Modal shift from air freight to sea freight for shipping cut roses from Kenya to The Netherlands

Bottleneck analysis

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Aim: Chain description and bottleneck analysis

Interviewed organizations:

- Xpol
- Royal FloraHolland
- Kuehne and Nagel
- Verdel
- Coop Switzerland
- Chrysal

Results

1. Current status sea freight
2. Model-shift bottlenecks
    a. Quality
    b. Logistics
    c. Market
3. Outline of decision-support model

1. Current status sea freight

- 10-20 sea reefers per week with roses from Kenya to NL
    - = 2.5-5 % of total
    - Ambition Kenyan Flower Council: 50% sea transport in 2030
    - From Colombia (Chrysantemums) 20-25% sea transport, good ambition for 2025
- One-three weekly sea service (Maersk and CMA)
    - Air: three *daily* services!
    - Maersk transports, K&N consolidates (different growers in one reefer)
- 4 weeks sailing + >3 days before + some days after = 28-35 days in transit

2. Modal shift bottlenecks

- Product quality
- Logistics
- Market

Product quality (1)

- Botrytis (waste 10-12%)
- “>35 days means serious Botrytis, for each additional day 3-4% extra”
- Also other quality issues
    - Differences between cultivars, growers
    - Probably conditions in green house, soil, crop, process until transport play a role; this would explain differences between growers
    - Probably change of season, rain season, play a role

Product quality (2)

- SF: 30 days at 0.5 °C (if achieved, probably 2 °C?)
- AF: 2 days at 7-8 °C
- Same temperature sum of 15 degree-days!
    - Same remaining vase life?

Product quality (3)

- Room for improvement: cold chain completion
  - Cooling, packing and consolidation should be done better and closer to the grower
  - Cooling should be done also downstream the supply chain
    - Good cold storages at 1° C to process flowers from full reefer
    - Cooling at retail display

Logistics (1)

- Reefer is commonly filled at port in Nairobi
  - However, consolidation near the growers is preferred
    - Cold chain, packing issues
    - K&N is investing
- Sea freight demands a different process at the grower
  - 2 pallets per week is not sufficient to cover these investments
  - A grower should say: >20% sea freight

Logistics (2)

- Frequency and reliability of sea freight is a real bottleneck
  - Only one-three ship departures per week
  - Risk of missed connection and/or electricity issues in transition point Salalah (Oman)
  - Date of arrival in Rotterdam is not reliable
    - 200 reefers which want to have a fixed arrival date are not important enough compared to the 20000 containers on the ship
  - Sea freight still needs a backup by air

Logistics (3)

- Capacity issues are important as well
  - Both in case of AF and SF
  - Less ‘repositioning cost’ for reefers in Middle East compared to Latin America is an advantage

Market (1)

- Clock sale (25%) and sea freight fit well
  - CIF
  - At the auction, and increasing number of growers is transparent about the transport mode
  - How critical buyers are depends on whether it is a supply market or demand market
- Direct sale (75%): substantial share of sea freight is needed (e.g. 30%) to win the tender of retailers
  - Mostly FOB

Market (2)

- Price difference air freight – sea freight is relevant
  - Currently 25%, should be more (to buy extra roses if unreliable transport)
  - Currently however hardly cost savings due to 10-12% waste with sea freight
  - Euro-dollar rate is relevant as well
- With direct sale, commitment of customers is needed for sea transport
  - Sea transport demands more planning from retailers (2 months forecast instead of 2 weeks), because longer leadtime sea freight
  - Mainstream product is highly predictable; master planning and rolling stock will work

Market (3)

- CO2 demands from retailers would be a game changer
  - 80% CO2 savings in case of sea freight compared to air freight
  - Although air freight will probably emit 50% less CO2 with bio ethanol
- EU max CO2 per kg imported product would be a game changer

Conclusions from interviews

- Main advantages SF compared to AF
  - Freight cost
  - CO2 savings
- Main disadvantages SF compared to AF
  - Frequency and reliability of transport
  - Higher waste (rejection rate)

3. Outline decision-support model

- Decision-support model development
    - To support the decision of the shipper to use AF or SF

Model developed by Chrysal

- Model compares air freight and sea freight on
  - costs per kg; includes freight cost, Chrysal SF service, rejection cost
  - CO_2 footprint per kg; includes precooling, trucking, ship/airplane and trucking again

Proposal: rejection module

- Dedicated product-quality module
- This module has rejection % as output parameter
    - Frequency and Reliability of transport + Production period -> effect on expected rejection percentage!
- Is used as input by Chrysal model

Sketch of Module development- I

- Module input
  - Harvest date
  - Departure date
  - Estimation/distribution arrival date (data driven or educated guess)
  - Initial quality of batch (model driven or educated guess)

Sketch of Module development- II

- Module output
    - Forecasted rejection rate
- This forecast is input for Chrysal model

  -> Improved forecast of

  overall costs per kg

  CO_2 footprint per kg

Literature

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- de Visser, P. H. B., Nannes, L., van Bokhoven, E. H., & Buwalda, F. (2015). Decision Support System (DSS) for prevention of Botrytis in tomato in greenhouses (No. 1345). Wageningen UR Glastuinbouw.

Conclusions

The rejection cost is an important factor when deciding about sea freight versus air freight for shipping cut roses from Kenya to The Netherlands.

We will develop a model for forecasting the rejection cost, to support the decision whether to sail or to fly.