



Better together—Harnessing motivations for energy utility crowdsourcing activities



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ABSTRACT

Energy utility firms operate under varying mandates throughout most of the world and typically must operate reliably with long planning cycles and requirements to meet bureaucratic scrutiny and regulatory toll gating to achieve both discrete plan approvals as well as their ongoing licenses to operate. One vehicle for gaining external insights and involving the stakeholders is crowdsourcing. Energy utility firms have a set of distinguishing characteristics (i.e. regulatory processes and stakeholder groups) that they must consider when implementing crowdsourcing activities to aid their planning and innovation strategies. To achieve constructive participation requires understanding and engaging the motivations of the population from which a firm wishes to draw input. We assert that customers' interest, facilitated by digital age communication channels, can provide utility operators with an accessible, valuable resource to assist a wide range of planning and innovation activities. We use the Self-Determination Theory (SDT) lens, grounded by a set of in-depth interviews with utility industry professionals, to articulate motivations for members of the external customer community to provide value to the firms through crowdsourcing activities. We develop five propositions that collectively identify how energy firms should use SDT elements to design crowdsourcing activities.

1. Introduction

Energy utility firms operate throughout most of the world under a range of different mandates including varying degrees of regulation and ownership (private equity, publicly traded, state-owned, etc.). Many energy firms build on a history of customer monopoly, with a near-ubiquitous need for their service. These firms operate within a stringent regulatory framework, resulting in relationships between these firms and their customers having different characteristics from traditional firm-customer relationships. Despite this reality, the energy-utility customers have many reasons to contribute to the decision making of their utility on matters including rate levels and metering policies, and energy availability as demand and supply factors evolve. (i.e. sufficient grid readiness to service electrical vehicle loads [1]). In many regions, a customer has the opportunity of a relationship with only one, or at most a very few, energy utility firms where they have limited options to "vote with their feet" as they might with restaurants or other service providers. We assert that this constraint of choice makes them more likely to influence the firm's operational activities because any dissatisfaction has limited alternative outlets. For this reason, customers, and

stakeholders more broadly, have relationships with the firm that closely parallel relationships with public sector agencies. Further, utilities may suffer both regulatory and reputational repercussions when their constituents' values are not aligned with their decision making [2–4]. Gathered insights from constituents and others via crowdsourcing can be an input for better-informed strategy. It is worth noting that the utility stakeholder landscape is made up of a blend of participants, including, but not limited to customers, present and prospective suppliers, partners, and service providers. We further assert that participation, using Internet facilitated communication channels, can provide utility operators with an accessible and valuable resource to assist a wide range of innovation and planning activities. Organizations operating in the public utility/policy space including water utilities such as Aarhus water [5] and energy utilities in over 108 countries are presently engaging in crowdsourcing activities of varying forms [6,7]. In a recent study by Deloitte [8], three potential benefits of crowdsourcing were identified for the public sector: 1) rapid idea generation, 2) maximization of resources, and 3) increased engagement. This study highlighted that "the crowd acts as a multiplier for enhancing organizational agility". Energy utilities can use the crowdsourced ideas to

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supplement reporting to regulatory processes and furthermore, use the crowdsourcing initiatives as avenues to drive constructive stakeholder commitment and engagement. Recent examples of introduction of new technologies such as smart meters and the selection of new hydro generating sites have received both regulatory and public scrutiny and while crowdsourcing insights should not be the central basis for these decisions they could provide valuable directional insights. On the above basis, and consistent with this sentiment from one of our interviewees, “Blending crowdsourcing with other sources [of data] fundamentally adds to the richness of the data and aids in communicating what makes a measurable change” we assert that it is crucial for firms to properly understand and address crowdsourcing participant motivations in the energy utility domain. This sets the stage for our central research question: How can energy utilities employ theory to design crowdsourcing activities that will motivate potential crowd members to participate constructively toward providing strategic value?

1.1. Structure of paper

We begin with a background of the practical context of energy utility firms and characteristics and challenges specific to it. This is followed by a foundational primer of the relevant concepts within the meta-term “crowdsourcing” and the academic developments of the Self-Determination Theory (SDT). With these three fields as bases (Fig. 1) we present examples of related past and present crowdsourcing initiatives. We then discuss the methodology leveraged to validate the theoretical reasoning with commentary from a sample set of utility industry experts and proceed to formal development of propositions on how utilities might use different crowdsourcing approaches productively. For each we broadly discuss key risks associated with energy utility firms using these crowdsourcing approaches. Collectively these propositions form a generalized mapping of energy utility firm crowdsourcing approaches to SDT mechanisms.

1.2. Background

The typical energy utility model in many countries involves a governmental regulatory body overseeing the utility firm industry's activities with the mandate to maximize the net public good through the balancing of social and economic priorities [[9] p.107]. This means the utilities need to achieve regulatory compliance related to pricing and billing models, services and the bundling of services offered, energy generation and acquisition activities, transmission activities, and geographical service requirements amongst others. This regulated model applies regardless of ownership structure as some are private, some public, some state-owned, and hybrids thereof. Traditionally, these regulatory commissions have been a primary official conduit of policy input available to customers and other stakeholders in the electrical energy market. Participation through this mechanism involves attending formal hearings and/or filing appropriate documentation. In comparison to the non-local and asynchronous character of Internet

communication, public hearings are slow and bureaucratic processes with special interest groups frequently dominating the discussions [10]. Public hearings are governmental processes and like many such public policy activities, are also adopting the use of Internet technologies to meet their mandates [11]. The other traditional paths for clients to bring ideas to the utility firm are feedback request cards and web surveys, which invite clients to contact the firm and answer the posed sets of questions. While we understand that firms have effectively used these paths, we assert that the community input traditionally acquired has only been a fraction of the potential available because these tools do not allow dialogue between participants, or between the customers and representatives of the firm. These features are within the working definition of crowdsourcing and are the focus of this paper.

1.3. Energy utility industry characteristics

Beyond frequently being regulated natural monopolies providing an essential service as mentioned, firms operating in the energy utility field today make their strategic decisions on a landscape of noteworthy characteristics.

- a **Regulatory considerations** - Integrated resource planning and other long-term planning activities are key for energy utilities but to pass regulatory scrutiny the utilities need to create and get approval for substantial business cases based on a wide range of data collection and analysis initiatives. Energy sector projects are often very costly, large-scale and involve long time horizons. Planning and construction of new power plants (hydrocarbon and renewable) and transmission lines, implementation of metering upgrades and billing policies are all multi-year projects from conception through regulatory approval and financing to ultimate completion. The service lives of these assets are measured in decades. Regulatory approval for the business cases of all such activities is required for the firms to maintain their licenses to operate.
- b **Technological innovations** – Maturation of new technologies are making immense changes to all dimensions of the industry at an unprecedented and seemingly accelerating pace. Driven by economic, political, and environmental forces, investment is producing radical departures from previously predictable patterns of production. Examples include renewables [12], transmission managed by smart metering [13], energy storage through pumped storage and battery [14], and consumption of electrical energy by electric vehicles [15].
- c **Political attitudes** - Industry practices considered generally acceptable at one time are frequently judged more critically at subsequent times [16,17]. For instance, the pipeline had been an example of an efficiency innovation that was preferable to freight of petrochemicals by tanker truck or rail but in recent years has become viewed as an anathema to many [18]. Wind turbines, once commonly regarded as symbols of clean, safe and elegant sources of energy are regarded today as bird killers or eyesores by large and growing segments of many regions' populations [19]. Hydroelectric dams in the 20th century were regarded proudly as infrastructure assets that served society and industry with reliable, low cost, quality of life improving reliable clean energy. Today, such projects are passionately opposed by various social factions as irreparable abuses of the environment [20]. From just these examples, we see practices that were generally considered progressive and responsible at one time can become measured by significant political factions as retrogressive and unacceptable. Contemporary research by Dermot et al. [21] explores the introduction of maturing renewable technologies to society through a political science lens, and we will complement this work with qualitative perspectives from energy industry professionals directly involved at the society-technology interface.
- d **Uncertainty and risk** - The inherent unknowns associated with

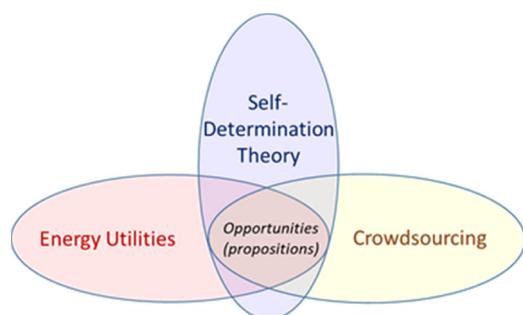


Fig. 1. Conceptual Structure of this Paper.

A sub-chapter below will develop each of these three fields.

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