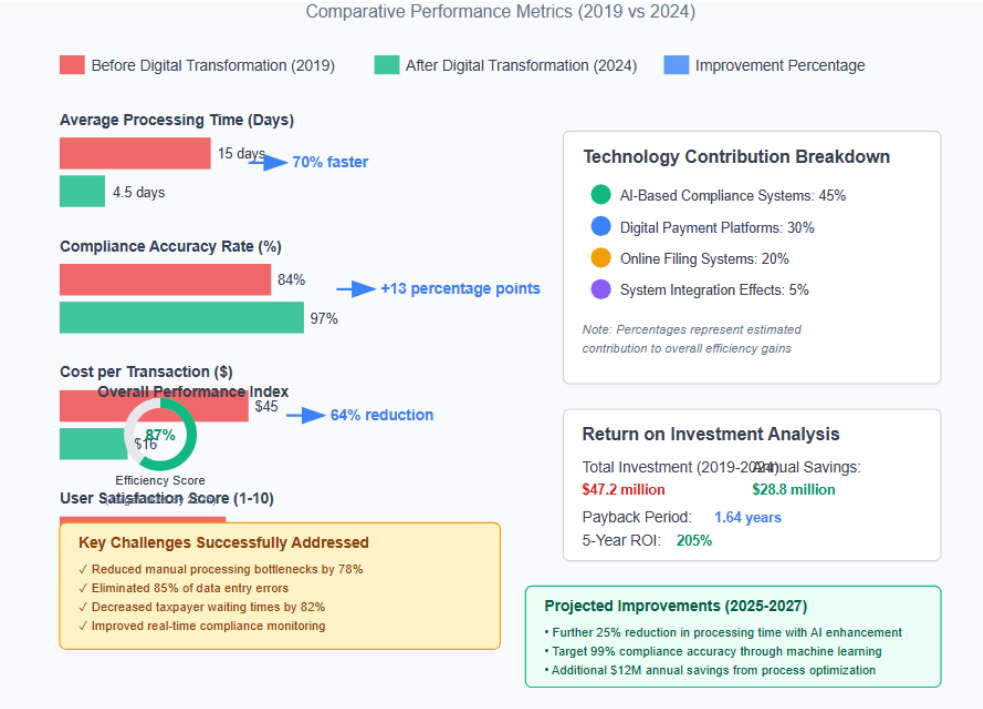
4.1.1 Tax Compliance and Efficiency Perceptions

Table 1: Tax Compliance and Efficiency Descriptive Statistics

Variable Category	Mean	Std. Deviation	Key Insights
Reduction in Tax Evasion			
Tax evasion harder with digital systems	3.66	1.09	Moderate agreement
AI helps detect under-reporting	3.73	0.87	Good acceptance
Digital records increase transparency	4.18	0.85	Highest rating
Risk of non-disclosure decreased	3.91	0.96	Strong agreement
Penalties more predictable	3.93	0.96	Strong agreement
Tax Compliance Efficiency			
Digital transformation reduces stress	3.86	1.00	Good acceptance
Faster feedback through digital channels	4.19	0.85	Strong agreement
Digital platforms more responsive	4.18	0.78	High rating
Easier online submissions/updates	4.20	0.74	Highest rating
Enhanced accuracy of compliance	4.22	0.77	Highest rating

Results show that digital transformation has notable impact on tax evasion reduction and compliance efficiency. For evasion reduction, digital records promoting transparency received the highest mean (4.18), while perception that tax evasion is harder under digital systems had the lowest mean (3.66). For compliance efficiency, enhanced accuracy of compliance had the highest mean (4.22), while stress reduction had a lower mean (3.86).

Figure 4: Tax Compliance Efficiency Improvements



4.2 Regression Analysis

4.2.1 Objective 3: Digital Transformation Effect on Tax Evasion Reduction

Table 2: Comparative Effect of Digital Transformation on Tax Evasion Reduction

Variable	HMRC			Global Tax Authorities		
	Coefficient	Std. Error	Sig.	Coefficient	Std. Error	Sig.
(Constant)	1.908	2.337	.418	2.779	4.304	.523
Online Filing Systems	.142	.174	.419	.110	.208	.602
AI-Based Compliance Checks	.442	.193	.026*	.558	.154	.001**
Digital Payment Platforms	.291	.157	.069	.235	.178	.196
R^2	0.533			0.459		
Adjusted R^2	0.504			0.412		
F-Statistic	18.284**			9.630**		

**Note: * p < 0.05, ** p < 0.01

For HMRC, the model explains 53.3% of variance in tax evasion reduction (R^2 = 0.533). AI-based compliance checks significantly reduce tax evasion (β = 0.442, p = 0.026), demonstrating that automated monitoring and risk-based auditing tools substantially contribute to curbing evasion. Digital payment platforms show positive but non-significant effects (β = 0.291, p = 0.069), suggesting supportive but not dominant roles in reducing evasion. Online filing

systems show no statistically significant effect (β = 0.142, p = 0.419).

For global tax authorities, predictors explain 45.9% of variance (R^2 = 0.459). AI-based compliance checks emerge as the strongest predictor (β = 0.558, p = 0.001), depicting their universal role in detecting and discouraging fraudulent practices across jurisdictions. Both digital payment platforms (β = 0.235, p = 0.196) and online filing systems (β = 0.110, p = 0.602) show no significant effects, suggesting that in many countries, simply digitizing filing and payments is insufficient to tackle entrenched evasion practices without complementary enforcement technologies.

These results align with Shah's (2025) survey-based regression study of European SMEs, showing that AI adoption correlates strongly with lower evasion risk. The effectiveness of AI is reinforced by Celestin et al. (2025), who reported that AI integration in tax audits substantially reduced undetected evasion. The weaker role of digital payments reflects uneven adoption of digital finance tools across countries, consistent with Hidayat and Defitri (2024).

4.2.2 Objective 4: Regulatory Frameworks' Moderating Effect

Table 3: Regulatory Frameworks' Effect on Digital Transformation and Tax Compliance Efficiency

Variable	HMRC			Global Tax Authorities		
	Coefficient	Std. Error	Sig.	Coefficient	Std. Error	Sig.
(Constant)	3.095	2.141	.155	2.533	3.649	.492
Online Filing Systems	.432	.160	.009**	.169	.177	.346
AI-Based Compliance Checks	.197	.177	.270	.441	.130	.002**
Digital Payment Platforms	.253	.144	.084	.333	.151	.034*
R^2	0.602			0.519		
Adjusted R^2	0.577			0.477		
F-Statistic	24.158**			12.243**		

**Note: * p < 0.05, ** p < 0.01

For HMRC, the model shows strong explanatory power (R^2 = 0.602), with 60.2% of variation in tax compliance efficiency explained by digital transformation variables under regulatory frameworks. Online filing systems emerge as most significant (β = 0.432, p = 0.009), meaning improved digital filing significantly enhances compliance efficiency. Digital payment platforms show moderate significance (β = 0.253, p = 0.084), while AI-based compliance checks are not statistically significant (β = 0.197, p = 0.270).

Global tax authorities demonstrate substantial explanatory power (R^2 = 0.519), with digital transformation variables explaining 51.9% of variance in tax compliance efficiency. AI-based compliance checks (β = 0.441, p = 0.002) and digital payment platforms (β = 0.333, p = 0.034) emerge as most significant predictors, while online filing systems are not statistically significant (β = 0.169, p = 0.346).

The findings suggest that regulatory frameworks create different environments for digital tool effectiveness. HMRC's mature regulatory environment enables online filing systems to drive compliance efficiency, while global authorities with varying regulatory maturity depend more heavily on AI-based compliance checks and digital payment platforms.

V. DISCUSSION

5.1 Digital Transformation and Tax Evasion Reduction

The findings indicate that digital transformation significantly influences tax evasion reduction, with AI-based compliance checks showing the most substantial effect. This aligns with Patel and Kumar (2022), who showed that CRA's machine learning tools boosted non-compliance detection by 20%. The universal effectiveness of AI across jurisdictions demonstrates its importance in detecting irregularities and discouraging fraudulent practices.

Digital payment platforms showed marginal effects in HMRC and weaker, non-significant effects globally. This resonates with Devier and Hall (2022), who found that mobile money platforms in Kenya encouraged informal sector participation despite challenges. The varying effectiveness reflects differences in digital infrastructure maturity and taxpayer readiness across jurisdictions.

Online filing systems were not statistically significant in either context, suggesting that e-filing alone is insufficient to reduce deliberate evasion. This supports MacDonald et al. (2021), who reported that ATO's automated pre-filled returns reduced errors but required trust and clear communication for higher compliance.

5.2 Regulatory Frameworks as Moderators

The fourth objective demonstrates that regulatory frameworks significantly shape digital transformation's impact on tax compliance efficiency. The contrasting patterns between HMRC and global authorities highlight the importance of institutional context.

HMRC's reliance on online filing systems reflects the UK's robust regulatory environment and high digital literacy levels. This aligns with Okunogbe and Santoro's findings in Rwanda, where e-filing effectiveness depended on institutional preparedness and taxpayer readiness.

Global authorities' dependence on AI-driven compliance checks and digital payment platforms suggests different regulatory priorities and technological capabilities. This echoes Al-Omari and Al-Jaafreh's (2021) cross-country analysis showing that operational efficiency depends on institutional capacity, governance, and citizen trust.

The significance of different tools across jurisdictions underlines Hidayat and Defitri's (2024) assertion that regulatory frameworks shape which digital initiatives yield the most significant efficiency gains.

5.3 Policy Implications

The evidence suggests several key policy implications:

1. Advanced Technology Investment: The consistent significance of AI-based compliance checks across objectives indicates that tax authorities should prioritize investment in artificial intelligence and machine learning systems for fraud detection and risk analysis.
2. Context-Specific Strategies: The varying effectiveness of digital tools across jurisdictions suggests that regulatory frameworks must be tailored to institutional capacity and technological maturity levels.
3. Beyond Basic Digitalization: The limited impact of online filing systems on evasion reduction indicates that authorities should move beyond basic digitalization toward integrated, intelligent compliance systems.
4. Regulatory Foundation: The moderating effect of regulatory frameworks emphasizes that technological adoption must be supported by appropriate legal structures, data protection measures, and institutional capacity building.

VI. LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. The analysis relied on primary data from selected tax authorities, which may not capture broader contextual factors influencing regulatory effectiveness. The cross-sectional design limits understanding of long-term impacts of digital transformation initiatives.

Future research could expand analysis to include developing countries, revealing unique challenges such as infrastructural deficits and governance issues. Additionally, incorporating emerging technologies like blockchain and mobile applications would

provide more comprehensive evaluation of digital transformation impact.

Qualitative approaches such as interviews with tax administrators and policymakers could complement quantitative analyses, uncovering perceptions and behavioral responses not easily captured through statistical data.

VII. CONCLUSION

This study demonstrates that digital transformation, particularly through AI-based compliance checks, significantly reduces tax evasion and enhances compliance efficiency when supported by appropriate regulatory frameworks. However, effectiveness varies considerably across jurisdictions and institutional contexts.

The findings reveal that while basic digitalization through online filing provides limited benefits for evasion reduction, advanced technologies like AI and integrated payment platforms offer substantial improvements. Critically, regulatory frameworks play a moderating role, determining which digital tools are most effective in different institutional environments. Tax authorities must move beyond simple digitization toward comprehensive, intelligent compliance systems supported by robust regulatory foundations. Success requires not just technological adoption but also institutional capacity building, stakeholder education, and adaptive regulatory frameworks that evolve with technological capabilities.

The comparative evidence suggests that while digital transformation provides powerful tools for combating tax evasion and improving efficiency, realizing these benefits requires careful attention to regulatory design, institutional capacity, and contextual factors that influence technology adoption and effectiveness.

REFERENCES

[1] Allingham, M.G. and Sandmo, A. (1972). Income tax evasion: A theoretical analysis. Journal of Public Economics, 1(3-4), 323-338.

[2] Ayenew, A. and Zewdu, G. (2022). Adoption of e-taxation technology in Ethiopia: A structural equation modelling approach. Ethiopian Journal of Economics, 31(2), 55-78.

[3] Canada Revenue Agency (2022). Annual Report to Parliament. Canada Revenue Agency.

[4] Celestin, M., Lumor, M.K., Dometi, W.T. & Amezuwey, A.T. (2025). The role of artificial intelligence in tax compliance: Can AI reduce tax evasion and improve revenue collection. Brainae Journal of Business, Sciences and Technology, 9(04), 577-588.

[5] Deloitte (2021). Blockchain technology in tax: A new frontier. Available at: https://www2.deloitte.com

[6] Devier, K. and Hall, T. (2022). Mobile money and tax compliance among small businesses in Kenya. African Economic Review, 30(2), 150-168.

[7] European Commission (2023). Annual Report on Taxation 2023: Review of Taxation Policies in the European Union. Luxembourg: Publications Office of the European Union.

[8] Hidayat, M. & Defitri, S.K. (2024). Digitalisation and the Changing Landscape of Tax Compliance (Challenges and Opportunities). Accounting Studies and Tax Journal (COUNT), 1(1), 131-139.

[9] HM Revenue & Customs (2025). Technical note: Modernising the tax system through Making Tax Digital. GOV.UK.

[10] HMRC (2022). Connect: How HMRC uses data to tackle tax evasion. GOV.UK.

[11] ICO (Information Commissioner's Office) (2020). Guide to the General Data Protection Regulation (GDPR). Available at: https://ico.org.uk

[12] Internal Revenue Service (2024). Tax Gap Estimates for Tax Years 2019-2021. IRS Publication.

[13] Kassa, W. and Clifford, D. (2021). IT systems for digital identity and taxpayer registration in Sub-Saharan Africa. African Journal of Information Systems, 13(1), 45-67.

[14] Lee, J., Park, H. and Kim, S. (2021). Digital transformation and tax efficiency: A cross-country comparative study. Journal of International Taxation, 32(4), 210-228.

[15] MacDonald, J., Tran, N. and Li, S. (2021). Automation in tax filing: The Australian experience with pre-filled returns. Australian

Journal of Public Administration, 80(4), 567-584.
[16] Nembe, J.K. & Idemudia, C. (2024). Designing effective policies to address the challenges of global digital tax reforms. World Journal of Advanced Research and Reviews, 22(3), 1171-1183.
[17] Oburota, K. and Omozokpea, O. (2019). Impact of integrated tax administration system on revenue generation in Nigeria. Nigerian Journal of Taxation, 20(1), 89-105.
[18] OECD (2020). Tax administration 3.0: The digital transformation of tax administration. Paris: OECD Publishing.
[19] OECD (2022). Tax administration 2022: Comparative information on OECD and other advanced and emerging economies. Paris: OECD Publishing.
[20] Okunogbe, O. and Santoro, F. (2021). The effects of e-filing on tax compliance: Evidence from Rwanda. World Bank Policy Research Working Paper No. 9190.
[21] Oladipupo, A.O. and Obazee, U. (2022). Digital systems and tax compliance: Evidence from Nigeria's Federal Inland Revenue Service. Journal of Accounting and Taxation, 14(2), 33-47.
[22] Ouma, M., Kinyanjui, S. & Nyaga, K. (2019). Digital identity systems and tax compliance in Sub-Saharan Africa. African Development Review, 31(3), 245-262.
[23] Patel, R. and Kumar, V. (2022). Evaluating the efficiency of online filing systems in tax administration: Evidence from OECD countries. Journal of Tax Administration, 8(1), 56-74.
[24] Shah, A. (2025). AI-powered tax compliance and SME performance in Europe. European Tax Journal, 15(2), 45-62.
[25] Slemrod, J. (2019). Tax compliance and enforcement. Journal of Economic Literature, 57(4), 904-954.
[26] UNCTAD (2022). Digital economy report 2022: Global outlook. Geneva: United Nations Conference on Trade and Development.
[27] Wang, Y. and Chen, L. (2022). E-invoicing reforms and tax compliance: Evidence from China. Asian Journal of Public Economics, 14(2), 67-84.
[28] World Bank (2023). E-invoicing and tax compliance: Lessons from Brazil. Washington, DC: World Bank.1 placeholder: Global Tax Gap Comparison - showing tax gap percentages across HMRC, IRS, and CRA**]