THE EVOLUTION OF TAX COMPLIANCE RISK MANAGEMENT IN THE DIGITAL ERA: FROM TRADITIONAL TO TECHNOLOGICAL DRIVERS

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Abstract: ***In the context of digital transformation and globalization, tax authorities have undergone three phases of tax management methodology development: (i) personalized approaches, (ii) taxpayer segmentation, and (iii) risk-based management. This evolution reflects the emergence of a tax compliance ecosystem, where digital technologies and multi-stakeholder collaboration play a central role. The article analyzes the shift in tax compliance risk management strategies through the OECD's analytical framework (2004) and updated reports, focusing on three key drivers: the application of big data and artificial intelligence (AI), the integration of behavioral science, and the promotion of international transparency. Research findings indicate that adopting advanced analytical technologies and automated interventions (e.g., Australia's ANGIE tool) reduces administrative costs by 25–30% while enhancing fraud detection efficacy. However, challenges persist in updating legal frameworks and building technological capacity. The article proposes an integrated approach combining proactive management, multinational cooperation, and targeted resource allocation to optimize tax compliance in the digital era.***

• Keywords: *tax compliance, risk assessment, tax fraud, audit.*

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1. Introduction

The core mandate of tax authorities is to collect revenue to fund public services and ensure resources for socio-economic development (OECD, 2024). In the context of globalization and digital transformation, tax administrations have continually refined their management approaches through three primary phases: (i) Personalized approach managing individual taxpayers separately. This method proved inefficient due to limitations in human and financial resources; (ii) Segmented approach classifying taxpayers into groups based on tax rates or operational scale. While improving efficiency, this approach still carried compliance risks due to the lack of systemic risk assessment mechanisms; and (iii) Risk-based management focusing on high-risk groups, leveraging multi-source data and analytical technologies to optimize tax collection effectiveness (OECD, 2017).

This evolution reflects the trend toward a tax compliance ecosystem, where tax authorities act as regulators and collaborate with third parties (e.g., tax service providers and financial institutions) to share data and design risk prevention strategies. Key drivers of this shift include (i) the adoption of big data analytics and artificial intelligence (AI) for risk forecasting, (ii) the demand for behavior-based, personalized interventions, and (iii) the push for transparency through international cooperation agreements (OECD, 2023). This paper contributes to the analysis of the evolution of tax administration strategies from a compliance risk assessment perspective.

2. The Evolution of Tax Compliance Risk Management: From Self-Assessment to Data Ecosystems

Since the widespread adoption of self-assessment mechanisms in the 1970s-1980s, tax authorities have shifted their focus to risk-based management methods to optimize taxpayers' voluntary compliance while minimizing stakeholder administrative and compliance costs (OECD, 2004). Although this mechanism accepts most tax declarations at face value, tax administrations have developed analytical tools to identify returns requiring post-audit checks. The emergence of data analytics software and AI has refined tax assessment processes, making them more sophisticated, adaptable, and personalized to factors such as industry characteristics, business scale, macroeconomic conditions, and taxpayer group behavior (OECD, 2016a).

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2.1. OECD's Compliance Risk Management Framework

In 2004, the OECD published its foundational document, Compliance Risk Management: Managing and Improving Tax Compliance (OECD, 2004), which established a compliance risk management framework based on a cyclical three-step process (Figure 1):

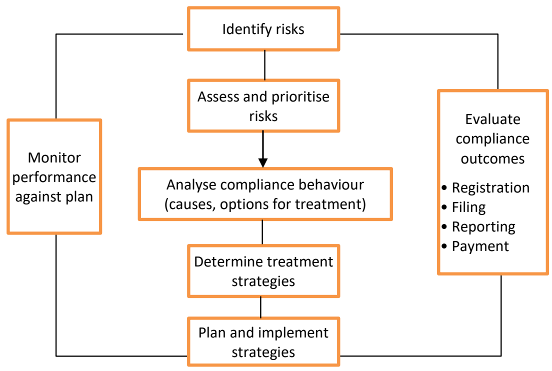
Risk Assessment: Identify and categorize compliance risks using historical data and taxpayer behavior patterns.

Strategy Design: Develop targeted intervention plans for high-risk groups.

Monitoring and Optimization: Measure strategy effectiveness and adjust based on real-world feedback.

This framework remains relevant nearly two decades later, particularly in transitioning from individualized management to a compliance ecosystem. Tax authorities integrate multi-source data and advanced technologies to enable real-time risk forecasting (OECD, 2017).

Figure 1: Tax Compliance Risk Management Process



Source: OECD (2004), "Compliance Risk Management: Managing and Improving Tax Compliance"

2.2. Emerging Approaches in Risk-Based Tax Management

Tax compliance risk management was first explored in depth at the 2004 Forum on Tax Administration (FTA) titled Compliance Risk Management: Managing and Improving Tax Compliance (OECD, 2004), a framework that remains valid and widely adopted today. Subsequent publications have documented shifts in methodologies and the integration of new technologies into tax administration. In 2016, the FTA released a supplementary guidance report, Cooperative Compliance: Building Better Tax Control Frameworks (OECD, 2016b). It proposed and discussed frameworks for tax control and methods to evaluate their practical relevance and effectiveness. In 2017, the FTA published The Changing Tax Compliance Environment and the Role of Audit (OECD, 2017), analyzing transformative trends in tax administrations that collectively reshape the compliance ecosystem, enabling more efficient compliance targeting and management. Synthesizing these reports, three dominant trends emerge:

Behavioral science applications: The report Understanding and Influencing Taxpayer Compliance Behaviour (OECD, 2010) identified five key drivers of tax compliance: opportunity, social norms, fairness, economic incentives, and deterrence. Later, in 2021, the OECD emphasized the integration of behavioral insights into policy design in Using Behavioural Insights for Better Tax Administration (OECD, 2021). Examples include personalized messaging to boost voluntary filing rates.

Shift from reactive to proactive Models: Tax authorities are transitioning from addressing compliance "symptoms" (e.g., post-violation audits) to targeting root causes of non-compliance. The report Starting from Scratch: Influencing the Compliance Environment for Small and Medium Enterprises (OECD, 2012) advocated embedding compliance into operational workflows at the system design stage.

Multi-Stakeholder Collaboration and Digital Innovation: The Tax Compliance by Design report (OECD, 2014) recommended leveraging Application Programming Interfaces (APIs) to integrate tax systems with business platforms and automate declaration processes. In 2019, the OECD's Unlocking the Digital Economy: A Guide to Implementing APIs in Government (OECD, 2019) promoted real-time data integration from e-commerce and fintech platforms to enhance compliance monitoring.

2.3. Changes in Tax Compliance Risk Management Strategies

While the compliance risk management framework and its principles remain valid, several strategic shifts have emerged, including:

• *Advanced sata analytics-driven approaches:* Traditional tax risk management processes beginning with risk identification, assessment, and prioritization are now enhanced by big data and AI. According to an OECD (2024) survey of 52 tax administrations, 80% use big data to improve risk forecasting accuracy, and 50% deploy machine learning to detect tax fraud, reducing manual audit time by 25% (OECD, 2024). Sophisticated analytical models enable the processing of multidimensional datasets (e.g., industry sector, business scale, filing behavior), facilitating automated interventions.

• *Automated intervention mechanisms:* Tax authorities increasingly deploy multimodal tools to detect discrepancies, leveraging AI for analysis and risk clustering to select intervention methods. Examples include:

- *Data matching* between internal systems and external sources (e.g., bank transactions).

- Social media analytics to identify anomalies in business activities.

- *Risk clustering algorithms*, such as Australia's ANGIE (Automated Network and Grouping Identification Engine), automate the identification of complex taxpayer relationships, cutting investigation time by 30% (OECD, 2024). Post-identification, authorities may issue automated requests for additional information or conduct comprehensive e-audits targeting specific transactions.

• *Real-time intervention timing:* Digital platforms enable real-time or near-real-time interventions. Through API integration and IoT (Internet of Things) systems, tax administrations can:

- Monitor financial transactions as they occur (*real-time monitoring*).

- Detect anomalies in tax declarations via automated alerts.

• *Unstructured data utilization and cross-border collaboration:* Tax authorities now harness unstructured data from social media, electronic contracts, and shared reporting templates, moving beyond structured internal or national datasets. Enhanced international collaboration particularly among emerging economies has strengthened compliance capabilities. OECD (2023) reports a 40% increase in automatic tax information exchange between 2015 and 2023, alongside efforts to standardize global tax data integration. Multilateral cooperation within the compliance ecosystem has uncovered 15-20% of multinational tax evasion cases.

Figure 2: Changes in Risk-Based Tax Management Strategies

• *Resource allocation prioritization:* Tax administrations focus on two priority groups:

- Large Enterprises: Contributing 44% of total tax revenue while accounting for only 1.7% of administrative costs (OECD, 2024).

- High net wealth individual: Targeted via behavioral analytics to predict non-compliance risks.

These changes compel tax authorities to rethink their approaches to compliance risk management and the nature and timing of traditional interventions. They must ensure tax laws and regulations particularly those governing data collection and usage evolve to address modern challenges and reflect the expectations of policymakers and citizens.

3. Conclusion

This study acknowledges that tax compliance risk management has evolved from traditional models to a data-driven ecosystem, driven by three transformative factors: (1) the adoption of digital technologies (big data, AI) for risk forecasting and automated interventions; (2) the integration of taxpayer behavioral insights into policy design; and (3) enhanced cross-border collaboration through standardized data protocols. Specifically, the shift to real-time interventions and the utilization of unstructured data have enabled tax authorities to detect 15–20% of multinational tax evasion cases while significantly reducing administrative burdens (OECD, 2023). However, this success requires harmonization between flexible legal frameworks (enabling digital data collection/processing) and investments in technological capabilities. To sustain effectiveness, tax administrations must:

- Prioritize resource allocation for high-risk groups (e.g., large enterprises, high net wealth individual) based on quantitative risk analysis.

- Establish public-private partnerships to embed compliance into enterprise management systems.

- Standardize global data-sharing protocols, particularly in the rapidly evolving digital economy.

These findings provide a comprehensive overview of tax administration reforms and lay the groundwork for future research on balancing compliance efficiency and data privacy in the AI era.

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