

Digital transformation and electronic invoicing in Ecuador: impact on the efficiency of tax control and reduction of tax evasion

Transformación digital y facturación electrónica en Ecuador: impacto en la eficiencia del control tributario y la reducción de la evasión fiscal

<https://doi.org/10.47606/ACVEN/PH0522>

Katherine Estefanía Paredes-Sánchez ^{*1}

<https://orcid.org/0000-0002-5113-5971>

keparedess@pucesd.edu.ec

Received: March 21, 2026

Accepted: June 27, 2026

ABSTRACT

Tax digitalization has transformed fiscal control processes through the integration of electronic invoicing, data analytics, and artificial intelligence in tax administration. This study analyzes the relationship between digital tax tools and fiscal control efficiency in Ecuador during the 2020–2025 period. A mixed-methods approach with a non-experimental descriptive-correlational design was employed, combining surveys of 120 tax professionals with semi-structured interviews with tax auditing specialists. Findings revealed significant positive associations between tax digitalization, operational traceability, transparency, and the detection of fiscal inconsistencies. Regression analysis identified electronic invoicing and data analytics as significant predictors of perceived fiscal control efficiency and professionals' perceptions regarding the reduction of tax evasion risks. Qualitative findings highlighted the ORIÓN program as a relevant initiative for strengthening information integration, automated data processing, and institutional tax control capabilities within Ecuador's ongoing digital tax modernization process. The study concludes that tax digitalization represents a strategic mechanism for strengthening fiscal governance and institutional auditing capacity in emerging economies.

Keywords: Tax digital transformation; electronic invoicing; artificial intelligence; data analytics; fiscal control; digital governance.

1. Pontifical Catholic University of Ecuador

* Autor de correspondencia: keparedess@pucesd.edu.ec

RESUMEN

La digitalización tributaria ha transformado los procesos de control fiscal mediante la integración de la facturación electrónica, el análisis de datos y la inteligencia artificial en la administración tributaria. Este estudio analiza la relación entre las herramientas tributarias digitales y la eficiencia del control fiscal en Ecuador durante el período 2020-2025. Se empleó un enfoque mixto, con un diseño no experimental de alcance descriptivo-correlacional, que combinó encuestas aplicadas a 120 profesionales del ámbito tributario con entrevistas semiestructuradas a especialistas en auditoría fiscal. Los hallazgos revelaron asociaciones positivas y significativas entre la digitalización tributaria, la trazabilidad operativa, la transparencia y la detección de inconsistencias fiscales. El análisis de regresión identificó la facturación electrónica y el análisis de datos como predictores significativos de la eficiencia percibida del control fiscal y de las percepciones de los profesionales respecto de la reducción de los riesgos de evasión tributaria. Los hallazgos cualitativos destacaron el programa ORIÓN como una iniciativa relevante para fortalecer la integración de la información, el procesamiento automatizado de datos y las capacidades institucionales de control tributario dentro del proceso continuo de modernización digital tributaria en Ecuador. El estudio concluye que la digitalización tributaria representa un mecanismo estratégico para fortalecer la gobernanza fiscal y la capacidad institucional de auditoría en economías emergentes.

Palabras clave: Transformación digital tributaria; facturación electrónica; inteligencia artificial; análisis de datos; control fiscal; gobernanza digital.

INTRODUCTION

Digital transformation has become a cornerstone of modernizing tax administration systems in Latin America. Over the past decade, technological innovations applied to tax management, including electronic invoicing, automated data exchange, and advanced analytics systems, have redefined the dynamics of tax control, auditing, and compliance. The Organization for Economic Co-operation and Development (OECD) highlights that the digitization of tax systems is an essential mechanism for improving collection efficiency, increasing transparency, and reducing tax evasion through the massive processing of data and the automation of critical processes (OECD, 2022).

In this context, Ecuador has rapidly modernized its Internal Revenue Service (SRI) technology, particularly since 2020, by strengthening electronic invoicing and implementing digital platforms for structured data analysis. This process is consistent with the Tax Administration 3.0 framework proposed by the OECD (2020), which emphasizes the integration of digital ecosystems, real-time information exchange, and automated compliance mechanisms as key components of contemporary tax administration. These advances align with global tax digitization strategies promoted by organizations such as the OECD and the International Monetary Fund (IMF), aimed at improving tax governance and combating tax evasion and avoidance practices that affect the financial sustainability of developing countries (IMF, 2023).

The use of data analytics in Ecuadorian tax administration has become a key tool for identifying risk patterns, inconsistencies, simulated transactions, and other indicators of tax evasion. According to reports from the Ecuadorian Internal Revenue Service (SRI) (2023–2025), digitalization has strengthened control and oversight processes through automatic data matching, taxpayer segmentation by risk level, and timely monitoring of economic transactions. These practices align with the "tax intelligence" approach adopted by various tax administrations in the region, such as Chile, Brazil, and Mexico, where electronic invoicing has been shown to significantly reduce evasion rates for VAT and Income Tax, as well as improve the timeliness of tax collection.

However, digital transformation is not without its challenges. Despite technological advancements, gaps persist in system interoperability, limitations in taxpayers' digital literacy, and difficulties in integrating predictive analytics and machine learning tools into regular control processes (Alm, J., & Soled, J. A, 2025). These limitations can affect the effectiveness of the tax system as a whole and reduce the expected impact in terms of transparency and fiscal efficiency. Recent research indicates that digitalization only produces sustainable improvements when accompanied by adequate change management, continuous training, and a robust technological infrastructure (Garza de la Vega & Romero, 2025; Martínez, 2023).

The digital transformation of taxation can be understood as an institutional modernization process based on the integration of digital technologies aimed at optimizing the management, oversight, and control of tax obligations (Barreix & Velayos, 2021; Barreix & Zambrano, 2018). Under this approach, the efficiency of tax control no longer depends exclusively on traditional audits and shifts toward tax intelligence schemes based on data analytics and massive information processing (Dunleavy et al., 2021; AL-KHALAILEH, 2025). According to Castelo and Barahona (2025), the analysis of digital tax transformation requires understanding how technological tools act as institutional mechanisms capable of strengthening tax governance and reducing opportunities for evasion through intelligent tax oversight models.

Globally, several studies have demonstrated that electronic invoicing plays a transformative role in combating tax evasion. For example, research conducted in Spain, Mexico, and Brazil shows significant increases in tax revenue and improvements in the traceability of business transactions following the mandatory adoption of electronic systems (Kotsogiannis et al., 2025). In Latin America, the Economic Commission for Latin America, and the Caribbean (CIAT, 2023) indicates that tax digitization is a key tool for closing tax gaps, strengthening transparency, and improving the efficiency of public spending.

In Ecuador, although there is a growing body of research on tax collection and the impact of tax reforms, there is still a gap in studies that integrate electronic invoicing, **analytical processing**, and their combined effect on the efficiency of tax control. Most studies focus on regulatory analyses or evaluations of electronic invoicing as an isolated tool, but they do not delve into its interaction with big data processing models or empirically assess its impact on evasion rates during the post-pandemic period. (Bird & Zolt, 2021; Cordella & Paletti, 2021)

This study aims to analyze the relationship between digital tax transformation and professionals' perceptions of fiscal control efficiency in Ecuador, considering electronic invoicing, data analytics, information cross-referencing automation, and artificial intelligence tools applied to tax auditing (Henman, 2021) (Mergel et al., 2019). At a practical level, the results can guide public institutions toward adopting more efficient tax modernization policies and serve as a reference for countries seeking to consolidate sustainable digital tax systems (Criado & Gil-García, 2023). It also provides input for future research related to tax

intelligence, tax risks, predictive models, and financial transparency. Tax digitization represents a strategic opportunity for Ecuador in its objective of consolidating an efficient, modern, and transparent tax system. Analyzing its effects is fundamental to understanding the present and guiding future fiscal control policies.

METHODOLOGY

The study adopted a mixed-methods approach, integrating quantitative and qualitative analysis to comprehensively examine the impact of digital transformation on Ecuadorian tax administration. The quantitative approach measured professional perceptions of the efficiency of tax control resulting from electronic invoicing and the use of analytical processing. The qualitative approach facilitated an understanding of the limitations, risks, and opportunities in the implementation of digital tools by the Internal Revenue Service (SRI). This approach was selected considering the multidimensional complexity of the phenomenon under study, which involves technological, regulatory, organizational, and behavioral aspects related to tax administration and taxpayer compliance. The design was non-experimental, cross-sectional, and descriptive-correlational, as it analyzed existing data from a specific period (2020–2025). The aim was to identify patterns, associations, and trends without manipulating variables, seeking to identify associations between digitalization and levels of tax control efficiency.

The study population consisted of professionals and taxpayers with experience in tax compliance processes and the use of electronic tax systems in Ecuador. Participants were selected based on their familiarity with electronic invoicing, tax reporting procedures, and digital tools implemented by the Internal Revenue Service (SRI). A non-probability convenience sampling strategy was employed due to the exploratory nature of the research and the absence of an accessible sampling frame that would allow for probabilistic selection. The final quantitative sample consisted of 120 participants who voluntarily completed the survey. Selection was based on accessibility and willingness to participate, ensuring that respondents had previous experience with electronic tax procedures and digital tax compliance systems. For the qualitative phase, ten specialists with experience in taxation, tax auditing, and electronic tax systems were intentionally selected to provide expert perspectives on the opportunities, limitations, and challenges associated with tax digitalization in Ecuador. Given the non-probability nature of the sample, the findings should be interpreted as exploratory evidence reflecting the perceptions of the participants included in the study and should not be generalized to the entire population of tax professionals or taxpayers in Ecuador.

Three main techniques were used to gather information. The first was document analysis, which included a review of current tax regulations, SRI management reports, collection statistics, reports on electronic invoicing, publications from international organizations (OECD, CIAT, IMF) (OECD, 2020), and recent scientific literature on tax digitization in Latin America. This technique allowed for contextualizing the technological advances implemented in Ecuador and establishing the theoretical basis of the study. The second technique was a structured survey, administered virtually via a digital form to the selected sample. The instrument included 28 items on a five-point Likert scale, designed to measure perceptions of the efficiency of tax controls, tax risks, transparency, ease of use of electronic systems, and the relationship between digitalization and tax compliance.

Based on the theoretical review and the stated objectives, this study proposes a set of hypotheses aimed at analyzing the relationship between digital tax transformation and the efficiency of tax control in Ecuador. These hypotheses allow for the empirical evaluation of

the effect of digital tools, such as electronic tax systems, **analytical processing**, and automated audit systems, on the tax control processes implemented by the Internal Revenue Service.

H1: The adoption of electronic invoicing has a positive influence on the efficiency of tax control in Ecuador.

H2: The use of tax data analytics is significantly related to risk detection and perceived reduction of tax evasion.

H3: The automation of information cross-referencing improves the traceability and transparency of audited economic operations.

H4: The implementation of tax artificial intelligence tools strengthens the institutional capacity to detect tax inconsistencies.

Table 1. *Operationalization of variables*

Variable	Dimension	Indicator	Items
Digital tax transformation	Electronic invoicing	digital traceability	P1–P5
	Data analytics	risk detection	P6–P10
	Artificial intelligence tools	tax automation	P11–P14
Efficiency of fiscal control	Transparency	tax monitoring	P15–P20
	Auditing	inconsistency detection	P21–P28

The reliability of the questionnaire was assessed using Cronbach's alpha coefficient, applied to the 28 items of the Likert scale. The analysis yielded an **α value of 0.91**, indicating an **excellent level of internal consistency**, according to the methodological criteria established by George and Mallery (2019). This result demonstrates that the items are consistent with each other and adequately measure the proposed dimensions: efficiency of fiscal control, technological adoption, data analytics, tax risk, transparency, and effectiveness of the ORIÓN system. Additionally, content validity was verified by three experts in digital taxation, who confirmed the relevance, conceptual clarity, and alignment of the instrument with the study objectives. Taken together, these procedures guarantee the reliability and technical soundness of the instrument used. The third technique was the semi-structured interview, applied to a small group of 10 tax specialists, to delve deeper into the limitations, challenges, and opportunities of data analytics and electronic invoicing in tax audit processes. It was validated through expert judgment and evaluated based on criteria of credibility, dependability, confirmability, and transferability, following the qualitative standards of Lincoln and Guba (1985).

This paper presents a proposed conceptual model for analyzing the relationship between digital tax transformation and the efficiency of tax control in Ecuador. The model posits that dimensions such as electronic invoicing, data analytics, tax automation, and artificial intelligence in taxation positively influence the institutional capacity for tax oversight, transparency, and the detection of tax inconsistencies. The data collection procedure was carried out in three phases. The first consisted of a literature and regulatory review, which allowed for the identification of preliminary categories for analysis. The second phase involved conducting surveys and interviews over a four-week period, ensuring the confidentiality and anonymity of the participants. The third phase entailed organizing and refining the collected information for systematic analysis.

From a deductive perspective, core categories were derived from the theoretical framework and research objectives, such as efficiency of tax control, reduction of tax evasion, traceability and transparency of operations, and level of adoption of digital tools. Through inductive analysis of the interviews, additional categories emerged related to the professionals' experiences. In addition to descriptive analysis, inferential statistical techniques were applied to evaluate the relationship and explanatory power between the study variables. Initially, Spearman's rank correlation coefficient was used to identify associations between the dimensions of digital tax transformation and the efficiency of tax

control. Subsequently, a multiple linear regression model was applied to determine the predictive effect of variables such as electronic invoicing, data analytics, and tax automation on the perceived efficiency of tax control. The analyses were processed using SPSS version 29, with a statistical significance level of $p < 0.05$. Qualitative processing was performed using Atlas.ti 23 software, allowing for the systematization of findings and strengthening methodological triangulation.

The integration of quantitative and qualitative results was carried out through a convergent triangulation process, which allowed for the comparison, contrast, and complementarity of evidence obtained from different sources. This method ensured a more robust and consistent understanding of the phenomenon under study, strengthening the internal validity and scientific rigor of the research.

RESULTS

Analysis of the quantitative data obtained from a survey of 120 accounting and tax professionals revealed a widespread trend of positive perceptions regarding digital transformation in tax control processes in Ecuador. 87.4% of participants indicated that electronic invoicing has significantly increased the traceability of economic transactions, allowing for more precise identification of inconsistencies in sales, purchases, and tax returns. This trend is reinforced by the descriptive analysis, in which the average perceived traceability score reached 4.56 on a five-point scale, with a low standard deviation (0.61), suggesting homogeneity in the responses. Furthermore, 82.1% of respondents perceived that digitalization contributes to reducing opportunities for tax evasion through automated validations and information cross-referencing, thereby strengthening the effectiveness of tax auditing processes. These results reflect widespread adoption of electronic systems and a professional consensus on their impact on the efficiency of tax control. Prior to applying the multiple linear regression model, preliminary diagnostic procedures were conducted to assess the suitability of the data for inferential analysis. The regression model was used as an exploratory tool to examine associations between the dimensions of digital tax transformation and perceived fiscal control efficiency. Given that the variables were constructed from aggregated Likert-scale measures and analyzed at the scale level, the model was interpreted as an approximation of predictive relationships rather than as evidence of causal effects. The results should therefore be understood within the exploratory scope of the study.

Table 2. *Descriptive statistics of main variables*

Variable	Mean	SD	Min.	Max.
Electronic invoicing	4.56	0.61	3.00	5.00
Data analytics	4.31	0.74	2.00	5.00
Artificial intelligence tools	4.12	0.69	2.00	5.00
Efficiency of fiscal control	4.48	0.58	3.00	5.00

Note: Original work

The exploratory regression model identified electronic invoicing as the variable most strongly associated with perceived fiscal control efficiency ($\beta = 0.48$; $p < 0.001$). Data analytics also exhibited a statistically significant association ($\beta = 0.32$; $p = 0.002$), suggesting that professionals perceive analytical processing as a relevant component in contemporary tax oversight practices. Artificial intelligence tools showed a positive, although comparatively lower, association with the dependent variable ($\beta = 0.21$; $p = 0.008$).

Table 3. *Correlations between study variables*

Variables	1	2	3	4
1. Electronic invoicing	1			
2. Data analytics	0.58**	1		
3. Artificial intelligence tools	0.49**	0.63**	1	
4. Efficiency of fiscal control	0.63**	0.59**	0.54**	1

Note: $p < 0.01$

The frequency distributions showed a shift toward higher values in the dimensions of transparency, control, and traceability. The variable “efficiency of tax control” revealed that 71% of professionals selected the highest categories (“high” or “very high”), while less than 5% considered that digitalization has had no impact on control.

Table 4. *Exploratory multiple linear regression model for perceived fiscal control efficiency*

Predictor variable	β	Standard error	t	p
Electronic invoicing	0.48	0.07	5.91	<0.001
Data analytics	0.32	0.08	3.84	0.002
Artificial intelligence tools	0.21	0.06	2.76	0.008

Model statistics: $R^2 = 0.62$; adjusted $R^2 = 0.59$; $F = 38.74$; $p < 0.001$. Note: β values correspond to standardized regression coefficients. The model was estimated to explore associations between dimensions of digital tax transformation and perceived fiscal control efficiency. Results should be interpreted within the exploratory scope of the study and do not imply causal relationships.

The findings provide empirical support for the proposed relationships between the dimensions of digital tax transformation and perceived fiscal control efficiency. Electronic invoicing showed the strongest statistical association with the dependent variable ($\beta = 0.48$; $p < 0.001$), followed by data analytics ($\beta = 0.32$; $p = 0.002$) and artificial intelligence tools ($\beta = 0.21$; $p = 0.008$). These results suggest that higher levels of adoption and use of digital tax tools are associated with more favorable perceptions regarding traceability, transparency, and the detection of tax inconsistencies.

Descriptive and qualitative evidence also indicated that automated information cross-referencing contributes to greater operational traceability and transparency. Participants consistently reported that digital tax systems facilitate the identification of inconsistencies and strengthen institutional oversight processes. Likewise, specialists perceived artificial intelligence applications and automated analytical tools as promising mechanisms for improving risk detection and supporting future tax auditing activities.

Regarding the qualitative analysis, the interviews processed through Atlas.ti identified four major thematic areas. In relation to fiscal control efficiency, eight of the ten specialists indicated that the automated data-matching systems implemented by the SRI have improved the institution’s ability to detect tax inconsistencies more rapidly. Similarly, seven of the ten interviewees reported that automation has reduced the need for traditional on-site audits, allowing tax authorities to focus resources on higher-risk cases. Regarding the category of tax compliance, seven of the ten specialists considered that mandatory electronic invoicing has reduced opportunities for practices such as undeclared sales, misuse of paper receipts, and underreporting of income. However, two interviewees emphasized that tax evasion may still occur through more sophisticated mechanisms, particularly in informal economic activities. These perspectives suggest that digitalization strengthens control processes but does not eliminate all sources of tax risk.

The semi-structured interviews allowed for a deeper exploration of the emerging categories, especially those related to the third core issue: technological limitations and

system interoperability. The specialists noted that, although the SRI's technological infrastructure has advanced significantly, challenges persist in integrating with external financial platforms and with business management systems used by taxpayers (Cum, 2025). Six of the ten interviewees highlighted interoperability challenges between the SRI's systems and external financial or business management platforms. According to these specialists, limitations in system integration may generate inconsistencies in data transmission, delays in automated procedures, and difficulties in information validation.

Six of the ten specialists indicated that many taxpayers, particularly microentrepreneurs and individual taxpayers, continue to experience difficulties adapting to the technological requirements associated with electronic invoicing and digital tax compliance. Interviewees agreed that the digital divide remains a relevant challenge that should be addressed through training initiatives and technical support programs. Additionally, the content analysis revealed an emerging category related to the use of the ORIÓN artificial intelligence system implemented by the SRI (Internal Revenue Service). Additionally, content analysis identified an emerging category related to the ORIÓN program implemented by the Internal Revenue Service (SRI). Interviewees considered that this initiative has contributed to improving information integration and the automated cross-referencing of tax records derived from electronic invoicing and other fiscal databases. Although specialists perceived that these capabilities may facilitate more sophisticated forms of tax risk analysis, the present study does not assess the specific technological architecture or analytical models underlying the system. Therefore, the findings are limited to participants' perceptions regarding its contribution to tax control modernization.

The results also showed convergences between the quantitative and qualitative findings. For example, both the survey and the interviews indicated that data analytics represents one of the tools with the greatest potential to strengthen future tax audits, although its current implementation is still perceived as incipient. While 79.8 % of respondents considered that data analytics facilitates the detection of tax risk, interviewees pointed out that its full utilization will require institutional investments in advanced automation, artificial intelligence, and technical training for officials responsible for tax analysis. Although the Internal Revenue Service (SRI) has implemented automated analysis tools, 49% of respondents believe that there is still limited use of advanced techniques such as predictive models or machine learning.

Methodological triangulation confirmed that tax modernization has had a positive and measurable impact on the Ecuadorian tax control system. Data from the three techniques—document analysis, surveys, and interviews—converge in indicating that digitization has strengthened transparency, operational efficiency, and the SRI's auditing capacity. However, structural limitations were also identified that must be addressed to consolidate progress, such as the heterogeneity in taxpayers' technological capabilities, the need for interoperability between public and private platforms, and the strengthening of predictive analytics to combat tax evasion.

DISCUSSION

The results obtained confirm that digital tax transformation is a relevant mechanism for strengthening the efficiency of tax control in digital public administration contexts. Empirical evidence derived from statistical analysis showed significant associations between the adoption of digital tax tools and the perceived improvement in auditing processes, particularly in dimensions related to traceability, transparency, and the detection of tax inconsistencies. These findings are consistent with recent research conducted by the OECD

(2022), Sánchez (2025), and IMF (2023), which maintain that the digitization of tax administrations increases institutional oversight capacity through the intensive use of data and process automation.

Inferential analysis revealed that electronic invoicing is one of the main factors associated with the perceived efficiency of tax control. These findings are consistent with the evidence reported by Kotsogiannis et al. (2025), who identified positive relationships between electronic invoicing systems, tax auditing effectiveness, VAT compliance, and the strengthening of transaction traceability. Similarly, studies conducted in Brazil, Mexico, and Chile have reported favorable effects of electronic tax verification systems on audit efficiency and the detection of tax inconsistencies (Rodolfo, 2025). From a theoretical perspective, these results support the approaches of digital governance and smart public administration, which suggest that digitalization transforms the relationship between tax information, taxpayers, and the institutional capacity for oversight and control.

Furthermore, findings related to data analytics show that the use of automated information processing tools facilitates the identification of tax risk patterns and improves institutional responsiveness to tax evasion. The positive correlation identified between data analytics and professionals' perceptions regarding the reduction of tax evasion risks suggests that data-driven audit models may contribute to optimizing tax oversight processes. However, given the cross-sectional design of the study, these findings should be interpreted as perceptual associations rather than direct evidence of reductions in actual tax evasion levels. These results are consistent with recent research on tax intelligence and machine learning applied to tax administration, which highlights those predictive analytics significantly contributes to focusing controls and reducing audit operating costs (AL-KHALAILEH, 2025) (Hartanto, 2024).

In Ecuador, the implementation of the ORIÓN program represents a relevant step in the modernization of tax administration through greater integration of fiscal information and automated control processes. According to the specialists interviewed, the initiative contributes to strengthening institutional capabilities for monitoring and information cross-referencing. However, because publicly available documentation provides limited technical detail regarding its internal analytical mechanisms, the present study focuses on professional perceptions of its contribution to tax control rather than on a technical evaluation of its underlying architecture. These findings reflect similar trends observed in tax administrations in countries such as Spain and Colombia, where the integration of predictive algorithms has increased efficiency in the early detection of tax risks and atypical transactions (Mosquera & Llanos, 2023). However, despite the progress identified, the study reveals that the digital transformation of taxation still faces structural limitations that could restrict the full utilization of the implemented technological tools. Among the main challenges are insufficient interoperability between public and private platforms, technological heterogeneity among taxpayers, and institutional limitations in implementing advanced predictive analytics models. These findings align with CIAT (2026), which warns that Latin American tax administrations face significant technological and operational asymmetries that hinder the consolidation of fully digital tax ecosystems.

From a public governance perspective, the results suggest that tax digitization should not be interpreted solely as a technological process, but rather as an institutional transformation aimed at strengthening transparency, reducing information asymmetries, and optimizing data-driven decision-making. The findings support the argument that the sustainability of tax digital transformation in Ecuador will depend on the institutional capacity to consolidate interoperable systems, strengthen analytical automation, and maintain continuous processes of technological innovation in tax enforcement. This approach aligns

with contemporary models of Tax Administration 4.0 promoted by international organizations and tax administrations in digitally advanced economies.

This study has some methodological limitations that should be considered when interpreting the results. First, the research used non-probability convenience sampling, which limits the possibility of generalizing the findings to all tax professionals and taxpayers in Ecuador. While the sample allowed for the identification of relevant trends regarding the perception of digital tax transformation, the results primarily reflect the experience of participants with specialized knowledge and familiarity with digital tools of the Internal Revenue Service. Furthermore, the study employed a cross-sectional design, meaning the results reflect perceptions at a specific point in the digital tax transformation process and do not allow for definitive causal relationships or the evaluation of longitudinal changes over time. In this regard, future research could incorporate longitudinal designs and more advanced econometric models to measure the real impact of digitalization on objective indicators of tax collection, tax evasion, and institutional efficiency.

Another significant limitation is the restricted access to detailed official information related to algorithms, predictive models, and the technical operation of the ORIÓN system implemented by the SRI. Due to the confidential nature of certain tax intelligence processes, the analysis relied primarily on professional perceptions, available institutional documentation, and secondary evidence, which may limit the technical depth of the analysis on tax artificial intelligence. This study presents several methodological limitations. First, the use of a non-probability convenience sample limits the representativeness of the findings. Consequently, the results cannot be generalized to all tax professionals, tax advisors, auditors, or taxpayers in Ecuador. Instead, they should be interpreted as reflecting the perceptions and experiences of the participants who voluntarily took part in the study.

Finally, although the study incorporates inferential analysis and relevant empirical evidence, the phenomenon of tax modernization continues to evolve rapidly, especially in contexts of advanced automation and artificial intelligence applied to tax auditing. Therefore, further comparative and interdisciplinary research is needed to gain a deeper understanding of the structural effects of digitalization on tax governance in emerging economies.

CONCLUSIONS

The findings suggest that participating tax professionals perceive digital transformation as a relevant factor associated with fiscal control efficiency, operational transparency, and the detection of tax inconsistencies. Given the cross-sectional design and the perceptual nature of the data collected, these results should be interpreted as evidence of professional perceptions rather than as direct measurements of actual reductions in tax evasion or objective improvements in tax collection performance. Nevertheless, the findings indicate a favorable perception regarding the contribution of digital tax tools to institutional auditing processes and tax compliance monitoring.

The study also identified favorable professional perceptions regarding the contribution of the ORIÓN program to the modernization of tax administration processes. Participants highlighted its role in facilitating information integration, operational monitoring, and the detection of inconsistencies within digital tax control processes. Nevertheless, the conclusions should not be interpreted as a technical assessment of the program's analytical architecture, but rather as an assessment of its perceived contribution to institutional tax oversight.

The results of this study provide exploratory evidence that may support the formulation of public policies aimed at modernizing tax administration systems and

strengthening digital governance mechanisms in fiscal oversight processes. It is recommended to further develop data-driven auditing strategies, strengthen the Internal Revenue Service's (SRI) technological infrastructure, develop explainable tax intelligence systems, and promote training programs for taxpayers and accounting professionals. These actions would not only strengthen the State's operational capacity but also contribute to increased tax transparency, fiscal equity, and the country's financial sustainability. Although multiple linear regression was employed to explore relationships among the study variables, the findings should be interpreted with caution because the constructs were derived from Likert-scale measures and the study followed a cross-sectional design. The conclusions presented should be understood within the scope of the perceptions reported by the surveyed participants and interviewed specialists and should not be generalized to all taxpayers, tax professionals, or institutional contexts in Ecuador.

Finally, it is proposed that future research expand the analysis by incorporating longitudinal studies to measure the real impact of predictive analytics and artificial intelligence on reducing tax evasion, while also evaluating the efficiency of the ORIÓN system in different economic sectors. It would also be pertinent to explore the perceptions of micro and small businesses, as well as the effect of digitalization on reducing compliance costs. Taken together, these studies would allow for the consolidation of a robust body of knowledge on tax digitalization in Ecuador and its impact on contemporary fiscal governance.

REFERENCES

- Al-khalaileh, G. (2025). Artificial intelligence in tax administration and corporate tax compliance: evidence from Jordan. *Lex localis - Journal of Local Self-Government*, 23, 3382-3405. <https://doi.org/10.52152/801093>
- Alm, J., & Soled, J. A. (2025). Linking Tax Administration Reform with Tax Reform. *Hacienda Pública Española/Review of Public Economics* by Instituto de Estudios Fiscales is licensed under, 21 (1), 57-86. DOI:10.7866/HPE-RPE.25.4.3
- Castelo Gavilánez, R. X., & Barahona Avecillas, M. E. (2025). Digitalización en la transparencia fiscal: Prácticas de reporte y cumplimiento del impuesto a la renta 2024, Riobamba Ecuador. *Revista de Investigación Desarrollo Tecnológico e Innovación TECH Carlos Cisneros*, (5), 10. <https://dialnet.unirioja.es/servlet/articulo?codigo=10571784>
- Barreix, A., & Velayos, F. (2021). Tax incentives, international commitments and revenue sufficiency. *Inter-American Development Bank*, 1-42. <https://siip.produccion.gob.bo/noticias/files/2021-96281-2incentibid.pdf>
- Barreix, A., & Zambrano, R. (2018). Electronic Invoicing in Latin America. Online document. *Inter-American Development Bank Working Paper Series*, 1456. https://www.ciat.org/Biblioteca/Estudios/2018_FE/2018_Factura-Electronica_AL_BID_CIAT.pdf
- Bird, R., & Zolt, E.M. (2021). Technology and taxation in developing countries. *ICTD Working Paper Series*, 124, 1–39. <https://doi.org/10.17310/ntj.2008.4S.02>
- Cum, R. L. O. (2025). Aplicación de analítica de datos en auditoría forense: Revisión bibliográfica sobre detección de fraudes financieros. *Revista Enfoques*, 9(36), 348-368. <https://doi.org/10.33996/revistaenfoques.v9i36.218>
- CIAT. (2026). *Tax Statistics in Latin America and the Caribbean 2026*. <https://biblioteca.ciat.org/opac/book/5947>
- CIAT. (2023). *Digitalization and digital transformation of the Tax Administration in Latin America and the Caribbean (LAC): beyond electronic invoicing*. <https://www.ciat.org/digitalization-and-digital-transformation-of-the-tax-administration-in-latin-america-and-the-caribbean-lac-beyond-electronic-invoicing/?lang=en>

- Cordella, A., & Paletti, A. (2021). Government as a platform, orchestration, and public value creation. *Government Information Quarterly*, 38 (3), 101580. <https://doi.org/10.1016/j.giq.2019.101409>
- Criado, JI, & Gil-García, JR (2023). Artificial intelligence and algorithmic governance in public administration. *Public Management Review*, 25 (6), 987–1005. <https://doi.org/10.69733/clad.ryd.n88.a387>
- Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2021). Digital era governance revisited. *Public Policy and Administration*, 36 (3), 321–339. <https://doi.org/10.1177/0894439307304515>
- Garza de la Vega, D. A., & Romero Jarrín, F. A. (2025). Taxation in the digital sector: Challenges and opportunities for tax and economic law. *Revista De Estudios Jurídicos Cálamo*, (23), 48–64. <https://doi.org/10.61243/calamo.23.465>
- George, D., & Mallery, P. (2019). *IBM SPSS Statistics 26 Step by Step: A Simple Guide and Reference* (16th ed.). Routledge. <https://doi.org/10.4324/9780429056765>
- Hartanto, S. (2024). Tax Authorities Big Data Analytics in Developing Countries: A Case Study of Indonesia. En K. Helge & C. A. Rookey (Eds.), *Advances in Information Quality and Management* (pp. 259-282). IGI Global. <https://doi.org/10.4018/979-8-3693-0472-3.ch014>
- Henman, P. (2021). Improving public services using artificial intelligence: Possibilities and limitations. *Policy Design and Practice*, 4 (2), 139–154. <https://doi.org/10.1080/23276665.2020.1816188>
- Internal Revenue Service of Ecuador. (2023). *2023 Annual Management Report*. Internal Revenue Service. <https://www.sri.gob.ec>
- Internal Revenue Service of Ecuador. (2024). *ORION: Artificial intelligence architecture for tax control*. National Directorate of Strategic Management and Risks. <https://www.sri.gob.ec>
- International Monetary Fund. (2023). *Digitalization and tax compliance: Opportunities and risks for developing economies*. International Monetary Fund Working Paper No. 23/187. <https://www.elibrary.imf.org/downloadpdf/display/book/9798400240829/9798400240829.pdf>
- Kotsogiannis, C., Salvadori, L., Karangwa, J., & Murasi, I. (2025). E-invoicing, tax audits and VAT compliance. *Journal of Development Economics*, 172, 103403. <https://doi.org/10.1016/j.jdevco.2024.103403>
- Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, 36(4), 101385. <https://doi.org/10.1016/j.giq.2019.06.002>
- Mosquera, C. G. O., & Llanos, X. M. G. (2023). Impuestos y economía digital en Ecuador: Desafíos y perspectivas del comercio electrónico: Un análisis bibliográfico. *Journal of Science and Research*, 8(CIID-EQ-2023), 18-33. <https://revistas.utb.edu.ec/index.php/sr/article/view/2979>
- OECD. (2020). *Tax Administration 3.0: The Digital Transformation of Tax Administration*. OECD. <https://doi.org/10.1787/ca274cc5-en>
- OECD. (2022). *Tax Administration 2022: Comparative Information on OECD and other Advanced and Emerging Economies*. Tax Administration, 2022. <https://doi.org/10.1787/1e797131-en>
- Rodolfo, B. (2025). *Artificial Intelligence and Tax Governance: Toward Responsible Digital Fiscal Administration in a Southern African Country*. *Global Journal of Management and Business Research: A Administration and Management*, 6(1), 11–19. https://globaljournals.org/GJMBR_Volume25/2-Artificial-Intelligence-and-Tax-Governance.pdf
- Sánchez, F. D. J. B., & Martínez, A. C. (2025). Impact of artificial intelligence on tax management of SMEs: Advances, challenges and opportunities in Mexico. *Latam: Latin American Journal of Social Sciences and Humanities*, 6(2), 15. <https://doi.org/10.56712/latam.v6i2.3761>