



Improving the operational efficiency and reducing transport-related carbon emissions of food distribution hubs

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Improving the operational efficiency and reducing transport-related carbon emissions of food distribution hubs

RESEARCH REPORT



Arijit De
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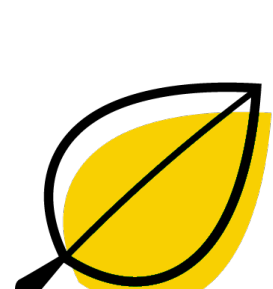
Overview

Small-scale food producers suffer from low margins and weak bargaining power. Local or regional food hubs, which aggregate products from such producers and deliver to final consumers, may improve producers' economic fortunes and contribute to local economic development.

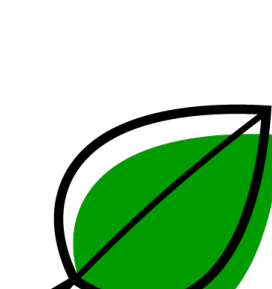
However, food hubs' logistics can be particularly costly, often involve small volume journeys, with carbon emissions potentially exceeding those of supermarket-based supply chains.

This research seeks to **improve food hubs' operational and environmental efficiency in logistics** by minimising transport costs and carbon emissions. A mathematical model is developed to address the 'producer-to-hub-to-customer' problem, drawing on real-world data for a local food hub serving over 150 producers in the North East of England.

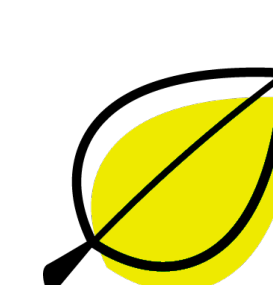
Key findings



Our empirical results show that horizontal collaboration in logistics between producers play a key role in improving vehicle utilisation which, in turn, can significantly reduce carbon emissions by up to 16%.



By switching to electric vehicles, transport and total costs can be reduced by 31.5% and 59.1% respectively, helping to optimise operational costs and reduce environmental impacts.



Our analysis indicates the benefits of direct shipping between producers and customers - specifically, it indicates that switching to direct connections between products and customers can cut down emissions by 12-16% per customer order. They also reduce the total cost per customer order by 12-15% and the number of vehicle trips to each customer zone.

Research team



Barbara Tocco
Centre Manager & Senior Research Associate



Matthew Gorton
Deputy Director

Conclusions and recommendations

- Our findings provide valuable insights for food supply chain practitioners and food hub managers, highlighting strategies to reduce operational costs and cut down transport-related carbon emissions. This study provides empirical evidence on the benefits of horizontal collaboration between producers, which in turn can contribute to achieve more sustainable food systems.
- By adopting electric vehicles in the logistics industry, carbon emissions and costs can be significantly cut, particularly in urban areas where there are dense networks of customers who live close together.
- From a managerial perspective, these findings provide useful empirical evidence for improving logistics strategies, specifically in addressing cost and environmental business pressures.
- Importantly, operational modelling and optimising techniques can be effective in reducing transport, inventory, and fuel costs while contributing to a cleaner environment.
- Power BI and data visualisation software can be effective tools for better understanding performance metrics and helping optimise logistics solutions.

Resources

Improving the operational efficiency and reducing transport-related carbon emissions of food distribution hubs - a short, non-technical overview

August 2023 (PDF: 774KB)



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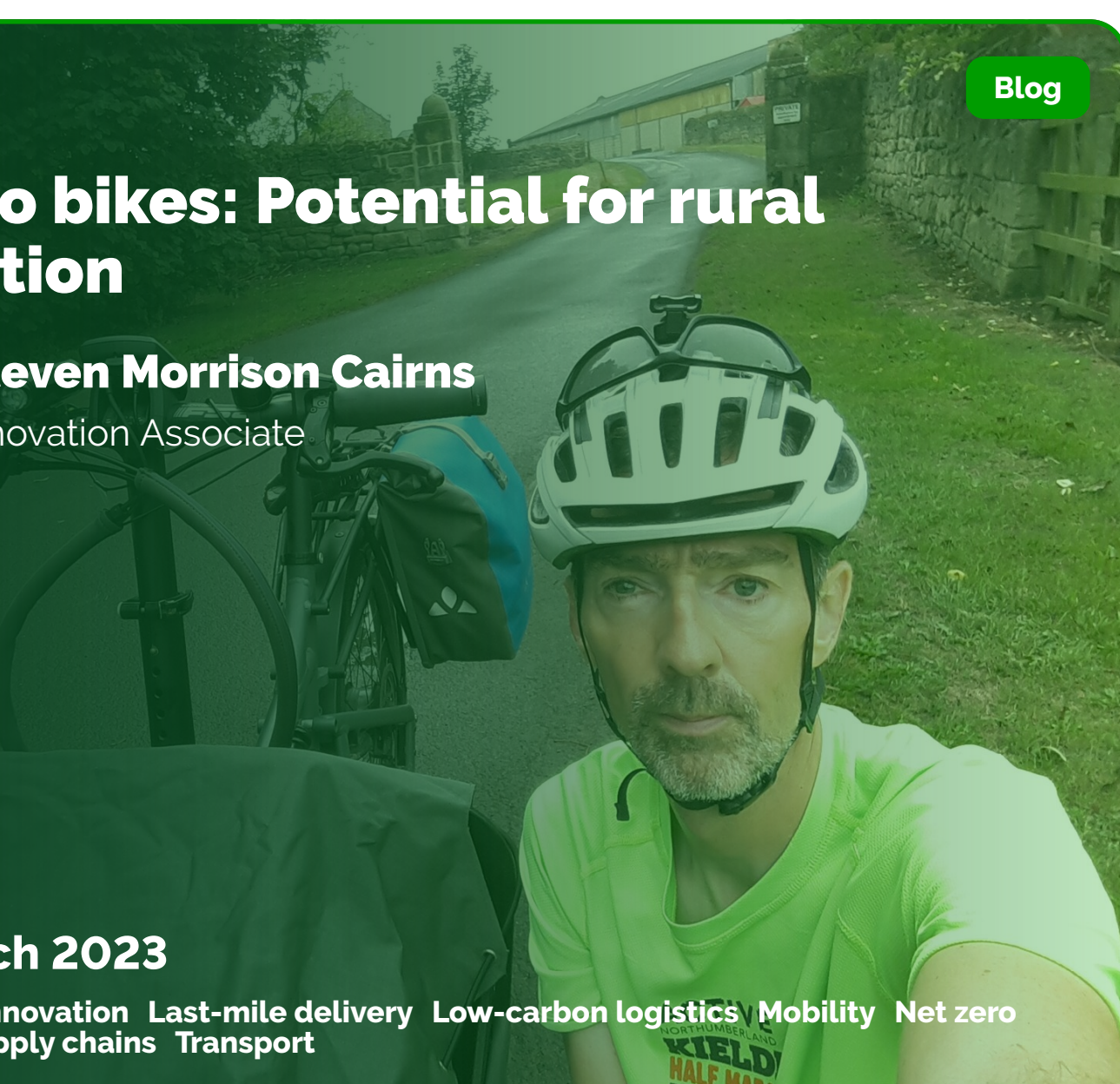
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