Forest sector modeling and foresight studies – how to combine?

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Outline

1. Key questions and background
2. Reasons to update forest sector outlook studies
3. What could foresight approaches add to forest sector outlook studies?
4. Combining modeling and foresight approaches
5. Conclusions
Key questions

Can we anticipate and explain structural changes taking place in global and European forest sector?

Do forest sector models and outlook studies answer the needs of the decision makers and stakeholders?

The presentation is based on:

Background: Global Forest-Based Sector is Going Through Major Structural Changes

Are the forest sector models and outlook studies able to keep up with these developments?
## Review of Forest Sector Outlook Literature

<table>
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<th>Approach</th>
<th>Scope</th>
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<td><strong>Model-based</strong></td>
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<td><em>Forecasts and scenarios</em></td>
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<tr>
<td>Buongiorno et al. (1998); Trømborg et al. (2000); Wenjun (2007); Mantau et al. (2010); Raunikar et al. (2010); UNECE/FAO (2011a); Wear &amp; Greis (2011); Buongiorno et al. (2012); UNECE/FAO (2012)</td>
<td>Hetemäki &amp; Obersteiner (2001); Bolkesjø et al. (2003); Turner et al. (2005); Hujala &amp; Hilmola (2009); FAO (2012); Ince et al. (2012)</td>
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<td><strong>Policy impact (what if)</strong></td>
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<td>Schwarzauer &amp; Rametsteiner (2001); Zhu et al. (2001); Solberg et al. (2010)</td>
<td>Szabó et al. (2009); Brown &amp; Baek (2010); Schwarzauer &amp; Stern (2010); Ince et al. (2011); Kangas et al. (2011); Lecocq et al. (2011); Schwarzauer et al. (2013)</td>
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<td><strong>Qualitative</strong></td>
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<td><em>Roadmaps, scenarios, visions</em></td>
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<td>Casti et al. (2011); CEPI (2011); UNECE/FAO (2011b): FTP (2012)</td>
<td>CEI-Bois (2004); Navarro et al. (2008); Palma et al. (2010); Jonsson (2011); Sikkema et al. (2011); Lindahl &amp; Westholm (2012); Riala &amp; Asikainen (2012)</td>
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Key Methodological Issues and Shortcomings

Validity of Methods

- Structural changes
- Informational value for long-term projections
- New products (no data)

Shortcomings

- Scarce use of foresight methods
- Services sector and other intangibles not analysed
Validity of Methods - Structural Changes: e.g. Newsprint in North-America

Historical Development

- Correlation = +0.98
- Correlation = -0.81

Projections

- Projections in one market tend to effect also other projections due to market balancing requirements in forest sector models

Figure sources: Hurmekoski and Hetemäki 2013, FPE
The Conventional Demand Equation

\[ \ln D_t = \alpha + \beta_1 \ln(p_t) + \beta_2 \ln(GDP_t) + \beta_3 \ln(D_{t-1}) + \varepsilon \]

- Based on assumptions, which may not hold anymore in the long-run (can do so for the business cycle)

- For example, the signs (relationships) have changed for graphics paper in many OECD countries

- The equation may not anymore capture and explain the new structures in some markets and products

→ need model updating and also additional approaches
"Essentially, all models are wrong, but some are useful"

George Box

former president of American Statistical Association
How to study future, which does not exist today?

- Fundamental dilemma related to all future-oriented research: *How can the future be studied, if it does not exist?*
  - No method can yield *correct* or even *reliable* information of the future
  - Therefore, the relevant question is: how *useful* the studies are?
- Long-term projections and what if –scenarios?
- It may not be enough to perform purely ”objective foresight”
Are We Ready for Normative Approaches?

- The boundaries of science – do we only accept positive approaches?
- Who says what is desirable (normative value judgements)?
  - *Policy makers* (they have been elected to do this)
  - *Stakeholders*: industry representatives, interest groups, etc.
- Researcher can make "objective or positive" analysis based on the normative objectives
- In foresight, one can also explicitly assess what the normative goals of different actors are (e.g. Delphi, backcasting)
Forest sector models necessary, but not sufficient

- New products already coming to markets (e.g. biodiesel, dissolving pulp)
- Many other new products in pipeline and likely to be in markets before 2030 (= EFSOS scope), not to mention 2060 (= RPA scope)
- No data (or models) on these -> can not use forest sector models
- Services becoming more important, but they are not considered
- *Forest sector outlook studies seem not able to answer some of the questions decisions makers are most interested* (impact of structural changes, new bioeconomy products and services, etc.)
What could foresight approaches add to forest sector outlook studies?
What is Foresight?

- The concepts of *foresight* and *futures studies* are intertwined in many ways, but some want to make clear distinction
- There is no single widely excepted definition of foresight
- “The forward-looking equivalent to history” (Slaugther 2005)
- Foresight concept became to be used in academic literature in 1980s (technology foresight)
- In the 21st Century, it has become increasingly popular and is starting to replace future studies concept
Different time-frame for different purposes

- **Short-term planning**
  - Work trip
  - Business negotiations
  - Quarterly financial results
  - Annual sales outlook
  - Business cycle
  - Inventing & commercializing new technology
  - Growing a forest
  - Restoring an ecosystem

- **Long-term planning**
  - Business negotiations
  - Quarterly financial results
  - Annual sales outlook
  - Business cycle
  - Inventing & commercializing new technology
  - Growing a forest
  - Restoring an ecosystem

- **Foresight, scenarios**
  - Foresight, scenarios
  - Forecasting

- **Forecasting**
  - 2-5 Years
  - Decade
  - 2-5 Decades
  - Century

- **Hours**
- **Days**
- **Months**
- **Year**
- **2-5 Years**
- **Decade**
- **2-5 Decades**
- **Century**
A four-step foresight process

History and present    Alternative futures    Preferable future(s)    Influencing the future

NORMATIVE ASPECTS

I. Diagnosis
hindsight, benchmarking, understanding the present, reflecting the future, ...

II. Exploration
scanning, assessing, exploring, forecasting, modeling, thinking, arguing, challenging, ...

III. Strategic orientation
defining, deciding, debating, evaluating, ...

IV Plan and action
implementing, coordinating, monitoring, ...

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Some commonly used methods in foresight analysis

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<tr>
<th>Qualitative</th>
<th>Quantitative</th>
<th>Semi-quantitative</th>
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<tr>
<td>2. Conferences/workshops</td>
<td>2. Benchmarking</td>
<td>2. Delphi</td>
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<td>4. Expert panels (e.g. UNEP)</td>
<td>4. Patent analysis (e.g. technolog. forec.)</td>
<td>4. Multi-criteria analysis</td>
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<td>5. Morphological analysis</td>
<td>5. Time series analysis (e.g. trends)</td>
<td>5. Polling / Voting</td>
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<td>7. Role play / Acting</td>
<td>7. Simulation models</td>
<td>7. Roadmapping</td>
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<td>8. Scanning</td>
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<td>8. Stakeholder analysis</td>
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<td>9. Scenario workshops</td>
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<td>9. Mixing econometrics, simulation models and qualitative methods</td>
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<td>10. Simulation gaming</td>
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<td>11. Surveys</td>
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<td>12. SWOT analysis</td>
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<td>13. Weak signals /Wildcards</td>
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Classification based, modified and extended from Rafael Popper’s presentation

*SMIC = Cross Impact Systems and Matrices
Proposal: Combine forest sector models with foresight approaches

- Forest sector models and outlook studies very much evidence-based. Tend to tell more about the past, present and project it to future, than about new emerging structures and issues

- Need to consider also new structures, alternative possibilities, and even desired (normative) futures

- Unlikely to be able to do these based on one approach only

- Combining forest sector models with foresight likely to provide more informative futures scenarios
Example I: Backcasting
What do we mean by backcasting?

- *Casting* is a term used e.g. in choosing actors to a film
- Before the filming, the director has a vision about the film and what type of characters it has
- Having this in mind, she starts to choose actors that would fit to the characters and would realize the visions she has of the characters
- In similar manner, we may vision a future, where, e.g. CO₂ emissions are stabilized to a certain level (c.f. EU target to reduce CO₂ by 20% by 2020)
- Having set this vision or goal, we start to think actions and policies (≈casting) which would help us to realize this goal in the future
- This is essentially what we do in backcasting
Backcasting is particularly useful when:

- The problem to be studied is complex
- There is a need for major change (e.g. climate change mitigation, etc.)
- When dominant trends are part of the problem
- The time horizon is long enough (typically 20-50 years)
- Sustainability problems may combine all these characteristics

→ There are number of methods applied in backcasting, i.e. backcasting can involve several analytic methods (quantitative and qualitative)
Example of possible forest sector application:

- How to reach a stage, where a set of criteria are met: e.g. forest products value added doubled, and wood production and biodiversity criteria met

- This would require at least to some extent decoupling from the current dominant structures

- Use backcasting to formulate that stage, and then analyze development paths that could reach those criteria

- A forest sector model could then be used to analyze the implications of those paths
Example II:
Emerging issues and expert panel
Apply UNEP Foresight Panel to Forest Sector

- Informing about the ‘emerging issues’
  Emerging issues are issues that are recognized as very important by the scientific community, and have important policy implications, but are not yet receiving adequate attention from the policy community

- Critical issues that have large scale impacts

- Issues that should be given priority in the next 1-3 yrs in the UN and society at large

- Ranking of the issues

- Could be used also e.g. to guide forest sector model developments
Conclusions (1/2)

- Forest sector models are necessary, valuable and needed for:
  - Abstracting and simplifying complex relationships
  - Analysing past and current trends
  - Analysing “what if” – policy analyses (assuming ceteris paribus)

- Current forest sector outlook are not sufficient, because:
  - Typically fail to anticipate structural changes
  - Tend to produce too axiomatic and scarce information for users
  - Overlook normative aspects (influencing and reaching a desirable future)
Conclusions (2/3)

- The value of foresight has to be assessed through its usefulness for users (decision-makers, researchers, public)

- Proposal: Long-term future assessments are more useful and informative, if forest sector outlook models are combined with foresight approaches

- At EFI, we are trying to combine panel data econometric model with qualitative foresight analysis in order to provide long-term scenarios for European sawnwood markets

- Also, starting a European foresight panel (similar to UNEP), to try to look at emerging forest sector issues
Foresight and forest sector model interface is like a marriage,
When you understand and respect each other,
you blossom!
If you don’t understand and respect each other,
don’t get married!
Thank you!