# Improving Qualitative Social Scientists' Confidence in System Dynamics Case Studies

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# Outline

- Research Motivation

- Research Purpose

- The Barriers deterring qualitative social scientists from the SD field

- Summary and Suggestions

# Research Motivation

- "…the discipline of system dynamics should be able to attract increasing numbers of social scientists, to get them interested in modelling and to give them a theory-building approach that will help them do marvelous work. "(Lane, 2001: 306–307)

# Research Motivation (cont'd)

- Incorporation of qualitative and quantitative data in SD study was introduced in the early 1980s. (ex. Wolstenholme, 1982; Wolstenholme and Coyle, 1983)

- Qualitative data are not only used in the conceptualization and formulation stages but also in model assessment. (ex. Barlas, 1996; Andersen et al., 2012; Luna-Reyes and Andersen, 2003).

# Research Purpose

- To explore the barriers deterring qualitative social scientists from the SD field.

- To clarify what information about qualitative research methods should be reported in a system dynamics case study to enhance qualitative social scientists' confidence in conclusions drawn from simulation results.

# The Barriers

- Source of Confusion: Different meanings of the word "qualitative"

- Qualitative research methods seemed play a comparatively minor role in SD case study.

    – The qualitative research processes are not sufficiently revealed.

# Barrier #1:
## Different meanings of the word "qualitative"

# Meanings of "Qualitative" in SD

- Research Method:
  - Database: SDR
  - Keyword: qualitative
- Meanings of "Qualitative":
  - Mathematics
  - non-mathematics

# Mathematics

- Terms such as qualitative analysis, qualitative simulation, qualitative value, qualitative study, qualitative motion of the system, qualitative pattern features, qualitative theory of nonlinear dynamic systems, etc.

- Qualitative theory is a mathematical discipline that studies the character of solutions to a given set of differential equations.

# Non-mathematics

- referred to the nature of the model:
  - Terms such as qualitative mapping, qualitative modeling, qualitative system dynamics, and qualitative system dynamics modeling

# Non-mathematics (Cont'd)

- referred to qualitative techniques for data collection, mental model elicitation, and parameter elicitation
  - GMB, in-depth interviews, focus groups, the Delphi method, document analysis

# Source of Confusion:
# Same Term with Different Meanings

- "qualitative technique"
    - an approach based on fuzzy sets and fuzzy numbers (ex. in Tessem and Davidsen, 1994)
    - GMB (ex. in Vennix, Akkermans, and Rouwette, 1996)

# Source of Confusion:
# Same Term with Different Meanings

- "qualitative analysis"
  - the process of transforming qualitative data into research findings (in social science articles)
  - to verify numerical and analytical solutions produced by a mathematical model (in mathematics SD articles)

Barrier #2:
The qualitative research processes were not sufficiently revealed.

# Information not Sufficiently Reported

- Sampling
  - Who are invited to GMB workshop and Why are they invited?
  - In data collection, parameter elicitation, and model calibration, who are the experts / stakeholders conducting estimation?

# Information not Sufficiently Reported

- Coding Process
  - The process of transcript coding has been reported more often in articles regarding GMB, qualitative modeling, and qualitative research skills in system, than in case studies that mixed qualitative data collection and model simulation.

# Information not Sufficiently Reported

- Cultural Context
  - The purpose of GMB workshops is to develop a consensus-based model.
  - Consensus driven GMB in eastern culture can encounter difficulties:
    - compliance with group leaders' ideas to avoid conflict and maintain harmony

# Summary and Suggestions

- Overcome the barriers:
  - An article clarifying the term "qualitative…" in SD
  - Both qualitative and quantitative research procedures being reported in balance
  - Cultural study being integrated into GMB scripts