

Utility Industry as a Complex Adaptive System: A Strategic Analysis

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Extended Abstract

The Indian urban population is on an ever-growing rise. This increasing urban population amounts to a greater demand for urban infrastructure. Utilities are an important part of the urban fabric- both above and below the surface and bring a huge range of activities in maintenance, repair, and updation of utility lines with most work zones intersecting with transportation infrastructure. With the increasing types of utility lines in cities and the emergence of private stakeholder participation in the utility market, there is a serious concern about fragmentation in the utility market. Collaboration and coordination in the utility space is now a complicated process.

In India, with multiple schemes and public policy interventions related to tap water provisions to every household, gas pipelines, and shifting overhead utilities to the subsurface in a planned manner, among many others - the subsurface space is now even more challenged and seeks a new perspective in managing the utility works. With every utility line added to the subsurface, the complexity of these networks increases. An even more complex state of interdependencies and conflicts arises between these infrastructure networks.

Over the years, infrastructure systems have evolved from being a simple service provision to a multi-party dynamic. With larger fragmentation in the infrastructure stakeholders, inter-party communication and coordination require an in-depth analysis of the complexities involved. Researchers have defined infrastructure as a complex system that is non-linear, interconnected, and interdependent [1]-[4]. Another study has studied the contribution of complex adaptive systems in dealing with infrastructure as a system. The paper describes key features of a complex adaptive system that appear in an infrastructure project. The analysis is taken at three levels – agent, network, and system level [5].

This study seeks to relook at the Indian utility industry from a complexity theory perspective and evaluate its key features and characteristics. Case business processes of the utility industry in India are studied and key features, interdependencies, and conflicts are studied to evaluate it as a complex process. The study takes into contribution the various decision flows within the process, stakeholders, and data and information flow. The utilities being considered in the study are water supply and underground drainage systems, electricity cables, telecommunication lines, gas pipelines, and optical fiber cables. The key contribution made by this study is the application of a developed perspective of complexity to the development of the utility industry in India. This will help policy-makers and project stakeholders to take up informed decisions and establish sound coordination across the fragmented industry landscape spanning several departments, authorities, and governance levels.

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