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Promoting Sustainable Freight Transport in Urban Contexts:
Policy and Decision-Making Approaches

Lorry Parks Selection Criteria: A Study of Drivers Preferences in the UK

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Outline



1. Introduction
2. Background
3. Research questions and objectives
4. Methodology
5. Results
6. Conclusions and implications

1. Introduction



- Developed during 2 secondment periods by JMGG (UEx) at the CBMDC and SCC
- Results:
 - Presented at 2019 ProLog Conference in Metz (France)
 - Submitted to a Special Issue of Sustainability
- A joint work by JMGG, TK, SR, AG

1. Introduction: Problem & antecedents

- CBMDC concerns about inappropriate lorry parking
- Problems affecting their residents derived from their communications network and the important volume of good transportation in their urban areas
- Urban freight transport (UFT) is a necessary factor in fostering urban economic systems, being an important facilitator of economic growth,
- However, UFT is associated with certain problems, which can be classified into social, economic and environmental problems

1. Introduction: Problem & antecedents

Urban Freight

Transport

Alternatives
for Sustainable
Urban Freight

Transport

- Social problems: congestion, noise pollution, ...
 - Economic problems: cost and economic losses
 - Environmental problems: air pollution, energy consumption, ...
-
- Policy development from government and policy makers
 - Technological development: vehicle-routing improvements, technological vehicle innovations, ...
 - Development of logistics systems: UCCs, underground logistics systems, intermodal transport, lorry parks.

1. Introduction: Problem & antecedents



Initial interest of CBMDC in the construction of a lorry park facility by Bradford City Council (2018 secondment)

Posterior interest of SCC about this information as a possible solution to their UFT problems (2019 secondment)

Table 1. Demand and capacity of lorry parking spaces in England

| Region | Sum of capacity | Total vehicles parked | Excess vehicles |
|----------------------|-----------------|-----------------------|-----------------|
| East of England | 1,943 | 2,854 | 911 |
| West Midlands | 1,906 | 2,519 | 613 |
| South East | 2,871 | 3,723 | 852 |
| Yorkshire and Humber | 1,856 | 2,032 | 176 |
| East Midlands | 2,167 | 3,032 | 865 |
| South West | 1,084 | 1,272 | 188 |
| North East | 405 | 745 | 340 |
| North West | 2,573 | 2,357 | -216 |
| London | 207 | 136 | -71 |
| England | 15,012 | 18,670 | 3,658 |

1. Introduction: Problem & antecedents



The Bradford case

Prior to the secondment: demand estimated and location decided.



No clue about potential customer preferences and needs:

- Lack of market orientation
- Lack of vital information in order to design the facility
- Decision made based on City Council vision of the problem, forgetting potential customers necessities

The Sheffield case

Recognition of the problems caused by urban freight transport, but the case was in a very preliminary phase



Interest in the information delivered to CBMDC previously

2. Background



- The number of studies conducted on the subject it has been low. Cui et al. (2015) report that cargo transport is receiving less interest than passenger transport.
- Most of the previous studies focused on calculating the optimum supply amount or finding the optimal place to locate new lorry parks.
- Studies focused on lorry drivers preferences towards lorry parks were mainly descriptive (Table 2)
- LABEL project (European Commission, 2011) classified the type of lorry parks into security and service, and selected them as five criteria (Table 3)

2. Background

Table 2. Main studies on the topic

| Authors | Methodology | Results |
|--------------------------------|---------------|---|
| Powell and Ande (2000) | Questionnaire | Top factors: restaurants, shower, telephone use, long-term breaks, toilet, equipment checks, and safety |
| Coleman and Trentacoste (2002) | Questionnaire | Important factors: restaurant, fuel sale, restrooms, shower facility, telephone, security and lighting. Non important: entertainment facilities, internet connection, and travel information |
| AECOM (2009) | Questionnaire | Important factors: high quality security, price and clean facilities |

2. Background



Table 3. Service level of lorry parks

| Service level | Description |
|---------------|--|
| 1 | Basics: Toilets, water taps, waste bins / Walking and driving across the area should be safe |
| 2 | Washing facilities and more convenient lay-out of the parking area: Level 1 + washing facilities |
| 3 | Personal hygiene and shop / fuel station: Level 2 + showers, a shop and a fuel station |
| 4 | Full service for driver and vehicle: Level 3 + a snack bar, laundry, spare parts shop and leisure facilities |
| 5 | The high end of comfort levels: Level 4 + a restaurant, truck wash, electricity and snow/ice removal equipment |

Source: European Commission (2011)

2. Background



Main conclusions drawn from the literature:

- The mentioned studies are considered to be **useful in selecting elements for sustainable lorry parks management**.
- These studies are **based on a descriptive analysis of the responses provided by lorry drivers to direct questions about the importance they attach to different criteria**.
- Most of the studies are quite dated (roughly 10 years). **The current situation has changed deeply in the last few years**.
- For all the above, **new studies are necessary to analyse trends in preferences of lorry drivers when selecting parking options**.

3. Objectives & Research Questions



The main aims of this research are to identify the preferences of **Heavy Good Vehicles (HGVs)** drivers when selecting truck stops and explore the factors for sustainable operation of lorry parks.

Specific objectives:

- 1) To assess, at a descriptive level, the main characteristics of lorry drivers operating in the UK, as well as their **evaluations on the importance they assign to certain services** associated to lorry park facilities.
- 2) To study the **preferences structure** of lorry drivers regarding a set of selection criteria to obtain information on the relative importance they give to them.

3. Objectives & Research Questions



In order to achieve these objectives the following **research questions (RQ)** are proposed:

- RQ1: Why do drivers park trucks at unauthorised parking spaces instead of lorry parks?
- RQ2: How will lorry parks encourage drivers to park in their facilities?

The results obtained would serve as a **guide for making decisions** related to the design of lorry parks and the additional services to be added to them.

4. Methodology

- A questionnaire was designed to accomplish the objectives established in this research.
- The questionnaire was based on previous studies aimed at analysing the needs of lorry drivers when deciding to stop in lorry park facilities and rest areas (Table 2).
- The questionnaire was divided into two fundamental parts:
 - The first one contained questions aimed at learning about professional aspects and main characteristics of lorry drivers operating in UK.
 - The second part was intended to analyse the lorry drivers' evaluation of certain services associated with lorry parks.

4. Methodology

- The second part is intended to analyse the lorry drivers' evaluation of certain services associated with lorry parks.
- Two approaches are employed:
 1. The first one uses a compositional method to analyse driver evaluations. It tries to obtain the driver's evaluation of the attributes through **direct questions**.
 2. The second part of this section uses **Conjoint Analysis** (decompositional method) to know the preferences structure of lorry drivers with respect to a series of pre-selected attributes.

4. Methodology

Conjoint Analysis – Study design

- Attributes and levels:
 1. Price: Which may be 16£, 20£ or 24£.
 2. Meal: One meal may be included in the price or not.
 3. Beds: A shared room may be included in the price or not.
 4. Level of security: The park may have a high level of security (including a big fence, CCTV, security personnel and an insurance in case of vandalism) or just a standard level of security (including a big fence and CCTV)
 5. Entertainment facilities: The park may have TV rooms (including DVD, pay TV and sport events) included in the price or not.

4. Methodology

Conjoint Analysis - Study design

- There were 48 possible stimuli. An orthogonal design was carried out to reduce the combinations to a subset of just 10. The reduction was done in such a way that all the attributes and their corresponding levels were presented with equal unbiased intensity (Table 4)
- The questionnaire:
 - Universe: lorry drivers using lorry parks in UK
 - Sample size: 99
 - Confidence level: 95%
 - Sampling: Non-probabilistic. Disseminated through Facebook
 - Type of survey: personal, self-administered, fulfilled on-line
 - Fieldwork: August 2018

4. Methodology

Table 4. Stimuli presented to respondents

| Lorry park | Price | Meal | Bedrooms | Security | Entertainment |
|---------------|-------|--------------------------------|-----------------------|----------------|-----------------------------|
| Lorry park 1 | £24 | No meal included in the price | Shared room with beds | High level | No entertainment facilities |
| Lorry park 2 | £16 | No meal included in the price | No room with beds | Standard level | No entertainment facilities |
| Lorry park 3 | £20 | No meal included in the price | Shared room with beds | Standard level | Entertainment facilities |
| Lorry park 4 | £20 | One meal included in the price | No room with beds | High level | No entertainment facilities |
| Lorry park 5 | £24 | One meal included in the price | No room with beds | Standard level | Entertainment facilities |
| Lorry park 6 | £16 | One meal included in the price | Shared room with beds | Standard level | No entertainment facilities |
| Lorry park 7 | £16 | One meal included in the price | Shared room with beds | High level | Entertainment facilities |
| Lorry park 8 | £16 | No meal included in the price | No room with beds | High level | Entertainment facilities |
| Lorry park 9 | £16 | One meal included in the price | No room with beds | High level | Entertainment facilities |
| Lorry park 10 | £20 | No meal included in the price | Shared room with beds | High level | Entertainment facilities |

Note: The result of the orthogonal design was carried out by SPSS 22.0

5. Results



Descriptive results:

- The majority (86%) of the participants are **big-sized truck** drivers.
- 82% of the participants mainly carried **long-haul**.
- 97% of the participants are driving a **truck owned by a company or a third party**.
- 92% of participants are **employed by a company** or an agency; just 8% is self-employed.
- 54% of participants responded that they **planned in advance where to park**.

5. Results



Descriptive results:

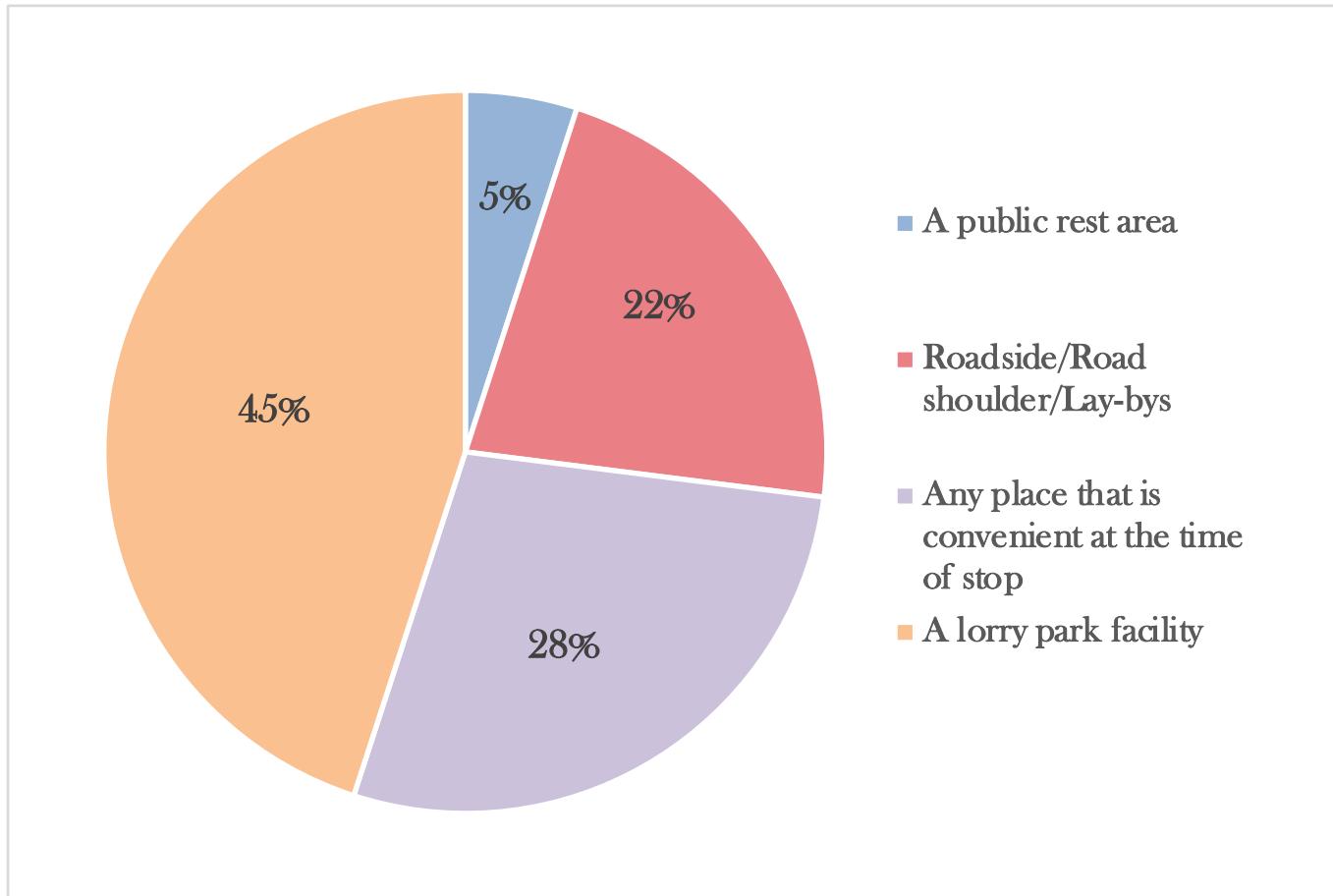
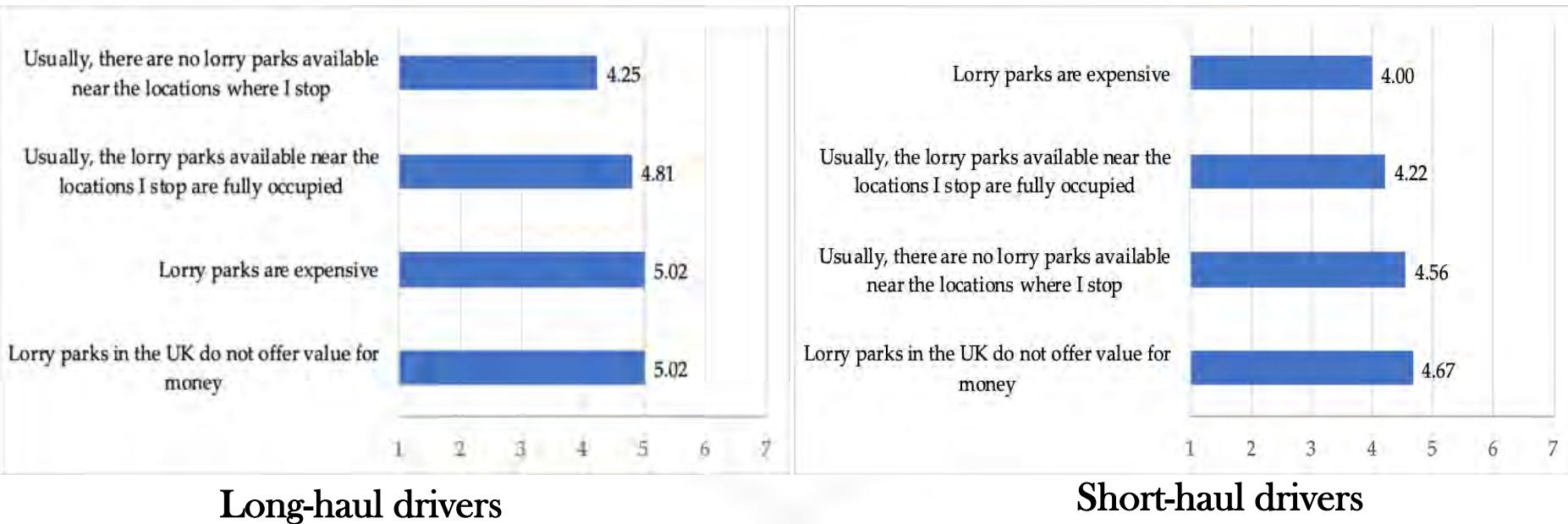


Figure 1: Which place do you prefer the most when you stop to rest?

5. Results

RQ1: Why do drivers park trucks at unauthorised parking spaces instead of lorry parks?

Figure 2. Reasons for inappropriate parking



Likert scale from 1 (totally disagree) to 7 (totally agree)

5. Results

RQ2: How will lorry parks encourage drivers to park in their facilities?

| Services | Score (average) | Services | Score (average) |
|--|--------------------|-------------------------------------|--------------------|
| Size of truck space | 6.00 | One meal included in the price | 4.89 |
| Toilets | 6.00 | Cafeteria | 4.86 |
| Number of parking spaces | 5.98 | Waste and recycling facilities | 4.78 |
| Large enough parking spaces | 5.94 | Fuel sales | 4.51 |
| 24-hour access | 5.91 | Grocery store | 4.35 |
| Showers | 5.90 | Automatic teller machine | 3.73 |
| Safe & clear environment | 5.85 | Unlimited internet Wi-Fi | 3.68 |
| Friendly personnel | 5.75 | Laundry facilities for drivers | 3.56 |
| Proper accessibility | 5.74 | Vending machines | 3.35 |
| CCTV | 5.72 | Lorry washing facilities | 3.32 |
| Security personnel | 5.62 | TV rooms | 2.84 |
| Location close to highway | 5.56 | Picnic tables | 2.69 |
| Located along your transport route | 5.56 | Lorry repair facilities | 2.67 |
| Insurance in case of vandalism | 5.52 | Rooms with beds | 2.62 |
| Timing on your route | 5.11 | Electric vehicle recharging station | 2.59 |
| Restaurant | 5.10 | Kitchen/kitchenette | 2.49 |
| Night lighting | 5.04 | Public phones | 2.33 |
| Loyalty card (e.g. discounts for long-term contract) | 4.89 | | |

1. Descriptive analysis - Direct questions

Likert scale from 1 (not at all important) to 7 (extremely important)

Top attributes: related to security and food.

Table 5. Ranking of lorry park services 22

5. Results

RQ2: How will lorry parks encourage drivers to park in their facilities?

2. Conjoint analysis

Table 6. Estimated utility of each level of the attributes

| Attribute | Level | Estimated utility | Standard error |
|---------------|---|-------------------|----------------|
| Price | £16 | -0.56 | 0.15 |
| | £20 | -1.13 | 0.30 |
| | £24 | -1.69 | 0.45 |
| Meal | One meal included in the price | 0.98 | 0.12 |
| | No meal included in the price | -0.98 | 0.12 |
| Bedrooms | Shared room with beds | -0.50 | 0.12 |
| | No room with beds | 0.50 | 0.12 |
| Security | High level (big fence, CCTV, security personnel and insurance in case of vandalism) | 0.37 | 0.12 |
| | Standard level (big fence and CCTV) | -0.37 | 0.12 |
| Entertainment | Entertainment facilities (TV rooms) included | 0.04 | 0.12 |
| | No entertainment facilities (TV rooms) included | -0.04 | 0.12 |
| Constant | - | 5.35 | 0.29 |

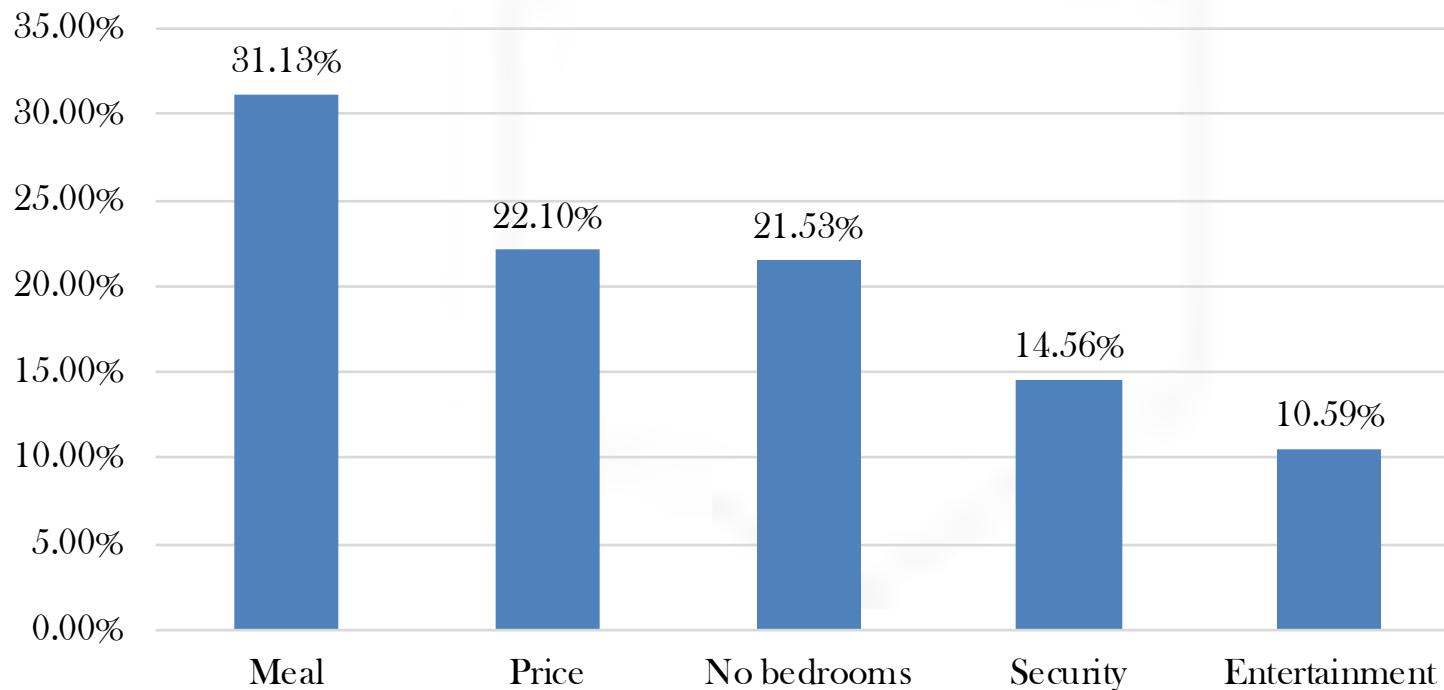
Notes: Pearson's R=0.990, Kendall's tau=0.909

5. Results

RQ2: How will lorry parks encourage drivers to park in their facilities?

2. Conjoint analysis

Figure 3. The relative importance of each attribute



6. Conclusions



1. The findings in the present research have corroborated that **price, security and meals are the most significant factors** for truck drivers to select lorry parks. Other aspects like bedrooms and public phones have little impact on drivers' choice of lorry parks.
2. **Both studies** which were carried out, descriptive and conjoint analysis, show **similar results** regarding the top attributes in importance for lorry drivers when selecting where to park their vehicles.
3. **The 'ideal' lorry park** is the one with low price, one meal included in the price and high level of security. We also could add 24 hour access, large enough spaces, and accessible location from our descriptive analysis.
4. These conditions can be utilised as indicators that contribute to the operation of lorry parks from a lorry park manager's perspective since these are generated by the evaluation of customers who actually use lorry parks. **These results can serve as a guide for decision- and policy- making on lorry park management.**



Thank you very much!

Questions?



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