Developing seedling logistics and organization of planting work – cost-efficiency perspective

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Content of presentation

I. Background – why logistics is important?
II. Logistical characteristics in Finland
III. Costs and development possibilities of seedling transportation
IV. Re-organization possibilities of planting work
V. Some conclusions
Changes in operational environment

I. Privatization of Finnish nursery companies in 1990s
   - A step towards market competition
   - Importance of cost-efficiency and customer-driven way of thinking in seedling production increased

II. Decreased number of nursery units
   - Decreased total number of seedlings produced
   - Economies of scale in seedling production

III. Mechanized planting and planting throughout the growth period

IV. Increased size of Forest Owner’s Associations and other service providers

V. Threats and possibilities of international competition

→ Altogether, the importance of logistics in forest regeneration has increased
Supply chain of seedlings

Seed suppliers etc.  Nursery companies  Transportation companies  FOAs etc.  Forest owners

- Raw material vendor
- Nursery unit
- Greenhouses
- Warehouse
- Customer outlet
- End-users
Logistical environment of a nursery company

- Nursery companies have typically about 50 major customers that operate as middlemen in supply chain of seedlings
- About 90% of seedlings is delivered via these middlemen
Seedling demand (order) per customer varied between 100,000 and 1,200,000 seedlings, the average being approx. 500,000 seedlings.
Choosing transportation vehicle

- tractor
- passenger car
- delivery van
- pick-up truck
- truck with a trailer
Economies of scale in transportation

Transportation unit cost function for fractional vehicle loads

Full-load transportation unit cost

The number of transported vehicle loads per transportation route
Possibilities of transportation optimization

The relative improvement in cost-efficiency caused by the centralized transportation planning system (i) compared to the current decentralized system (ii) varied from 13.0% to 36.5%.
Cost-effects of dividing transportation into periods

- Dividing transportation into 3 periods increased transportation costs about 10% and into 5 periods about 20%
An example of re-organization of planting work

- FOA’s old operation model
  - Great variety of workings within the same organization
    - Part of seedlings were delivered straight to planting sites, some to foremen’s intermediate stores and the rest to FOA’s common seedling store
  - Seedling delivery was mostly done by foremen
  - Forest workers used to work alone
  - The need for re-organization was caused by, for instance, insufficiency of foremen’s working hours and high travelling expenses during the planting period. Also the quality of regeneration was deteriorated because of fuzzy practices.
New operation model

- Transportation company delivers seedlings to delivery terminals according to the contract

Delivery terminal managed by a middleman organization
- Applicable number of terminals
- Named forest worker in charge
- Equipment to load and unload seedlings
- Irrigation equipment
- Possibility for roofed storage
- Pick-up service for forest owners with own initiative
- Book keeping
- FIFO (first-in-first-out) principle

- Planting groups (2–4 forest workers / group) take care of the delivery of seedlings to planting sites
- Workers take remainder seedlings to the next planting site

- Centralized seedling orders
- Quality control based on follow-up system measured by planting groups
Some results of re-organization

- Total number of seedlings delivered
- Total amount of working hours used by foremen
- Foremen's travelling expenses

+ Both forest workers and foremen were satisfied to the changes
+ Better regeneration quality
Some conclusions

- Costs of well-organized transportation are not an obstacle for focusing seedling production into fewer large-scale nursery units
  - *This is important because most of the nurseries in Finland are still too small to gain a real advantage from large-scale production*

- Clear rules and liability distribution together with cost calculation and basic biological knowledge are the most important tools for successful organization of planting work
  - *More responsibility to planters, usage of planting groups, exploiting planters in quality control and information collection…*