



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Bureau
International des
Poids et
Mesures



Digital Transformation of Legal Metrology in Saudi Arabia

A new digital legal metrology platform (Taqyees) ensures that the citizens of Saudi Arabia can have confidence in goods and services in a fair and equitable marketplace

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The Challenge

Prior to 2018, legal metrology activities in Saudi Arabia were distributed across multiple sectors, each operating under sector-specific technical requirements and verification procedures, and with non-standardized measurement procedures. This distribution limited cross-sector coordination and regulatory visibility for effective compliance monitoring and timely responses to market risks and created inefficiencies in ensuring measurement accuracy across trade and industrial applications. This also created challenges in maintaining a consistently level playing field, increased the potential for commercial disputes, affected confidence in measurement consistency, and led to more complex verification and inspection processes.

These challenges also affected confidence in the essential quantities used in trade and industry, including critical measurement quantities (e.g. mass, volume, and energy consumption) measured by weighing instruments, fuel dispensers, and electricity meters, each of which plays a critical role in economic transactions and national resource management. The core issue extended beyond isolated technical inaccuracies to a limited system-wide integration characterized by fragmentation, and limited tracking of, and access to, measurement data across regulatory bodies.

Between 2018 and 2020, a unified metrology system became available; however, service requests were handled via email, and reports were issued only in paper form. Furthermore, centralized digital records were not yet available for verification status and compliance monitoring. It was evident that market participation was still limited during the initial implementation phase, as few entities were licensed to perform verification activities during the early stages (2018–2020) of the Legal Metrology Program (Taqyees) in Saudi Arabia. These limitations highlighted the need for a comprehensive, scalable, technology-enabled national solution to transform legal metrology into a cohesive, data-driven system.

The consequences of these limitations were significant. From a policy perspective, the limited availability of consolidated measurement data constrained evidence-based decision-making. At the same time, this gap presented a clear opportunity to use the digital transformation to enhance measurement reliability, improve transparency, and strengthen governance within the legal metrology system.

The Solution

In response to these challenges, starting in 2021, the Saudi Standards, Metrology, and Quality Organization (SASO) implemented a comprehensive digital transformation of the Legal Metrology Program (Taqyees), establishing a centralized national platform that integrates all stakeholders within a unified operational ecosystem.

The intervention consisted of developing a fully digital, paperless platform that enables end-to-end management of legal metrology activities. This includes registration, licensing, verification processes, verification scheduling, reporting, and compliance monitoring. In addition, the platform enables the activation and management of core legal metrology activities, including type approval, initial verification for both local and international manufacturers, periodic verification, and market surveillance. The platform seamlessly connects manufacturers, importers, service providers, verification bodies, and regulatory inspectors within a single ecosystem.

Key functionalities of the digital legal metrology platform (**Figure 1**) include a(n):

- Fully online licensing and verification services
- Automatic bulk insertion of large-scale data
- Frictionless user experience
- Robotic Process Automation (RPA) for repetitive business service

From a metrological perspective, the intervention represents a large-scale implementation of legal metrology digitalization, strengthening the overarching national quality infrastructure and enabling more effective control of measuring instruments used in trade and industry.

The system operates within the national legal metrology framework, ensuring verification activities are conducted by authorized and regulated entities, thereby supporting traceability and consistency. Metrological traceability to the SI is ensured through verified equipment calibrated by the National Metrology Institute (NMI), or through equipment with metrological traceability chains linked to the NMI, which are used to verify measuring instruments on the market.

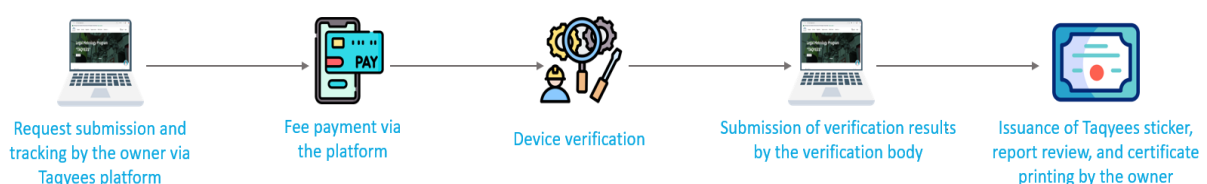


Figure 1. End-to-end digital workflow of the Taqyees legal metrology platform, from service request submission to issuance of verification certificates and stickers.

The intervention involves multiple institutional stakeholders, including the Saudi Standards, Metrology and Quality Organization (SASO) as the national regulatory authority, and aligns with international and regional metrology frameworks and organizations such as the OIML and GULFMET. These collaborations support harmonization with international best practices and enhance the system's credibility. The implementation is also aligned with international conformity frameworks, particularly the OIML Certification System (OIML-CS), which supports mutual recognition and facilitates international trade through standardized and trusted measurement systems. In this context, SASO utilizes OIML-CS certificates in its regulatory and operational processes and contributes as a member of the OIML-CS committee, thereby reinforcing SASO's role in adopting and shaping international best practices in legal metrology.

While the intervention is primarily operational and regulatory, it aligns with international best practices in legal metrology and quality infrastructure development. The digital platform serves as an operational backbone, transforming previously fragmented, manual processes into a coordinated, efficient, and scalable system that supports nationwide implementation.

A Quantifiable Impact

The digital transformation of the Legal Metrology Program has generated substantial, measurable impacts across operational, economic, regulatory, and environmental dimensions. A clear demonstration of performance and impact can be illustrated by comparing data collected before and after the implementation of the digital platform. This included sources from historical records maintained by SASO under the Legal Metrology Program to the real-time data and analytics generated by the current digital platform, as well as reports submitted through the platform by Taqyees operational staff and licensed entities, regulatory records and verification databases, and Customer Relationship Management (CRM) systems, including technical support and ticketing systems.

The Taqyees platform is considered a “one-stop shop” that includes the necessary services and materials to support and enable both individuals and entities in the market through an automated process, increasing efficiency and effectiveness, while reinforcing measurement and calibration laws and regulations, covering legal metrology activities in cooperation with relevant stakeholders in the ecosystem. The digital legal metrology platform achieved full digitalization of services over the 4-year timeframe, with 100 % of transactions now conducted electronically. A more than 3-fold increase in fuel dispenser verifications (from 32 529 to 102 043) and a near 3-fold increase in weighing instrument verifications (from 9 806 to 28,595) have been observed. The total volume of electricity meters increased nearly 2-fold (from 580 390 to 1 133 595) across 75 distinct factories and electricity service providers. Water meters have been recently included, with 354 091 verifications completed through to the end of 2025. The platform has supported a total of over 6.3 million verification processes and over 65 thousand field inspections to ensure alignment with best practices in sectors that contribute to the protection of consumers, businesses, and the environment.

The introduction of automation significantly reduced manual intervention, with four key services fully automated, including initial, periodic, and post-maintenance verification requests, as well as type approval. This resulted in faster processing times, improved service delivery, and enhanced user experience. Following the digital legal metrology platform's launch, transaction volumes grew at a compound annual rate of 44 %, reflecting strong stakeholder engagement and improved service accessibility. The average verification time for completed requests decreased from 15 to 10 business days, representing a 33 % reduction, while geographical coverage expanded from 3 to all 13 regions of Saudi Arabia. This improvement was achieved despite the operational demands associated with serving remote locations across the Kingdom's vast geographical area. Furthermore, the technical infrastructure was bolstered by a 3-fold increase in the number of licensed verification entities (from 16 to 48). The regulatory impact is equally significant. The availability of real-time data enabled the execution of over 16 000 field inspections in 2025, ensuring stronger market oversight. Integrated workflows have improved compliance monitoring, enabled more targeted inspections, and strengthened overall market oversight.

Data quality is ensured through several mechanisms. The transition to a fully digital system enables high levels of data consistency, traceability, and standardization. Automation reduces the likelihood of human error, while system integrations with external entities enhance data validation and cross-verification. Data accuracy is further supported through sampling verification and field inspection campaigns. The centralized nature of the platform also improves comparability of data across sectors and over time.

The environmental impact further highlights the broader benefits of intervention. By digitizing the verification processes, the platform eliminated the need for paper-based documentation. With over 5.8 million devices verified digitally, approximately 11.7 million sheets of paper were saved, equivalent to preserving around 1 406 trees. This contributes directly to national sustainability objectives and environmental conservation efforts.

Compared to prior baseline operations that relied on a fragmented, manual, and resource-intensive system, the transformation is clear: a fully integrated, automated, and data-driven ecosystem that has demonstrated the strategic role of digital metrology in advancing policy development, regulatory effectiveness, and institutional strengthening by delivering actionable, data-driven insights to decision-makers. It enabled the redesign of the national operational model for metrological supervision, the structured classification of metrological activities, and the enhancement of the regulatory (inspection) model. Furthermore, it directly supported the modernization of the national Law of Measurement and Calibration and its implementing regulations, resulting in stronger governance, improved regulatory coherence, and more effective, evidence-based policymaking.

The availability of reliable, real-time data has enabled more informed and evidence-based decision-making. Regulators are now better equipped to monitor compliance, identify high-risk sectors, and allocate resources more effectively. This has enhanced the overall

effectiveness of regulatory enforcement and improved transparency and accountability. This national-level initiative also aligns with the Saudi Vision 2030, the Digital Government Authority strategy, and national transformation programmes. It has strengthened the national quality infrastructure, advanced digital transformation in public services, and supported sustainability by reducing resource consumption and promoting environmentally responsible practices.

Several institutional lessons emerge from this case. First, stakeholder integration is essential to achieving regulatory efficiency and coherence. Second, digital transformation serves as a key enabler of governance, improving coordination, data sharing, and service delivery. Third, user-centric design plays a critical role in driving adoption and improving compliance outcomes.

Finally, the case clearly demonstrates the value of sustained investment in metrology. By modernizing legal metrology systems and embedding them within a digital framework, governments can achieve significant gains in efficiency, cost reduction, and regulatory performance. More importantly, it reinforces metrology's foundational role in achieving sustainable development goals, enabling fair trade, supporting industrial growth, and fostering innovation.

Acknowledgements. Legal Metrology Program “Taqyees” website: WWW.TAQYEES.SA.

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