



Data Article

Dataset on the behavior of local and foreign users in their willingness to pay for bike sharing in medium-sized cities

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ARTICLE INFO

Article history:

Received 6 February 2024

Revised 15 July 2024

Accepted 16 August 2024

Available online 26 August 2024

Dataset link: [Dataset on the behavior of local and foreign users in their willingness to pay for bike sharing in medium-sized cities. \(Original data\)](#)

Keywords:

Survey

E-bike

Bike-sharing

Willingness to pay

Urban design

ABSTRACT

The data provide information from a face-to-face survey of 370 potential dock-based e-bike-sharing users in Santander, Spain. The survey was designed to collect information about the current and future use of the city's bike-sharing service, including frequency of use, trip purpose, and Willingness to Pay (WTP) for a future e-bike-sharing service. The questionnaire is structured in two sections. The first section relates to the characterisation through socio-economic data and information on bike-sharing services. The characterisation questions were intended to clearly distinguish between potential recurrent users (locals) and occasional users (visitors). The second section corresponds to a stated preference (SP) exercise that reveals the WTP for using e-bike-sharing considering different payment structures: fee per use, annualised registration, and a combination of the above. The data provide a valuable reference for municipal managers, private bike-sharing service providers, and the scientific community about users' preferences and intentions to use bike-sharing and e-bike-sharing according to sociodemographic characteristics

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and pricing scenarios. In addition, the questionnaire can be used as a reference in related research.

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Specifications Table

Subject	Engineering / Municipal Engineering and Urban Design
Specific subject area	Municipal engineering's urban design subset examines willingness to pay for dock-based electric bikes in cities.
Data format	Raw
Type of data	Questionnaires/Survey data
Data collection	The survey was conducted face-to-face at various locations in Santander, Spain, from July 1 to 31, 2023, targeting residents and visitors. A 5-minute structured questionnaire was used. Enumerators followed a systematic approach to ensure diverse demographic representation and avoid significant biases. A total of 370 respondents participated, reflecting a robust sample size. No incentives or reminders were needed, and no personal data was collected. The success rate of individuals willing to participate was about 85 %, higher among city residents than visitors.
Data source location	The data were collected in Santander, Spain.
Data accessibility	Repository name: Dataset on the behavior of local and foreign users in their willingness to pay for bike sharing in medium-sized cities. Data identification number: 10.17632/wggsn9w6b6/4 Direct URL to data: https://data.mendeley.com/datasets/wggsn9w6b6/4

1. Value of the Data

- The data provides information on users’ preferences for electric dock-based bike-sharing under different pricing scenarios, which allows for a better understanding of the uptake of sustainable mobility services in urban areas.
- The relationships between demographic variables and preferences for payment (WTP) for electric dock-based bike sharing can be used by other research to compare data from similar cities and for design experiments in different urban contexts.
- The characterisation questions were designed to distinguish between potential recurrent users (local) and occasional users (visitors). This distinction could be utilised to understand how preferences and WTP vary between these two demographic groups in, for example, tourist cities. This distinction could be utilised to understand how preferences and WTP vary between these two demographic groups in, for example, tourist cities.
- The data can be used by researchers and policymakers to make decisions based on real observations. Service providers can also use it to understand the WTP of potential users of their systems.

2. Background

Sustainable mobility habits are presented as an alternative to car use and the reduction of polluting emissions by adapting citizens’ behaviour to the Sustainable Development Goals (SDG) guidelines. Electric bicycles help in this process of modal shift in mobility habits [1–3]. Citizens also highlight the environmental friendliness of electric bikesharing [4]. Opening up the option to achieve this modal shift by putting the bicycle at the centre of the process has led many cities to establish public bicycle rental systems. This entails establishing charging policies such as the one explored in the survey presented in this research. Along these lines, previous work, such as that of Fyhri et al. (2017) [5], has studied car users’ willingness to pay for electric bike use. It has also been shown that offering incentives is effective as a strategy to accelerate modal shift [6].

Other factors that have been studied in favour of the adoption of electric bicycle systems include seasonality [7], the typology of the city, its connection problems, and the location of bicycle stations concerning the location of user demand [8] or the psychological factors that lead to their use [9]. The literature also emphasises the need for further research to determine whether specific policies are needed to increase e-bike adoption, indicating a gap in understanding the policy implications (such as willingness to pay) for e-bike adoption [10].

In terms of the types of bike-sharing systems that we usually find in cities, we could establish a classification according to Zhang et al. (2015) [11]; among the most common are those based on stations (docked), bicycles without fixed stations (dockless) and hybrid systems that combine both. In addition to this distinction, bikesharing systems can offer electric and conventional bicycles. Regarding the type of loans based on time, there are loans for daily rental generally focused on tourism or rental for periods between 30 min and 1 h as an efficient means of transport for urban journeys. This paper develops a case study applied to docked electric bicycle systems, where the combination of electric technology and fixed stations offers a practical and sustainable solution for mobility in congested urban areas.

This dataset aims to help fill the gap in research on dock-based e-bike sharing and willingness to pay. It will provide the responses of 370 residents and outsiders in a medium-sized city for analysis. These data can also be used as a starting point for research to help policy decisions continue the modal shift of citizens to promote more active and sustainable mobility.

3. Data Description

This database is the result of a study that aimed to investigate the demand for a dock-based e-bike-sharing service from the point of view of the costs involved for the user in the city of Santander. The resulting database file is composed of 26 columns corresponding to the survey questions applied and 370 rows corresponding to the answers received by each respondent, with the addition of a row for the labels. Regarding success rate, the data collectors reported a rate of individuals willing to collaborate of around 85 %, with a higher rate among city residents than among visitors. Table 1 presents the questions, the response options, and the id in the database file.

The first part of the questionnaire is related to socioeconomic variables, the current use of the bike-sharing service, and the intention to use e-bike-sharing. Questions with database IDs from 1 to 15 in the database (see Table 1). Table 2 shows the percentage of the respondents in the sample for each variable.

As a validation of the data, a comparison is provided in Fig. 1 of the collected data with the compiled census of the 172,655 inhabitants of the city of Santander for the year 2023, according to the Spanish National Institute of Statistics. Fig. 1(a) shows a practically identical distribution in terms of gender between the two samples. Fig. 1(b) shows that the age distribution is sim-

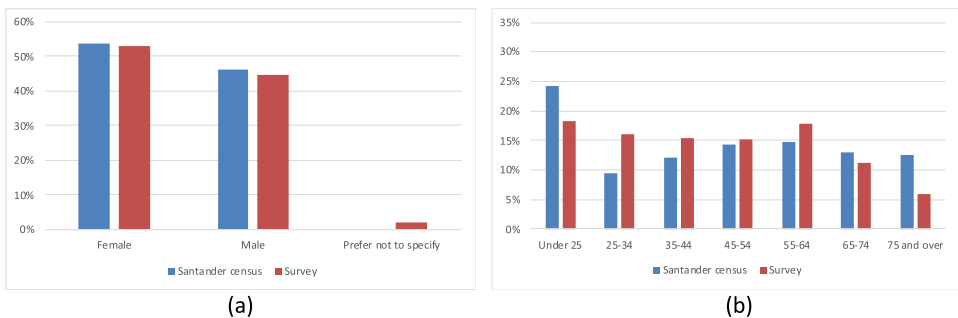


Fig. 1. Comparison of responses between the actual census and the sample.

Table 1
Description of the question in the dataset.

Question	OPTIONS	DATABASE ID
Indicate your gender	Male, Female, Prefer not to specify	Gender (1)
Indicate your age	Under 25 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years, Over 75 years	Age (2)
What is your employment situation?	Choose an option, Home duties, Self-employed, Employee, Unemployed, Student, Retired	Employment (3)
Profession	Text entry	Profession (4)
Level of education	None, School graduate, Compulsory Secondary Education, Baccalaureate, University	Education (5)
Place of residence	Santander, Cantabria, Spain, Outside Spain	Residence (6)
Street, neighbourhood or postal code of residence in Santander	Text entry	Neighbourhood (7)
Have you ever used bike-sharing (shared bicycles)?	Yes, No	bikesharing_use (8)
How often	Daily, Weekly, Monthly, Occasionally	frequency_bs (9)
In which city	Santander, Other	city_bs (10)
If you answered another city, which one?	Text entry	other_city_bs (11)
For what type of trips (indicate the most common when you have used this type of services)	Leisure, Work, Studies, Health, Shopping, Errands, Sports, Other	type_of_use (12)
If available, would you use a shared electric bicycle system in Santander?	Yes, No, I don't know/depends	availability_sdr (13)
How often would you use it?	Daily, Weekly, Monthly, Occasionally	freq_if_avail (14)
For what type of trips (indicate the most common for which you would use it)	Leisure, Work, Studies, Health, Shopping, Errands, Sports, Other	type_if_avail (15)
Given these conditions, what would you do?	Travel (1), No travel (2)	Scenario_n (16 to 24)

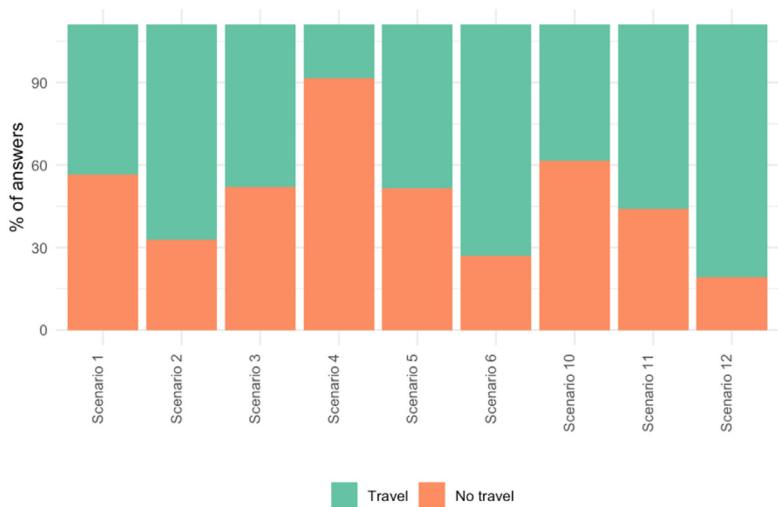


Fig. 2. Distribution of responses in the SP scenarios.

Table 2

Distribution of responses by question.

Variable	Option	Percentage
Gender* (1)	Female	53.01 %
	Male	44.81 %
	Prefer not to specify	2.19 %
Age** (2)	Under 25	18.21 %
	25–34	16.03 %
	35–44	15.49 %
	45–54	15.22 %
	55 –64	17.93 %
	65–74	11.14 %
	75 and over	5.98 %
Employment (3)	Employee	44.05 %
	Retired	19.46 %
	Student	17.03 %
	Unemployed	8.38 %
	Self-employed	6.76 %
Education (5)	Housework	3.78 %
	University	46.59 %
	High School Diploma	34.6 %
	School graduate	9.26 %
	High School	7.63 %
Residence (6)	None	1.91 %
	Santander	61.41 %
	Cantabria	19.84 %
	Spain	14.67 %
	Outside of Spain	4.08 %
Bike-sharing Use (8)	No	75.27 %
	Yes	24.73 %
Frequency (9)	Occasionally	81.32 %
	Weekly	13.19 %
	Daily	4.4 %
	Monthly	1.1 %
City (10)	Santander	63.74 %
	Other	36.26 %
Trip Type (12)	Leisure	61.54 %
	Work	10.99 %
	Other	9.89 %
	Studies	7.69 %
	Sport	5.49 %
	Health	2.2 %
	Administrative tasks	2.2 %
Use E-Bike? (13)	Yes	56.1 %
	No	27.91 %
	Don't know/depends	15.99 %
E-Bike Frequency (14)	Occasionally	60.16 %
	Weekly	19.14 %
	Daily	12.89 %
	Monthly	7.81 %
E-Bike Trip Type (15)	Leisure	55.04 %
	Work	14.73 %
	Studies	7.36 %
	Other	5.43 %
	Administrative tasks	5.43 %
	Sport	5.04 %
	Health	3.88 %
	Shopping	3.1 %

* Santander census: Female 54 %; Male 46 %;.

** Santander census: Under 25 24 %; 25–34 9 %; 35–44 12 %; 45–54 14 %; 55–64 15 %; 65–74 13 %; 75 and over 13 %.

ilar in practically all categories. There is a slight decrease in the number of citizens surveyed older than 75 because they aren't the main target group for this bike sharing system. Also, the decrease in citizens under 25 is because the survey started at 16.

The second part of the survey consisted of 9 SP scenarios that varied the payment structure for using an e-bike-sharing service. The response alternatives were to travel or not to travel with the e-bike-sharing service. Fig. 2 shows the distribution of responses among the options in the scenarios (labelled as in the database and discussed in the next section) between choosing the scenario's fare option and not taking the service.

4. Experimental Design, Materials and Methods

A mixed questionnaire was conducted in a medium-sized city in northern Spain, Santander (180,000 inhabitants); a panel of data was generated comprising an initial socio-economic characterisation section of the participants and a subsequent stated preferences (SP) survey aimed at discerning their predisposition towards electric bicycle use in specific tariff scenarios. SP surveys allow for a detailed analysis of the responses, mainly when segmented according to socio-economic factors [12].

The survey instrumentation was designed to capture essential information on behaviours related to bike-sharing services, including their frequency of use, preferred location and the primary nature of the trips made by these means. As for the design of the user characterisation form, the aim was to obtain the fundamental characteristics for this type of study that have already been widely endorsed [13,14] as well as in other studies oriented to bike-sharing [15,16].

Table 2 lists the variables asked about age to identify demographic segments; employment status and profession to understand occupation and potential commuting needs; level of education to assess the correlation between education and use of bike-sharing services; and place of residence, along with specific details such as street, neighbourhood, or postcode in Santander, to determine proximity to bike-sharing stations and assess commuting feasibility. The last two questions focused directly on previous use of bike-sharing systems and willingness to use electric bicycles in Santander, seeking to discern the acceptance and potential demand for this service in the community and its comparison with the subsequent SP section. As a main difference, conditional questions were inserted to capture the potential for use by both local users and visitors. For this purpose, questions (8) and (13), shown in Table 1, served as pivoting elements to show in the first case questions (9, 10, 11 and 12) and the second case questions (14 and 15).

After the characterisation of the users, two SP experiments were carried out. This technique, prevalent in economics, psychology, social sciences, and transportation, aims to measure individual preferences [17]. Various ways of presenting these scenarios to collect data with as little bias as possible have been proposed in the literature [18]. SP surveys are especially valuable when understanding preferences for goods or services that still need to be created in the market or for which market data are unavailable [17].

The main challenge facing the design of an SP experiment is the correct balance of the options offered so that there are no dominant scenarios over the rest. In this case, an efficient design has been carried out with the NGENE software [19]. The development process involves selecting a set of questions and defining the possible answers, then constructing a balanced and uncorrelated design matrix that allows the necessary information to be gathered efficiently.

With the NGENE software, a process to generate the scenarios was carried out in 4 stages. The first stage was the survey of a pilot sample of 20 people. This sample is a small but representative group of the target population. Once this group had been surveyed, the second step consisted of applying a Multinomial Logit (MNL) model to the responses of this pilot sample. The MNL model is a statistical method commonly used in discrete choice decision analysis. In the third step, the model results assign a variable to each considered variable called priors. These values constitute NGENE's input parameters for the final survey design. Finally, this software performs an efficient design of the scenarios to not generate decision options biased towards any available options.

Table 3

Scenarios of the SP experiment.

Scenario	Type Fare	Subscription fare (€)	Price per 30 min (€)
1	Annual	35	0,5
2	subscription	20	0,25
3	subscription + Price	50	0
4	per 30 min	50	0,25
5		20	0,5
6		35	0
10	Price per 30	0	1,5
11	min	0	1
12		0	0,5

After calibrating the survey and obtaining the final design, fieldwork proceeded. Respondents face a series of hypothetical scenarios with different options, varying in specific attributes or characteristics, and must indicate their preference. This methodology allows researchers to deduce how much individuals value different attributes to establish WTP in pre-defined scenarios. The specificity and effectiveness of SP surveys rely heavily on the researcher's experiment design.

The experiment developed in this case had two parts, with nine scenarios presented to each respondent (Table 3). In the first part of the experiment, participants were presented with a series of hypothetical scenarios according to the pattern: Annual subscription + Price per 30 min of use (Scenarios 1 to 6). In the second part, scenarios (10–12) were presented according to the pattern: payment per 30 min of use of an electric bicycle without the option of an annual subscription. Here, usage prices of €1.5, €1 and €0.5 per 30-minute slot were offered. In all cases, the surveyed must choose between two alternatives: 1) make the trip or 2) Not make the trip considering the conditions presented in each scenery.

Limitations

A limitation of the study is that data has been collected in a city with the specific characteristics described. Future research should explore various populations and settings to compare and analyze the findings.

Ethics Statement

The authors of this manuscript declare that no ethical approval was required for data collection in this study. Therefore, we affirm that informed consent was included in the first part of the survey, following the recommendations of the Organic Law BOE-A-2021-8806 7/2021, of 26 May, on the Spanish General Data Protection Regulation (RGPD). In addition, the following relevant laws have complied with Organic Law 3/2018, of 5 December, on the Protection of Personal Data and the guarantee of digital rights.

At the beginning of the questionnaire, participants were shown a detailed informed consent form, which included information about their rights concerning the information provided, thus respecting the current regulations on data protection and digital rights. This consent guaranteed participants' full knowledge and understanding of the use and purpose of their data, ensuring their right to privacy and the protection of their information.

Finally, we have ensured that the data acquired has been anonymised and that our research practices fully comply with the ethical requirements for publication in the Data in Brief journal.

CRediT Author Statement

Andrés Rodríguez: Conceptualization, Data Curation, Writing - Original Draft Preparation; **Luigi dell'Olio:** Conceptualization, Supervision, Project Administration Methodology, Software; **Silvia Sipone:** Conceptualization, Formal Analysis, Investigation; **Maira Delgado-Lindeman:** Validation, Writing - Review & Editing.

Each author has drafted, written, revised, or critically reviewed the article; has approved the final version to be published; and agrees to be accountable for all aspects of the work.

Data Availability

Dataset on the behavior of local and foreign users in their willingness to pay for bike sharing in medium-sized cities. (Original data) (Mendeley Data).

Acknowledgements

This research paper was developed under grant “SUM+Cloud: COCREACION Y COMPATIBILIZACION DE LA INFORMACION EN LA NUBE-BORDE” funded by Spanish Ministerio de Asuntos Economicos y Transformacion Digital and of Asuntos Econóo and by the European Union NextGenerationEU/PRTR, also supported by Cantabria Region Government / FEDER under grant “2023/TCN/007” and finally thanks to the fundings offered by the Santander (Spain) City Council inside the collaboration framework between the University of Cantabria and Santander city Council.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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