The Value of Sensor Information for Managing Perishable Goods

Motivation

Relevance of Perishable Goods:
- 50% of the retail grocery revenues
- High loss rates (15% on average)
- High environmental impact: 25-30% of all CO₂ emissions in the EU

Sensor-based quality prediction

- Sensors (e.g., temperature) monitor environmental parameters
- Recorded temperature history can be used with formulas from food science to predict quality level and remaining shelf-life
- Reusable transport items or cases such as RPC

Quality model

Example: improving through better information

Example - highest-quality-first-out (HQFO) - numbers indicate remaining shelf-life

Sensor + ID

HQFO

Quality experience

HQFO

LQFO

LQFO

Discernible quality

Highest visual quality

Mean

Distribution

Goal: high quality

Goal: low waste

Mean

Baseline

Benchmark of issuing policies with different information levels

Simulation model for benchmarking in-store issuing policies

Analysis of inaccuracy of sensor-based shelf-life prediction

In-store logistics: Using information to reduce waste and increase customer satisfaction

Profit gains of using sensor information for early decision-making in supply chains

Supply chain simulation model with early removal of goods

Sensitivity analysis of information-based profit gains

The impact of sensor-based management of perishables on CO₂ emissions

Supply chain and sourcing scenarios of simulation

Simulation results by macro scenarios

CO₂ savings vs. CO₂ of sensors

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