WATER WITH DIGITAL INTELLIGENCE

By Abdul Rahman Mohammed, CEO, Sahara Industry

Water is an important natural resource. The consumption pattern globally has become unsustainable while its quality and contamination by human activities are constantly growing. The integrated water resources management paradigm emphasizes the importance of considering all water sources as a valuable resource to bridge the artificial disconnect between water quantity and water quality. Whether any water source is depleted or rendered unusable by pollution, it is a lost resource and may lead to a failure to meet basic human needs.

India is home to almost 18% of the world's population, but only holds 4% of the freshwater resources. Not only is water scarce in India, the quality is also deteriorating gradually. The traditional approaches to managing water assets are no longer sustainable. The current method of stretching equipment life and making patches and repairs to aging infrastructure puts them at even greater risk of failure. The water utilities have limited visibility and control over these assets amplifies the challenge which gets multiplied as they are dealing with constrained budgets that constantly force them to rethink and prioritize where and how they should invest in modern technologies.

Water utilities across the globe are under tremendous pressure to innovate and address the growing challenges of population growth, increasing demand, water scarcity and deteriorating asset health which were further compounded by the pandemic outbreak that saw demand for water rise considerably and workforce mandated to work from home.

Smart Water Management for Increased Efficiency

Water utilities have to find better solutions that complement the infrastructure needs and available technologies. The old system is not going to be replaced instantly but providing deeper insight into operations, with real-time analysis to enable meaningful and effective management decisions will be the key factor to change.

Adoption of modern technology can help accurately analyse the demand-supply, predict flow volumes, availability at source and determine next steps in real time basis. The solutions will add intelligence to the pumps, allowing automated processes to reduce manual work, remove latency, reduce breakdowns, and eliminate delays enabling real-time decisions.

Artificial intelligence (AI) and Machine Learning (ML) have revolutionized our lives, but water sector has been slower to adopt smart solutions than others. Despite AI systems underpinning everything from power grid regulation to Google's search tools, water and wastewater services have only recently embraced data-driven technologies mainly after the safety protocols have been stiffened after the pandemic. After years of lagging behind other industries, the waste sector is making up for lost time, and smart systems are taking off, however, has been comparatively slow in India as compared to European and Middle Eastern nations.

FRP Pressure Vessels of Different Capacities

Water utilities have traditionally been conservative due to various reasons. They have been resistant to change while focusing on stability rather than taking a chance with new technologies despite knowing that it could improve performance over time. They are hesitantly going for upgrades with new sensors, monitors, and tracking capabilities that needed substantial capital investments.

Data Management and Analytics

Today's world has greater access to data than it ever had. But the water industry is still developing data collection, management, analytics, and controls to more effectively use those data for informed decision-making across all management and operational functions. Many water treatment facilities have centralized supervisory control and data acquisition (SCADA) systems or distributed control systems (DCS) for plant process and equipment control. Operators monitor equipment for status and performance, with perhaps thousands of signals collected as unique data points in the control system that can be stored in a data legacy.

It is still often works manually, combining key operating data such as water flows with laboratory data to develop trends for process analysis that can be very time consuming. As a result, much of this data is relatively untapped to support decisions that would enable higher levels of performance and control. Recent advancements that leverage business-intelligence tools offer an opportunity to save time extracting, transforming, visualizing, and analyzing data for faster and more meaningful performance monitoring.

Data management platforms that serve as a data hub using inputs/data from the SCADA or DCS, laboratory information management systems (LIMS), and computerized maintenance management systems (CMMS) enable more efficient combination of these datasets for dashboards, tracking of key performance indicators, automated reports, and saving executive time for other things. Facility-specific systems can provide real-

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time (or frequent) updates for management and operations staff.

Once collected and organized, advanced analytics can identify trends and predict outcomes that in turn provide opportunities to optimize the performance of equipment and processes. Utilities are also starting to incorporate digital twins for asset management. Advanced equipment monitoring and data analytics yield insights into equipment health and performance that maximize prioritization benefits.

Asset Management

Asset management is a key for optimizing capital investments in treatment and distribution facilities. Taking care of equipment and infrastructure to ensure that it performs as required for the full design life of the facility is essential to managing cost and risk. A data-driven mindset is essential in this regard. Utilities continue to develop monitoring programs to collect the right data, populate maintenance management systems, and track and analyze data to facilitate better decisions. Implementing asset-level likelihood-of-failure and consequence-of-failure metrics, asset condition assessment procedures, and onsite condition assessment of critical assets at treatment plants, could provide easy access to selected performance data at the facility and asset levels.

Fully Automatic Water Softener

Looking outside the water industry will also help the water utilities to advance asset management practices for facility optimization. Development of ISO standards demonstrated the value of collaboration across industries and countries for effective asset management. There is room to learn more from manufacturing, energy, oil and gas industries, particularly with their advanced monitoring and diagnostics of asset health.

Enhanced Operational Efficiency

The water sector continues to focus on operational efficiencies to enhance performance reliability and reduce consumption of resources such as energy and chemicals. Selecting treatment strategies that reduce consumption of resources is a foundational opportunity to optimize a facility.

It's important to consider the impacts of mechanical and electrical design choices on efficiency over the life of the facility. The design life of water treatment facilities often projects 20 years or more into the future. However, equipment that is sized and selected for efficiency at a future design capacity may operate inefficiently under conditions of lower flows and loads, thus increasing energy demands relative to the level of water treatment in the near term. Incorporating appropriate new processes and tools into planning and design and simultaneously considering operation and asset management for the full life of the facility is a challenging, but essential, balancing act.

Water utilities are mindful of how the designs affect future maintenance, the true costs and challenges of maintenance are often not fully realized until well after commissioning. Knowledgeable engineers enhance designs by incorporating risk-management practices such as hazard-and-operability review (HAZOP) and failure modes, effects, and criticality analysis (FMECA) results into facility designs or upgrades. The quality of 3D models and building information modelling (BIM) and the ability to link equipment information can provide an intuitive way for operations and maintenance professionals to access equipment data and other information.

Initiatives by Sahara Industry

Being market oriented with modern system and processes, Sahara Industry has a client-centric approach to provide high quality products with excellent service standards. The technical expertise and in-depth understanding of the water sector has enabled it to offer the best integrated and strategic approach to industrial and municipal water and wastewater treatment systems. The Company provides multi-disciplinary water and wastewater treatment and engineering services and delivering ideal solutions based on the experience of implementing hundreds of plants and projects with integrated project approach.

Ultra-Pure Water Tretament Plant

In a legacy of about two decades, it has contributed immensely by making water safe for drinking, industrial and institutional purposes. The ISO 9001:2015 certified company; it has executed water and wastewater projects in the length and breadth of India as well as in several other countries. The technologically advanced machineries and manufacturing solutions combined with professional engineers and well-qualified teams to achieve the rare feat of being an indigenously creator of advanced water and wastewater treatment solutions matching with world standards.

Foreword

With the price of inaction mounting each day and the tools to improve India's water and wastewater infrastructure in smart, sustainable ways increasingly available, now's the time to do what we can to secure our water future. Water Innovation 2050, the water industry's vision for the sector, had some fantastic ideas. Solving its problems is not just about developing new solutions but using the innovations that already exist. It is time to look at replacement, not the whole water network, but where the limited available funds will have the greatest impact on the functioning and enhancement of the system.

Deploying alternative approaches, solutions, and more efficient water management strategies that enable society to live with unexpected climate events will take on greater priority. The municipal water reuse systems have increasingly become necessary, irrespective of cost, to mitigate water supply risks for cities. At the same time, rising investments in more innovative irrigation and farming practices, which are on the rise, are poised to scale. When digital transformation is taken up with complete commitment the results does not always take time to materialise. Hence, it is time to take the initiative, commit, and you will reap the rewards.

About the Author

The young entrepreneur with an MBA in marketing & finance, he is the Founder & CEO of Sahara Industry, providing technologically advanced, economical yet best quality water and wastewater treatment solutions. His success lies in his dynamic leadership and his group company has achieved turnover of over INR 1000 million.

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