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System Dynamics for Structural Theory Building in IS

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TREO Talk Paper

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Abstract

Nothing is as practical as a good theory, and theory building continues to be an enduring theme in IS research. At its core, a theory is a carefully thought-out explanation for some observed phenomenon (physical, economic, technological, political, social etc.), that has been constructed using the scientific method, and which brings together many facts and hypotheses. In crafting these 'carefully thought-out explanations', certain theory building methods have emerged as dominant in the IS literature. For instance, there is the grounded theory approach that immerses itself in the phenomenon and inductively develops constructs and theories from observed data. Then there are approaches that start with proposed hypotheses which are then tested using empirical data. A classic example of this is the Technology Acceptance Model and its numerous variants. Econometric modeling is another method where a phenomenon, represented by a dependent variable, is explained using a collection of independent variables and appropriate controls. These theory building methods continue to help us understand a wide variety of IS related phenomena.

Our talk will make a case for adding systems dynamics (SD) to our repertoire of theory building methods in the IS literature. It will do so by first pointing out a gap in our current theory building milieu and then showing how SD helps address that gap. In particular, we will point out how feedback effects, accumulations and delays which are present in many IS phenomena, are either simplified out or not considered appropriately in current approaches to theory building. Moreover, many phenomena have complex and interesting patterns of evolution over time. While current theory building approaches in IS have helped us understand different drivers and constructs associated with such phenomena and their interrelationships, much less attention has been paid to explaining temporal patterns in observed phenomena. We will show, using models developed by the author over the past decade, how SD is particularly strong at capturing the structural aspects of phenomena and at explaining their temporal behavior. Several phenomena of current interest to the IS community, such as sustainability, diffusion of helpful or harmful behaviors in social media platforms, impact of healthcare information technology mandates etc., have a significant temporal element which we believe SD is well poised to explain.

Additionally, since SD models are a network of cause-effect relationships, by their very nature they offer a structural theory of how a phenomenon is occurring. Moreover, since SD models can be simulated, a validated SD model can be used to computationally deduce the impact of managerial interventions intended to have some salutary impact on the phenomenon. This feature of SD is attractive since, as managers, we theorize not simply to understand a phenomenon, but to be able to make desirable interventions.

While SD has strengths to address some gaps in IS theory building mentioned above, like any method, it also has its weaknesses. We will devote sufficient time in the talk to discussing the challenges in employing SD for IS theory building, particularly the validation phase. We hope to have a robust discussion with colleagues on the strengths and weaknesses of SD as a theory building method for IS.

References

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