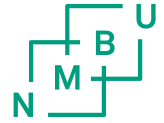# *FOREST SECTOR MODELS – INTERNATIONAL OUTLOOK*

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Presentation at SNS-NKJ meeting
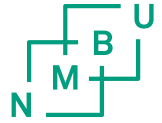Gardermoen, May 24, 2016

Three questions:

I. What do we mean by a Forest Sector Model (FSM)?

II. How has FSMs developed historically and internationally?

III. Where are we now regarding FSMs?

I. What do we mean by a Forest Sector Model (FSM)?

❑ A forest sector model is **NOT** :

  ▪ Forestry simulation or optimisation model

  ▪ Short- or long term forest supply model

  ▪ Forest management simulation or optimisation model

  BUT

❑ A FSM is a model (numerical or strictly analytical) which takes into account both forestry and forest industries and main interactions between these two sectors.
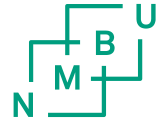
The FSMs can be classified in at least 2 ways:

1. Pure simulation models, or

2. Models which **secure market clearance** – i.e. that **demand equals supply** for each of the product, periods (years) and regions considered (including trade). Here **2 sub-types** exists:

 a. *«Recursive dynamic models».* Just securing market clearance for each period at the time – no optimisation for all periods seen together (*imperfect foresight* is assumed)

b. *«Dynamic Optimized Models» -* i.e. in addition to the above assumptions of market clearance per year in a., it is assumed that the allocation of resources for the **whole** planning/modelled horizon is optimal according to the assumed objective function (i.e. *perfect foresight* is assumed).

II. How has FSMs developed – some important stages

Time period	US - region	Europe
1963 - 1973	• New econometric methods introduced in the forest sector (McKillop 1967). • But shown to be inadequate for policy analyses (Adams 1974, Robinson 1974),	1972: Limit to Growth (Meadows, Meadows and Randers 1972) got high attention
1973-1986	• Haynes (1975) – using programming methods to compute spatial equilibria within the US softwood market • The Timber assessment market model TAMM (Adams & Haynes 1980)	About 1973:Prof. Jørgensen (Norway) saw possibilitiese in the DYNAMO simulation approach for the forest sector – contact with J. Randers. Similar thinking in Finland (Prof. Seppälä). Established the Nodic SOS model (Skog and Samfunn). Randers, Lønnstedt , Kuuluvainen, and Høsteland (Randers et al. (1978)
1987	IIASA-GTM model (Kallio, Adams & Binkley 1987)	IIASA-GTM model (Kallio, Adams & Binkley 1987) IIASA project (1982?-1987)
1996	The FASOM model – Forest and Agriculture Optimisation Model (Adams et al. 1996) for the US	
2010		Including risks (Kalio 2010)
2011		Impact of varying degrees of agent information (Sjølie et al. 2011)

III. Where are we now regarding FSMs? a. **Global FSM models** (all are recursive dynamic models)

Name of model	Strong points (relative to the other two models)	Weak points (relative to the other two models)
GFPM (Global Forest Products Model)	• Software easily available	• No bilateral trade • No technology vintages • Rather rough on forestry (only one assortment)
Globium (IIASA)	• Agriculture land use and management is included • Some Forest managements can be included	• Rather sensible to agriculture productivity assumptions. • No forest product bilateral trade. • No forest production technology vintages • Software not easily available
EFI-GTM	• Bilateral trade is included • 3 technology vintages included for forest industry products • Detailed production cost data	• Rather rough on forestry (two assortments but no forest management options)

b. National models

Land	Recursive dynamic partial equilibrium model	Dynamic partial equilibrium model	Pure simulation model
Austria			x
Finland	x	(x)	
France	x		
Sweden	x		
US	x	x	
Norway	x (NTM)	x (NorFor)	