Does backcasting lead to SItS: the case of meat alternatives & NPFs

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1. Backcasting: introduction

**Backcasting**: Create a desirable sustainable future first before looking back from that future how it could have been achieved and planning initial steps how to move towards that future.

**Backcasting**: Particularly useful in case of complex ‘wicked’ problems that include dominant trends; when market-based solutions are insufficient; a need for a major change; long time horizons allow strong alternatives (Dreborg ‘96)

**Backcasting**: Intervention approach related to Constructive TA, aiming at anticipation, reflexivity and learning (Schot 2001), but also criticised for lacking these.

Backcasting: from vision to action

- Explicitly normative
- Participatory
- System oriented
- Desired future & changes (action-oriented)
- Combines process, design, analysis
- Transdisciplinary
- Helpful if institutions / rule system lack

Research problem

- Different varieties in backcasting: Energy, Natural Step, STD, SusHouse, COOL, Canada, Sweden
- Participatory backcasting experiments have been completed in NL: vision, analysis, (action) agenda
- Sometimes considerable follow-up, not always: WHY?
- How does follow-up relate to system innovation theory?

Backcasting and impact

Backcasting superstars:
- stakeholder participation
- explicit, future vision
- negation

Impact after 5-10 years:
- follow-up activities
- non-technical/bottom-up
- no status quo
- other effects

Long-term impacts:
- system innovation
- technological breakthroughs
- unexpected visions
- no status quo

Backcasting: conceptual framework

- in creative state
- in social state
- in economic state
- in cultural state
- in technological state
- in policy state
- in institutional state
- in system state

Impact on the creative state
- in social state
- in economic state
- in cultural state
- in technological state
- in policy state
- in institutional state
- in system state
Framework: networks

- Based on industrial network perspective (Hakansson)
- No focal company, but focal activity
- Covering four domains: government, business, research, public
- Relationships among actors take different forms

Framework: Vision / Leitbild

- Leitbild concept: Dierkes et al. (’92 & ’96)
  1. Vision is shared and helps unite people and actors from different scientific disciplines
  2. Vision guides behaviour and actions of these actors
  3. Guidance (where to go) & Orientation/ Image (what to do)
  4. Focus on emerging radical innovations/ new technologies
- Adjustments/ assumptions
  1. SI to sustainability; (ii) synchronisation across societal domains;
  3. Competing visions (2 types)

Framework: institutional change

- Institutions as rules (cognitive, regulatory, normative, Scott 2001)
- Institutionalisation: ...the process by which activities & practices become accepted... (N.B. de-institutionalisation)

3. NPF backcasting experiment

- Future vision 2040: 40% of the meat will be replaced by Novel Protein Foods that reduce environmental impact with factor 20
- 30 researchers and 9 institutes involved
- STD program: financed by government and firms
- Outcome: NPF analysis, scenario analysis, action agenda, trajectory, stakeholder support
- Substantial spin-off: new NPF-type products, like Vales; research; growing market & new products; limited product development

7 examples

- Protex
  1) Spirulina
  2) Green pea
  4) Lucerne
- Fibrex
  5) Fusarium
- Fungapy
  6) Pea with mould
  7) Lupine with mould (rhizopus)
NPF backcasting experiment

- Stakeholder involvement from all four domains including capacity, funding & knowledge
- Instances of higher order learning
- Vision gradually shaped: provided guidance & orientation
- Participation, analysis, design: vision & action agenda
- Two vision champions, institutional protection

NPF: follow-up after 10 years

- Multidisciplinary research programme Profetas
- Food Companies developing new protein foods, sometimes in alliance with research institutes
- Follow-up by ministry of the Environment, addressing ngo’s, present producers of veggie foods, retailers
- Initiatives for V-day and product office
- Positive attention from NGOs (vegetarians union NVB, environmental movement) and Supermarket AH
- Media attention & usage by educational bodies
- Recently: Campina has launched Valess

NPF Case: spin-off & follow-up clusters

<table>
<thead>
<tr>
<th>Cluster of activities</th>
<th>Number of actors</th>
<th>Amount of resources</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profetas programme</td>
<td>20 - 50</td>
<td>€ 1.5 million</td>
<td>Research domain</td>
</tr>
<tr>
<td>NPF Business cluster</td>
<td>10 - 20</td>
<td>€ 5 - 20 million</td>
<td>Business domain</td>
</tr>
<tr>
<td>SME cluster</td>
<td>10 - 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministry of Environment, national &amp; regional policy groups</td>
<td>10 - 20</td>
<td>≤ € 500,000</td>
<td>Government domain</td>
</tr>
<tr>
<td>Public interest groups</td>
<td>10 - 20</td>
<td>≤ € 500,000</td>
<td>Public domain</td>
</tr>
</tbody>
</table>

NPF case: some analysis

- New networks: Profetas, bus-R&D, SME, VROM, NGOs
- Adjustment innovation system: NPF knowledge base, product office + broader impact
- Future vision: redefinition to a global problem and reframing in line with actor expectations / missions
- Future vision: guidance, orientation, stability, flexibility
- Regime change: not (yet), more on level of niches but with growth potential

NPF case: Conclusions

- STD brought right people together, backcasting was successful, broad participation
- There is considerable spin-off & follow-up and it is growing
- The future vision was adjusted but includes its original core
- There is an emerging NPF knowledge base and network in NL, but still as a niche; instances of institutional changes
- Companies are interested but still little in development
- Internationally, a lot of dynamics (Nestle, US soy & health)
- Context developments advantageous, possibly important
- Next to opportunities, there are threats (supermarket war, dislike of industrial foods by consumers): external factors too!
- Considerable government funding

Finally: System innovation & governance

- Long-term process: no system innovation (yet) after 10 years
- Niche development (or related niches): possible stepping stone
- Both drivers (context factors) and threats (government)
- Framework (vision, networks, institutions) relevant for transition monitoring

Implications for governance:

- Participatory backcasting facilitates higher order learning and has relevance for transition management
- Experimentation in niches with visions and new rules useful/helpful (learning)
- Stakeholder need to see opportunities in vision and capable of mobilising resources
- Not only stimulating R&D domain, but also other domains
- Visions provide decentralised guidance & orientation and allow adjustment by new stakeholders & networks in new domain; this suggests that strong hierarchical coordination by government might not be needed
Backcasting cases: 3x nutrition

<table>
<thead>
<tr>
<th>Case and origin</th>
<th>When</th>
<th>Type of system</th>
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<tbody>
<tr>
<td>Novel Protein Foods (NPF) case</td>
<td>1993 - 1996</td>
<td>Production and consumption system involving companies and consumers</td>
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<tr>
<td>Household nutrition (SHN) case</td>
<td>1998 - 2000</td>
<td>Household consumption system</td>
</tr>
<tr>
<td>Multiple Sustainable Land-use (MSL)</td>
<td>1994 - 1997</td>
<td>Spatial rural system involving agriculture and other functions like water, nature, leisure</td>
</tr>
</tbody>
</table>

Empirical conclusions I

- All three backcasting experiments successful in broad participation, visions, higher order learning and follow-up agendas.
- This does not guarantee follow-up and spin-off; the extent of follow-up and spin-off depends on various internal and external factors.
- Follow-up and spin-off materializes in networks consisting of activities, actors, and resources; it involves old and new actors.
- Future visions are important in follow-up and spin-off; they provide guidance (where to go) and orientation (what to do).
- Future visions show both stability and flexibility, which relates to entries, clusters, domains.
- Follow-up and spin-off are at a niche level: seeds for change.
- Some institutionalization but also institutional resistance.

Empirical conclusions II

<table>
<thead>
<tr>
<th>Enabling internal factors</th>
<th>Constraining internal factors</th>
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<tbody>
<tr>
<td>High degree of stakeholder involvement</td>
<td>-</td>
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<td>Small groups much influence</td>
<td>-</td>
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<td>Diversity in types of stakeholder involvement</td>
<td>-</td>
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<tr>
<td>Single vision backcasting experiment</td>
<td>Multiple visions backcasting experiment</td>
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<tr>
<td>High degrees of guidance and orientation of the future vision</td>
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<td>Institutional protection</td>
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<td>Presence of vision champions</td>
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<td>Strong focus on follow-up and implementation</td>
<td>Strong focus on academic achievements</td>
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<td>Plant and congruent learning</td>
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Theoretical conclusions / reflections

- Conceptual framework supportive including adjustments.
- Industrial network theory applicable for analyzing follow-up and spin-off of backcasting experiments.
- Leitbild concept applicable for normative visions in addition to emerging technical innovations.
- Further conceptualization of stability versus flexibility, as well as nested character / gradual elaboration.
- Conceptualization of linking pin process between backcasting experiment and follow-up / spin-off: combining learning & organizational behavior.

Closing remark

- Repository.tudelft.nl
- www.eburon.nl
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