Improved Modelling of Sustainable Lifestyles in IAMs: Cross-disciplinary Insights from Methodologies and Theories

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Source: ZEAL (2017)
Rationale

Lifestyle is often not included in IAM studies...

... but can be critical

So, how can other studies help IAM modellers better represent lifestyle change?

Table SPM.3: Key mitigation technologies and practices by sector. Sectors and technologies are listed in no particular order. Non-technological practices, such as lifestyle changes, which are cross-cutting, are not included in this table (but are addressed in paragraph 7 in this SPM).

Source: IPCC (2007)

Source: van Vuuren et al. (2016)
Outline

• Context and research aim
• Literature search
• Intent-oriented behaviours
• Impact-oriented behaviours
• Conclusions and recommendations
Current state of lifestyle change in IAMs

- IAMs mostly define:
  - Efficiency: the same activity – but with less energy use (fully included)
  - Lifestyle change: different/less activity – requiring less energy/ emissions (mostly not included)

- Some efforts have been made to incorporate lifestyle change
  - E.g. Van Sluisveld et al. (2016), Stehfest et al. (2009), van Vuuren et al. (2018), Grubler et al. (2018)
  - Very stylized and based on exogenous assumptions

- Better representation could:
  - Draw from qualitative studies to better understand *motivations*
  - Draw from quantitative studies to improve understanding of *assessments* of behaviour
Distinction: intent vs. impact

- *Intent*-oriented behaviours: e.g. sustainable lifestyles, psychology, behavioural economics
- *Impact*-oriented behaviours: e.g. industrial ecology, IAMs, energy modelling
Ranges of intent-oriented behaviours: efficiency to sufficiency
Literature search

- Systematic literature research - SCOPUS
- NVIVO software programme to analyse literature

<table>
<thead>
<tr>
<th>Search terms:</th>
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<tbody>
<tr>
<td>1</td>
<td>“climate and (mitigation or mitigate) and (lifestyle or behaviour or behaviour) AND (&quot;greenhouse gas&quot; or emissions)”</td>
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<tr>
<th>Selection criteria:</th>
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<tr>
<td>1.</td>
<td>Explicitly stating or modelling lifestyle or behaviour in as mitigation measures for climate change</td>
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<td>2.</td>
<td>Explicitly consider behavioural change and not technological change based on cost efficiency</td>
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Approach

Varying perspectives between disciplines

Intent-oriented behaviours

Motivations → Behavioural actions → Outcomes

Impact-oriented behaviours

Attitude → Facilitators → Infrastructure

Food → Transport → Residential

Recommendations for improved representation of lifestyle changes in IAMs
Opportunities to model lifestyle changes

→ We distinguish 3 possibilities of lifestyle change modelling in IAMs:

1) can be incorporated into narratives (i.e. more-detailed storylines) or based on exogenous assumptions;

2) endogenously with adjustments of parameters and assumptions within the IAMs (e.g. heterogeneity);

3) by explicitly modelling lifestyle change entirely within the model (e.g. a lifestyles module interacting dynamically).
Impact-oriented behaviours from qualitative perspective
Drivers of intent-oriented behaviours

Determinants
- Attitude
  - Cultures & social norms
  - Social interactions
  - Subjective well-being
  - Personal norms

Facilitators
- Institutions, regulations & policies
- Market conditions & prices
- Education
- Income & wealth
- Costs
- Nudges

Infrastructure
- Physical infrastructure
- Technology
- Product & architecture design
- Suitability & appropriateness
- Options & alternatives
- Convenience, availability & accessibility

Source: adapted from Akenji & Chen (2016)
Social learning & heterogeneity: adopter groups

Source: Edelenbosch et al. (in press)
Expansion to behaviour in general: public segmentation model

Source: Backhaus et al. (2008)

- **Waste watchers**: 'Waste not, want not' that's important, you should live life thinking about what you are doing and using.
  - 12%

- **Cautious participants**: I do a couple of things to help the environment. I'd really like to do more, well as long as I saw others were.
  - 14%

- **Concerned consumers**: I think I do more than a lot of people. Still, going away is important. I'd find that hard to give up, well I wouldn't, so carbon off-setting would make me feel better.
  - 18%

- **Stalled starters**: I don't know much about climate change. I can't afford a car so I use public transport.. I'd like a car though.
  - 14%

- **Positively disengaged**: Maybe there'll be an environmental disaster, maybe not. Makes no difference to me, I'm just living life the way I want to.
  - 18%

- **Sideline supporters**: I think climate change is a big problem for us. I know I don't think much about how much water or electricity I use, and I forget to turn things off.. I'd like to do a bit more.
  - 14%

- **Willing to act**: High
  - Market Share %
  - 0%
  - 25%
  - 50%
  - 75%
  - 100%

- **Innovators**: 2.5%
- **Early Adopters**: 13.5%
- **Early Majority**: 34%
- **Late Majority**: 34%
- **Laggards**: 16%
Recommendations

• **Harmonize** lifestyle change definitions (especially within IAM community)
• Expand the range of **novel modelling approaches**
• Expand the range of **transformative solutions** modelled
• Add **essential nuanced details** to depict lifestyle changes in IAMs
• Represent the **whole picture**, both intent- and impact-perspectives, and not just partial aspects of lifestyle changes
• **Strategically address trade-offs** between exogenous inputs and endogenous modelling
<table>
<thead>
<tr>
<th>Modelling detail</th>
<th>Exogenous</th>
<th>Endogenous</th>
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<tr>
<td>Approaches</td>
<td>Ad-hoc</td>
<td>Informed</td>
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|                  | **Stylized adjustments**  
|                  | e.g. assumed full vegetarian diet | **Narratives or storylines**  
|                  | e.g. narrative backcasting analysis | **Consumer segments**  
|                  | e.g. adopter groups | **Actors react to system**  
|                  | e.g. social learning |
| Dynamic modelling of lifestyle changes | Can cover full system |
| Static modelling of lifestyle changes | Limited coverage of system |
| Easier to implement in IAMs | More representative of lifestyle changes |
| Less representative of lifestyle changes | More difficult to implement in IAMs |
Conclusions

• Broad research:
  – Focused on efficiency/sufficiency (avoid, shift, improve framework)
  – Combining intent- and impact-oriented methodologies
  – Representing context and drivers of lifestyle changes

• Future work:
  – On the basis of this research, we can narrow down the research towards promising approaches
Thank you for your attention

Are there any questions?
References

• ZEAL (2017): http://zeal-sustainability.com/less-is-more-sustainable/
Different perspectives on lifestyle & behaviour

**Sustainable lifestyles:** “...cluster of habits and patterns of behaviour embedded in a society and facilitated by institutions, norms and infrastructures that frame individual choice...” (Akenji & Chen, 2016)

**Innovation studies:** “Social innovations are manifested in changes of attitudes, behaviours, or perceptions resulting in new social practices... social innovation is about social change... not only talking about changes in the way social agents act and interact with each other, but also changes in the social context in which these actions take place through the creation of new institutions and new social systems” (Cajaiba-Santana, 2014)

**Industrial ecology:** From an industrial ecology perspective, the disaggregation of different types of behaviours into specific mitigation strategies helps to structure consumer practices and can serve as a starting point for calculating the emission-saving potential of different strategies in order to gain more insight into the effectiveness of specific measures.” (Schanes, Giljum, & Hertwich, 2016)

**Health and nutrition:** “[Positive health effects] are important not only because they can provide an additional rationale to pursue mitigation strategies, but also because progress has been slow to address international health priorities such as the UN Millennium Development Goals (MDGs) and reductions in health inequities. Mitigation measures offer an opportunity not only to reduce the risks of climate change but also, if well-chosen and implemented, to deliver [substantial] improvements in health almost immediately.” (Haines et al., 2009)

**Behavioural economics:** “[...] any aspect of the choice architecture that alters people’s behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting the fruit at eye level counts as a nudge. Banning junk food does not.” (Thaler & Sunstein, 1999).