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The Impact of Quality Management Systems on Customer Service Performance: Evidence from Portuguese Retail Water Utilities

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Abstract:

Policy decision-making models in water governance have become increasingly participatory and focused on performance. Despite the growing adoption of environmental public policies across Europe, a critical gap remains in understanding their effectiveness, inclusivity, and measurable outcomes in water governance. This doctoral research project, titled *Essays on Water Governance and Performance*, aims to investigate how quality management systems, operational performance, and citizen engagement tools shape water service delivery. The project seeks to advance knowledge and improve practices in water governance, performance assessment, and citizen participation in the European context, with a particular focus on Portuguese water utilities.

This dissertation addresses these gaps by adopting a multi-paper research approach that integrates mixed methods to analyze how governance practices influence service delivery and citizen participation. Structured into four academic articles, the research aims to: (1) assess the impact of quality management systems on customer service performance; (2) evaluate the operational efficiency of water utilities; (3) examine citizen engagement with water governance initiatives; and (4) analyze the transformative potential of *CivicTech* tools in co-creating water policies. By integrating empirical findings across these dimensions, the research contributes to advancing water governance theory and the design of more effective, accessible, and impactful water initiatives by policymakers. Given this context, Portugal serves as a detailed case study for analyzing management and operational factors in Public Administration, as presented in Papers 1 and 2. Meanwhile, the comparative European context in Papers 3 and 4 allows for the exploration of policy innovations in water governance. Overall, the dissertation offers a clear perspective on water governance by connecting organizational performance with citizen engagement dynamics.

For the purposes of this Research Day, the presentation focuses on the first paper, titled *"The Impact of Quality Management Systems on Customer Service Performance:*

Evidence from Portuguese Retail Water Utilities" and discusses its preliminary findings. This study investigates the relationship between quality management system certifications and customer service performance in Portuguese retail water utilities, using a comprehensive panel dataset covering the period 2011-2023. While previous research has examined the adoption of quality management systems in water utilities, the empirical evidence linking certification to revealed service performance remains limited, particularly in the context of retail water services. The study addresses the following research question *RQ.*: *"What is the relationship between quality management certifications and customer service performance in Portuguese retail water utilities?"*

The empirical analysis covers 306 retail water utilities in Portugal, focusing on the relationship between multiple management system certifications (ISO 9001, ISO 14001, OHSAS 18001, energy management, and asset management) and customer service performance, measured through response rates to written and telephone complaints. To this end, a database was constructed using data from the Annual Reports of Water and Waste Services in Portugal (RASARP). The indicators extracted from the RASARP database were aligned with the study variables. Additionally, control variables, such as utility size, system type (bulk vs. retail), and infrastructure age, were collected from the RASARP, PORDATA, and INE databases.

In this framework, the dependent variables are (1) Presence of multiple certifications - (a) Binary variables for each type of certification; (b) Count variable for multiple certifications; and (2) Response rate to customer complaints. Independent variables include both organizational and service-delivery characteristics. Organizational form is defined by the governance model under which the utility operates. Service characteristics are measured through: (i) percentage of service coverage; (ii) volume of water distributed; (iii) number of pipeline failures; and (iv) classification of the service area (urban–rural). Additional controls include the number of served accommodations and other structural characteristics of the utilities.

The study employs a two-stage analytical approach. First, binary logistic regression models are used to examine the determinants of multiple certification adoption. Second, panel data analysis with utility fixed effects is employed to investigate the effect of certifications on customer service metrics, controlling for utility characteristics and operational conditions. By analyzing response rates to both written and telephone complaints as key performance indicators, this research addresses a significant gap in understanding how quality management frameworks influence day-to-day customer service operations in water utilities.

Initial findings reveal that retail water utilities demonstrate varying levels of protection of user interests, reflected in service interruption rates and average response rates to written and telephone complaints. The analysis shows that utilities holding multiple

certifications tend to exhibit higher performance in protecting user interests. However, the relationship appears to be moderated by utility size and ownership structure, aligning with patterns observed in comparative studies of Southern European utilities.

The study contributes to the literature by: (1) providing empirical evidence of the relationship between QMS and measurable service outcomes in water utilities, (2) identifying the specific combinations of certifications that yield the highest performance improvements, and (3) highlighting the role of organizational characteristics in moderating certification benefits. Taken together, these findings have important implications for utility managers and regulators in designing effective quality management strategies and establishing appropriate regulatory frameworks.

Keywords: Water utilities, Quality management systems, Certification, Customer service, Panel data analysis.

SDGs: Goal 6 Clean Water and Sanitation; Goal 12 Responsible Consumption and Production; Goal 17 Partnerships for the Goals.