SRP9 Cargo Bikes in Scotland

Exploring the barriers preventing wider adoption

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To find out more, please contact: Harry Tainton
Harry.Tainton@sustrans.org.uk

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Author(s):	Euan Smith Cameron Millar
Reviewed by:	Harry Tainton
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Contact:	srp@sustrans.org.uk

Executive summary

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Cargo bikes, including electrically motorised “e-cargo” bikes, have a vital role to play in achieving Transport Scotland’s active travel outcomes. However, despite their known benefits, in Scotland they are still not widely adopted by either businesses or the public. The aim of this project is to evidence the barriers preventing the uptake of cargo bikes by small businesses and organisations in Scotland, supplementing research carried out in England and Europe, by looking at two research questions:

1. What are the barriers, physical, financial, and other, preventing small businesses and organisations from successfully integrating the use of cargo bikes in their operations?
2. What possible solutions are there to tackle these barriers?

To address these, we conducted eleven semi-structured in-depth interviews with representatives of small and medium sized Scottish businesses and organisations based in urban and rural locations across the country.

Key Findings

Most participants commented that a critical mass of cargo bikes in use across the country would alleviate many of the barriers identified, however as the current levels of use are low, it will likely require all or many of these barriers to be addressed directly before the effects of this critical mass becomes felt across our towns and cities.

Grouped across five themes, the interviews established the key barriers preventing use of cargo bikes and the potential solutions where resources should be focussed.

Costs and Funding

There are high costs involved in purchasing a cargo bike, especially so for e-cargo bikes. An increase in the provision of grants and funding schemes that are accessible and well-advertised would help lower this initial outlay.

For cargo bikes to be made more financially appealing in the transportation of goods they need to be supported by a policy framework which rewards sustainable modes of delivery and penalises those which cause further congestion and pollution. Such policies include the enforcement of low emission zones in densely populated areas, and the taxation of individual parcel deliveries according to their method of delivery.

Infrastructure

Most active travel infrastructure is not wide enough for cargo bikes, with most riders forced to use the open road for their trips. The provision of cycling infrastructure which is built with cargo bikes in mind would provide a safer alternative for riders.

Training

Cargo bike training courses for riders are currently limited in their geographical spread. With more courses offered across Scotland, and professional recognition of this training, uptake of cargo bikes would be more widespread.

Storage and Parking

There is a lack of suitable on street and overnight storage options for cargo bikes. An expansion of suitably designed street cycle stands, and hanger storage would address this, opening up access for those without facilities to store the bikes and reduce potential obstruction of pavements.

Insurance, Licensing and Liability

There are difficulties in attaining insurance for cargo bikes as commercial vehicles, with providers seeing them as high risk. A limited choice in insurance provider resulting in high prices.

Businesses attempting to gain insurance found value in exchanging information with charities knowledgeable of the sector and other fleet operators, highlighting a need for communal resources of information.

Introduction

Scotland has set a target of achieving net-zero greenhouse gas emissions by 2045. This target requires significant reductions in the carbon emissions of many sectors of the country's economy, including transportation.

The transport of freight in the UK accounts for a third of the overall emissions from transport in the UK, with road freight accounting for 77% of this (Paddeu, 2022). From 2012 to 2019 the emissions from vans increased in Scotland by 25% because of increased e-commerce and the associated increase in door-to-door deliveries, amongst other factors (Worthy, 2021); Office for National Statistics, 2024). In a review of last mile delivery in Scotland, Worthy (2021), found that light commercial vehicles (such as vans) make up the majority (75%) of all the miles driven in the last mile sector and are primarily used by Small and Medium sized Enterprises (SMEs) and sole traders running small fleets. This research also identified that SMEs are a size of business most unlikely to be able to accommodate a rapid shift to a more sustainable vehicle fleet, such as electric vehicles (EVs), compared to larger organisations due to issues regarding the required large upfront capital cost and a lack of expertise in the deployment of vehicles requiring a charging infrastructure. As such a focus on SMEs, which make up a large proportion of van users, is crucial for the decarbonization of this sector as they are more likely to be running older, more polluting vans with an inability to rapidly adopt EVs.

One way to reduce the carbon emissions produced in transportation of freight is to use cargo bikes. Cargo bikes can transport up to 200kg of cargo whilst not emitting any greenhouse gas emissions. As they are beneficial for reducing traffic congestion, pollution, and noise, this has made them a popular method of transportation in last mile deliveries. In central London research by Verlinghieri et al. (2021), has shown that the use of cargo bikes in place of diesel or electric

vans for the delivery of parcels can cut emissions by up to 90% and 33% respectively. In central London it is projected that cargo bikes will replace up to 17% of van kilometres by 2030 (Transport for London, 2023). Already in the Netherlands DHL make up to 60% of inner-city deliveries by cargo bikes (Bicycle Association, 2018). To achieve similar levels of usage in Scotland, where the current levels are significantly less than that of London and the Netherlands, we need to understand the barriers present which may be inhibiting the uptake and popularity of this new technology.

Previous research has explored the barriers which are limiting the wider adoption of cargo bikes in countries across Europe and England, which are further detailed in a literature review undertaken as part of this research project. Some of these barriers are encountered similarly across different study areas however there is also a requirement to learn more about the barriers which are specific to an area. These context dependent barriers may vary depending on where the cargo bike is being used, as in either a rural or urban setting, and who is using the cargo bike, whether it is a private owner, a community group, or a large national company.

As part of this research project, we collected primary data on the barriers faced by small businesses and organisations[1] using cargo bikes[2] in urban and rural locations across Scotland through a series of semi-structured, in-depth interviews.

The findings from this research will be used to help identify where investment should be directed by local authorities and national governments to increase the number of businesses and organisations taking up and making best use of cargo bikes across Scotland.

[1] We characterised a small businesses or organisation as one that employs fewer than 50 people and included: charities, private businesses, public sector organisations and not for profit social enterprises.

[2] For the purposes of this report we will use cargo bikes as an umbrella term which includes e-cargo bikes, with e-cargo bikes specifically mentioned when their use is explicit, as in a research paper, or the barrier is specific to them, such as high costs, requirement of charging and difficulties in servicing.

Study aims

Cargo bikes have a vital role to play in achieving Transport Scotland's active travel outcomes. There is currently a gap in the knowledge of specific barriers in Scotland preventing the uptake of cargo bikes, with current reports and research coming from Europe and England.

This project aims to evidence the barriers preventing wider uptake of cargo bikes for small businesses and organisations across Scotland.

Our research questions include:

1. What are the barriers, physical, financial, and other, preventing small businesses and organisations from successfully integrating the use of cargo bikes in their operations?
2. What possible solutions are there to tackle these barriers?

Definitions and terminology

Small businesses and organisations: We characterised a small businesses or organisation as one that employs fewer than 50 people and included: charities, private businesses, public sector organisations and not for profit social enterprises.

Cargo bikes and e-cargo bikes: For the purposes of this report, we will use cargo bikes as an umbrella term which includes e-cargo bikes, with e-cargo bikes specifically mentioned when their use is explicit, as in a research paper, or the barrier is specific to them, such as high costs, requirement of charging and difficulties in servicing.

Methodology

Literature review

To understand the current research and available information on the barriers facing cargo bike users we conducted a literature review of peer-reviewed academic and grey literature.

Our use of key search terms[3] enabled us to identify relevant literature using literature titles and abstracts using the search engines Google and Google Scholar. After collating the relevant literature into a spreadsheet containing key information (dates, authors, key words, summaries, and source) we then read through the resources at a greater level of detail so as to apply our inclusion criteria and identify the most relevant resources for our review. Additionally, we employed a snowball approach by reviewing the references of literature found as part of our reading. This approach yielded 23 resources, 14 of which were grey literature and the remaining 9 from peer reviewed journals, dating from 2009 – 2023.

Stakeholder mapping

Alongside our literature review we conducted a stakeholder mapping exercise. From our proposal we knew that we wanted to speak with stakeholders from small businesses and organisations across Scotland as well as key stakeholders who were either involved in organisations which administered cargo bike loans/grants, or who had expert knowledge of the sector.

Our initial identification of businesses came from the Cargo Bike Library project which was run by Sustrans Scotland from 2019 – 2022 and as a part of which had mapped active businesses using cargo bikes, cargo bike library hubs and bike shops which stocked and could repair cargo bikes. We were also able to obtain a list of businesses which had received a grant for a cargo bike from the Energy Savings Trust from 2018

[3] Key search terms used: "cargo bike", "barriers", “challenges”, "e-cargo bike", "eCargo bike".

– 2023. Additionally, we employed a search online for Scottish businesses which had evidence of using a cargo bike. Key stakeholders were identified through the literature review and through recommendations of colleagues active in the area.

From this we were able to identify 42 potential stakeholders. We compiled these in a spreadsheet identifying the following characteristics: type of organisation, size (number of employees), location, urban rural classification[4], website, description and how they are using cargo bikes. As part of our research methodology, we aimed to have a maximum of 12 interviews with stakeholders representing a diversity of the characteristics listed. The characteristics of the stakeholders we identified from our mapping exercise are indicated in Table 1.

Table 1. Interviewee sample characteristics.

Type of organisation	Use of cargo bikes	Location
Business	Fleet operator	Edinburgh
Public sector organisation	Cargo bike advocacy group	Southeast Region
Charity	Cargo bike advocacy group	National
Charity	Cargo bike loan provider	Edinburgh

[4] We used the Scottish governments sixfold urban rural classification system: https://statistics.gov.scot/data/urban-rural-classification
[5] The definition we used for fleet was one or more e-cargo bicycles.

Type of organisation	Use of cargo bikes	Location
Not for profit social enterprise scheme	Fleet operator	Edinburgh
Public sector organisation	Fleet operator	Highlands
Public sector organsiation	Fleet operator	Highlands
Charity	Cargo bike loan provider	Highlands
Business	Fleet operator[5]	Lowlands
Charity	Fleet operator	Aberdeen
Public sector organisation	Cargo bike loan provider	Highlands

From those we contacted we were able to conduct 10 recorded interviews and one written interview with 11 stakeholders between January and February 2024.

Qualitative data collection

From our literature review we were able to group the key barriers into 5 themes: costs and funding, infrastructure, training, storage and parking, and insurance, licensing, and liability. These then formed the framework of our interview topic guide used during the semi-structured in-depth interviews with each stakeholder.

Four topic guides were created for the stakeholder groups of: cargo bike grants and funding organisations, cargo bike loan providers, cargo bike fleet operators and key stakeholders with expert knowledge of the sector.

Semi-structured in-depth interviews were conducted with each stakeholder. The interviews started with an initial broad question on the barriers facing their organisation in using cargo bikes. This gave them an opportunity to raise barriers which were not listed in our topic guide. Following on from their initial answer, further questions were asked about the barriers they raised. When this questioning was complete, any themes in the topic guide which did not come up in this process were then raised. At the end of the interview the participant was asked to highlight what barriers they thought were preventing the uptake of cargo bikes across Scotland. The topic guides for each group of stakeholders can be accessed upon request. Interviews lasted between 30 minutes and 1 hour. One interview was conducted in person whilst the rest were conducted online via Microsoft Teams video software, all interviews had the audio recorded and transcribed.

The analysis of the interviews was conducted through the coding of responses according to the key themes of barriers developed during our literature review, with any additional topics raised by the participant coded as well. This coding was conducted in NVivo, a qualitative data analysis computer software package produced by Lumivero.

Summary of barriers and potential solutions

Table 2 – summary of barriers and potential solutions to cargo bike adoption in Scotland

	Barrier	Potential solution
Costs and funding 1	High cost of cargo bike	Further financial incentives should be provided for increasing the appeal of purchasing a cargo bike. Subsidies provided to businesses should address the upfront costs of purchasing the bikes as well as the costs associated with the training of their staff.

	Barrier	Potential solution
	Accessibility of loan/grant funding	Available funding should be well advertised and the process of securing the funding as streamlined and easily accessible as possible.
Costs and funding 2	UK monopolies of cargo bike providers	National governments to encourage diversification and competition of cargo bike providers within the UK.
Infrastructure 1	Safety in traffic	The provision of a comprehensive network of cycling infrastructure which is of a high quality built with cargo bikes in mind.
Infrastructure 2	Charging facilities	The wider provision of charging facilities for cargo bike batteries, which would allow greater confidence in use of cargo bikes for longer journeys.

	Barrier	Potential solution
Training 1	Training staff	Training courses already provided by different organisations should be offered to a wider geographic region. Professional recognition of training will help draw recognition of these roles as being high skilled and have subsequent benefits for attaining insurance.
Training 2	Road Safety - car cargo bike awareness	Mandatory training on UK driving tests to make drivers more aware of cargo bikes, especially the additional length of these bikes when considering overtaking.

	Barrier	Potential solution
Storage and parking 1	Lack of safe storage	The provision of cycle hangers which are capable of housing cargo bikes would achieve a similar provision of storage currently available to van owners who use parking at their personal address. A widespread expansion in the number of suitable and secure bike storage options will help increase the ease of use of cargo bikes during use and ensure that pavements are not obstructed.
Storage and parking 2	Lack of suitable storage on trains	Provision of larger bicycle storage that can accommodate cargo bikes on train journeys.

	Barrier	Potential solution
Insurance, licensing, and liability 1	Difficulties in attaining insurance	Insuring cargo bikes as commercial vehicles in which both the bike and its contents are covered has proven very challenging. One solution has been the exchange of knowledge amongst businesses and charities which can provide help and information on insurance brokers who have prior experience in insuring cargo bikes for businesses. Greater awareness of cargo bikes as viable commercial vehicles may help attain insurance from a wider variety of brokers, bringing down expensive premiums.

	Barrier	Potential solution
Insurance, licensing, and liability 2	Difficulties in finding mechanics that will service cargo bikes.	National and local governments to create a directory of mechanics that service cargo bikes and the encouragement of more mechanics to service cargo bikes.
Other factors 1	Financial viability	A policy framework which supports the promotion of sustainable freight deliveries would help increase the financial viability of using cargo bikes compared to cars and vans. Such policies could include strict enforcement of low emission zones which penalise polluting vehicles and the taxation of individual parcel deliveries.

	Barrier	Potential solution
	Awareness	The promotion of cargo bikes through all possible channels will help increase awareness of cargo bikes as commercial vehicles. As the number of users grows and approaches a critical mass there will be wide ranging benefits as a greater proportion of the population are aware of their capabilities and potential.

Literature review

Research looking into the barriers facing cargo bike uptake: Evidence from outside the UK

As part of this review, literature from outside the UK was included to gain a wider picture of barriers to using cargo bikes in different socio-political as well as geographical contexts.

Research by Rudolph & Gruber (2017) looked to summarise the potentials, constraints, and recommendations for the uptake of cargo bikes in commercial transport in Germany. They conducted a literature review and over 45 interviews with corporate fleet managers, urban planners, municipality representatives and bicycle associations. In outlining the factors which affect the adoption of cargo bikes in these companies, the researchers adopted a framework of innovation theory which grouped environment-specific factors, company-specific factors, and product-specific factors. They then split these factors into drivers and constraints. The environment-specific factors included the basic requirement of up-to-date cycle infrastructure which permits the smooth flow and adequate parking of cargo bikes. A company-specific barrier identified was the lack of awareness of individuals at a decision-making level about the possible commercial benefits of using a cargo bike for the transport of freight. Examples of product-specific barriers identified were the perception of low-quality components used on cargo bikes which were not suitable for commercial uses, the load capacity of a cargo bike compared to a car or van, and the total trip distance they are capable of.

Thoma & Gruber (2020) continued this research into the drivers and barriers for cargo bike uptake as part of Europe's largest cargo cycle testing project "Ich entlaste Städt". As part of the project 150 cargo bikes were given out on loan to a variety of private and public organisations, those organisations which expressed an interest in taking part also completed a survey in which they were asked to rate potential drivers and barriers to

using cargo bikes. Overall, 389 organisations provided ratings against the 23 drivers and barriers identified in a literature review by Rudolph & Gruber (2017). The barriers identified in the literature review were: load capacity, weather, theft, organisational effort, implementation cost, payload damage, employee acceptance, handling experience, cycle infrastructure and the safety and service network. As part of the analysis these barriers were then grouped into four categories: (F1) vehicle limitations, (F3) worries and perils, (F6) riders concerns and (F7) infrastructure constraints. An exploratory factor analysis was used to indicate which of the 23 drivers and barriers were rated most prevalent across the participants on a 5-point likert scale. Of all barriers, (F7) infrastructure constraints, had a mean rating of 3.0 which was significantly higher than for any other grouped categories. The researchers noted that at the time of data collection the level of cycle specific infrastructure was low in Germany and that alongside this lack of provision there were prevalent associated concerns over the safety of cyclists in street traffic. Also considered in this category was the barrier of cycle maintenance provision for cargo cycles and the potential damage to the payload due to poor road conditions. Rated second highest was (F3) worries & perils with a score of 2.8, followed by (F1) vehicle limitations with a score of 2.4 and then lastly (F6) riders concern with a score of 2.2 which corresponded to the response of “I rather don’t agree”. Compared to the benefits which were all rated above 4 on the likert scale it is worth noting that though large, this sample was collected from a group of interested parties who had motivations to use a cargo bike and were keen adopt them into their operations.

Using data from an e-cargo bike pilot scheme in Dún Laoghaire-Rathdown County, Ireland, Malik et al. (2023), modelled the conditions which were favourable for completing trips on the loaned e-cargo bikes over their primary delivery modes, diesel vans or cars, which they still had access to. They used GIS trackers and real time intelligent learning units to collect data from each bike used by the twelve businesses in the scheme. Using an archive of the local weather forecast

data during this trial period they were able to create a model framework that could identify the critical variables which influenced mode selection and rank them accordingly.

The most critical variable affecting trip length was maximum temperature. The model suggested a strong interaction between weather (rainfall and temperature) and the distance traversed for delivery by an e-cargo bike. The critical factors affecting the decision to use an e-cargo bike during wet weather conditions was: the maximum daily temperature, the total trip time, months since service launch, and trip length. From this the researchers concluded that small businesses prefer to use e-cargo bikes for deliveries during warmer and drier conditions over longer distances.

The significance of weather on the use of e-cargo bikes highlights that e-cargo bike usage can easily be incentivized in good weather but it will be difficult to incentivise businesses to use e-cargo bikes in bad weather. They also highlight how perceptions of cycling as a fair-weather activity can affect the usage of bikes more generally, citing the example that the Netherlands has less variance according to season in bike use compared to Germany despite having similar weather conditions. Changing this narrative is highlighted as an area for development for e-cargo bikes to be adopted on a more regular and seasonally independent basis.

To gain insights into the characteristics and perceived barriers of active and potential users of an e-cargo bike sharing scheme in Basel, Switzerland, Hess & Schubert (2019) surveyed four different user groups: active members, inactive members, potential members, and uninterested non-members.

They hoped to be able to characterize the typical user with regards to age, gender, education, and income which the scheme currently attracts and, by surveying potential users and people who are not interested in joining the scheme, they hoped to explore some of the perceived barriers stopping people from signing up to the scheme. These barriers were assessed through open-ended survey questions.

They found that active bike share members where likely to be regular walkers and cyclists compared to non-active and non-member groups. The non-member groups were more likely to use cars or public transportation as their favoured modes of travel. They also found that existing active members were more likely to be male, however there was an equal gender split between those who could imagine using the e-cargo bike sharing scheme in the future.

The most cited reason for not signing up was that the respondent had no need or only an irregular need for a e-cargo bike and for these instances they already had a mode of transport which satisfied this. This included members who would use their car but also those who did not like the sharing aspect of the scheme and had instead purchased their own e-cargo bike. Uninterested non-members rated safety concerns as the second most frequently mentioned barrier whereas other groups did not raise this as an issue. This perception of e-cargo bikes being risky was prevalent in the uninterested non-members group with people stating that the city was more suited for cars than bikes and that the electric motor would make the bike dangerous. Compared to the other user groups uninterested non-members also mentioned features of the e-cargo bikes such as size, weight, and load safety as barriers. Linked to this they also cited a lack of interest or competence to cycle and navigate the city safely.

Research looking into the barriers facing cargo bike uptake: Evidence from the UK

A review of the academic and grey literature revealed a growing number of reports and research from 2015 onwards as the technology has propagated and grown in popularity across the UK.

As a research project into the e-cargo bike as an emergent technology in last mile deliveries, Blazejewski et al. (2020) carried out a series of interviews and focus groups with businesses in Greater Manchester who were using the bikes as part of their daily operations. As a result of this research, they explored some of the deterrents and barriers to use which were

encountered by the businesses. Some of the barriers highlighted include:

- Size and cost: One of the principal concerns raised by the research participants was the high outlay cost of an e-cargo bike, in the range of £2000 - £5000, which put them in the same category as a second-hand van, with none of the associated risks of trying out an emergent technology. The other concern raised was on storage and security of the e-cargo bike compared to conventional bicycles.
- Transporting hot food: It was perceived by the businesses owners that heat retention would be more of an issue for transporting food compared to using a van.
- Licensing, insurance, and security: Management of insurance and licensing is done on a business-to-business level and there is no standardisation across the industry. There is a greater perception of risk with regards to theft of the bike compared to normal bikes, especially when there is not a suitable place to lock the bike.
- Perceptions and incentives: Both employers and employees have perceptions of the e-cargo bike which make uptake less likely. This includes being able to convince employees to leave the comfort and familiarity of a van and for the employers an awareness that a e-cargo could offer a viable commercial alternative to a car or van.
- Infrastructure: Many e-cargo bike users expressed a preference for riding on roads rather than off-road due to the off-road infrastructure being unsuitable for a wider and longer bike design.

This study also estimated the societal readiness for the adoption of e-cargo bikes as a socially accepted way to transport goods. The study uses the societal readiness scale developed by Büscher, et al. (2023), in which the stage of development of a technology is rated on a scale from 1, the initial inception of the technology, to 9, where the innovation is integrated into a diversity of everyday lives and other society

systems. The researchers placed Manchester at the level of SRL 5 in which there is evidence of systematic change with potential for it to move up a level when adopted by more businesses. The paper linked the acceptance of cycling as a functional activity rather than a purely leisure activity, as a unifying factor in cities with a higher SRL level and greater chance of wider acceptance by society of e-cargo bikes “e-cargo bikes are more likely to be prevalent if there is a strong local culture of cycling”.

Highlighted as a key takeaway is the fact that future research will need to develop further understanding of what challenges particular sectors of the economy would experience if they engaged more substantially with e-cargo bikes. Such research could involve a greater understanding of the types of skills required by staff to effectively use e-cargo bikes and how different levels of training can be effectively delivered. Additionally greater understanding of how concerns about insurance could be reduced is raised due to new adopters having to currently navigate this area independently due to a lack of standardisation across industries. Additionally, the authors stated that it would be hard to increase the number of businesses using an e-cargo bike when they are still relatively unknown by much of the population. A potential solution highlighted was to have more trial schemes and bike libraries in which individuals and businesses can try out the bikes.

The cargo bike library project run by Sustrans Scotland offered small businesses and organisations a no-cost opportunity to borrow an e-cargo bike as part of their operations. An evaluation of the project from July 2019 – March 2020 was carried out by Hammond & Melville (2021). It found that nine out of the participating 16 organisations reported switching modes to e-cargo bikes and that these nine organisations reported an average reduction of 91% in weekly car/van journeys. 12 organisations reported that the e-cargo bike was the more convenient transport option, whilst 9 of these agreed that they saved time by using e-cargo bikes. As well as finding out the benefits of the cargo bikes for the participating organisations they identified some of the barriers which they

encountered over the course of their loan. Training was required by the riders to use the e-cargo bikes on loan from the cargo bike library, a lack of trained riders meant that some organisations struggled to get the most use out of the bikes they had. This was further complicated during the pandemic during which training could not be delivered by the e-cargo bike library team in person. Some loan participants found that the capacity of the e-cargo bike limited their operations meaning that they had to use other modes, such as a car or van, or make multiple trips. Additionally, when the distance of the trip was too great to be made by bike some organisations had to revert to using a car or van to complete the trip. Due to being inexperienced with this new technology some organsiations did face logistical challenges with regards to keeping the batteries charged and ready to go, as well as where to store the e-cargo bikes when not in use.

Most participants were already keen cyclists and so they thought that training of less confident cyclists, whilst possible, may take longer. The different handling characteristics of the bike, especially its turning circle, took some getting used to for the loan participants. Unfortunately, there was one traffic accident which took place between an e-cargo bike loan rider and a car when the driver attempted to overtake the e-cargo bike and collided with the box at the front of the bike which they had not seen from behind. The size of the e-cargo bike also meant that they could not make use of cycling specific infrastructure, such as the temporary segregated paths installed as part of the Covid-19 response. This could lead to greater animosity from car drivers who felt that the e-cargo bikes should be making use of the cycling infrastructure – despite the riders not feeling comfortable to do so. As a new technology the e-cargo bikes do not yet have the associated repair and recovery systems which traditional cycles or cars and vans have, which could dissuade new businesses from choosing to use a e-cargo bike over fears of reliability.

The Cargodale project delivered produce from the local market to households who were self-isolating or shielding during the pandemic in the surrounding areas of Todmorden, Hebden

bridge and Halifax from March 2020 to July 2020. The project made over 700 deliveries covering 1,585 miles with a team of 15 volunteers using 3 e-cargo bikes. In a report of the project, they discussed some of the challenges they encountered when using the bikes (Cargodale, 2021). These include:

- Reliability: one of the bikes had reliability issues and the battery failed. This required the bike to be replaced under warranty.
- Storage: Access to storage areas was difficult with the bikes having to be stored in the town hall which could only be accessed using a keyless access token.
- Engaging local businesses: many were not set up for deliveries and so could not use the service – lack of awareness at what the bikes could be used for.
- Delivery range and density: Some delivery runs were made which would not have been time/cost effective for a commercial business due to the low volume of orders and high dispersion.
- Weather: Tricky to keep the goods being transported dry. This required the use of custom protective rain gear.
- Navigation: Can be tricky in wet weather when dependent on using phones.
- Dangerous driving: Riders experienced close passes during deliveries. The bikes have been equipped with traffic cameras and in future the footage of incidents will be uploaded to the west Yorkshire police online portal.

Schliwa et al. (2015) investigated the potential of Cargo bikes to make city logistics more sustainable and how their diffusion can be encouraged in the UK. They found that the language used to describe the use of cargo bikes in a commercial setting was a barrier, with many different terms being used for a variety of different technologies. Through a literature review and a series of expert interviews they developed a typology of cycle logistics which aimed to clarify definitions and terminology. They secondly identified that the culture and current conditions for cycling in the UK were preventing the professionalization of the sector which is mainly dominated by small businesses that are not looking to expand their

operations or are hindered by the concern that potential customers might have adverse perceptions of their businesses if they were to use cargo bikes. This perception could lead to local SMEs missing out on the growth of a new green business sector which could favour their position in the overall market. Lastly, they identified that geography could present a major barrier for the viability of cargo bikes compared to motorised vehicles. The conditions which suit a cargo bike include high density urban areas with narrow streets in historical city centres. Where these conditions are not present, they see a place for governance measures, such as traffic regulation orders, which reduce through traffic during the day, could incentivize their use.

In a review of commercially successful cycle logistic services in the urban freight market carried out by Cowie & Fisken, (2023) they highlight the key elements which make cycles a viable commercial option for the transportation of goods and the constraints holding the sector back. One barrier they found in the growth of cycle logistics services operating in the last mile delivery was that many delivery carriers would be unwilling to hand over the last mile delivery to a third party for reasons related to branding, and being seen to be carrying out the delivery, and due to not wanting to pass on this responsibility of delivery. Additionally, a major barrier which could limit the uptake and development of successful cycle logistic services in cities is the lack of policy development around urban freight logistics. The lack of budget and interest shown by policy makers has left the sector lacking a clear policy framework from which cargo bike logistics could promoted. They do note that such policy developments may change as cities sign up to net zero emission pledges and look to enact low emission zones in central urban areas.

As part of a research project looking into the experience of workers in the cargo bike sector, in terms of physical, mental, and overall wellbeing, Couve et al. (2023) carried out 22 interviews and two focus groups with 15 cargo bike companies in London. This research aimed to explore the precarious and low paid nature of the work which is being associated with

cycle couriers and why this sector may be overlooked in terms of cycling research, policy and planning for what is a physically demanding and, potentially, a dangerous job. The researchers argue that the working conditions currently experienced by cargo bike couriers acts as a barrier to further expansion of the sector to its full potential. Without wider institutional support, such as through government funding for the purchasing of cargo bikes, the smaller companies which can be assets for local communities and strengthen local economies may struggle with financial viability, rider recruitment and retention, and diversity and inclusion.

A challenge which was highlighted by the managers was around the recruitment, retention, and reliability of riders. Recruitment tends to be done on an informal basis and by “word of mouth” this means that for managers who do not have a network of contacts already in the sector, recruitment is a major challenge. As is typical more widely of the logistics sector there is a high level of staff turnover, this is also further compounded by effects of seasonality with bike riders being more willing to work in the warmer months of the year. Another area in which recruitment faces a challenge is in the diversity of its workforce, with their being a high skew towards cargo bike workers being male. This was recognized by the managers as an area they are hoping to improve upon yet had no practical steps as to how to do so.

Furthermore, the rising costs of running a cargo bike company in combination with reduced government support mean that the companies are facing greater financial and operational difficulties. The lack of a subsidy for new cargo bike purchases, the equivalent of which for low-emission vans is still available, has meant that from 2022 the cargo bike companies must pay in full for any new equipment.

This problem is exacerbated by the issue of theft of cargo bikes in London. There have been instances where break-ins at depots have resulted in a whole fleet of bikes being stolen. These events can be extremely costly and detrimental for a small company.

From a rider's perspective there are challenges which are unique to being a cargo bike rider. The bikes require a different and more assertive style of cycling and as a relatively new feature on the roads they feel the bikes can attract a lot of attention themselves. This can lead to positive as well as negative interactions as other road users are annoyed by the bikes which can lead to personal, physical, or sexual harassment.

The riders also highlighted how a lot of cycling specific infrastructure is unsuitable for cargo bikes which are wider and longer than most traditional bicycles.

The level of training provided for the riders varies across the sector, from nothing at all – to a highly involved and in-depth process. There is a bikeability level 3 training which as cited as a requirement for the cargo bike riders however often the burden of completing this course falls with the rider. Most managers commented that their training would be led by an experienced rider in an informal setting. One interviewee did report how she felt unequipped to deal with a difficult road situation. One company carried out a rigorous training procedure which took place over 5 days and was paid for. In the focus group with both bike riders and managers it was agreed that this level of training would be beneficial for both the companies and riders.

Female and nonbinary people commented on the male-dominated aspect of the sector. The interviewees reported a "work hard - play hard" culture which felt exclusionary and unsafe when it related to a drinking culture.

While carrying out deliveries feelings of safety and fear were reported by female cargo bike riders who sometimes felt unsupported in situations where they were on their own and facing a difficult situation. The report highlights that "freedom from violence, harassment and intimidation is a fundamental component of an equitable and inclusive public space". As there is a lack of diversity at the management level of cargo bike companies – this left female and nonbinary riders from not feeling that their fears and concerns were duly recognised.

Ultimately the research highlighted that if the sector is to scale and achieve the reductions in emissions it is capable of, then companies must address the issues around pay and progression, health and safety and work culture.

To understand the opportunities and barriers which face van users in the UK who would not typically choose an e-cargo bike, Green Alliance, conducted three sets of focus groups and in-depth interviews tradespeople and fleet operators (Green Alliance, 2022). They specifically recruited participants who would be less inclined to use e-cargo bikes to understand these positions better.

Objections to e-cargo bikes raised during the focus groups were categorised by “capability” “opportunity” and “motivation” according to the COM B behaviour change model. Opportunity barriers were the most important barriers cited during the focus groups, these included: the expectation that the bike won’t be able to transport materials, that there is a lack of cycling infrastructure, and that they had a stigma towards cycling in general. The motivation and capability barriers raised were, respectively, a feeling that they would be limited by the weather and that there was an established relationship between the tradespeople, their profession, and their vans which e-cargo bikes did not similarly have.

The researchers highlight that many of the most frequently mentioned barriers have a similar solution related to increasing the awareness and potential of e-cargo bikes amongst trades businesses. This would highlight the practical capabilities of the bikes for their purpose as well as reducing stigma around cycling.

In 2019/20 Aberdeen city council received funding from Transport Scotland to implement an e-cargo bike pilot scheme with businesses in the city centre. Nestrans, a regional transport partnership, administered the pilot scheme and wrote a report on the project and the businesses experience of using the e-cargo bikes (Nestrans, 2020) .

The main challenges which arose over the course of the trial scheme was related to the type of e-cargo bikes purchased.

Most of the bikes purchased were models from Europe and they were fitted with coaster brake system which is not commonly used in the UK. This created an additional challenge for people using the bikes for the first time and made encouraging new riders to the bikes more difficult. Additionally, maintenance of the bikes was made more challenging due to these braking mechanisms which were more difficult to service locally. As a result of this each of the bikes had to have their brakes replaced.

They expected that the use of two-wheeler e-cargo bikes would be less appealing to businesses which would need to familiarize themselves with their different handling characteristics. However, the companies were not put off by the training required to operate these bikes and preferred them to the tricycle e-cargo bikes which were larger and meant that multiple companies would struggle to store the bikes.

Cost is frequently cited as a major barrier for the adoption of e-cargo bikes by businesses and courier companies, with deliveries by e-cargo bikes seen as being more expensive than diesel vans on a like-for-like basis. As e-cargo bikes have a lower upfront cost and lower per mile running costs, this seems counter intuitive. However, the freight sector has developed such that courier companies are able to undercut e-cargo bike operators by passing on the costs of employee benefits, fuel and vehicle purchase to the contractor, which is not the case for most e-cargo bike operators.

In the evaluation of the Bikes for Business programme, an initiative in Southwark, London aiming to help businesses to switch to low emission e-cargo bike deliveries, the main challenge cited by the businesses to using e-cargo bike deliveries was the high cost compared to diesel vans, which could be a third more expensive (Just economics, 2023). Just economics used the findings from the evaluation to carry out an additional piece of research, delivering value, which looked to compare the costs of diesel powered vans, electric vans and e-cargo bikes using a quantitative model using social and environmental valuation techniques to explore the difference in delivery prices when taking into account the social and

environmental damage caused by the method of delivery (Just Economics , 2023).

Their modelling indicated that the hidden social and environmental costs associated with diesel vans in London amounts to £2.46 billion annually and that on a per mile basis the social and environmental costs of diesel van deliveries (66p/mile) are more than eight times higher than those associated with e-cargo bikes (7.8p/mile), whilst electric vans were seven times higher (54p/mile) than e-cargo bikes. Broken down, the environmental costs associated with diesel vans is 67 times higher on a per mile bases than for e-cargo bikes.

The paper outlines how many van courier companies which operate on an independent contractor model pass on a substantial share of the cost of doing business to the drivers, such as making them pay costs such as for their own vehicle and the fuel they use, are not offering a fair price for deliveries in comparison to e-cargo bike courier companies which mostly do not operate on a contractor model. They found that if van driving couriers which are charging £2 per delivery were to cover the full economic costs, and not pass these on to drivers, it should be charging £6.42. For a similar delivery by e-cargo bikes it would charge £4.98 and for electric vans £5.68.

To remove this barrier of a price differential between diesel van deliveries and e-cargo bike deliveries the authors of the paper set forward recommendations. These include: the introduction of smart road pricing – in which cleaner vehicles which are better for the environment are incentivized, investment in e-cargo bike infrastructure – such as storage and consolidation hubs which would bring down the costs for e-cargo bike couriers and to work with private sector developers and landlords to support the development of e-cargo bike friendly infrastructure. At a national level they suggest that there should be a smart vehicle tax which encourages the use of cleaner vehicles, and a strengthening of employment protection laws which reduces the likelihood of employees being exploited by the employer.

The SURFLOGH project was run by six partners across Europe which aimed to examine the provision of urban sustainable logistics, specifically the role of logistics hubs in first/last mile deliveries, using 6 case studies in 6 cities across Europe. As part of this project Cowie et al. (2022) undertook an assessment of the urban freight transport (UFT) policy framework in each of the partner cities, to establish if there was a relationship between the commercial success of the cargo bike delivery initiatives and the policy framework maturity in each city.

The policy maturity ratings were based of the urban freight transport policy maturity developed by (Kibia-Janiak, 2017). The policy frameworks are given a rating from low to high and an associated title ranging from “Pure Market” where maturity is low to “proactive” were maturity is high. Across each of the pilot schemes Groningen had the highest rating of being medium – “Policy Focus” whilst Mechelen and Borås both had a rating of Low/medium - “Policy Appeasing”, and Edinburgh had the lowest score of low – “Pure Market”.

The success of the cargo bike delivery initiative was scored using a Delphi Panel Workshop and assessed the business against the following criteria: their dependence on subsidy/profitability, market penetration, scalability, an identifiable business model and longevity. The pilots were assessed against these on a scale of 1 -5, the highest-ranking pilot schemes were Edinburgh and Groningen each with a score of 2.8.

The authors conclude that there does not appear to be any clear relationship between the level of UFT policy maturity and the success of the pilot. This can be exemplified by Edinburgh having the lowest UFT policy rating whilst being deemed to be the joint most successful pilot alongside Groningen, which conversely had the highest UFT policy rating. The authors note however that a link between UFT policy maturity and pilot scheme success should not conclusively ruled out as all the cities had a relatively low level of UFT rating, with only Groningen having a policy framework which was consistent and evident of being functioning. A lack of cities with a UFT

rating over 3 (out of a possible 5) limits the ability to make a correlation between the two factors and instead highlights the lack of cities where there is a highly mature and developed UFT policy in place.

Discussion of barriers to cargo bike adoption

This section presents the findings from the qualitative data collection. The barriers are organised into the themes which were developed from the literature review and used in the creation of the interview topic guides and the coding of the qualitative analysis.

Costs and funding

The high cost of cargo bikes was raised across all our interviews as a barrier preventing their wider uptake. One of the interviewees, a private business operating a gardening service solely using e-cargo bikes, noted that the e-cargo bikes on offer in Scotland were expensive and not well suited to carrying the equipment they needed to carry out their jobs. As such they decided to order bikes from the Netherlands and customise the bikes so that they were suitable for the job. To purchase their fleet of bikes they made use of the e-cargo bike loans and grants from both the Energy Saving Trust (EST) and Spokes. Whilst they cited the usefulness of these loans, they also explained that the bureaucratic nature of the loan agreement and the extended timeline for purchasing the equipment could put off other businesses looking to make use of these loans.

On the other hand, one of our interviewees who has expert knowledge of the sector highlighted how some organisations could be buying cargo bikes which are not suitable for their needs due to them being cheaper, which can lead to issues further down the line with maintenance costs and an inability to get replacement parts. This may typically be done by organisations with less technical knowledge of bikes and can

therefore led to them being put off using cargo bikes all together.

An organisation which is involved in the loaning of cargo bikes highlighted that the biggest barrier which is stopping them from operating is a yearly funding model on which they are reliant. Whilst they recognise that funding pressures are a prevalent problem for the third sector, having to apply for funding in the Spring which can sometimes drag on to the Summer, which is a time when they would be most active with getting people out and trying the bikes.

Another issue raised by this organisation is the perception different groups have of the price of these bikes. They have found that wealthier, middle-class people are not only able to afford the cost of a new bike, but as they are often committed cyclists as well, they are able justify the cost of the bikes, which can be as much as between £5000 - £7000. If you do not have prior experience with cycling or the cost of equipment, this initial outlay can be a major barrier for uptake.

> "It's the cost of the bike, the kind of financial burden of a loan and the idea that within seven years' time you might have paid off a bike that cost £7,000 but is actually now worth £3,500. I think that probably deters some people."

Another grant being offered by Transport Scotland is the Travel Better grant which offers £500 per adult in a household (to a maximum of £1000) in exchange for the scrapping of a car. However, one interviewee stated that these grants do not go far enough in helping those on low incomes and who depend on their car, which if it is not ULEZ compliant will have a higher running cost.

> "If Transport Scotland want to see substantial change in the way that people are using e-cargo bikes over other vehicles, it's got to be subsidised in a meaningful way I think. I'd like to just see, if you want a cargo bike, here's half the cost or here's a tax break or don't pay VAT on it."

Two interviewees also raised another issue with the procurement costs of cargo bikes. They raised the lack of market options in manufacturers and distributers of cargo bikes within the UK. This led to a lack of choice when purchasing cargo bike models within the UK which drives up purchasing cost and can be unsuitable. Due to this, one local business decided to source the cargo bike from abroad.

> "The biggest difficulty we had was we didn't like any of the available cargo bikes here in this country. They're all made by one specific manufacturer and, from the reviews and everything that we've seen, from use cases and things, they were having problems. The build quality wasn't good enough, that kind of feedback we were getting, hence, why I went with one I could buy from Belgium."

The other interviewee who raised market concerns, from a local transport partnership, suffered when the provider of e-cargo bikes for a planned scheme of theirs leaves them vulnerable to e-cargo bike schemes being delayed due to providers collapsing.

> "Our e-bike provider for our other e-bike share scheme was supposed to supply the e-cargo bikes and we had put an order in for them and then all of a sudden, they went bankrupt. So, we were left without those e-cargo bikes."

Solutions

The ability to receive funding, through a grant or loan, was identified as a key solution in making the purchase of cargo bikes a more appealing option. With models of funding already available our interviews revealed how these could be improved.

Ensuring that acquiring the funds is an intuitive and easily accessible process would help increase the appeal of

purchasing cargo bikes. Of the two funding streams, one interviewee found that funding from a smaller organisation which required less form filling and time was a much easier and they would sooner apply for this funding again. They also cited the need for increased awareness around the existing funding that is available, especially to businesses which do not fit the archetype of already being keen cyclists.

One interviewee raised the issue of hire purchase schemes and the benefits of buying a bike only after you have had an extensive period to trial and test the suitability of the technology for their purposes. They highlighted that loan schemes run by Cargo Bike Movement are an excellent example of this and it might be that more of these need to be set up across the country or awareness of them raised amongst potential adopters.

In an interview with one of our stakeholders who has expert knowledge of the sector, they raised the issue of some of these loans only being available for businesses which had been in operation for over 12 months, meaning that businesses which were just starting up – and at a stage where they would be most likely to adopt the usage of e-cargo bikes, were not able to access this funding.

The solution to the lack of market options for cargo bikes, is likely only to be solved by national governments investing in encouraging diversification and competition of cargo bike providers in the UK, which would drive down initial purchase costs and ensure there is a larger provision of cargo bike model options.

Infrastructure

Tied into the theme of infrastructure were interviewees concerns around perceived and actual safety concerning traffic.

> “The roads are just not cycle safe for people, full stop really.”

A concern raised by users of cargo bikes in Edinburgh is the lack of any clear roads which prioritise more vulnerable users such as cyclists and pedestrians. The cycle lanes can be disconnected and when you come to their end point, you often find yourself in a dangerous situation.

> "A lot of people just think why put me in that dangerous situation and then why go through the stress of being in that dangerous situation."

The infrastructure requirements for cargo bikes are similar to those of adapted cycles due to their physical dimensions being wider and longer and subsequently have different handling characteristics to traditional bikes. Barriers at the start and end of bike lanes are particularly disruptive as they completely prevent access for either due to their longer wheelbase and longer turning circle.

Whilst there are similarities in the design of infrastructure for cargo bikes as there is for normal bikes, there are also key differences as one interviewee stated:

> "If you've got ten cargo bikes versus ten standard cycles utilising the cycle path, that's going to look very different".

Certain features of design become more important, such as the presence of dropped kerbs to enable safe access on and off the cycle lanes whilst carrying heavy loads of up to 150kgs. Additionally, some bike lanes, such as ones which feature a steep and twisty access point or contra flow lanes are not suitable or safe to be used whilst on a cargo bike.

As more businesses take up the use of cargo bikes, the suitability of some cycling infrastructure for use by cargo bikes, such as contra flow or bidirectional bike lanes, will become more apparent. One interviewee who has been using the bike as part of a not-for-profit social enterprise mentioned that the roads can often be more comfortable and feel safer on the cargo bike. This can be especially the case if cycling in freezing

conditions as it is more likely the case that a road will be gritted than the cycle lanes.

> "I can't think of a loan that we've had recently where we haven't had someone come back with a really scary story of some incident with a car or a van or something."

Another interviewee, representing an organisation that loans out cargo bikes to the public, mentioned that cargo bikes are not appropriately considered with existing cycle paths.

> "…even on the cycle paths, you have the cycle path and then it goes into bollards where they're large enough for a cyclist to go through, but they're not large enough for e-cargo bikes to go through."

Another infrastructure barrier to wider adoption of e-cargo bikes that was raised in interviews was that an interviewee was discouraged from using e-cargo bikes for longer journeys due to concerns of battery capacity.

> "More people would adopt a cargo bike if it was easier to get a little bit further away from home base without having to put two or three extra batteries and packs on there or carry solar panels to charge it."

> "I've met plenty of people with cargo bikes that pack solar panels, because they've got no way of charging the damn thing once they get 20 miles from home, or they're spending thousands of pounds on extra batteries, but that adds weight which actually reduces your range, so just being able to put it on a train would make a huge difference."

Solutions

As with the provision of cycling infrastructure more generally it was highlighted that a more comprehensive coverage which is of a high quality, with cargo bikes in mind, would be highly beneficial for the uptake of cargo bikes.

> "I don't think there's that many things that need to be considered for cargo bikes, specifics around infrastructure. It's almost like just more space for people on bikes, full stop, is better. You know the things around infrastructure, just more and better. That's the feedback we always get really."

Interviewees also raised regarding cycling infrastructure that not only should cycle paths be more accommodating of cargo bikes, but also that there should be safer cycling infrastructure on main roads with barriers or cycle infrastructure that bypassed main roads.

In relation to concerns of using e-cargo bikes for longer journeys, a solution would be the wider provision of charging stations for e-cargo bikes, which would allow people to use e-cargo bikes for longer journeys safe in the knowledge that if required they can charge their battery during their journey.

Training

All our interviewees highlighted the importance of training for the use of cargo bikes. Linked to the theme of training were also comments about the unique handling characteristics of the bikes and issues regarding safety.

One interviewee who administers training courses described how on a two-hour course they progress from getting used to the handling of the bikes on soft surface with no cars around and then progress to positioning on the road and how to manage hill starts with a heavy load. Whilst they see the benefits of providing people with the fundamental skills

required to use the bikes and they see an increase in confidence over the course of the training, they recognise that they are not only increasing their confidence in riding a bike, but more so they are increasing their confidence to be able to put themselves in a very dangerous environment, which is something they feel apprehensive about.

When administering the training courses, they also recognised that men are always more confident even when they have the same level of experience as other people on the course. Generally, they will feel comfortable getting on the bike and going, without the need for training. This highlights how the lack of training can end up further skewing the bias of cycling being carried out by men compared to women, as the initial barrier of confidence and lack of training may prevent women from using the bikes whilst it similarly would not for men.

One of our stakeholders highlighted how training at the point of sale or loan could help with raising awareness around the capability of the bike and the wider perception people have as to its handling and usability. Without training people might be justifiably anxious about buying a cargo bike and using it with heavy loads. As many users are currently highly motivated and keen cyclists the lack of widespread training may not affect them, but it could be a significant barrier for the wider uptake of cargo bikes by people who do not currently cycle.

Training may also help to prevent someone purchasing a bike and then having a bad experience early on which could prevent them from making full use of the bike. One of the organisations we spoke to had direct experience of this as they delivered an e-cargo bike to an e-bike hub in the Scottish borders where it was “used once by someone and they’ve gone, bloody hell that’s really hard to use, and then it just sits there”.

> “Some people might not have ridden a bike since they were a kid and then you’re asking them to ride a bike for work. That’s quite a big leap.”

For the adoption of cargo bikes by businesses training is arguably of a greater concern than for the public. This is due to the responsibility the employer should have for the safety and wellbeing of their staff. If staff are uncomfortable switching from using a van for their job to using a cargo bike, then training is one of the key tools they can use to ease this transition. One business owner said that it would be great for them is having both the training to use the bikes with a load as well as general maintenance skills which riders would need to know, such as setting up the bike correctly and changing a tyre, which is a level of technical knowledge they did not need to have for similarly using a van or car.

One interviewee also raised the concern that car users were not aware of cargo bikes on the road, with the additional length of cargo bikes meaning that sometimes they may attempt unsafe overtaking manoeuvres. This in turn discourages wider use of cargo bikes on roads.

> "When you're approaching it in a car from behind, it can look like a normal pushbike, and some people might chance overtaking you, cutting in a bit too soon and then realising there's another 5ft of the bike in front of you, because you've got that extra bit."

Solutions

Several organisations are already involved in the provision of cargo bike courses in Scotland. A professional recognition of these courses will help draw recognition to these jobs as being highly skilled. Along with this professional standardisation of training there may be following on benefits to the sector with regards to attaining insurance and increasing the perception of cargo bikes as viable vehicles of business.

Concerning road safety, awareness of cargo bikes as road users should be incorporated into UK driving tests, to ensure there are fewer road safety incidents.

Storage and parking

As cargo bikes are much larger than standard bicycles the issue of safely storing them requires greater consideration. Additionally in comparison to the storage of cars and vans, for which ample on street parking is available, similar offerings of public space are not available for cargo bikes. For workers who park their vans outside of their residences, the same option is not available for cargo bikes as there is a greater likelihood of them being stolen or damaged.

In an urban setting, businesses may have less space to store equipment indoors and do not have access to garages. This means alternative solutions must be found, which normally involves renting a storage space or adapting the space you have available to create a secure space to leave the bike, often with considerations to the requirements set in the terms of their insurance agreement.

One of the main benefits to using cargo bikes for a business is the ability to easily park during a trip and to avoid any parking charges or fines. A barrier associated with this however is that the options for securely parking your cargo bike whilst not inconveniencing other path or road users is fewer than that for traditional bicycles.

> "Right now, it's a bit of a challenge to use them so you really have to want to use them."

Another issue raised during the interview process was a that the lack of suitable provision for cargo bikes on trains meant that for longer work journeys, a self-employed businessman had to drive locations that were further away and would be inaccessible on cargo bikes via road.

> "…now they've got these silly little racks, that you have to put them up on their back wheel on the side, and my wife has got a normal e-bike, and she can't actually, physically, lift the front wheel high enough to put it into

the rack. So that's just a standard e-bike. There are limitations in that respect. So those are our biggest bugbears with it, to be honest."

Solutions

Increased provision of storage options for cargo bikes in residential areas through bike hangers will enable an equivalent option for storing cargo bikes as for people who store commercial vans at personal residences.

The solution for use of cargo bikes for longer mixed mode journeys would be to adapt trains to ensure that there are specific cargo bike bays provided so that passengers can take their cargo bikes on longer leisure and work trips.

Insurance, licensing, and liability

Early adopters of this new technology have found that the process of insuring a cargo bike was very difficult.

As a private business owner one of our interviewees was directly involved in the process of acquiring this insurance for a fleet of bikes which would be carrying expensive equipment to and from jobs. In trying to gain a level of coverage like that for a tradesperson using their van, which will sometimes be left unattended, they had difficulty in getting a quote from their historic broker, specialist cycling insurers and insurers which specialise in unusual coverage. They eventually found one broker willing to insure them who was recommended by the cargo bike community in Edinburgh, they noted that:

"We were very grateful for the support of the cargo bike community in Edinburgh. We instantly had calls and emails from organisations such as Laid-Back Bikes, Spokes, Cargo Bike Movement, Sustrans and Cargo Bike Scotland. We couldn't have got this sorted without this help and it's great to know we're part of a community of developing industries that are looking out for each other."

Having invested in new equipment which if stolen would significantly damage the operation of the business, they were very anxious at the prospect of not being able to not be covered by any insurance and at points thought that they might have to return all the newly acquired equipment.

Reflecting on this process they are hopeful that having gone through this themselves the brokers may be more likely to offer insurance to other businesses. However, the number of brokers they were turned away from makes them think that someone less determined to use a cargo bike will easily be put off at the prospect of not having insurance for their tools which for a plumber, joiner or gardener could jeopardise his only source of income.

For organisations which are involved in loaning out cargo bikes the complications in attaining insurance are also present. They have found that the costs of insuring a cargo bike can be equivalent to that of a van as they see them as goods which are as expensive as cars, but which have little to no level of protection against theft. As such the one or two brokers who are insuring the bikes are issuing high premiums on coverage which is not very flexible.

> "There's lots of intricacies to the insurance and some of the organisations we spoke to are finding it quite difficult and cost prohibitive to do it."

A further issue raised by organisations was the difficulty in finding local mechanics that would service their cargo bikes.

> "Maintenance, whenever we needed any work done on the cargo bike in any way, a service or anything like that, a lot of the bike mechanics in the area said we can't work on it, it's too big. Traditionally, bike shops, some of them were just working out their own garage in the back garden. I eventually managed to find a guy in Dumfries who has premises that's big enough to actually get it in. They just don't have the space, because a pushbike

doesn't take up that much room, and they just have their stands to put them on."

Solutions

One example of a solution shared with us around gaining insurance was through the exchange of knowledge/contacts amongst organisations involved in promoting the use of cargo bikes, such as charities and local authorities, and the private businesses. The development of these knowledge hubs where the exchange of information can occur should be encouraged more widely across the country.

As mentioned previously the greater recognition of cargo bikes as viable commercial vehicles by the wider public may help with attaining insurance.

Lastly, the provision of local and national government initiatives that clearly identify providers in the local area that can service cargo bikes would ensure that it would be easier to source maintenance services for their fleet.

Other factors

Our interviews allowed for an exploration of barriers which the interviewees themselves saw as important in preventing the wider uptake of cargo bikes for small organisations in Scotland.

Several of our interviewees commented on the lack of awareness around what cargo bikes are and how much they can carry which may be holding back some organisations from employing them in their operations. Cargo bikes are not capable of carrying the same maximum load as a van which one interviewer pointed out could lead to the underestimation of the bike's utility. Despite the maximum load being less, it might be that the cargo bike can carry their typical load or would be capable of fulfilling a service for carrying specific

loads across shorter distances where congestion may be an issue.

“When we used to go round in vans, I was just losing money having gardeners sitting stuck in traffic. Two gardeners in a van and paying them to sit for an hour in between jobs stuck in traffic. It was hell when we were doing that. So, I think the other thing to promote it would be, it’s quicker. It’s as quick, if not quicker. If people realise that as well and it’s greener as well and it’s safe.” – Cycling gardeners.

Two organisations which have successfully incorporated cargo bikes into their business operations have been required to carry out considerable adaptations to the bikes to make them functional for their purposes. Additionally, they have had to hire mechanics on retainer who are knowledgeable of the bikes and able to regularly carry out maintenance and repairs. This led to one interviewee describing cargo bikes as a “cottage industry” in which each organisation is having to commit a high level of resources into adapting the cargo bikes currently available to make them suitable for their operations. This level of planning and technical knowledge could present a barrier to organisations interested in using the bikes, were a similar level of effort and planning are not required for using vehicles like vans or cars.

Weather and geography were mentioned as barriers in some of our interviews. One of the main benefits the e-cargo bikes now have is that they can negate some of the barriers to using bikes when confronted with unfavourable conditions such as hills and wind. However, the interviewees still highlighted this as one barrier which they think is still stopping other people and organisations from making the switch to using e-cargo bikes. However, the fact that some organisations are making good use of e-cargo bikes in places like Edinburgh suggests to one of our interviewees that “if we can make cargo bikes work here, we can make them work anywhere.”

In rural settings where there may only be a single road with a 60mph speed limit connecting two settlements it is understandably a challenge for someone to undertake this on a

bike over a car or van. However, the urban and rural differences are not as clear cut as this as one of our interviewees was able to cite instances in Orkney and the Cairngorms where cargo bikes were more effective at completing deliveries because of their rural settings and not despite it. This included the forest tracks already available in Grantown being made use of by a local bakery, and the postal deliveries on one of the smaller islands off Orkney which was able to deliver parcels were the use of diesel vans was not effective. As it is so specific to the area and its context, the success of using a cargo bike should not be predicated on population density alone as these examples show and it highlights the importance of raising awareness and allowing for the trial of cargo bikes in a wide variety of settings.

Solutions

Low awareness of cargo bikes across Scotland more widely is linked to their use only in small areas of high-density urban cities. The positive effects that would follow on from more people using cargo bikes and them reaching a critical mass of users across the country would do much to solve to issues relating to awareness and perceptions of their capability.

Due to their more limited capacities with regards to load carrying capacity and distance compared to a van, the use of cargo bikes in an organisation requires greater consideration and effort to incorporate into an organisation’s operations. In addition to this, the savings offered by using cargo bike may not be high enough to offset the effort integrating this new technology would require. As such one of our interviewees highlighted the crucial importance of a policy framework which promotes sustainable freight deliveries could have on the uptake of cargo bikes due to measures such as the low emission zone and the taxation on the delivery of individual parcels.

With additional initiatives aimed at changing the perception of the public and subsequently consumer behaviour, such as through offering a more sustainable delivery option which is

also cheaper, there is greater likelihood of there being cultural shift in favour of the uptake of cargo bikes in Scotland.

Limitations and opportunities for future research

Limitations

Size of Stakeholder Mapping Tool

Selections were identified from data from the Cargo Bike Library project, as well as data from the Energy Savings Trust. A total of forty-two businesses to potentially select for interview were identified from this process. However, to make the best and varied selections of businesses would have involved a larger database and the involvements of industry bodies.

Whilst there were also efforts to interview businesses from a larger variety of urban and rural locations across Scotland, this was not entirely possible due to the size of the stakeholder mapping tool. As a result of this whilst there were a mix of urban and rural businesses, these were concentrated in two cities for urban businesses and most of the rural based businesses interviewed were in the Highlands.

Project Constraints

Project constraints of time and funding led to focusing of interviews to 11 smaller to medium businesses and organisations. This means that this research and its findings cannot necessarily be generalised for barriers for wider cargo bike use in these larger sized businesses.

Opportunities for future research

Future research could focus on studying the impact of any programmes focused on the utilisation of solutions identified in this report, to measure how successful the proposed solutions are in overcoming the identified barriers to wider cargo bike use.

Another suggestion in any future research for identifying barriers to wider cargo bike adoption, would be to interview participants representing large sized businesses. Additionally, research could incorporate interviewing e-cargo bike manufacturers to understand the feedback they are getting from customers as well as the geographical distribution of their customers. This geographical distribution could then be analysed to identify areas in Scotland which would most benefit from future support programmes.

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