

Designing a Socio-Technical System for Groundwater Resources Management, Applying Smart Energy and Water Meter

Authors : S. Mahdi Sadatmansouri, Maryam Khalili

Abstract : World, nowadays, encounters serious water scarcity problem. During the past few years, by advent of Smart Energy and Water Meter (SEWM) and its installation at the electro-pumps of the water wells, one had believed that it could be the golden key to address the groundwater resources over-pumping issue. In fact, implementation of these Smart Meters managed to control the water table drawdown for short; but it was not a sustainable approach. SEWM has been considered as law enforcement facility at first; however, for solving a complex socioeconomic problem like shared groundwater resources management, more than just enforcement is required: participation to conserve common resources. The well owners or farmers, as water consumers, are the main and direct stakeholders of this system and other stakeholders could be government sectors, investors, technology providers, private sectors or ordinary people. Designing a socio-technical system not only defines the role of each stakeholder but also can lubricate the communication to reach the system goals while benefits of each are considered and provided. Farmers, as the key participators for solving groundwater problem, do not trust governments but they would trust a fair system in which responsibilities, privileges and benefits are clear. Technology could help this system remained impartial and productive. Social aspects provide rules, regulations, social objects and etc. for the system and help it to be more human-centered. As the design methodology, Design Thinking provides probable solutions for the challenging problems and ongoing conflicts; it could enlighten the way in which the final system could be designed. Using Human Centered Design approach of IDEO helps to keep farmers in the center of the solution and provides a vision by which stakeholders' requirements and needs are addressed effectively. Farmers would be considered to trust the system and participate in their groundwater resources management if they find the rules and tools of the system fair and effective. Besides, implementation of the socio-technical system could change farmers' behavior in order that they concern more about their valuable shared water resources as well as their farm profit. This socio-technical system contains nine main subsystems: 1) Measurement and Monitoring system, 2) Legislation and Governmental system, 3) Information Sharing system, 4) Knowledge based NGOs, 5) Integrated Farm Management system (using IoT), 6) Water Market and Water Banking system, 7) Gamification, 8) Agribusiness ecosystem, 9) Investment system.

Keywords : human centered design, participatory management, smart energy and water meter (SEWM), social object, socio-technical system, water table drawdown

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