

Fuzzy-set Qualitative Comparative Analysis (fsQCA) for Causal Relationship Validation of System Dynamics Model

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Abstract

Modelers typically produce different system dynamics models for the same problem, depending on each modeler's perspective, leading to reduced stakeholder confidence. Validation of system dynamics can increase stakeholder confidence. This research proposes the use of Fuzzy-set Qualitative Comparative Analysis (fsQCA), based on the set theory method, as a method to validate causal relationships between entities in Causal Loop Diagram (CLD) models. The problem of mobile network operators in Indonesia with small sample data characteristics is used as a case study to demonstrate the use of fsQCA. The fsQCA method is used after the CLD model is built in the system dynamics methodology. The fsQCA method is used to test causal relationships between entities in the CLD that need to be validated. The results can be used to improve the previously created CLD model. The Fuzzy-set Qualitative Comparative Analysis (fsQCA) method, which combines QCA with fuzzy set theory that allows partial membership, can be used to test whether or not there is a causal relationship between entities in the CLD model. The fsQCA method can be used to test causal relationships between entities in the CLD model with small sample data and increase stakeholder confidence in the CLD model.

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