



Leveraging Data Analytics for Tax Reform and Revenue Mobilization

A well-organized tax system is the main pillar of a successful economy. So far, developing countries like Pakistan are struggling with issues of tax evasion, limited tax bases, and managerial inefficiencies. To combat these problems, leveraging data has emerged as a problem-solving tool to accelerate revenue growth and implement genuine tax reforms. The incorporation of big data analytics into the tax management system enables simultaneous predictive analysis and rigorous monitoring that compels responsive implementation (OECD, 2021).

Economies that have adopted data-driven tax guidelines such as India, Brazil, and Estonia have demonstrated substantial real-time progress in tax imposition and collection, digital identity linkage, and third-party data consolidation (IMF, 2022). At the moment, Pakistan is in the phase of developing digital setups, followed by implementing parallel data alignment through national databases like NADRA, SECP, FBR, and other utility organizations such as WAPDA, Sui Southern Gas Pipelines, PTCL, WASA, etc.

Data analytics is not merely a technological advancement but a modern modification in the system of tax operationalization—the transition from a reactive system of taxation to a proactive one (Bird & Zolt, 2018). If Pakistan wants to overcome the problems of tax evasion, data provision gaps, and unexplored revenue possibilities, data analytics can provide new arrangements for data provision, help curb tax evasion, and increase tax revenue.

The Role of Data in Modern Tax Systems

Data analytics has transformed the traditional audit-based tax system into a modern tax system, enabling tax authorities to design risk-informed and proactive tax implementation strategies. This is only possible when tax authorities integrate different sources of data—such as utility companies, banks, and other social databases like NADRA—with the FBR. In this way, the state can more easily detect non-compliance activities and distinguish between eligible and ineligible taxpayers (Baer, 2011).

Computerization of tax procedures, online tax activities, and audits followed by inspection of taxpayer data will consequently lead to intentional data submission and reduced evasion tendencies. It has been proven that digital data integration is effective in expanding the tax base (Kloeden, 2011). At the macro level, the use of data

analytics allows tax authorities to be more vigilant, targeted, and transparent in tax implementation and policy matters.

Pakistan's Current Taxation Landscape

The main characteristics of Pakistan's tax system are organizational incompetencies, a limited tax base, and a continuous decline in tax revenue. Despite many structural tax reform efforts, Pakistan's tax-to-GDP ratio has persistently remained the lowest in South Asia—around 9.2% in recent years (World Bank, 2022). A large economy in the region, Pakistan suffers from weak implementation of tax procedures and patchy datasets that hinder tax receipts and widen compliance gaps.

Pakistan's tax collection setup mainly depends on sales tax, which disproportionately burdens lower-income groups, while a significant portion of income tax often remains unexplored for various reasons (Ahmed & Ahmed, 2021). Furthermore, data linkage among many government organizations such as SECP, NADRA, and provincial tax authorities has largely remained unattended, particularly in terms of profiling and real-time risk analysis.

Fortunately, some steps such as the integration of IRIS and the track-and-trace system show progress, but the system is undermined by political interference, weak tax morale, and flaws in tax infrastructure. If Pakistan wants to enhance its tax revenues, it must adopt effective big data analytics; inter-agency collaboration is indispensable.

Sources and Types of Data for Tax Reform

Tax reforms help in utilizing macro-level data to improve the tax base, enhance compliance, and detect evasion. The main sources of data analytics include income tax return filings, records of incoming and outgoing customs transactions between countries, and domestic sales and purchase documentation, which reflect the behavior of taxpayers in their country.



Moreover, big data analytics from telecom providers, real estate transactions, and utility consumption data can fill gaps in income tax filing information (Bird & Zolt, 2018).

Tax authorities can also access and verify the level of risk in taxpayer profiles through e-commerce transaction sources such as mobile phone payments, receipts, and social media earnings. Big data analytics is the only way to shift from reactive analytics to proactive analytics. In this way, tax authorities can conduct real-time audits and inspections.

According to the International Monetary Fund (2022), data sharing between tax authorities and third parties—such as utility companies, real estate, and mobile transactions—has meaningfully improved in India and Brazil. If Pakistan wants to increase compliance, reduce tax evasion, and expand the tax base, it must use legal, institutional, and technological sources of data to ensure secure and effective integration.

Applications of Data in Tax Reform

Data-driven tax systems enable tax authorities to improve compliance, reduce evasion, and maximize resource utilization. Risk-based auditing is the most effective application of a data-driven tax system. This application can detect high-risk taxpayers, enhance audit efficiency, and provide predictive analytics that reduce the tax department's workload (Khwaja, Awasthi & Loeprick, 2011). If the authorities aim to expand transparency and reduce manual errors, they must encourage taxpayers to use e-invoicing and provide tax information through e-filing.

To better understand taxpayer behavior and compliance strategies, tax authorities should adopt taxpayer segmentation and profiling applications. Another key application, anomaly detection, can uncover hidden income or earnings generated through fraudulent activities.

If Pakistan wants to improve tax equity and revenue mobilization, it must adopt such applications through platforms like utility companies, NADRA, IRIS, etc.

Institutional Readiness and Technological Infrastructure

The effective incorporation of data in tax reform largely depends on organizational capacity and digital infrastructure. In Pakistan, the first mover initiative is the Integrated Revenue Information System (IRIS), with NADRA Information System as the only major integrated application. However, the system currently functions in fragments, with limited coordination and outdated mechanisms (Ahmed & Ahmed, 2021).

It is observed that a major challenge lies among institutions such as SECP, PRAs, FBR, and NADRA, specifically due to the lack of data interoperability. Moreover, challenges related to insufficient investment

in big data analytics and trained human capital have constrained the advancement of AI technologies and machine learning for tax administration.

Taxpayers also have serious concerns about cybersecurity and data protection. These concerns can only be addressed if sufficient measures are taken through laws on data protection and an ethical governance framework. Taxpayers are of the view that legal safeguards, governance reforms, and capacity building are the most effective measures for ensuring cybersecurity and data protection.

Challenges in Data-Driven Tax Reform

While data-driven taxation holds significant promise, its implementation in countries like Pakistan is fraught with systemic and structural challenges. A major issue is data fragmentation, where relevant information is dispersed across disconnected agencies, creating obstacles for integrated analysis and enforcement (Jenkins, 2017). Poor data quality, including outdated or incomplete records, further undermines the reliability of analytics.

Legal and regulatory constraints also hinder progress. The absence of comprehensive data-sharing laws and a lack of clarity on taxpayer privacy protection raise ethical and operational concerns. Weak institutional capacity—especially in areas of data governance, analytics expertise, and IT infrastructure—limits the effective use of emerging technologies such as AI and machine learning (IMF, 2022).

Furthermore, resistance from vested interests, low political commitment, and low digital literacy among taxpayers slow down tax reforms. In the absence of the above-mentioned initiatives, the economy will continue to underperform in tax revenue.

To address these challenges, a comprehensive and broad approach is required, including public awareness, capacity building, institutional collaboration, and legal reform, in order to gain the full benefits of data-driven tax reforms.

Policy Recommendations

It is time to realize the potential of data-driven tax reforms. The next step must be adopting a multi-stakeholder strategy that strengthens institutions and technological capacity. A multipronged strategy should begin with enacting governance laws related to inter-agency data sharing while ensuring taxpayer privacy protection (World Bank, 2020). Alongside the enactment of comprehensive data governance laws, there is also a dire need for investment in digital infrastructure to enable real-time access and big data analytics.

It is essential for tax authorities to focus on capacity building. This includes establishing risk analysis teams, well-equipped IT professionals, and trained data scientists, supported by ongoing training programs to embed analytics into daily operations (OECD, 2021).

Establishing public–private data-sharing agreements can also enhance access to financial and transactional information from telecommunication companies, banks, and utility companies. Moreover, Pakistan should initiate a modern system of risk-based compliance to ensure efficiency and effectiveness. This system will replace the old practice of annual audits. It functions through taxpayer profiling, education, behavioral nudges, and voluntary e-filing of returns. Implementing a modern risk-based compliance system will improve tax revenue.

Lastly, tax reforms will also help harmonize the roles of provincial and federal tax authorities with the support of strong political will and coordination. In the absence of such will and coordination, tax reform will not achieve its full potential.

Case Studies / Global Benchmarks

Worldwide practices establish that data-driven tax guidelines can significantly enhance compliance and revenue growth when supported by institutional will. Two notable success stories of data-driven tax systems are India and Estonia.

In Estonia, 95% of tax returns are filed electronically, with most of the information pre-filled through a government-integrated online system. This was possible because Estonia built one of the world's most advanced digital tax systems. The system connects data with banking records, insurance companies, employment records, and even social media transactions, enabling the e-tax board to ensure real-time compliance and audits. The system is also administratively optimized through a high level of voluntary compliance (OECD, 2020).

Another success story is India's development of the Goods and Services Tax Network (GSTN). This system collects and reconciles transactions across states. It incorporates e-invoicing, automatic matching of input and output tax credits, and red-flagging of doubtful activities. Identity verification is completed through Aadhaar and PAN cards, integrating tax systems to eliminate fraud and leakage (Purohit, 2021).

These success stories highlight that leveraging data-driven tax systems—supported by reforms, legal frameworks, and institutional coordination—can help Pakistan build an effective and modern tax system.

Conclusion

Leveraging data for tax reform and revenue acceleration has a direct relationship. Pakistan now has a golden opportunity to address its long-standing problems of tax evasion, a limited tax base, and managerial incompetencies. It is essential to adopt a big data analytics approach so that tax authorities can shift from a reactive to a proactive enforcement strategy. This will make the tax system more efficient and effective by expanding compliance, reducing evasion, and

strengthening the tax base.

However, technology alone is not sufficient to resolve these challenges. Other critical factors—such as a strong legal framework, public trust, cross-sector collaboration, and institutional readiness—are equally necessary in the long run. International success stories such as those of India and Estonia have proven that big data analytics, when combined with political will and strategic alliances, can improve both effectiveness and equity. For Pakistan, the doors are open to build a transparent and sustainable tax system by integrating data, empowering institutions, and fostering innovation and commitment.

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