Data Before Algorithms: Digitalization, AI and Technology-Enabled SOE Transformation

Introduction

Pakistan's federal state-owned enterprises (SOEs) generated approximately Rs 12.4 trillion in revenue in FY2025 but ended the year with a net loss of Rs 122.9 billion, highlighting a significant gap between their scale of operations and financial performance. According to the Finance Division's Central Monitoring Unit (CMU), profits of profitable SOEs declined by 13 percent to Rs 709.9 billion, while losses of loss-making SOEs eased by only 2 percent to Rs 832.8 billion (Finance Division, 2026; Business Recorder, 2026). Consequently, the net loss was four times higher than a year earlier (Figure 1), underscoring the need for stronger financial measurement, transparency and oversight. This article examines how digitalization and artificial intelligence (AI) can help narrow this gap by improving data reliability, streamlining digital processes and strengthening board-level and ownership oversight.

Figure 1: Aggregate profits and losses of federal SOEs, FY2024 and FY2025.



Source: Finance Division (2026); Business Recorder (2026)

The balance sheet reveals greater fiscal risks than the income statement alone suggests (Table 1). Government fiscal support to SOEs amounted to Rs. 2,078 billion in FY2025, almost matching the Rs. 2,119 billion received by the government from SOEs in the form of dividends, taxes and interest. This reflects the scale of the government's financial exposure, particularly when considered alongside total SOE debt of Rs 9.57 trillion, unfunded pension liabilities of approximately Rs. 2 trillion, and guarantees and other contingent liabilities of Rs. 2.16 trillion. Such substantial financial obligations mean that financial distress within an individual SOE can ultimately translate into additional pressure on the federal budget.



Abdul Qayyum, FCMA
Group Finance Manager, Lootah Group, UAE

SOE losses are concentrated in a relatively small number of entities, particularly in the power distribution and transport sectors (Business Recorder, 2026). In both sectors, operational inefficiencies are closely linked to weaknesses in information management, monitoring and accountability. These include electricity supplied but not accurately metered, bills issued but not recovered, and physical assets owned but inadequately tracked. The National Electric Power Regulatory Authority (NEPRA, 2026) estimates that excess transmission and distribution losses cost Rs 265 billion in FY2024–25, while under-recovery of electricity bills resulted in an additional loss of more than Rs 132 billion.

Strengthening SOE Governance Through Digital Oversight and Policy Alignment

The Organization for Economic Co-operation and Development (OECD)'s revised Guidelines on Corporate Governance of State-Owned Enterprises call on governments to act as active, informed and professional owners while ensuring that SOEs adhere to high standards of transparency, accountability and disclosure (OECD, 2024). However, effective ownership oversight depends on the availability of timely, reliable and comparable information. Governments cannot exercise informed oversight when enterprise data are delayed, unaudited or presented in incompatible formats.

The World Bank (2023), in a study covering 76,000 state-owned firms across 91 countries, found that their combined revenues averaged 17 percent of GDP, with nearly 70 percent operating in competitive markets. Among its five recommendations, the World Bank identifies nationwide mapping of state-owned businesses as a priority. This highlights that effective SOE reform begins with establishing a comprehensive and reliable information base, making data collection and consolidation a prerequisite for informed policymaking.

Table 1: Fiscal Exposure of the Federal SOE Portfolio, FY 2025

Indicator	FY2025
Aggregate revenue	About Rs 12.4 trillion
Government fiscal support to SOEs	Rs 2,078 billion
Inflows from SOEs to government	Rs 2,119 billion
Total SOE debt	Rs 9.57 trillion
Unfunded pension liabilities	About Rs 2 trillion
Guarantees and other contingencies	Rs 2.16 trillion

Source: Finance Division (2026).

Similarly, the International Monetary Fund (IMF)'s Governance and Corruption Diagnostic for Pakistan identifies weaknesses in SOE oversight and public procurement as areas that expose the country to corruption risks (IMF, 2025). The report recommends mandatory e-procurement across all public-sector transactions and the elimination of procurement preferences for SOEs. These measures underscore the importance of digital systems in strengthening transparency, improving procurement efficiency and reducing opportunities for discretionary practices.

Pakistan's existing legal and policy framework provides a foundation for this transition. The SOE (Governance and Operations) Act, 2023, and the SOE Ownership and Management Policy, 2023, provide for the establishment of the Central Monitoring Unit (CMU), which has subsequently developed a digital database of SOE financial information aligned with International Financial Reporting Standards (IFRS) (Business Recorder, 2026). Further, the Digital Nation Pakistan Act, 2025, establishes a framework for a national digital masterplan, while the National AI Policy 2025 sets a target of developing one million AI-trained professionals by 2030 (PID, 2025; Profit, 2025). Together, these initiatives provide an institutional and technological foundation for integrating digitalization and AI into SOE governance, financial monitoring and operational decision-making.

Existing Digital Initiatives: Progress and Early Results

Four ongoing initiatives demonstrate measurable progress in the digital transformation of Pakistan's SOE sector (Table 2).

Although, these initiatives operate through different mechanisms, they share a common principle: replacing fragmented, manual and individually controlled processes with digital systems that generate verifiable records.

Table 2: Digital initiatives in Pakistan's SOE Sector

Initiative	Entity	Reported evidence
Advanced Metering Infrastructure (AMI)	Power Distribution Companies (DISCOs)	2,125,296 smart meters installed by 5 August 2026, including 1.15 million in IESCO
RABTA E-ticketing and Digital Payments	Pakistan Railways	Revenue increased by 20% to Rs 115 billion in FY2025–26. ERP integration, real-time train tracking and digital freight booking are also included in the reform roadmap.
EPADS, E-Procurement	PPRA and Procuring Agencies	526,271 transactions worth Rs 1,408.58 billion processed in FY2024–25, with 9,846 agencies registered.
SOE Digital Database	Central Monitoring Unit (CMU), Finance Division	Consolidated IFRS-aligned financial data, with SOEs classified as green, amber or red according to their financial sustainability.

Source: Compiled by the author from the sources cited in the table.

Smart meters reduce dependence on manual readings and estimated billing while providing interval-based consumption data accessible remotely (APP, 2026a). Similarly, online ticketing creates a traceable record of tickets sold, while EPADS enables registered suppliers to compete through a centralised procurement platform. With approximately 43,000 registered suppliers, the platform expands digital participation in public procurement, while the revised procurement rules make e-procurement mandatory (PPRA, 2026). In each case, transactions that previously depended heavily on individual record-keeping become more transparent, traceable and accessible for independent verification.

However, these developments should not be interpreted as evidence that technology alone can resolve institutional and operational weaknesses. Digital systems can improve information availability and process efficiency, but their effectiveness ultimately depends on implementation, institutional ownership and accountability for results. For instance, the increase in Pakistan Railways' revenue provides an indication of improved financial performance, but it does not, by itself, establish how much of the improvement can be attributed to digitalization. Similarly, the smart-metering programme, initiated following the approval of an Asian Development Bank loan in 2015, experienced delays of nearly two years amid disagreements over technology selection and the bidding process (Express Tribune, 2017). This illustrates how procurement challenges, institutional coordination and implementation delays can constrain the benefits of technological investments.

The experience of Delhi offers a useful comparative example. Tata Power Delhi Distribution Limited (Tata Power-DDL), a distribution company privatised in 2002, reported reducing its aggregate technical and commercial (AT&C) losses to 5.54% in FY2024–25. This improvement was supported by an integrated approach combining smart metering, GIS-based asset mapping and changes in ownership and management structures (Tata Power-DDL, n.d.). The broader lesson is that technology delivers meaningful operational improvements when supported by clear institutional responsibility, effective management and accountability for measurable outcomes. Digitalization can provide the tools for better performance, but governance determines whether those tools translate into results.

Where Artificial Intelligence Can Add Value?

Artificial intelligence (AI) can create value in SOEs where substantial volumes of transactional and operational data are already being generated and where inefficiencies, revenue leakages or operational losses follow identifiable patterns. For example, existing smart-metering systems in Pakistan can flag irregularities such as meter tampering, faulty meters and missing readings through rule-based monitoring (APP, 2026a). Building on these capabilities, machine learning can analyse historical and real-time data to identify more complex anomalies, anticipate equipment failures and support predictive decision-making. Table 3 maps five potential AI applications to the major sources of operational and financial losses in Pakistan's SOE sector.

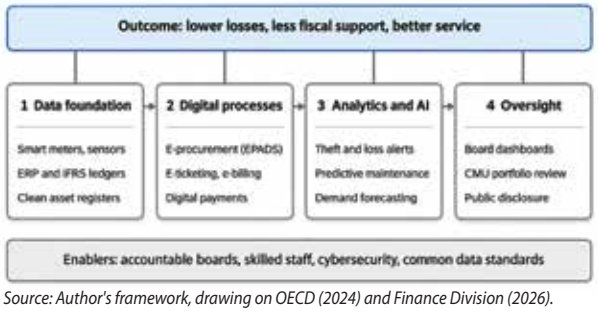
Table 3: AI Applications Mapped to Key SOE Loss Drivers

Loss driver	AI application	Data required	Sector
Electricity theft and meter tampering	Anomaly detection using interval-based consumption readings	AMI data and feeder-level energy audits	Power distribution
Equipment failure and service disruptions	Predictive maintenance and failure forecasting	Sensor data, equipment histories and maintenance logs	Power, railways, gas
Idle or overloaded capacity	Demand forecasting, capacity optimisation and scheduling	Ticketing records, historical demand and load data	Railways, aviation and power
Procurement inefficiencies and potential leakage	Bid-pattern analysis, price-outlier detection and supplier risk profiling	EPADS tender records, bid histories and supplier data	All SOEs
Delayed or inadequate financial reporting	Automated financial data consolidation, anomaly detection and risk flagging	ERP ledgers and standardised IFRS-aligned financial records	CMU and SOE boards

Source: Author's analysis.

The potential financial gains are particularly significant in two areas such as power distribution and public procurement. National Electric Power Regulatory Authority (NEPRA) 2026, estimates that excess transmission and distribution losses cost Rs 265 billion in FY2024–25. Even a modest reduction in these losses through AI-enabled anomaly detection and targeted inspections could translate into substantial financial savings. Similarly, procurement analytics offers considerable potential because it can be introduced without major additional hardware investment. EPADS already generates digital tender and transaction records that can be analysed to identify unusual bidding patterns, price deviations, supplier concentration and potential procurement irregularities. This provides an opportunity to move beyond transaction digitisation towards intelligence-driven procurement oversight.

Figure 2: A Four-Layer Framework for Technology-Enabled SOE Transformation



Source: Author's framework, drawing on OECD (2024) and Finance Division (2026).

The sequencing of this transformation is critical. AI systems are only as reliable as the data on which they are trained. Algorithms developed using estimated meter readings, incomplete transaction records or unaudited financial statements risk reproducing existing inaccuracies at scale and generating misleading insights. Therefore, each layer of the framework presented in Figure 2 depends on the effective implementation of the preceding layer. Reliable data, standardised digital processes and robust governance arrangements must be established before AI can deliver meaningful improvements in SOE performance.

Risks and Preconditions for Successful Digital Transformation

Despite the potential benefits of digitalization and AI, several risks could turn technology investments into additional cost centres without delivering meaningful improvements in SOE performance. Four challenges require particular attention:

Technology Without Accountability: Digital dashboards and automated reporting systems cannot improve performance unless boards and management are held accountable for acting on the information they provide. The Cabinet Committee on SOEs has already emphasised the need for realistic business plans and hard budget constraints for chronically loss-making enterprises (Business Recorder, 2026). Digital performance indicators must therefore be linked to managerial responsibility and measurable outcomes.

Cybersecurity and Data Protection: The integration of smart meters, digital ticketing platforms, procurement systems and financial databases increases the exposure of critical infrastructure to cyberattacks and data breaches. Robust cybersecurity protocols, access controls and data protection mechanisms are essential to safeguarding these systems. These requirements are also recognised in Pakistan's National AI Policy 2025 (MoITT, 2025).

Implementation Costs, Skills and Vendor Dependence: Digital transformation requires substantial investment in infrastructure, technical expertise and workforce development. Pakistan's smart-metering programme has experienced delays arising from procurement and implementation challenges, illustrating the risks associated with technology selection and vendor management. Furthermore, the transition must account for workforce implications, particularly in SOEs with significant unfunded pension obligations of approximately Rs 2 trillion. Reskilling programmes and structured workforce transition plans are therefore necessary to ensure that technological improvements do not create additional institutional and financial pressures.

Weak Data Quality and Unexplained AI Models: AI systems cannot produce reliable results when trained on incomplete, inaccurate or inconsistent data. Similarly, decisions generated by algorithms must be explainable and open to scrutiny. Boards and auditors should understand the criteria behind flags relating to electricity consumers, suppliers or procurement bids, while internal audit functions should independently test automated systems as part of the organisation's broader internal control framework.

A Five-Step Roadmap

To translate existing digital initiatives into measurable improvements in SOE performance, Pakistan should adopt the following priorities:

Strengthen Data and Reporting Systems: Implement integrated ERP systems and complete IFRS-aligned financial reporting across commercial SOEs. Automate the submission of financial and operational data to the CMU database to facilitate timely monitoring and risk identification.

Expand Smart Metering: Extend AMI beyond the existing 2.1 million installations, prioritising feeders with the highest transmission and distribution losses. Integrate metering with automated billing and revenue recovery systems.

Integrate SOE Procurement into EPADS: Extend mandatory e-procurement across SOEs through integration with the Electronic Public Procurement Acquisition and Disposal System (EPADS). The government has informed the IMF of its plan to integrate EPADS with public-sector enterprises by June 2027 (The News, 2026). Implementation should begin without waiting for the deadline.

Pilot AI Applications with Measurable Returns: Prioritise two or three applications addressing identifiable financial losses, particularly electricity theft detection, predictive maintenance and procurement analytics. Establish baseline indicators to assess actual savings and operational improvements.

Incorporate Digital Targets into Management Evaluation: Include measurable digital transformation targets in SOE business plans, Statements of Corporate Intent and CEO performance contracts. The CMU and respective boards should periodically evaluate progress against these targets.

Management accountants have an important role in implementing this roadmap. Their responsibilities should include evaluating the financial viability of technology investments, monitoring realised benefits and ensuring adequate internal controls over automated processes. This would help connect digital expenditure with measurable organisational value.

Conclusion: Turning Digitalization into Financial Performance

Digitalization and artificial intelligence will not, by themselves, determine whether Pakistan's SOEs should remain under public ownership or undergo restructuring or privatisation. Their primary contribution is to provide the government with reliable information on enterprise costs, revenues, operational inefficiencies and financial risks, thereby strengthening the evidence base for ownership and reform decisions.

With loss-making SOEs reporting aggregate losses of Rs 832.8 billion in FY2025, even modest improvements in revenue recovery, procurement efficiency and asset utilisation could generate substantial fiscal benefits. However, success should be measured not by the amount invested in technology but by the resulting improvements in financial and operational performance.

Pakistan's priority should be to move from fragmented digital initiatives towards an integrated system of reliable data, automated processes, intelligent analytics and accountable governance. The foundations are already emerging; the next step is to ensure that these investments translate into measurable improvements in SOE performance and reduced fiscal exposure.

References

- Associated Press of Pakistan. (2026a, September 23). Over 2.12m smart meters installed nationwide to curb power theft. https://www.app.com.pk/?p=1280603
- Associated Press of Pakistan. (2026b, September 7). Railways approves strategic roadmap for modernization, financial sustainability. https://www.app.com.pk/?p=1274066
- Business Recorder. (2026, January 9). SOE losses widen to Rs123bn in FY25 despite revenue of Rs12.4trn. https://www.brecorder.com/news/40401430
- Express Tribune. (2017, August). $400m project faces two-year delay. https://tribune.com.pk/story/1493518/400m-project-faces-two-year-delay-dispute-complexities-take
- Express Tribune. (2026, July 7). Railway revenue rises 20% to Rs115b. https://tribune.com.pk/story/2616883/railway-revenue-rises-20-to-rs115b
- Finance Division, Central Monitoring Unit. (2026). Federal state-owned enterprises (SOEs): Aggregate annual report on SOEs, fiscal year 2025. Government of Pakistan. https://finance.gov.pk/cmu.html
- Government of Pakistan. (2023a). State-Owned Enterprises (Governance and Operations) Act, 2023. https://finance.gov.pk/cmu.html
- Government of Pakistan. (2023b). State-Owned Enterprises (Ownership and Management) Policy, 2023. https://finance.gov.pk/cmu.html
- International Monetary Fund. (2025, November). Pakistan: Governance and corruption diagnostic report (HLS/25/40). https://www.imf.org/-/media/files/publications/hls/2025/english/hlsea2025040.pdf
- Ministry of Information Technology and Telecommunication. (2025). The Federal Cabinet has officially approved the Artificial Intelligence (AI) Policy 2025. Government of Pakistan. https://www.moitt.gov.pk/SliderDetail/NWIyMzEwYzktYTIwYy00ZTk0LWI5ODUtYjg5NjZmYTYyMTg2
- National Electric Power Regulatory Authority. (2026). Performance evaluation report of distribution companies FY 2024-25.https://nepra.org.pk/M&E/PER/Distribution/2026/PER%202024-25%20Distribution%20Companies.pdf
- OECD. (2024). OECD guidelines on corporate governance of state-owned enterprises 2024. OECD Publishing. https://doi.org/10.1787/18a24f43-en
- Press Information Department. (2025, January 28). Approval of the Digital Nation Pakistan Bill 2025: A milestone towards Pakistan's digital transformation (PR No. 266). Government of Pakistan. https://pid.gov.pk/site/press_detail/27860
- Profit by Pakistan Today. (2025, July 30). Pakistan approves landmark AI Policy 2025 to drive digital transformation and empower youth. https://profit.pakistantoday.com.pk/2025/07/30/pakistan-approves-landmark-ai-policy-2025-to-drive-digital-transformation-and-empower-youth/
- Public Procurement Regulatory Authority. (2026, January 16). PPRA leads reforms; EPADS brings transparency, accountability in procurement. https://ppra.gov.pk/news/ppra-leads-reforms
- Tata Power Delhi Distribution Limited. (n.d.). Company profile. Retrieved October 9, 2026, from https://www.tatapower-ddl.com/corporate/our-company/company-profile
- The News International. (2026, February). Govt assures IMF of new procurement rules by June, ends preferential treatment for SOEs. https://www.thenews.pk/print/1401347-govt-assures-imf-of-new-procurement-rules-by-june-ends-preferential-treatment-for-soes
- World Bank. (2023). The business of the state. World Bank. https://doi.org/10.1596/978-1-4648-1998-8

About the Authors: Mr. Abdul Qayyum *is a seasoned finance leader with over 15 years of diversified experience across construction, FMCG, manufacturing, and multinational environments in the Middle East and South Asia and is a Fellow Member of ICMA. Currently serving as Group Finance Manager at Lootah Group, UAE, he specializes in IFRS compliance, financial controlling, digital transformation, ERP implementation, and strategic business partnering. His expertise spans financial governance, cost optimization, VAT implementation, and performance management, contributing to sustainable growth and operational excellence.*