

Requirements for a new digital system in the cargo rail sector

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1. Background, Challenge & Objectives

Background / Context

This project investigates the digital transformation in the rail freight industry, a sector integral to global logistics but traditionally slow in adopting new technologies. Focused on the implementation of the Digital Automatic Coupler (DAC), the study examines the challenges of integrating digital innovations in an industry marked by established practices. It includes expert interviews, customer journey analysis, and practical use-cases to understand the operational and marketing impacts of digitalisation in rail freight.

Research question

This project addresses the challenge of integrating digital technologies, like the DAC, into the traditional rail freight industry. It seeks solutions for balancing technological advancements with established practices, emphasizing the critical role of digital transformation in enhancing the industry's efficiency, safety, and sustainability.

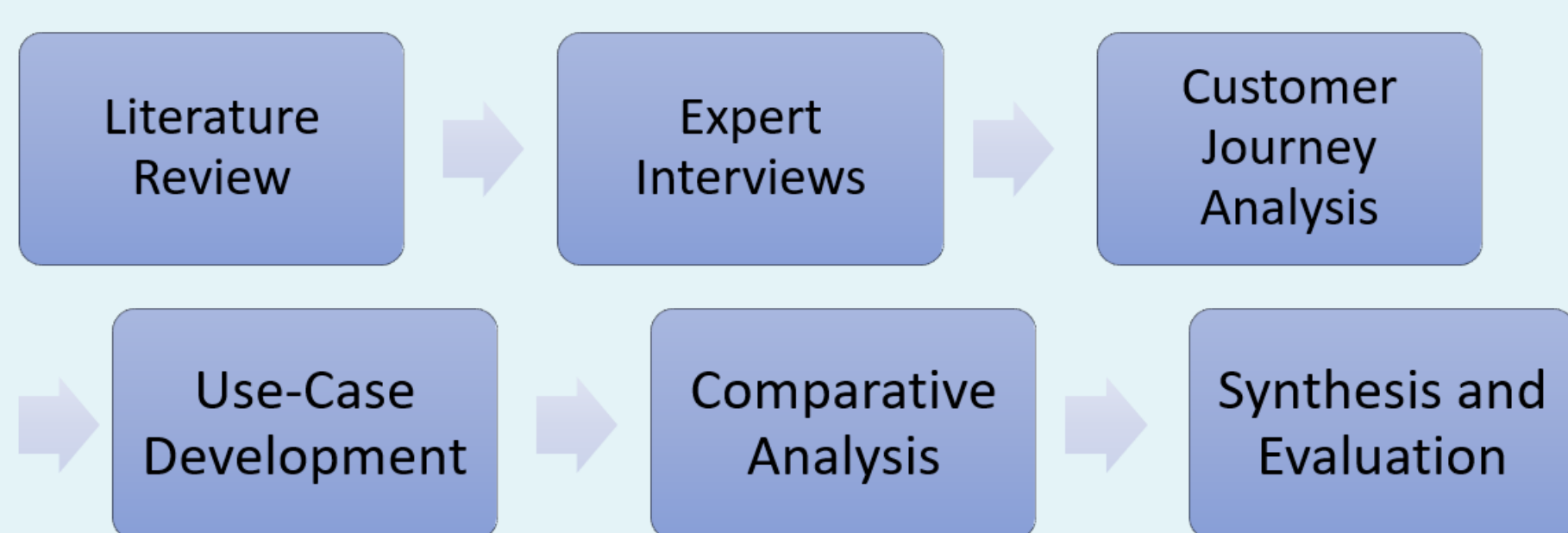
Objectives / hypotheses

Investigate the integration challenges and potential benefits of the DAC in the rail freight industry.

1. Analyze how digitalization, particularly through the DAC, can enhance operational efficiency, safety, and sustainability in rail freight logistics.
2. Assess the readiness and adaptability of the rail freight sector for digital transformation, emphasizing customer-centric approaches and industry-wide collaboration.

2. Methodology / Materials

Methodology



Material / Data / Tools

Expert Interviews: These were conducted with industry professionals to gather insights on digital transformation in rail freight.

Customer Journey Mapping Tool: Used for visualising customer experiences with digital technologies in rail freight.

DAC Data: Technical and operational information on the DAC, central to the study.

Use-Case Scenarios: Practical examples demonstrating the application of digital technologies in rail freight.

Literature and Academic Resources: Key for providing theoretical context on digital transformation in logistics.

Data Analysis Software: Employed for organising and interpreting interview and customer journey data

3. Results / Solution / Recommendations

Understanding of Industry Challenges: The study identified key challenges in integrating digital technologies like the DAC in rail freight, such as user acceptance, data integration, and the need for industry-wide standardization.

Insights from Expert Interviews: Interviews with industry professionals revealed practical perspectives on digitalization, highlighting both potential benefits and operational hurdles.

Customer Journey Analysis Findings: The analysis showed the importance of customer-centric approaches in adopting digital technologies, revealing insights into customer expectations and experiences.

Practical Use-Case Applications: The study demonstrated how digital innovations could enhance efficiency, safety, and sustainability in rail freight through practical use-case scenarios.

Comparative Analysis Outcomes: The comparison of interview insights with literature underscored the complexities of digital transformation in a traditionally conservative industry.

Synthesis and Evaluation: The study concluded that successful digital transformation in rail freight requires a balanced approach, addressing both technological advancements and operational realities.

Use-Cases:

Vibration Sensors for Maintenance: Utilizes sensors to track real-time conditions and maintenance needs of railway tracks and wagons, enhancing safety and efficiency.

3D Point Cloud Technology for BIM: Employs 3D scanning for Building Information Modeling (BIM) to improve railway infrastructure management and planning.

Force Measurement in Train Couplings: Analyzes forces in train couplings for optimized efficiency and safety, aiding in load management and system performance.

4. Discussion, Conclusions & Outlook

Discussion

The semi-structured interviews revealed significant challenges in adopting digital technologies like the DAC in rail freight, including data integration and user acceptance. The findings are crucial for Voith, highlighting the need for strategies that consider both technological and stakeholder aspects.

Conclusions

Recommend fostering collaborative dialogues and incremental digital integration. These insights are vital for effectively marketing innovative technologies in rail freight, balancing technological advancements with human factors.

Outlook

- Study long-term digitalisation impacts in conservative industries.
- Investigate digital solutions and policy roles in digital transformation.

Literature

Kallio, H., Pietilä, A.-M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, 72(12), 2954–2965. <https://doi.org/10.1111/jan.13031>

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