

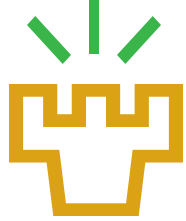
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Closing Webinar

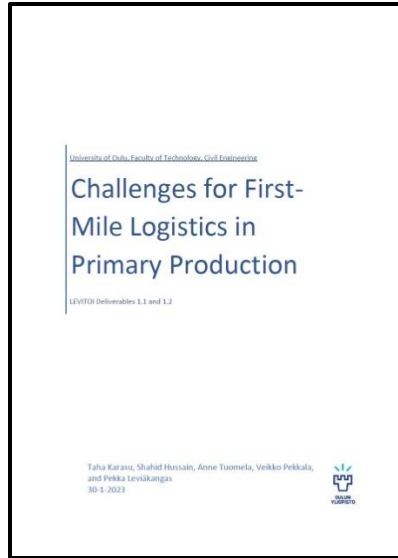
Dec-12-2024

Agri-logistics: From first-mile challenges to strategic solutions and forecasting

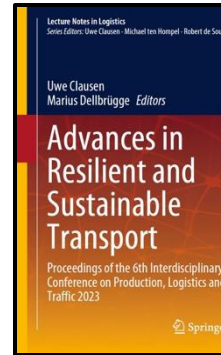
Taha Karasu
Doctoral Researcher
University of Oulu



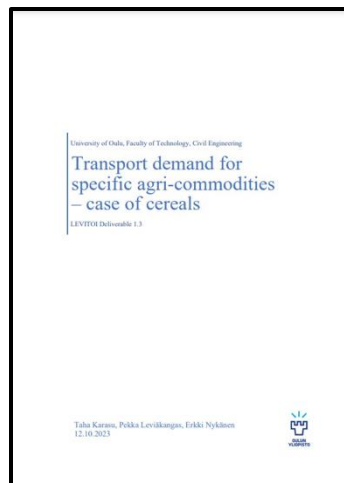
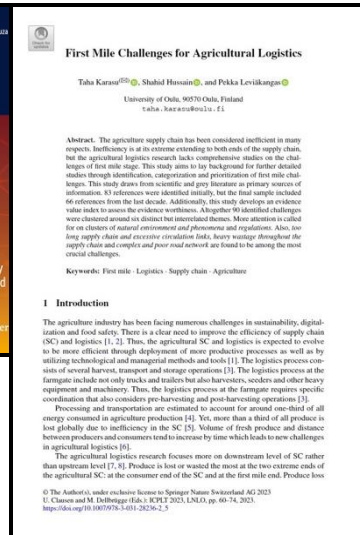
Agri-logistics: From first-mile challenges to strategic solutions and forecasting



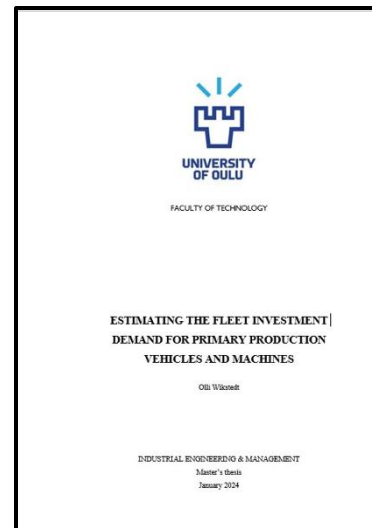
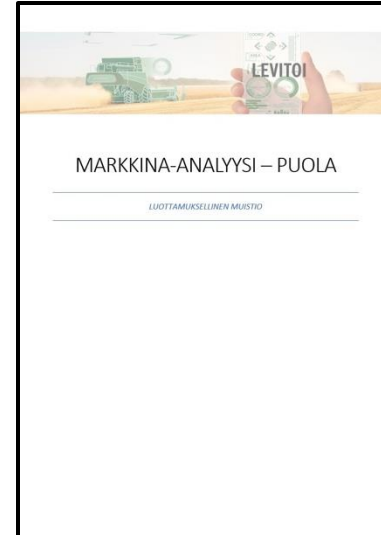
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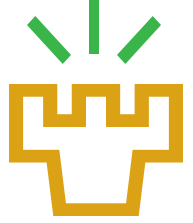
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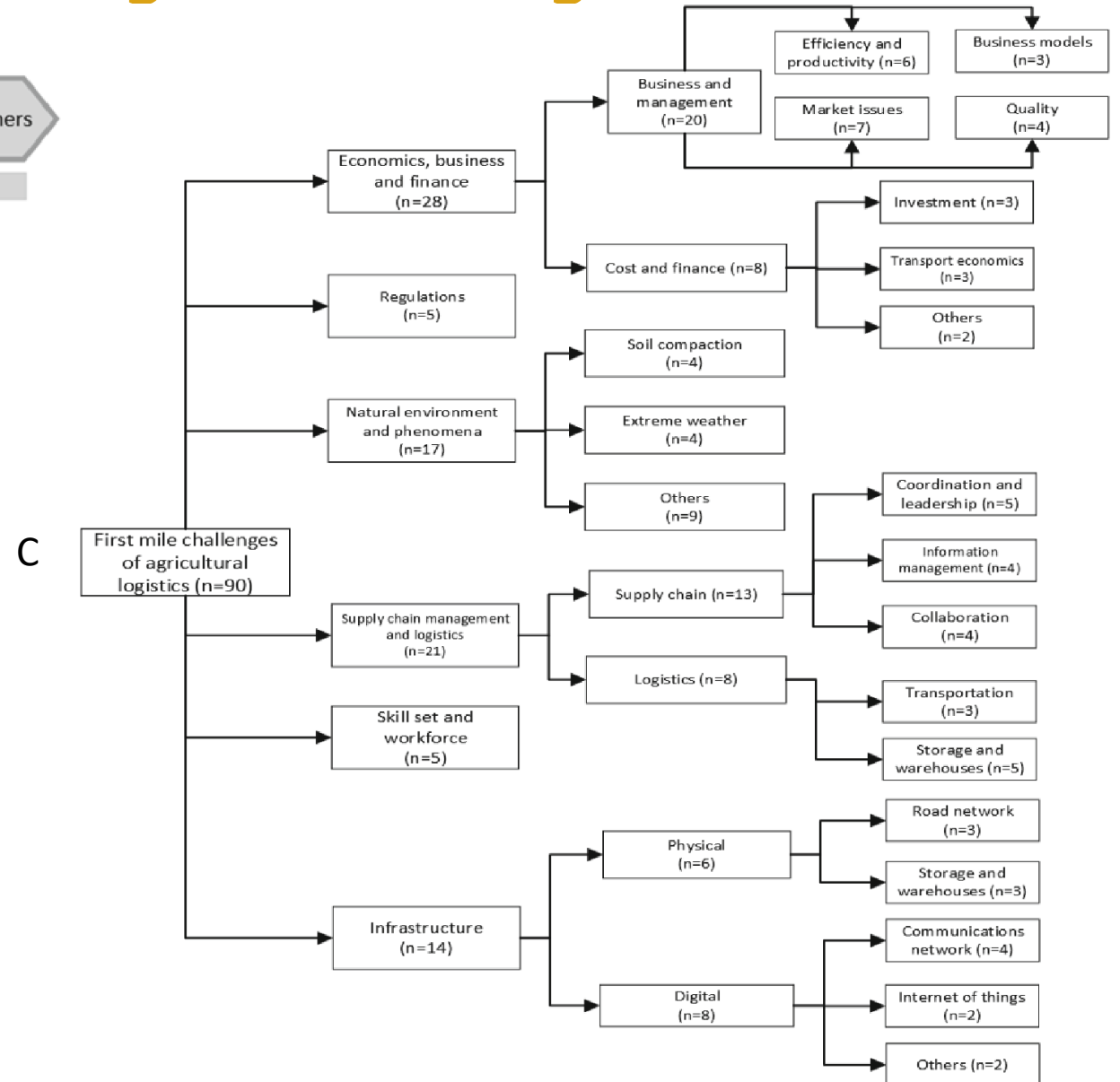
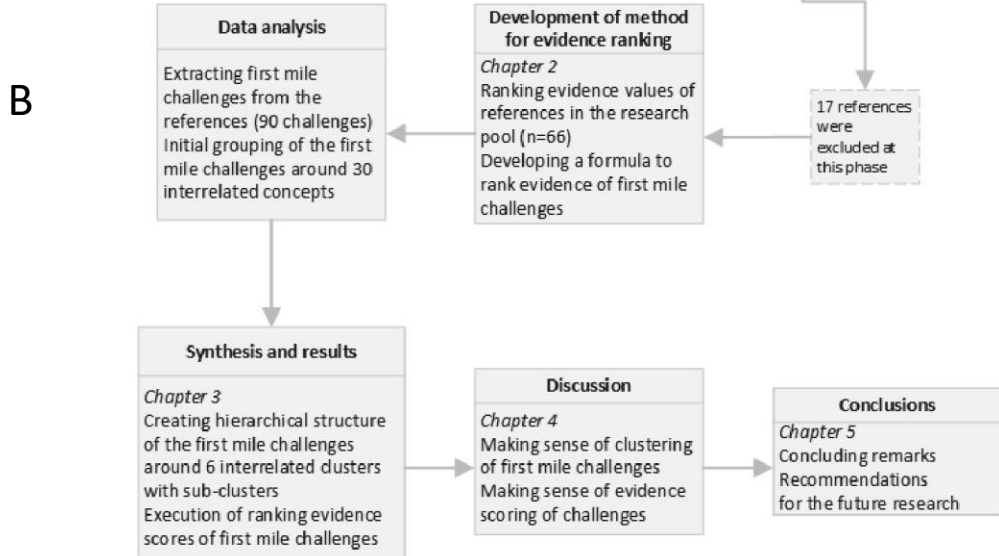
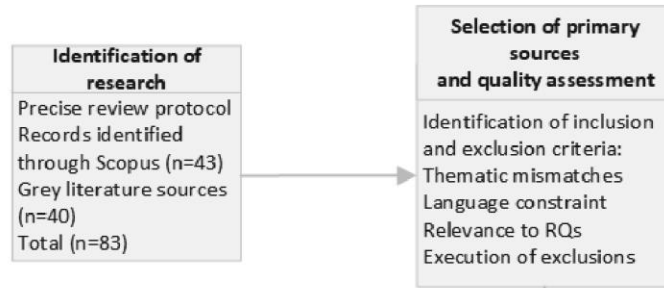
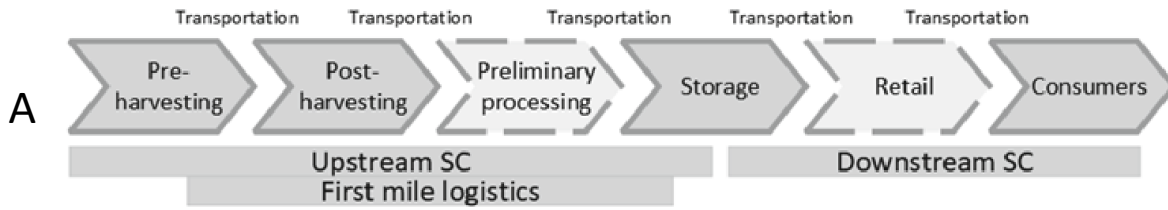
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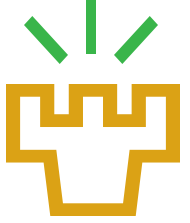


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First mile challenges for agricultural logistics

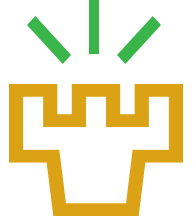




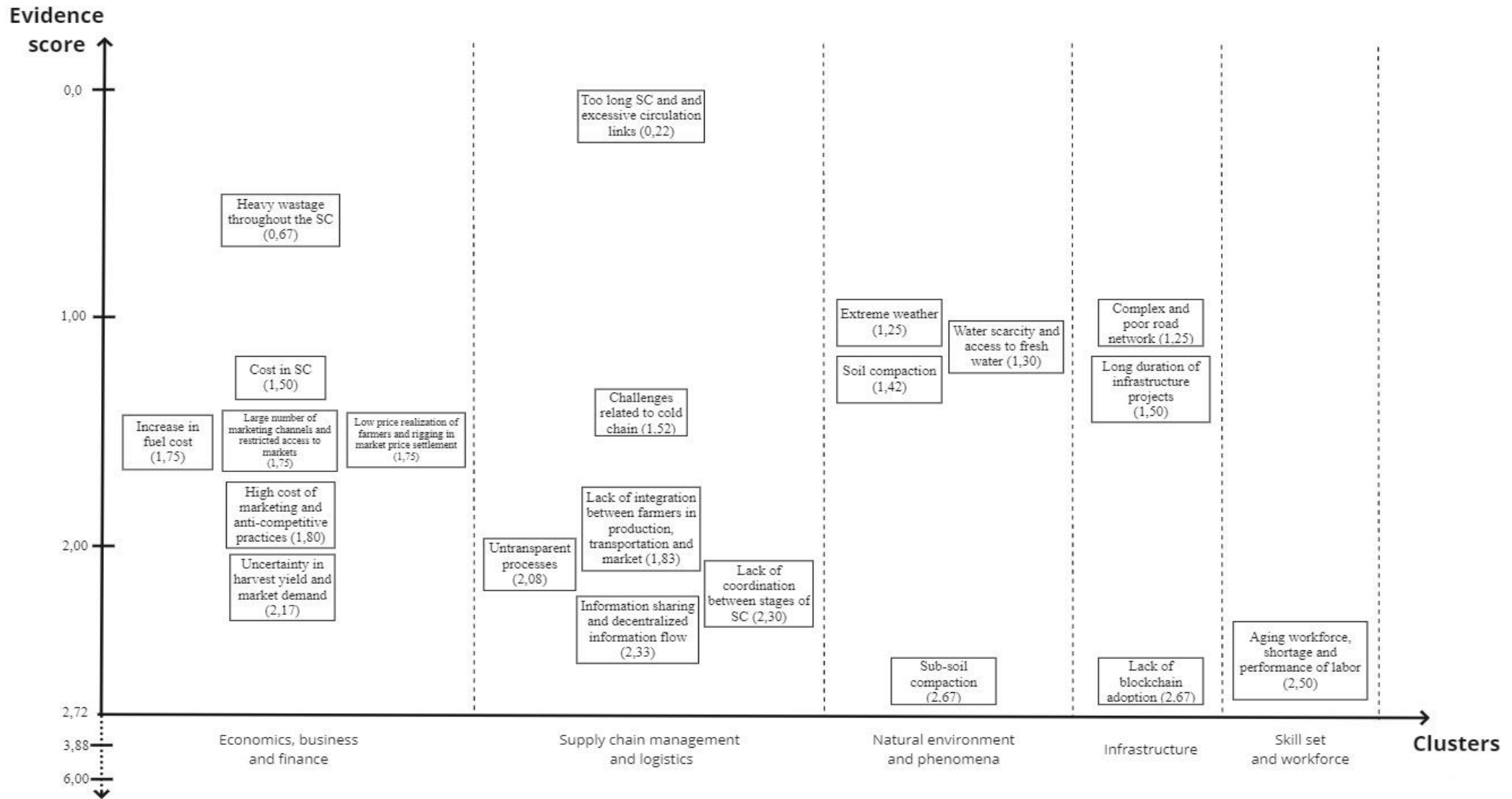
First mile challenges for agricultural logistics

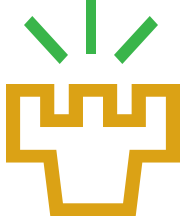
- **ES = BEV** – $\left(\sum_{EVi=2}^n \frac{1}{EVi} \right)$
- For example;
- If a challenge is identified in **4** references with the values of **[2,3,4,4]**
- Then the evidence score (ES) is
- $2 - \left(\frac{1}{3} + \frac{1}{4} + \frac{1}{4} \right) = \mathbf{1,17}$
- Threshold for classifying a challenge “**evident**” is set at **2,72** (M-(s/2))
- **21/90** challenges were found to be **evident**

*ES: Evidence score, BEV: Base evidence value, EV: Evidence value of other sources, M: Median, s=standard deviation

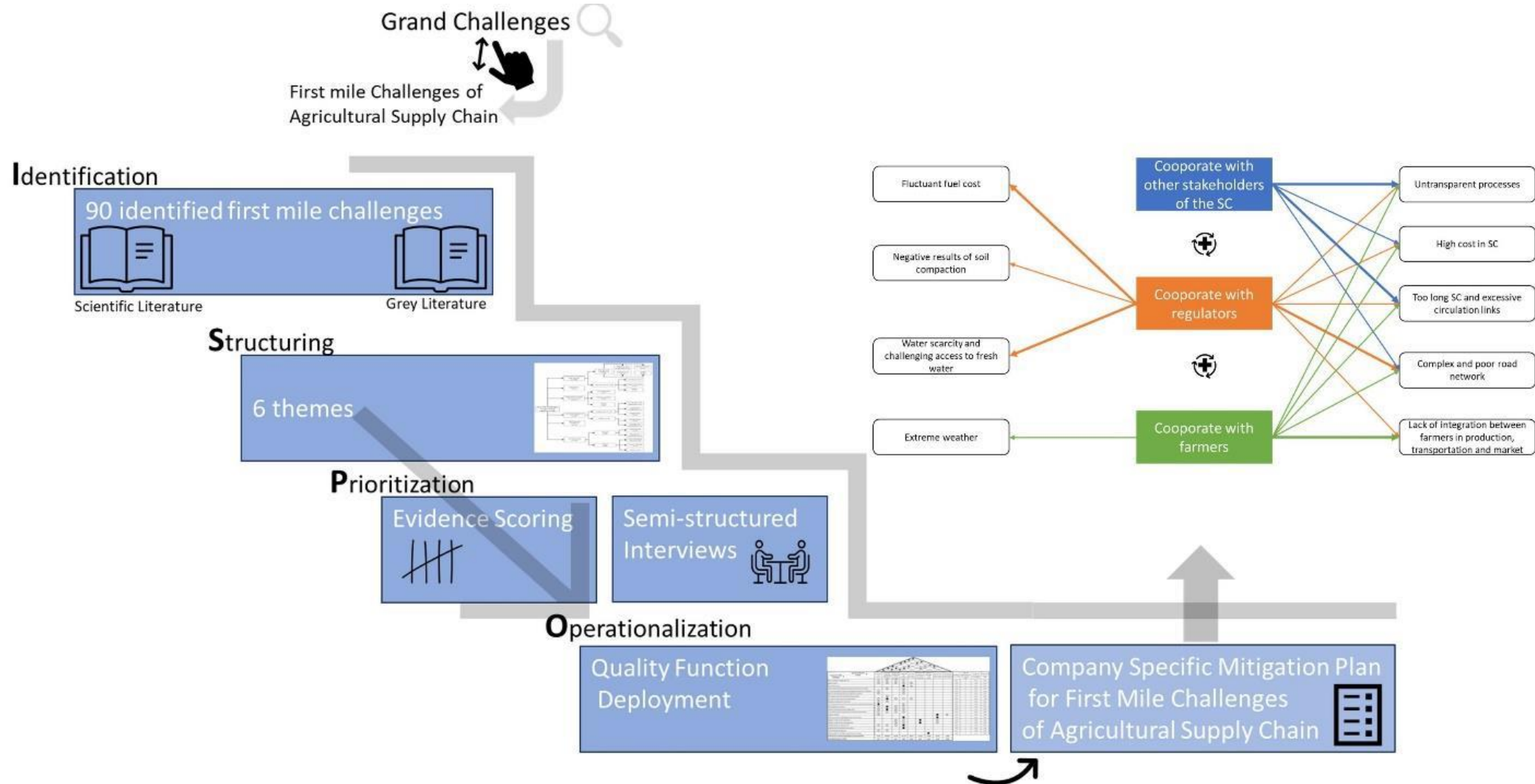


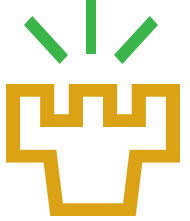
First mile challenges for agricultural logistics



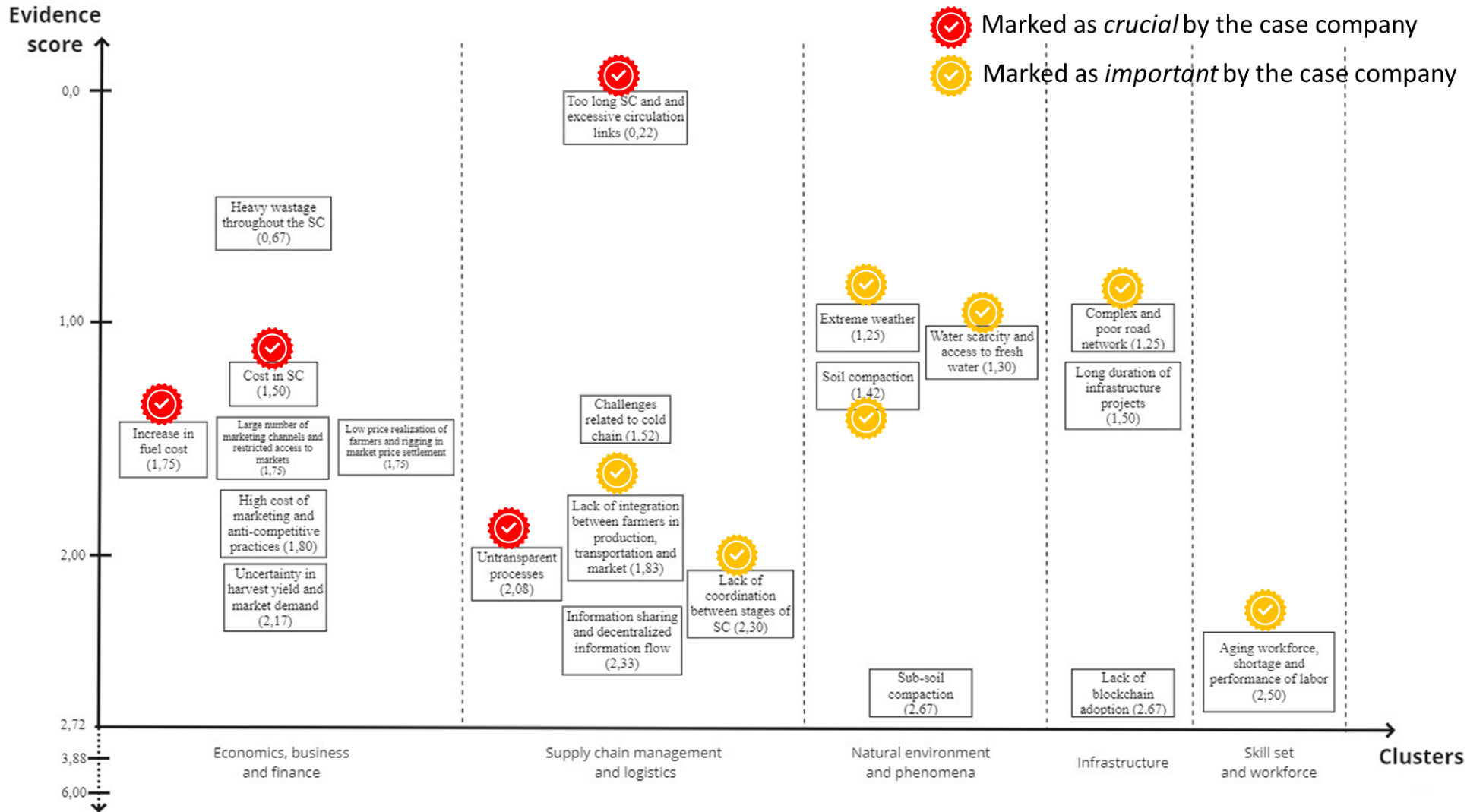


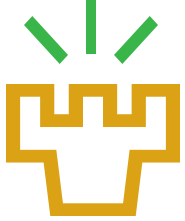
Transforming agricultural supply chain challenges into operational strategies: Insights from an agri-machinery company



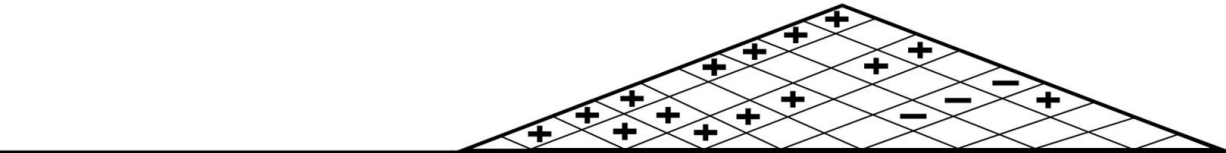


Transforming agricultural supply chain challenges into operational strategies: Insights from an agri-machinery company



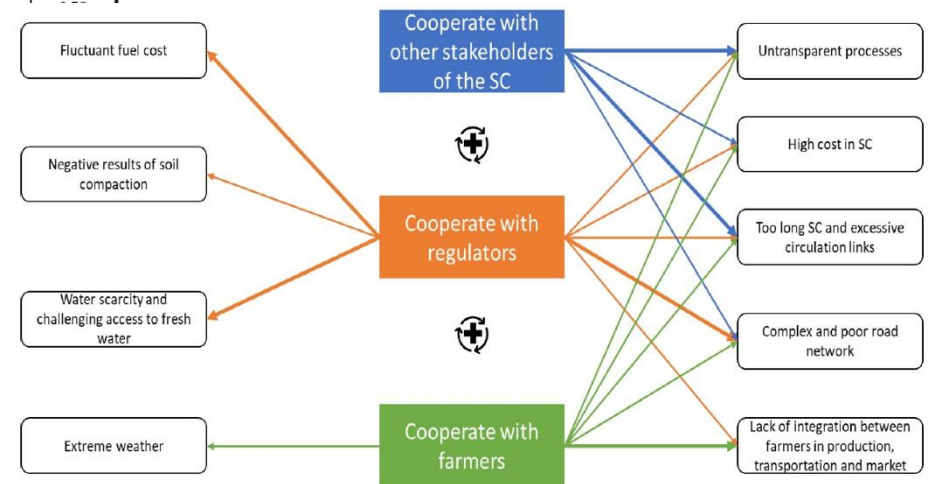


Transforming agricultural supply chain challenges into operational strategies: Insights from an agri-machinery company

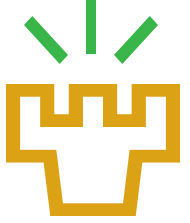


Evident First Mile Challenges ↓	Operationalization Actions →									Evidence score (ES)	Value for importance for the company (VFI)	Weighted prioritization score (WPS)	Normalized values of WPS
	Cooperate with farmers	Cooperate with other stakeholders of the SC	Cooperate with other vehicle providers	Cooperate with regulators	Decrease the cost of the vehicle	Decrease the pressure of the vehicle to the soil	Improve the safety of the vehicle	Increase the effectiveness of the vehicle	Increase the sustainability of the vehicle				
Heavy wastage throughout the SC	○	○	○	○						0.67	-1	-0.17	0.07
High cost in SC	○	○	○	○	○					1.50	5	3.56	0.76
Fluctuant fuel cost				●	△					1.75	5	3.52	0.75
Large number of marketing channels and restricted access to markets		○		○						1.75	0	0.19	0.14
Low price realization of farmers and rigging in market price settlement	○			○						1.75	0	0.19	0.14
High cost of marketing and anti-competitive practices	○			○						1.80	0	0.19	0.13
Uncertainty in harvest yield and market demand		○								2.17	0	0.15	0.13
Too long SC and excessive circulation links	○	●	○	○	○					0.22	5	4.85	1.00
Difficulty to implement 'cold chain'	○	○								1.52	0	0.22	0.14
Lack of integration between farmers in production, transportation and market	●			○						1.83	3	2.18	0.51
Nontransparent processes	○	●	○	○						2.08	5	3.49	0.75
Lack of coordination between stages of SC	○	●	○	○						2.30	3	2.14	0.50
Lack of information sharing and decentralized information flow	○	○	○	○						2.33	-1	-0.52	0.00
Extreme weather	○						●	○		1.25	3	2.27	0.52
Water scarcity and challenging access to fresh water				●			●	○		1.30	3	2.26	0.52
Negative results of soil compaction			○	○		●	○			1.42	3	2.2	0.5
Negative results of sub-soil compaction			○	○		●	○			2.67	-1	-0.5	0.0
Complex and poor road network	○	○	○	●						1.25	3	2.2	0.5
Long duration of infrastructure projects				●						1.50	0	0.2	0.0
Lack of blockchain adoption	○	○								2.67	-1	-0.5	0.0
Aging workforce, shortage and performance of labor							●			2.50	3	2.1	0.5
Priority Score of Operationalization Actions (PSOA)	73.45	109.84	51.93	127.79	28.74	15.24	19.20	45.79	6.80				
Normalized values of PSOA	0.55	0.85	0.37	1.00	0.18	0.07	0.10	0.32	0.00				

Critical operationalization actions and first mile challenges

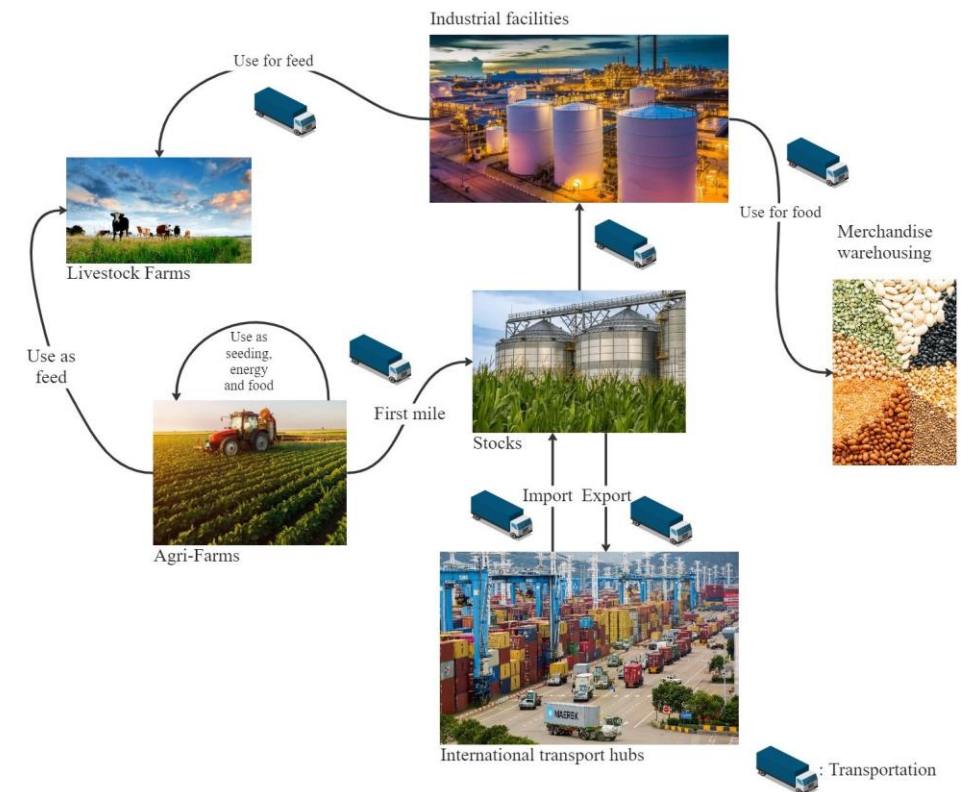
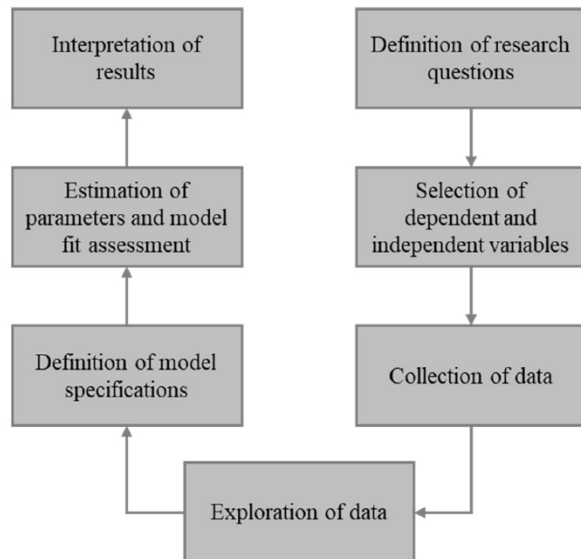


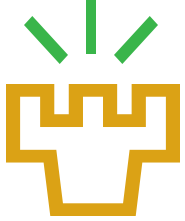
Quality Function Deployment



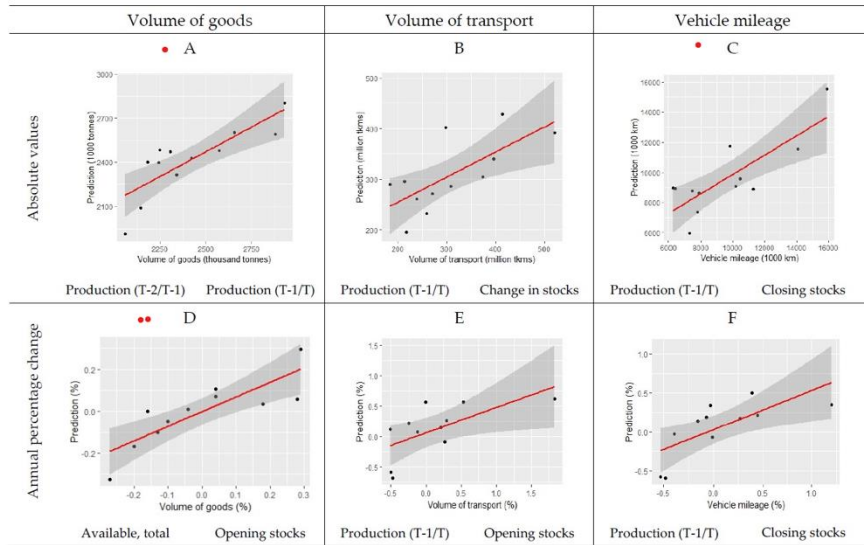
Road freight demand forecasting using national accounts' data: The case of cereals

- Explore relationships between agricultural production data and freight demand
- Assess the utility of national accounts for transport forecasting in agriculture
- Propose actionable insights for transport planning

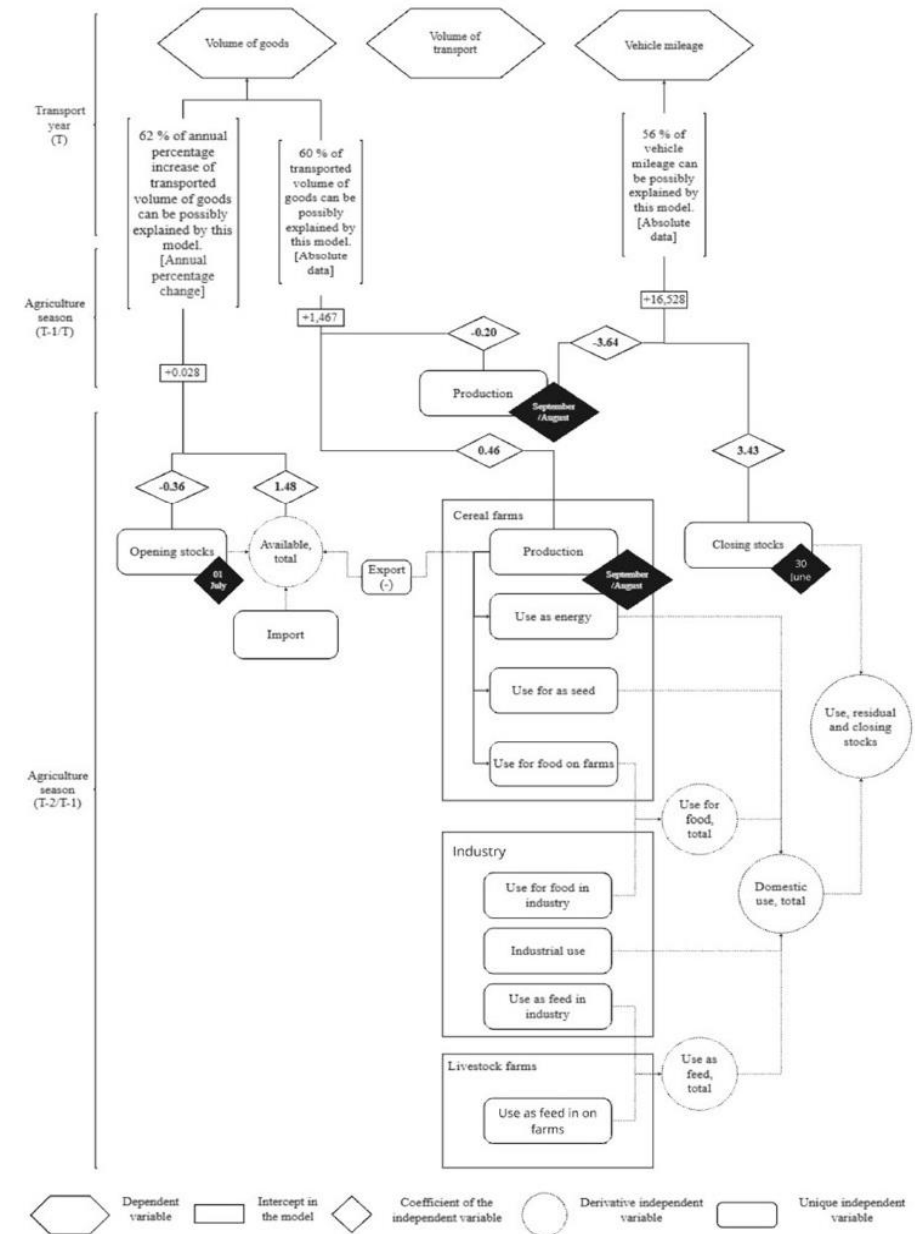


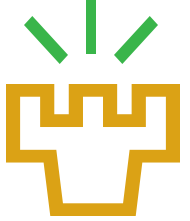


Road freight demand forecasting using national accounts' data: The case of cereals



- Key variables influencing road freight demand: production, closing and opening stocks
- Adjusted R2 is highest with Model D: 0.62
- Short time series limits robustness
- Need for more granular and longitudinal data
- Expanding to other agricultural commodities
- Collaboration with Luke for integrated models
- Use production cycles to refine existing forecasting tools
- Developing policies leveraging insights into agri-transport needs





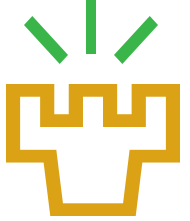
Fleet investment demand forecasting: Case of agricultural tractors

Context and objectives

- There is a shift in agriculture globally and also in Finland. Average farm size increases, number of farmers decrease.
- This consolidation stresses the need for higher demand from agri-tractors, but there is also global market dynamics that affect agriculture sector as well.
- Accurate forecasting can help manufacturers, policymakers make informed decisions about future investments in machinery demand.

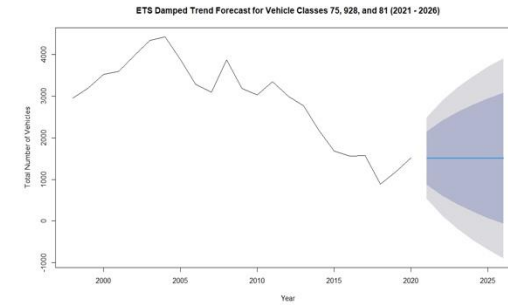
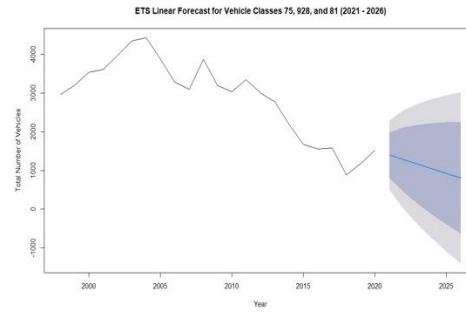
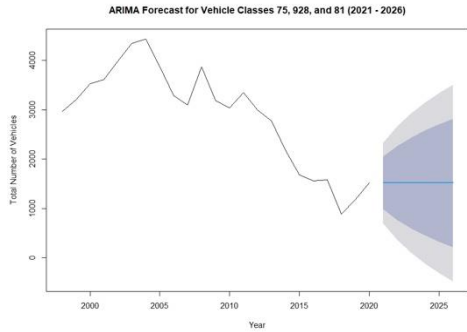
Methodology

- The study applies time-series data from Traficom to analyze historical trends and patterns.
- We use two methods and their combination for forecasting quantitatively.
- ARIMA: relies on patterns from past data to predict future values. It's commonly used when data has trends or patterns that repeat over time.
- ETS: When data shows trend and seasonal variations. The method adjusts based on recent values, giving more weight to recent observations.
- Combination: Leverages the strengths of both models to improve forecast accuracy.

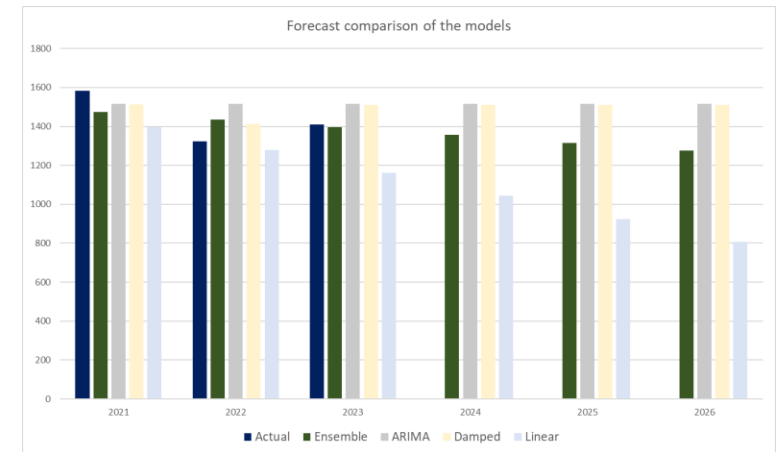
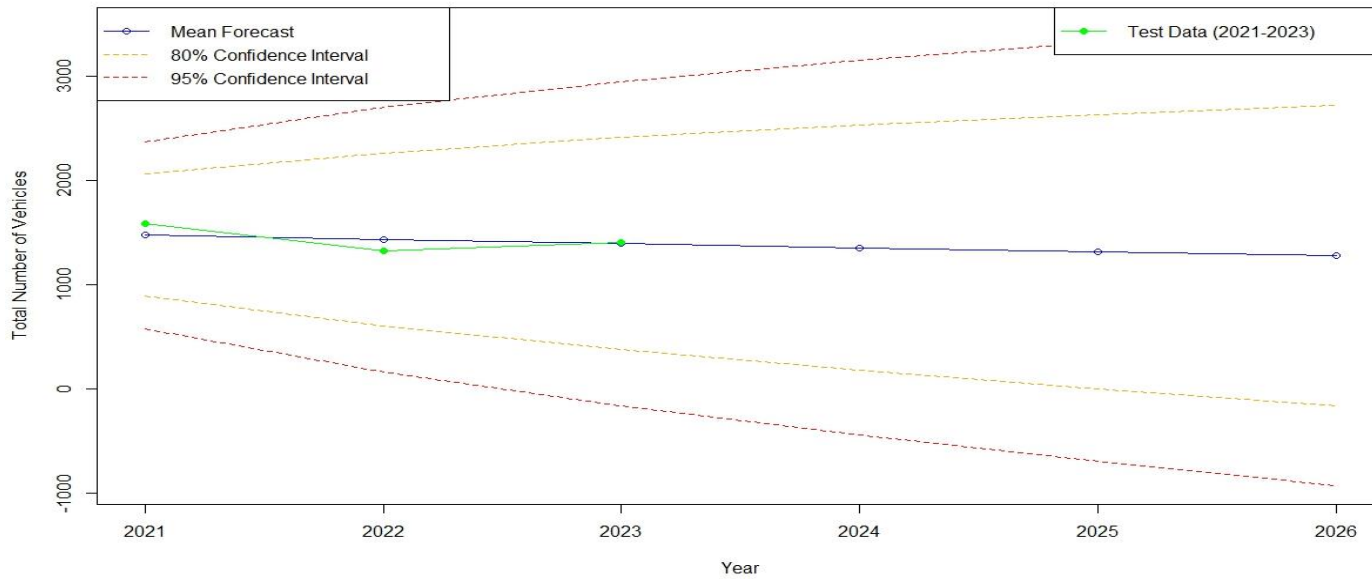


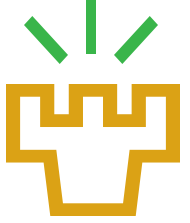
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Individual forecasts



Ensemble Forecast for Vehicle Classes (2021 - 2026)





Thank you

Agri-logistics: From first-mile challenges to strategic solutions and forecasting

Taha Karasu
Doctoral Researcher
University of Oulu