

Inventory Management Sourcing Policy Selection: A Focus on Wastewater Infrastructure

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Abstract

The wastewater utility industry serves a critical function for a nation's growth and is one of the essential pillars for a healthy infrastructure system. Efficient operations and maintenance of wastewater infrastructure heavily rely on material and equipment available at the right time in the right quantities. Therefore, making correct inventory management strategic decisions a paramount necessity to gain cost efficiencies. At present, a common practice in the industry for decision making is entirely dependent on the experience of the team or individuals in the decision-making process. In this research, strategic inventory management decision-making tools are developed for the wastewater utility industry. The tools include an inventory management maturity framework, a qualitative and quantitative material-specific inventory management sourcing policy selector. The maturity model developed takes into account criteria related to cost, culture, process, and technology from industry practitioners' experience and their envisioned future. The qualitative decision-making tool is demonstrated using sample data intended to be acquired from a global survey. The quantitative decision tool is demonstrated by performing economic assessment simulations of various scenarios, by investigating a case study for inventory management sourcing policies, using in-house and performance-based contracts for mobile flood mitigation pumps. The findings highlight the selection decision should be driven by forecasted equipment utilization. With a trend indicating lower utilization is economical with outsourcing through Performance Based Contract (PBC), while higher utilization is economical using the in-house option. At the same time, the cost parity point for the inventory management policies under investigation can vary according to the equipment output capacity, in this case, the flow rate. The tools developed in this research have the potential to be extended to other industries to assist in strategic decision making, where operations and maintenance works are performed.

Keywords

Inventory Management, Performance Based Contracts (PBC), Inventory Management Sourcing Policy (IMSP)

Biography

Mohammed Maharooof is a Supply Chain Professional currently working in the roads and drainage infrastructure sector. He earned an MEng in Electrical & Electronics Engineering at the University of Nottingham, UK, Master in Professional Engineering Leadership at Griffith University, Australia and a Master in Logistics and Supply Chain Management from Hamad Bin Khalifa University (HBKU), Qatar. His research interest includes inventory management and optimization. He is a Chartered Engineer and a Chartered Water and Environmental Manager.

Dr. Laoucine Kerbache is currently serving as a Professor and a Founding Faculty Member of the Logistics and Supply Chain Management Program within the Engineering Management and Decision Sciences Division at HBKU. For over thirty-five years of academic, research, and consulting activities, he has been very active in his areas of expertise, focusing on modeling and optimization in Operations and Supply Chain Management. He has published over one hundred papers in international journals. He has a PhD, MSc, and BSc in Industrial Engineering and Operations Research from the Mechanical and Industrial Engineering Department, University of Massachusetts, Amherst, USA.