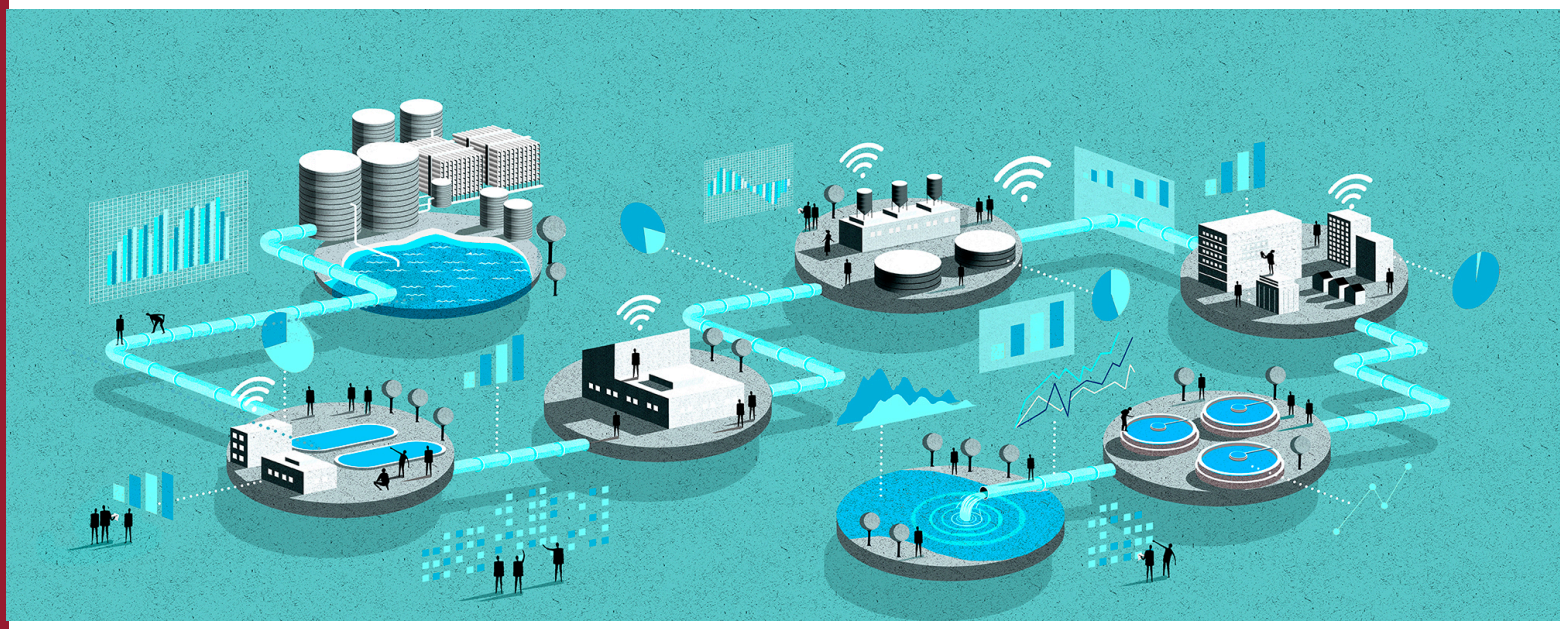

The transformative power of Lean digital within water utilities

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WATER UTILITIES, LIKE MANY OTHER SECTORS OF THE UTILITY INDUSTRY, ARE FACING INCREASED SCRUTINY IN THE AREAS OF COSTS AND PROFIT DELIVERY AND NEW CHALLENGES IN THEIR QUEST TO ENSURE ADEQUATE SUPPLIES AND PROPER SANITATION. THE WATER SECTOR MUST ALSO COPE WITH AN UNCERTAIN FUTURE OF DWINDLING WATER RESOURCES, THE PRESSURES OF INCREASING POPULATION, AGEING INFRASTRUCTURE, AND A WARMING CLIMATE.

One report from the United Nations predicts that by 2030, global water demand will be 40 percent higher than supplies can accommodate. The Middle East and North Africa (MENA) region will suffer the greatest economic loss from climate-related water scarcity, according to the World Bank, which predicts that a 20-percent reduction in water supply would lead to a 10-percent reduction in GDP. Finding ways to modernize, adapt, improve customer service and cut costs, has become a necessity and to do, so requires streamlining and updating of operations, technology and infrastructure.

In addition, the COVID-19 pandemic has led to significant shifts in demand, with less usage by industrial and commercial customers and more daytime usage by individual customers, now working remotely from home offices. These new patterns are upending forecasts, while a rise in payment defaults by shuttered businesses are causing revenue losses in some regions.

In the face of these pressures, the next ten years will be a time of profound and fundamental change for the water utility sector as more companies embrace digitization with an eye to increasing both short- and long-term earnings.

“Success will depend on the readiness of the water utility sector to adapt to changing times and circumstances and maximize the benefits of Lean management and digital water solutions,” says Seif Shieshakly, Co-Founder and Managing Partner at Four Principles.

Smart Water is the Future

Taking a page from the industrial sector, forward-thinking water utilities are applying new digital tools and technologies, such as advanced analytics, to help them better assess assets and operations. With the aid of experienced management consultants, water utilities are introducing Lean solutions that integrate with digital tools, to transform customer experience and the ways cities, towns and regions are managing water.

The European water sector will spend $30 billion on software, data, and analytics solutions by the year 2025, while in the U.S. and Canada, smart water will grow 6.5 percent a year with annual expenditures topping $10 billion a year by 2030, according to reports by Bluefield Research.

In the Middle East, governments and industry are investing in smart technologies to preserve water resources, enhance sustainability, and mitigate economic losses from climate-related water scarcity. Regionally, the entire utilities sector has moved forward rapidly towards digital transformation, with the UAE and Saudi Arabia home to some of the technologically advanced utility sectors in the Middle East.

“Looking ahead, it seems clear the water utility sector must look to digitization enabled by Lean management to succeed in the face of current challenges,” says Mehdi Chelhi, Principal at Four Principles. “Our experts can help water utilities adopt smart water solutions and incorporate Lean principles and practices to reap the most benefits in both the short- and long-term.”

How Lean Methods Can Transform Water Utility Management

The Lean principles, tools and techniques that have proven so valuable in the manufacturing and technology sectors, are providing equally impressive results in the utility sector. Water utilities are currently utilizing Lean-based practices, including:

- Cross-Functional Teams: a team-based approach to problem solving and optimization, in which team members are chosen to represent all aspects of the process.
- Kaizen/Lean Event: Multidisciplinary teams participate in a Kaizen event to analyze and improve a process over a concentrated period of days.
- Standard Work: A process for documenting the best way to perform a task, accompanied by diagrams, photographs, and step-by-step instructions.
- Total Productive Maintenance: A Lean method that engages all managers and employees in analyzing equipment and identifying problems, to prevent malfunctions, breakdowns, accidents and other losses.
- Six Sigma: An optimization method based on a set of statistical tools designed to standardize processes, eliminate variation and prevent defects.
- Value Stream Mapping: A means to identify and create a detailed map of all steps in a process, to identify those that bring value and eliminate wasteful steps.

In Europe, Asia, the Middle East, Africa and the Americas, Lean management consultants and technology companies are actively involved in applying Lean solutions together with digitization, to help water utilities deliver essential services affordably and sustainably in the face of an unpredictable future.

The concept of value stream mapping is particularly useful for water service providers to improve customer experience. This allows them to reengineer processes from the standpoint of the end-use customer, to create simple, intuitive customer service interactions with the least number of steps possible. Utilizing water data and analytics, water service providers can document each step in a process, identifying areas of waste, highlighting areas in need of improvement, and revealing opportunities to reduce times to desired outcome. Strategic insights might include the need for organizational redesign, increased automation, or training and skillset improvement for employees.

“Water utilities, like others in the utilities sector, can build in a process for performance improvement based on incoming information from digital analytics,” says James Ryan, Principal at Four Principles.

How Digitization and Analytics Are Enabling Lean Transformation in the Water Sector

Digitization and advanced analytics are helping water utilities identify issues and reduce revenue loss from both technical and non-technical sources. Water utilities are implementing advanced metering infrastructure and automated data management across their operations, increasing the use of remote sensors, analytics, reporting and communications in multiple areas. These include measuring and recording water flows, monitoring water and wastewater quality, hydraulic modelling, financial planning, and personnel management. Real-time interactive customer service and transparent payment processes are other areas where digitization and data analytics offer benefits.

With the insights provided by real-time data sets, utilities can make better decisions, prepare for changing regulations, improve customer engagement, and adapt to the dynamics of fast-changing markets.

New techniques in advanced analytics allow water utilities to build predictive models for water assets based on structural information, work orders, failure history, and risk analysis. Insights from these data, offer water utilities the chance to focus on high-risk, critical assets and anticipate expensive equipment expenditures, maintenance and replacement costs. Machine learning algorithms can identify water leaks before they affect customers and more quickly uncover billing anomalies. Lean also helps water utilities establish and implement new rates by using validation, editing, and estimation (VEE) to deliver accurate bills, even under complex rate plans.

Digitization can enable a true omnichannel experience for customers. Seamless customer service processes can be offered across channels, not only improving customer satisfaction, but also reducing cost per interaction. Advanced data management tools allow utilities to provide customers with interactive views of usage data, improving customer satisfaction with proactive usage alerts, high bill warnings, and valuable reports and tips. Water utilities can also publish and analyze reports identifying discrepancies and documenting compliance with regulations.

Incorporating the measurements and outcomes resulting from these new tools, water utilities can iterate rapidly in response to insights, instigating performance improvements with input from all stakeholders.

Benefits of Lean for Water Utility Management

Consider that one third of water utilities around the globe report water loss of more than 40 percent due to leaks, and it is immediately clear why Lean management and digital solutions are needed. Water utilities that apply a Lean management strategy in combination with digitization and data analytics, see performance returns and cost savings almost immediately. By quantifying the health and criticality of assets to create a long-term predictive maintenance plan, water utilities realize savings from focusing maintenance in the highest-need areas and from decreasing non-revenue water losses.

Smart water-management systems yield big results in i. Water sector utilities implementing digitization and advanced analytics, report savings of 10 to 20 percent in maintenance costs and 20 to 30 percent in capital expenditures.

The government of Dubai is a textbook example of this success, with the Dubai Electricity and Water Authority (DEWA) recently receiving ISO 18404 certification for Lean operations, the first government organization in the world to receive this recognition. Among more than 100 smart initiatives included in the "Dubai Smart City" plan, DEWA developed a comprehensive strategy to implement a smart water and electricity infrastructure.

Between 2015 and 2020, DEWA successfully replaced all mechanical water meters with smart water meters – a total of 884,820 smart meters – to create a state-of-the-art smart water grid.

While the program is still very new, the most recent report on DEWA's smart grid program touted results including:

- Improvement in meter reading accuracy
- Better detection of water tampering
- Faster detection of water leaks
- Enhanced customer awareness of water consumption
- Improvement in billing cycle procedures and bill accuracy
- Optimized performance, risk and cost throughout the life cycles of water system assets
- Reduced need for water asset inspections due to better use of water asset records and health data
- More proactive water asset maintenance

The National Water Company of Saudi Arabia has, alongside smart meter and other initiatives, made significant improvements in customer service using Lean and digital methods. Together with Four Principles' consultants, the NWC team was able to achieve great results for customers:

- 72% decrease in customer waiting times
- 20% decrease in customer service times
- 59% improvement in the number of customers served on time
- 58% increase in customer E-Branch awareness
- Development and implementation of detailed standards for all aspects of branch operations
- Creation of a holistic Branch Management System with impacted employees and managers
- Introduction of Lean and significant changes in employees' mindsets

Another success story comes from Lyon, France, where Eau du Grand Lyon, the public water service provider serving more than 2.2 million people in the city and surrounding region, established a smart water network in 2015. The system, which incorporates smart water sensors, remote monitoring, two-way communication, and a sophisticated grid management platform, identified and repaired 1,200 water leaks, saved more than 1 million cubic meters of water, and achieved an 8 percent increase in efficiency.

Some of the best-documented case studies come from the U.S., where the Environmental Protection Agency (EPA) has taken an active role in encouraging water agencies to develop Lean-based performance improvement programs. Created with the involvement of six national water-sector associations, the EPA developed a Lean-based Effective Utility Management (EUM) program as a framework to help water utilities assess operations, establish priorities, plan optimization projects and implement continued performance improvement, with the goal of becoming more efficient and sustainable.

Following the EUM, water-sector utilities have applied Lean and Six Sigma methods to organizational processes such as budgeting and customer management, to core operational processes like planning and carrying out infrastructure improvement, managing treatment plant operations, and repairing stormwater and sewer systems.

Two examples of successful Lean transformation projects often cited by the EPA are:

Charleston, South Carolina: Following the practices of Lean and Six Sigma, Charleston Water System optimized operations and improved availability and management of water resources with a wastewater collection inflow and infiltration project, that boosted treatment capacity by 2.62 million gallons per day. The project improved the utility's financial stability, saving $1.3 million per year in operations and maintenance costs.

Washington County, Oregon: Faced with challenges to the health of the Tualatin River Basin that required a cohesive watershed-based strategy, Clean Water Services made it a strategic goal to form a cross-departmental team charged with utilizing Lean, Six Sigma, and Structured Process Improvement to "work smarter," eliminating wasteful steps and implementing data-driven tools for analysis and problem-solving. Investing more than $100 million over ten years, Clean Water Services improved infrastructure, optimized operations, advanced resource recovery, and boosted efficiency and productivity.

The project enabled Clean Water Services to upgrade, replace and expand four outdated wastewater treatment facilities, 40 pump stations, 839 miles of sewer lines and 495 miles of storm sewers. The utility's Bio-P project improved the utility's financial profile by saving $250,000 in chemical costs per year and increasing struvite recovery by 20 percent. Clean Water Services was awarded a Distinguished Budget Presentation Award from the Government Finance Officers Association of the United States and Canada in 2015.

"The application of Lean processes and digital water technologies is relatively new to the water utility sector, and already we can see water service providers achieving substantial increases in efficiency and cost reductions," says Patrick Wiebusch, Co-Founder and Managing Partner at Four Principles. "We would like to see many more water utilities benefiting from these advances."

GET IN TOUCH

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