Multi-Stakeholder Decision Making for Wicked Problems – A Systems Thinking Lab

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Multi-Stakeholder Decision Making for Complex Problems

A Systems Thinking Approach with Cases

In the complex world of today, important policy and business decisions are still made with a 19th Century methodological mindset and approach. Yet, complex challenges such as climate change, poverty, public health, security, energy futures, and sustainability transcend any single science, discipline or agency. Rather, they require integration of social, economic, political, and environmental concerns to achieve acceptable and sustainable solutions. This book synthesizes a vast knowledge base to present a transparent and unifying decision making process, engaging stakeholders with competing interests, perspectives and agendas under uncertain and often adversarial conditions.

Multi-Stakeholder Decisions Making for Complex Problems — A Systems Thinking Approach with Cases brings together a unique well-constructed volume to address this challenge. The book introduces the systems approach in a non-technical language for decision makers. Multi-stakeholder decision making is a relatively new area of studies including business, economics, healthcare, agriculture, energy, sustainability, policy and planning. The book provides a fresh and levels approach with practical tools for dealing with complex challenges facing an evolving global business and society today.

Professor Kambiz Maani has devoted nearly three decades to research, teaching, and consulting in Systems Thinking and group decision making, culminating in extensive academic publications and books. His textbook, “Systems Thinking, System Dynamics — Managing Change and Complexity” with R. Cavana, has been republished multiple times and is being used at universities and corporations around the world. Professor Maani has held senior academic positions at major universities including Boston University, Massachusetts Institute of Technology (MIT), London Business School (LBS), University of Auckland, University of Queensland (UQ), and Massey University. He was the founder and chair of Systems Thinking and Practice of Global Business Systems Director of Research at Massey Business School in Auckland, New Zealand. Professor Maani provides seminars, workshops, and short courses for businesses, academics, and government leaders internationally.

World Scientific
www.worldscientific.com

Introduction to Systems Thinking

Second Edition

Kambiz E. Maani
Robert Y. Cavana

Systems Thinking, System Dynamics
Managing Change and Complexity
Why Decisions Fail?
Adapted from John Morecroft (1983)

**Reductionist Thinking**
Complex issues are divided up into pieces to facilitate decision making (e.g., education, business, government).

**Partial and uncertain information**
Decision makers tend to use only a small proportion of relevant information. They also tend to discard uncertain information. This diverts the focus of the decisions to problem symptoms and locally optimum solutions.

**Use of Quick Fixes**
Decision makers, often under time pressure, resort to “quick fixes”. Quick fixes often backfire or result in unintended outcomes.

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Why Decisions Fail (2)?

**Narrow goals and incentives**
A focus on narrow goals and incentives (e.g., manager’s KPIs) compromises other areas and undermines the performance of the larger system.

**Culture and Tradition**
Culture and tradition are powerful predetermined frameworks for decision makers as they frame one’s world views, mental models, and values.

**Cognitive processes**
“People take time to collect and transmit information. They take still more time to absorb information, process it, and arrive at a judgment. There are limits to the amount of information they can manipulate and retain. These cognitive processes can introduce delay, distortion, and bias into information channels.”
Factors that distort decision making

- Presence of multiple actors (stakeholders) in decision making
- Lack of understanding of feedback dynamics
- Lack of appreciation of non-linearity
- Hidden time delays

J. Sterman (1989)

Complexity

This century is the century of complexity

Stephen Hawking

For every complex problem there is a simple solution - and that is wrong.

Newsweek
The Organismic Mindset of the Systems Age

The Mechanistic Mindset of the Industrial Age

Wicked Problems

Rittel and Webber, Professors in Design and City Planning at Berkeley coined the term ‘wicked problems’. Later, Buchanan defined wicked problems succinctly:

A class of social problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing.

Wicked Problems

Tackling wicked problems requires thinking that is capable of grasping the big picture, including the interrelationships among the full range of causal factors underlying them. They often require broader, more collaborative and innovative approaches.”

Australian Public Service Commissioner

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R.D. Stacy, 1996
Multi-stakeholder decision making principles

**Inclusive Participation**: Early participation and involvement of key stakeholders at all levels and across all functions and sectors is crucial. This will create ownership and commitment to group decisions.

**Common good outcomes**: It is critical for the facilitator to establish at the outset that the goal is to reach the ‘best possible’ outcome for all concerned - common good. This means tradeoffs are inevitable and so called ‘win-win’ solutions are not realistic.

**Learning attitude**: The decision-making process should be viewed as a learning process as complex problems evade simple, linear, and expert-driven approaches.

**Systemic understanding**: This is the key which unlocks mental models and paves the way for accepting tradeoffs.

MSDM Principles (Cont’d)

**Leverage**: Leverage means one must look for interventions that change the system, not the symptoms. Often, fundamental solutions are not the most obvious ones (e.g., educating women could be the best intervention for eradication of poverty).

**Timeframe**: Both short-term (symptomatic) and long-term (fundamental) interventions should be considered.

**Emergent outcomes**: In complex systems, the outcomes of interventions are by and large unpredictable and will unravel over time in ways not always anticipated by decision makers. Thus interventions are best viewed as desirable directions for change and not as fixed and deterministic plans.
The Iceberg Model
Four Levels of Thinking (P. Senge)

Events

Patterns

Systemic Structures

Mental Models

Reactive

Adaptive

Generative

Creative

Headline Issues

- Climate Change
- Energy Crisis
- Food Crisis
- Environment
- Carbon Emission
- Water Shortage
- Land use
- Biodiversity

- Economic Growth
- Social dislocation
- Poverty
- Human Health
- Animal Health
- Food Safety
- Globalisation
- Sustainability

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A Systems Thinking Story

Staff T/O

Market Share
Problem Solving Archetype

Problem Solving Archetype

Unintended Consequence

Data

Information

Knowledge

Understanding

Wisdom

Ackoff’s Contents of the Mind

Data

Information

Knowledge

Understanding

Wisdom
Mental Models and Wisdom

Case Study 1
Case Study 1

Systems Thinking and Organisational Learning
Resolving Performance Measure Conflicts in a Supply chain

Annie Fan
Kambiz Maani
The University of Auckland
Before

- “It’s just not good enough, you guys at the front line need to keep us informed, we can’t keep on doing this. We are spending thousands of dollars rushing around in the hope to raise our CFR, but our performance seems to be going down even more.”
  Supply planner

- “There is no such a thing as oversold - sales have basically under forecast and there is a communication breakdown.”
  Demand planner

Before

- “We are way off our target CFR [case fill rate] of 98% - category A is currently averaging around 70%! I’m constantly getting hammered by unhappy customers about missed orders …we’ve got to do something!”
  Customer services manager

- “What happened this quarter? Our airfreight cost has gone through the roof! In addition, our local delivery charges between North Island and South island have also increased due to more urgent truck deliveries instead of rail. What’s happening in the planning team?”
  Supply Chain financial controller
After

- “I never thought about the problem this way, now I see! I guess I was a little selfish… I was probably the one that caused all the chaos in supply chain. I shall arrange more meetings with supply chain to find out more about what they do.”
  Key account manager

- “It’s amazing how I have actually created these problems for myself!”
  Supply planner

- “I have got more exposure to other parts of the business especially marketing’s view on market share and product ranging… This is beneficial, we should get more people involved in similar cross-functional discussions. It could add a lot of value.”
  Factory performance manager

Valuing the big picture

Before:

- “SC team is the whistle blower, because they are usually the one that says NO to marketing’s new product launch ideas, NO to the promotion date that we have organised with the trade, they are the one that stop all the fun!”

After: (same individual)

- “I never thought about an issue this way, now it seems so simple and it is all common sense. Why didn’t we look [at] the situation this way before? I now understand why they [supply chain team] are always challenging our ideas. To be honest we never actually think about whether it is cost effective or whether the inventory level is enough to go ahead with promotion…[before] it wasn’t really my problem. My only concern was how we can increase sales from particular activity. I missed the whole idea of the big picture and was only achieving local optimisation.”
Language and gesture

“I didn’t really see how I could help the SC department in terms of reducing bad goods and distribution cost, because after all, my job is demand planning and concentrating on the DPA (demand plan accuracy) and making sure that we meet our target of 75%. But now through identifying these causal relationships I understand! If the forecasted volume is too high, inventory goes through the roof; cost of working capital increases. Moreover, stocks become aged and will need to be written off when the expiry date hits us. Alternatively, if the forecasted volume is too conservative, we will be out of stock which hits our CFR. In order to counter attack OOS, we need to arrange urgent devanning, urgent deliveries by truck to SI, which again increases more OOS. The loop just keeps on going!”

Key take-home …

“The key take-home for me from this discussion session will be regarding understanding of ‘working as a whole’ concept; that write offs are not SC’s [supply chain] responsibility alone. Our sales trade spend budget and SC’s write off are really from the same bucket of funding.”

Key account manager
16 months on …

- We revisited the case company 16 months after the initial research and asked three questions:

Q1: whether the collaboration between the teams had continued?
A: Yes, particularly in the Supply Chain team. There is a strong consensus amongst the entire SC division that communication and cross-functional collaboration had become the key area of focus for business success.

Post Research Question 2

Q2: Have the supply chain performance improvements been sustained?

A: The main SC KPI results (DPA*, CFR, Stock Cover, Bad Goods, etc) have all shown consistent improvement. CFR, for example, increased from 70% to 97.5%.

*demand plan accuracy
Post Research Question 3

Q3: Have the employees continued to utilise systems thinking concepts to maintain a culture of continuous improvement and learning?

A: Since the introduction of Systems Thinking, FoodCom has initiated a “One Number” principle - a holistic view of business where cross functional stakeholders collaborate together and share responsibility to achieve a single company target. This is in sharp contrast to the previous mode of operations whereby sales set its own target, SC forecast another figure, and finance would budget for another number which resulted in endemic dysfunctional behavior. While this is still work in progress, it is believed that the benefits from adopting a systemic performance management is profound and enduring.

Research Framework
(Source: Maani & Cavana, 2007)

- Reactive
- Adaptive
- Generative
- Creative
Scenario One – Events

- Goods receipting time had increased from five days turnover to nearly eight days.
- Out of stock (OOS) products had noticeably increased since March 2006 and accelerating thereafter.
- Warehouse and distribution staffs frequently complained about the workload and stress.

Scenario One - BOT
Scenario One – Systemic Structure

Warehouse inwards team: “Everything is urgent! We had to do a lot of double handling to shift the containers around to do the ones that they want first. We are working harder and faster, but we are just getting further and further behind.”

Management: "we are getting lots of OOS and goods receipting time is decreasing. We need to put more pressure on the inwards team.”

Planning: “Making up for OOS is critical! We need to catch up and put through more urgent devanns.”

Management: "we are getting lots of OOS and goods receipting time is decreasing. We need to put more pressure on the inwards team.”
Scenario One – Mental Models

- Planning team: “need more urgent devanns”
- Management team:
  - “Warehouse guys are too slow”
  - “We need double shifts”
- Inwards team: “we will keep our nose down”
- Finance team: “cost of goods is unacceptably high”

Attitude towards Systems Thinking

Overall, all the participants had a positive attitude towards system thinking concepts. This was demonstrated by their level of enthusiasm and engagement towards the case problems. Some participants were even interested in looking into further readings about system thinking which was a surprise.
Behavioural change occurred due to:

- Individuals examining their hidden assumptions and surfacing of their mental models
- Understanding and valuing the big picture
- Co-creating shared understanding across organizational boundaries

Case Study 2
Consensus Building through Systems Thinking

Policy and Planning in the Ministry of Health

The Case Study

- Public Organization (New Zealand Ministry of Health)
- Planning exercise

Management Question:
How can we reduce our work priorities to a manageable set (i.e., from existing 24 to a desired 6-7 areas)?
Methodology

Three steps:
1) Identification of Issues and Priority Areas
2) Priority Selection using matrix
3) From priority matrix to *Systems* of priorities

Identification of Issues and Priority Areas

Using KJ Methodology (Maani & Cavana 2007):

- **Issues**
  - from 50 ‘raw’ statements to 19 “headers” representing key issues

- **Priorities**
  - from 42 ‘raw’ priorities to *19 Priority Areas*
Clustering of Issues

**Time Pressure**
- Work pressure limits ability for staff development
- Lack of time to develop as a team
- Too much to deal with

**Clear Priorities**
- Not sure what to do
- Lack of focus on priorities
- Lack of shared focus
- Lack of vision in direction
- AD HOC work priorities
- Unable to prioritize work (lack of guidance)
- MoH-Taking a problem (solving) approach most of the time
- Not enough attention & time given to big issues or questions
- Too reactive, not enough proactive

Priority Areas

- Prevention - Public Health
- Group Capacity
- Capacity of all providers
- Provider Development
- Communication & Relationship & Collaboration
- High Priority Diseases
- Rural Health
- Accountability Cycle
- Evaluation Monitoring & Evaluation tools
- Workforce Capacity
- Health Service-Access Barriers
- Incentives on Providers
- Health: Child & Youth
- Disease Management
- Social Economical & Cultural
- Maori Health
- Maori Health Model
- Capacity & Capability of MoH to Respond
Priority selection

Question: How can we reduce 19 priority areas to 6-7 key areas?

Criteria development: multi-pick method
- 7 Criteria
- Priority matrix
- Rank-ordered priorities by the group

### Priority Matrix

<table>
<thead>
<tr>
<th>Priority Area</th>
<th>Realistic Impact on Maori Health</th>
<th>Quick Visible Results</th>
<th>Align - ment</th>
<th>Fundamental Cause</th>
<th>Capitalis e on other initiative s</th>
<th>Plannin g Time</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>Accountability Cycle</td>
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<td>2</td>
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<td>Developing Maori Models</td>
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<td>Evaluate monitoring &amp; evaluation tools</td>
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<tr>
<td>Maori Provider Development</td>
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<tr>
<td>Maori workforce capacity</td>
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<td>Communication relationship &amp; collaboration</td>
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<td>Increase Maori Health Putea</td>
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<td>High Priority Diseases</td>
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<td>Incentive on Providers</td>
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<tr>
<td>Capacity &amp; capability of MoH to Respond</td>
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<tr>
<td>Social, Cultural &amp; Economic</td>
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<td>5</td>
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<td>Child &amp; Youth</td>
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<td>Access Barriers</td>
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<td>Whanau Capacity</td>
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<td>Capacity of all Providers</td>
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<td>24</td>
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</table>

Scale 1 = low to 5 = high
1 = no to 5 = yes
s = short term
m = medium term
l = long term
### Priority Matrix (sample)

<table>
<thead>
<tr>
<th>Priority Area</th>
<th>Realistic</th>
<th>Impact on Maori Health</th>
<th>Results</th>
<th>Quick Visible</th>
<th>Alignment</th>
<th>Cause</th>
<th>Fundamental</th>
<th>Capitalize on other initiatives</th>
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<th>Score</th>
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<td>Accountability Cycle</td>
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</tbody>
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### Creating Systems of Priorities

- Causal loop models of priority areas
- Leverage *instead of* Reduction
Priorities CLD

Conclusions

- Surfacing of mental models
  - Individuals
  - Group

- Outcomes
  - Immediate consensus
  - Greater commitment
  - Shared understanding and vision
Case Study 3

Tonle Sap Learning Lab For Sustainable Tourism

Workshop (2) Summary
Siem Reap, Cambodia

Professor Kambiz Maani
UQ-AgResearch Chair in Systems Thinking and Practice
What is a Learning Lab?

Learning Lab (LLab) is a UNESCO sponsored process and methodology based on Systems Thinking whereby diverse stakeholders representing multiple sectors, communities, NGOs, as well as scientists, and decision makers could think, plan and work together towards common goals and higher levels of performance.
Expected Outcomes of the LLab

1. Shared vision & common goals
2. Collaboration & participation
3. Collective learning & capacity building
4. Creative thinking & innovation
5. Alignment of actions
6. Continuous performance improvement
Workshop 2 Participants

Participants: >116
- Ministries (MOT, MAFF, Urban& Land Planning, Education, Ministry of Water Resource and Meteorology, etc.)
- Tonle Sap Authority
- ASEAN
- 6 Provinces
- Community
- Private Sector
- NGOs

Learning Lab Community Workshop

Two questions were posed to the participants during the full-day workshop.

Q1. What are the barriers/challenges for sustainable tourism for Cambodia?

Q2. What are the drivers/factors that affect sustainable tourism for Cambodia?
1. Lack of rules and regulations (3 times – mentioned by 3 groups)
2. Lack of law enforcement (3 times)
3. Lack of developed infrastructure (3 times)
4. Lack of coordination (3 times)
5. Lack of capacity building (3 times)
6. Low level of education (2 times)
7. Poverty (2 times)
8. Safety and security (2 times)
9. Sanitation (2 times)
10. Lack of public awareness (2 times)
11. Lack of tourism facilities (2 times)
12. Pollution (2 times)
13. Corruption
14. Cultural impact (bad influence of tourism)
15. Lack of understanding of tourism development
16. Waste management
17. Quality services
18. Lack of integrated planning
19. Lack of local community participation and benefit sharing
20. Lack of sustainable indicators
21. Lack of master plan and policies
22. Economic crisis
23. Lack of environmental protection
24. Social and political issues
25. Lack of urban planning and implementation

1. Infrastructure development (4 times)
2. Increase public awareness (3 times)
3. Political stability (3 times)
4. Government policies (3 times)
5. Set up and implement policies and master plan (2 times)
6. Protection of the environment and sanitation (2 times)
7. Sharing experience and information in seminars and workshops
8. Conservation of natural resources and promotion of local culture
9. Honesty and reasonable prices
10. Sharing tourism income for all
11. International relationships
12. Service quality
13. Encouragement to use local products
14. Equal share of tourism benefits among stakeholders
15. CPP products (conservation, protection, preservation)
16. New products and destinations
17. Increase waste management
18. Security and safety
19. Eco tourism
20. Responsibility of institutions
21. Education (at all levels)
22. Building capacity
23. Broadcast and educate people about eco and sustainable tourism
24. Preserve and develop sustainable tourism with all stakeholders
25. Motivations from government for foreign investors
26. Conservation and development
27. Management
28. Funding
29. Clear understanding of the main barriers
Leverage

Leverage are places within a complex system where a small shift in one thing can produce big changes in everything.

Donella Meadows
### Leverage points for Tonle Sap sustainable tourism

<table>
<thead>
<tr>
<th>Leverage Area</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poverty alleviation</td>
<td>4</td>
</tr>
<tr>
<td>Human resource development</td>
<td>2</td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
</tr>
<tr>
<td>Service quality</td>
<td>1</td>
</tr>
<tr>
<td>Rules and regulations</td>
<td>1</td>
</tr>
<tr>
<td>Strategic plan (including eco-friendly solution for the floating village)</td>
<td>1</td>
</tr>
</tbody>
</table>

### Intervention Strategies for Poverty Alleviation

<table>
<thead>
<tr>
<th>Intervention Strategy</th>
<th>Actions/Projects/Program</th>
<th>Project Team</th>
</tr>
</thead>
</table>
| --Provide land | --Provide concession land  
--Provide land for education | --Government  
--Local authorities  
--Relevant ministries (e.g., Education; Land, Urbanization and Construction) |
| --Promote and strengthen the legal system | --Improve law enforcement | --Government  
--Local authorities |
| --Improve literacy skills | --Literacy training  
--Skill training in sewing, hairdressing, sculpture, etc. | --Government  
--Local authorities  
--Ministry of Education |
| --Build community capacity based on people’s needs | --Train the trainers workshops  
--Exchange programs  
--Study tours | --Provincial governments  
--NGOs |
| --Improve standard of living | --Provide loans to the communities to set up small businesses to support the fishing industry | --Local government  
--Relevant ministries |