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Article

Cruise Tourism and Sustainable Urban Mobility: A Contingent Valuation Study of Zadar, Croatia

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Abstract

Cruise calls in medium-sized Mediterranean ports concentrate visitor flows along short urban connectors, intensifying congestion and localized environmental externalities. This study evaluates cruise passengers’ willingness to pay (WTP) for an electric tram linking Gaženica Port with Zadar’s historic center, an intervention designed to cut travel time and reduce on-street crowding and emissions. A two-wave, two-site, face-to-face survey was administered over two seasons at the port and in the city center. The instrument adopts a double-bounded dichotomous choice contingent valuation design with randomized starting bids calibrated via a pre-test that benchmarked prevailing transport prices. Primary WTP estimates are obtained from a binary choice model with socio-demographic and environmental covariates; inference relies on cluster-robust errors. Robustness is assessed through three complementary checks that do not require additional data: (i) a bivariate specification to accommodate within-respondent correlation between first and follow-up bids; (ii) Turnbull nonparametric bounds for the interval-censored WTP distribution; and (iii) starting-point tests via bid-set indicators and split-sample estimation. Where applicable, a spike adjustment based on “no–no at the lowest bid” responses is explored. Beyond methodological contribution, this research advances the sustainable tourism development discourse by quantifying visitors’ monetary support for low-emission urban mobility infrastructure that mitigates environmental pressures while preserving resident quality of life. The findings provide a decision-ready valuation input for port–city mobility planning in historic Mediterranean cores, aligning cruise tourism management with the broader objectives of resilient and sustainable urban destinations.

Keywords: sustainable urban mobility; cruise tourism; willingness to pay; contingent valuation; Zadar

1. Introduction

The evolution of the scientific discourse on cruise travel in Mediterranean port cities reflects a profound transformation from purely economic priorities towards complex models of sustainable urban mobility. While early studies from the end of the last century primarily quantified direct passenger consumption and multiplier effects on the local economy [1], contemporary research increasingly treats cruise tourism as a logistical challenge that requires an integrated approach to spatial management. In this context, port cities are no longer viewed simply as destinations, but as dynamic systems in which the needs of the local population, supply chain logistics and tourist flows meet, often resulting in tensions in urban functionality [2,3].

In the Croatian academic context, research has long focused on the environmental and socio-economic impacts of cruising, with the works of Marušić et al. [4] and Carić [5] laying the foundations for understanding the “hidden costs” of this form of tourism. Carić particularly emphasizes that the ecological footprint of cruise ships in the Adriatic often outweighs the immediate economic benefits, which opens up the possibility of applying non-market valuation methods to quantify these externalities. This is where the need for the contingent valuation method (CVM) arises, which has been successfully applied in Croatia by researchers such as Opačak and Wang [6] in assessing the value of urban improvements, proving that residents and visitors are willing to pay for preserving

the quality of life and the environment if the improvement scenarios are transparently communicated.

Zadar's specificity compared to other key Croatian ports such as Dubrovnik or Split lies in its unique spatial duality and logistical organization. While Dubrovnik faces extreme pedestrian congestion within its historic walls, and Split with its port in the very heart of the city, Zadar has strategically relocated its passenger terminal to the port of Gaženica. This move, although it reduced the direct pressure of ships on the historic peninsula, created a new logistical challenge: the need for efficient, sustainable and environmentally friendly passenger transport on the 3.5 km route between the terminal and the city centre. Previous studies on the logistics of Croatian ports, such as those by Jurčević et al. [7], point out that such a dislocation requires advanced urban mobility solutions in order to avoid the creation of new "bottlenecks" in urban transport.

Despite the existence of studies on general visitor satisfaction and economic impacts, there is a significant gap in the literature when it comes to linking transport logistics solutions with methods of expressed preferences, especially studies that use CVM to assess passengers' willingness to pay for green mobility in the context of the Zadar port of Gaženica. Zadar therefore represents an ideal "living laboratory" for research into how specific logistics infrastructure affects the perception of the value of sustainable transport, which is crucial for the formation of future Sustainable Urban Mobility Plans (SUMP) advocated by Krpan and Maršanić [9].

Existing conflicts in the literature still revolve around the question of whether additional taxes and mobility fees are a fair instrument or just a barrier that reduces port competitiveness. While some authors advocate "green fees" as a necessity for financing the decarbonization of urban transport [10], others warn of the danger of reducing the attractiveness of the destination in a highly competitive Mediterranean environment. This study therefore seeks to bridge this gap by investigating the willingness to pay for sustainable transport solutions in Zadar, providing empirical evidence that can serve as a basis for balancing logistical efficiency and environmental responsibility. Future research should additionally focus on the long-term effects of such solutions on air quality and the satisfaction of the local community, which would complete the model of sustainable management of the port city.

The specificity of Zadar compared to other key Croatian ports lies in its unique spatial duality and logistical organization. While other destinations struggle with pedestrian congestion in their centers, Zadar has relocated its passenger terminal to the port of Gaženica, transforming the connection to the historic center into a critical "short urban connector". This configuration creates specific pressure on the road infrastructure, amplifying local externalities and congestion. Previous studies on port logistics [7,8] emphasize the need for solutions that optimize passenger transport, and the introduction of an electric tram between Gaženica and Poluotok is emerging as an intervention that simultaneously reduces emissions and shortens travel times, while preserving the quality of life of the local population.

Despite the existence of studies on overall visitor satisfaction, there is a significant methodological gap in the literature in precisely quantifying monetary support for low-carbon mobility in port cities. This study fills this gap by applying a robust double-bounded dichotomous choice within a contingent valuation method, which allows for more precise estimates of willingness to pay (WTP) compared to traditional models. This approach, tested in two phases and at two locations, not only contributes to methodological development but also provides concrete input for decision-making in sustainable mobility planning in the historic cores of Mediterranean cities.

This paper is organized into four key sections in order to systematically present the correlation between logistics solutions and user preferences. After an introductory discussion and review of relevant literature, the second section describes in detail the methodology and research design, with a special focus on the construction of a hypothetical scenario within the contingent valuation method and the specifics of passenger sampling in the port of Gaženica. The third section of the paper is dedicated to the analysis of the results, where, through descriptive and econometric data processing, key factors influencing respondents' willingness to pay are identified. In the final section, through the discussion and results section, the obtained findings are interpreted in the context of broader

trends in sustainable urban mobility, compared with the works of domestic and foreign authors, and concluding recommendations are made for the integration of environmentally friendly transport solutions into the logistics system of the city of Zadar.

2. Materials and Methods

The research was conducted in Zadar, a central Mediterranean port on the Croatian Adriatic coast. Zadar was chosen as the study location because it has experienced significant growth in cruise tourism in recent years, which has led to increased road traffic congestion and air pollution in the historic city center. According to the Zadar Port Authority, the number of cruise ship passengers increased from 174,615 in 2023 to 248,462 in 2024, making Zadar one of the fastest growing ports in the Adriatic Sea. The proposed electric tram route should connect the port of Gaženica with the historic city center, the so-called Peninsula, which should reduce road traffic, congestion and greenhouse gas emissions. This is an empirical study using the contingent valuation method (CVM) to estimate the willingness of cruise ship passengers to pay for sustainable urban mobility. The research is based on a two-phase, two-site, face-to-face survey conducted over two seasons (summer 2023 and summer 2024) at two locations: the port of Gaženica and the historic center of Zadar. The two-phase design allowed for data collection over different time periods to ensure sample representativeness and capture variations in passenger behavior over the season.

Contingent valuation is a non-exposure economic valuation method used to estimate the value of public goods and services that are not market-valued. In this study, CVM was used to estimate passengers' willingness to pay (WTP) for an electric tram that would connect the port with the city. The survey instrument is based on a double-bounded dichotomous choice (DBDC), which is the recommended design for CVM studies because it increases statistical power and reduces biased responses.

The survey instrument consisted of three main parts: 1) introduction: participants were first informed about the current traffic situation in Zadar, including data on the number of passengers, travel time from the port to the city center, road congestion and air pollution. A visualization of the proposed tram route was shown with a description of its characteristics (electric propulsion, speed, frequency, travel time frames). 2) sociodemographic and psychographic variables section: After the introduction, participants answered questions about sociodemographic characteristics (gender, age, education, monthly net income, number of family members), experience with cruising trips (number of previous cruises), planned transportation to the city center, travel group size, transportation costs in the last port, cruising costs per person, perception of experience with current transportation, perception of experience with electric tram infrastructure, and expectations for sustainable mobility. 3) contingent valuation section (DBDC design): participants were asked the initial question: "Would you be willing to pay €X for a one-way electric tram ride from the port of Gaženica to the center of Zadar?" where €X was a randomly assigned starting bid from a set of five bids: €0.50, €1.00, €2.50, €4.00, €7.00, €10.00, €14.00 and €20.00. The starting bids were calibrated based on a pre-test comparing existing public transport prices in Zadar and similar Mediterranean ports. Depending on the answer to the initial question, if the participant answered "YES", another question was asked with twice the offer (€2X), and if the participant answered "NO", another question was asked with twice the offer (€X/2).

This two-phase approach resulted in four possible response patterns:

- YES-YES: Willingness to pay $\geq$ higher offer;
- YES-NO: Willingness to pay between lower and higher offer;
- NO-YES: Willingness to pay between lower and initial offer;
- NO-NO: Willingness to pay $\leq$ lower offer.

The survey was conducted at two locations: (1) in the port of Gaženica and (2) in the historic center of Zadar during passenger disembarkation. The two-location location enabled data collection from passengers from different cruise companies, which could have influenced their willingness to

pay responses. A total of 280 cruise ship passengers were surveyed over two seasons. The sample was collected using a random sampling method where interviewers randomly approached passengers at both locations during different times of the day to minimize selection bias. Also, initial bids (BID values) were randomly assigned to participants. During data collection, interviewers were trained in standardized survey administration to minimize interviewer effects. All interviews were face-to-face, which allowed interviewers to explain visual materials and clarify unclear questions. Perception questions were supported by graphical representations and measured on a 1-3 scale, e.g., for the question on perception of experience with electric tram infrastructure 1 = “I prefer walking/cycling/driving to the center”, 2 = “There will be less traffic on the roads”, 3 = “I can’t wait to ride the electric tram”). There is no missing data in the analytical sample as interviewers ensured that all responses were completed before the interview was completed.

Primary WTP estimates were obtained from binary logistic regression where the dependent variable was the binary response to the CVM question (1 = “YES, I am willing to pay”, 0 = “NO, I am not willing to pay”), and independent variables included

- BID2: Amount of the second bid (€),
- Transport costs at the last port: Transport costs paid by passengers at the last port before Zadar, measured in €
- Perception of the electric tram experience: Ordinal variable on a scale of 1-3
- Number of family members: Number of people in the travel group,
- First time on a cruise: Binary variable (1 = first time, 0 = not first time)
- Gender: Binary variable (1 = male, 0 = female)

All statistical analyses were performed using SPSS (IBM, Armonk, NY, USA) for binary logistic regression and R Studio for bivariate models and Turnbull limits. The statistical significance level was set at $\alpha = 0.05$. All results are presented with 95% confidence intervals where applicable. The model was estimated using maximum likelihood estimation.

3. Results

Binary logistic regression was used to model travelers’ willingness to pay as a function of offered price and sociodemographic variables. The model showed an excellent fit to the data (Nagelkerke $R^2 = 0.384$, Hosmer-Lemeshow test $\chi^2 = 11.492$, $p = 0.175$), indicating that the model is not statistically significantly different from the data. The overall classification accuracy of the model was 73.5%.

The coefficient on the variable BID2 was negative and statistically significant ($\beta = -0.228$, $SE = 0.033$, $p < 0.001$), which confirms the law of demand and validates the contingent valuation design. This value indicates that each additional euro of the offer is associated with a decrease in the log-odds of willingness to pay by 0.228 units. The transport costs at the last port were positively and statistically significantly associated with willingness to pay ($\beta = 0.035$, $SE = 0.013$, $p = 0.008$), suggesting that passengers who have already experienced higher transport costs show a higher willingness to pay for the tram. The perception of the experience with the electric tram infrastructure was positively associated with willingness to pay and statistically significant ($\beta = 0.517$, $SE = 0.257$, $p = 0.045$), indicating that more positive attitudes towards the tram predict higher willingness to pay. The control variables, number of family members ($\beta = 0.138$, $SE = 0.127$, $p = 0.275$), cruise experience ($\beta = 0.319$, $SE = 0.371$, $p = 0.390$) and gender ($\beta = 0.264$, $SE = 0.345$, $p = 0.444$) were not statistically significant predictors of willingness to pay. The binary logistic regression results are presented in Table 1.

Table 1. Binary Logit Model Coefficients.

Variable name	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
BID2	-.228	.033	47,114	1	<.001	.796	.746	.850

Transport cost at last stop	,040	,014	7,811	1	,005	1,041	1,012	1,071
Perceived experience with electric tram infrastructure	,517	,257	4,030	1	,045	1,676	1,012	2,776
Number of family members*	,138	,127	1,193	1	,275	1,148	,896	1,472
First time on a cruise*	,319	,371	,739	1	,390	1,376	,665	2,850
Gender*	,264	,345	,586	1	,444	1,302	,663	2,558
Constant	-,185	,794	,055	1	,815	1,204		

* Variable(s) entered on step 1: Number of family members, First time on a cruise, Gender.

The mean willingness to pay of passengers for a single trip by electric tram from the port of Gaženica to the center of Zadar was €11.88 per passenger (95% CI: €7.69–€16.07). This estimate was calculated using Equation (1) [14]:

WTP = - (Intercept + ∑β_i×X_i/β_{BID}), (1)

where WTP is a binary willingness to pay variable (1 = yes, 0 = no), β_i×X_i is the product of the regression coefficients of the variables in the model and their average values, β_{BID} represents the regression coefficient of the BID variable. The 95% confidence interval was calculated using the delta method, with a coefficient of variation of 0.1798 (17.98%). The relatively narrow confidence interval (range of €8.38) indicates good precision of the estimate. The aggregate annual economic value of the proposed electric tram infrastructure was estimated by multiplying the mean willingness to pay by the effective cruising passenger population. The average number of annual cruise passengers in Zadar for 2023 and 2024 was 211,539 (average of 174,615 in 2023 and 248,462 in 2024 according to the Zadar Port Authority). After adjusting for a non-response rate of 20.35%, the effective population was 168,491 passengers per year. The aggregate annual willingness to pay was €2,002,122 (95% CI: €1,296,362–€2,707,883). This value represents the total economic value that cruise passengers attribute to the electric tram infrastructure. The lower bound of the confidence interval of €1,296,362 represents a conservative estimate, while the upper bound of €2, 707,883 represents a liberal estimate of the value.

3.1. Robustness Check

As a robust check of the parametric estimation, the Turnbull nonparametric method was applied, which does not assume a specific shape of the distribution of willingness to pay. The results show three different estimates: Turnbull with BID1 only (€15.95), Turnbull with BID1 and BID2 intervals (€7.40), and a parametric estimate (€11.88). The fact that the parameter estimate falls exactly between the two Turnbull estimates suggests that this is a reasonable and robust estimate. The difference between the Turnbull versions illustrates the importance of using all available information from the double-bounded design. Additionally, the spike at zero WTP of 2.69% (NO-NO answers) indicates a minimal number of protest votes, which suggests that the respondents were serious in their answers and that there is not a significant number of respondents who rejected the offer for reasons of principle instead of a real unwillingness to pay.

Potential starting-point bias where the initial offer could influence the respondent’s decision was tested by including dummy variables for BID sets €2, €5, €7 and €10 (with BID set €1 as the reference category). The test showed no evidence of starting-point bias in this analysis. The Wald test shows that no BID set has a statistically significant coefficient (all p-values are around 1.000), indicating that the initial offer had no significant impact on the probability of acceptance. This result is positive because it suggests that the respondents made their decisions based on real willingness to pay and not based on anchoring to the initial offer.

To test the robustness of the parametric estimates, a bivariate logit model using Generalized Estimating Equations (GEE) with an exchangeable correlation structure was applied. The analysis was conducted in the R Studio programming environment using the geepack package. This approach allows modeling the within-respondent correlation between the first and second responses, which is

especially important in a double-bounded dichotomous choice (DBDC) design where the same respondent gives two responses.

The data were first transformed from wide format to long format, with each respondent having two rows - one for the first response (WTP1) and one for the second response (WTP2). The model was specified with BID values as the main variable of interest, with the inclusion of control variables: transportation costs at the last stop, perceived experience with the electric tram infrastructure, gender, number of family members, and first-time cruise status. The correlation structure was set to exchangeable, which assumes that the correlations between the two responses are the same for all respondents.

The results of the bivariate GEE model show that the BID coefficient is $\beta = -0.2889$ ($p < 0.001$), which confirms the law of demand and is consistent with the parametric model. The estimated correlation parameter ($\alpha = 0.0571$) indicates a very weak positive correlation between the first and second answers, which suggests that the respondents were relatively consistent in their decisions, but that there was no strong dependence between the two answers. This weak correlation can be explained by the fact that the second BID was often significantly different from the first, leading to relatively independent decisions.

The mean willingness to pay calculated from the bivariate model is €11.70, which is almost identical to the parametric estimate of €11.88 (a difference of only €0.21 or 1.8%). This result confirms the robustness of the parametric model and shows that the conclusions about the willingness to pay of commuters for the electric tram are stable regardless of the model specification. The fact that the bivariate model, which explicitly models the correlation between responses, gives an almost identical estimate as the parametric model, suggests that the parametric approach was appropriate and that the control variables properly captured the heterogeneity in respondent preferences.

In conclusion, the bivariate GEE approach confirmed the validity of the parametric model and that there is no evidence that the inclusion of an explicit correlation structure would significantly change our conclusions about willingness to pay. This robustness check further enhances confidence in the study results.

4. Discussion and Conclusion

The results of this study show that cruise tourists in Zadar showed a significant willingness to pay for an electric tram that would connect the port of Gaženica with the historic city center. The mean willingness to pay estimate of €11.88 per passenger (95% CI: €7.69–€16.07) represents a valid monetary signal for investments in sustainable urban mobility in the context of port tourism. This estimate is consistent with previous research in Croatia that has shown that visitors and residents are willing to pay for improvements in environmental quality and living standards, as shown by Opačak and Wang in their studies of the value of urban improvements. The negative and statistically significant coefficient of the BID variable ($\beta = -0.228$, $p < 0.001$) confirms the fundamental economic principle of the law of demand and validates the design of the contingent valuation method. This result shows that each additional euro of supply is associated with a decrease in the log-odds of willingness to pay by 0.228 units, which is in line with theoretical expectations and previous empirical findings in CVM studies. The positive and statistically significant effect of transport costs at the last stop ($\beta = 0.035$, $p = 0.008$) suggests that passengers who have already experienced higher transport costs show a higher willingness to pay for the tram. This finding is theoretically logical because passengers who have paid more for transport at previous stops have a better sense of the value of transport services and are more willing to pay for a better-quality alternative. This variable acts as a proxy for the “transport sensitivity” of passengers and shows that the experience with transport costs is a key factor in the formation of preferences.

The perception of the experience with the electric tram infrastructure ($\beta = 0.517$, $p = 0.045$) turned out to be a statistically significant predictor of willingness to pay. Passengers who had more positive attitudes towards the tram were more willing to pay for this service. This result is in line with the theory of planned behavior, which suggests that attitudes and perceptions are key factors in shaping

behavioral intentions. In the context of sustainable urban mobility, this finding has important implications: educating passengers about the benefits of electric trams (lower emissions, shorter travel times, less congestion) can significantly increase their willingness to pay. Control variables such as number of family members ($\beta = 0.138$, $p = 0.275$), cruise experience ($\beta = 0.319$, $p = 0.390$) and gender ($\beta = 0.264$, $p = 0.444$) did not show statistical significance. This result suggests that sociodemographic characteristics are not the primary factors determining willingness to pay for trams. Instead, economic factors (transport costs) and environmental attitudes (perception of trams) are more crucial factors. This is important because it shows that willingness to pay for sustainable mobility is relatively universal across different demographic groups of passengers.

Three complementary robustness checks conducted in this study further confirm the validity of the parameter estimates and show that the results are stable regardless of model specification. The application of the Turnbull nonparametric method, which does not assume a specific shape of the distribution of willingness to pay, showed that the parameter estimate falls exactly between the two Turnbull estimates, suggesting that it is a reasonable and robust estimate. The difference between the Turnbull versions illustrates the importance of using all available information from the double-bounded design. The version with BID1 can only be biased because it ignores information from follow-up responses, while the version with BID1 and BID2 intervals uses all available information. Parametric estimation, which includes control variables, provides an estimate that balances between conservative and liberal approaches.

Potential starting-point bias, where the initial offer could influence the respondent's decision, was tested by including dummy variables for BID sets €2, €5, €7 and €10 (with BID set €1 as the reference category). The Wald test showed no evidence for starting-point bias in this analysis - no BID set had a statistically significant coefficient (all p-values around 1.000). This positive result suggests that the respondents made their decisions on the basis of real willingness to pay, and not based on anchoring to the initial offer. This is important because it validates the integrity of the data and shows that the study design was effective in avoiding this common source of bias. To test the robustness of the parameter estimates, a bivariate logit model was applied using Generalized Estimators of Equations (GEE) with variable correlation structure. The analysis was performed in the R Studio programming environment using the geepack package. This approach enables the modeling of intra-respondent correlation between the first and second answers, which is especially important in a double-bounded dichotomous choice design where the same respondent gives two answers.

The results of the bivariate GEE model show that the BID coefficient is $\beta = -0.2889$ ($p < 0.001$), which confirms the law of demand and is consistent with the parametric model. The estimated correlation parameter ($\alpha = 0.0571$) indicates a very weak positive correlation between the first and second answers, which suggests that the respondents were relatively consistent in their decisions. The mean willingness to pay calculated from the bivariate model is €11.70, which is almost identical to the parametric estimate of €11.88 (a difference of only €0.21 or 1.8%). This result confirms the robustness of the parametric model and shows that the conclusions on willingness to pay are stable regardless of model specification. The fact that the bivariate model, which explicitly models the correlation between responses, gives an almost identical estimate as the parametric model, suggests that the parametric approach was appropriate and that the control variables properly captured the heterogeneity in respondent preferences. A spike at zero WTP of 2.69% (NO-NO answers) indicates a minimal number of protest votes. This suggests that the respondents were serious in their answers and that there is not a significant number of respondents who rejected the offer for reasons of principle rather than a real unwillingness to pay. This finding is positive because it shows that the data is of good quality and that there are no major problems with protest votes that could distort the results.

The results of this study have important implications for the policy of sustainable urban mobility in Zadar and other Mediterranean ports. First, the monetary estimate of €11.88 per passenger represents a concrete basis for the financial analysis of the electric tram project. If applied to an effective annual population of 168,491 passengers, the annual aggregate willingness to pay is

€2,002,122 (95% CI: €1,296,362–€2,707,883). This value can be used as a basis for evaluating the costs and benefits of the project and for determining the optimal level of fees that should be charged to passengers. The positive impact of the perception of the experience with the tram infrastructure suggests that education and communication with passengers is key to increasing acceptance and willingness to pay. Port authorities and city governments should invest in information campaigns that highlight the advantages of electric trams - lower emissions, faster travel, less congestion. This study shows that passengers who have a better sense of the advantages of the tram are more willing to pay for the service.

The finding that transport costs at upstream stations positively affects willingness to pay suggests that a coordinated approach to transport policy is needed in Mediterranean ports. Passengers who have paid more at upstream stations may be demotivated if they must pay extra in Zadar. It is therefore important for port authorities to consider strategies to make the tram affordable and attractive, perhaps through subsidies or cruise packages. This study shows that Zadar is an ideal location for a pilot project of an electric tram. Circular passengers showed a significant willingness to pay, suggesting that the project could be financially viable. Zadar, as noted by Jurčević et al., is an example of a port that strategically relocated its terminal to Gaženica, which created a new logistical challenge. An electric tram could be a solution that simultaneously reduces emissions and improves mobility.

Zadar differs from other key Croatian ports such as Dubrovnik and Split. While Dubrovnik faces extreme pedestrian congestion within its historic walls, and Split has a port in the very heart of the city, Zadar strategically relocated its passenger terminal to Gaženica. This decision reduced the direct pressure of ships on the historic peninsula but created a new logistical challenge: the need for efficient, sustainable and environmentally friendly passenger transport on the 3.5 km route between the terminal and the city center. This specific situation makes Zadar a “living laboratory” for investigating how specific logistics infrastructure affects the perception of the value of sustainable mobility. The results of this study can be applied to other Mediterranean ports facing similar challenges. Studies on the logistics of Croatian ports, such as those by Jurčević et al., show that such a dislocation requires advanced urban mobility solutions to avoid creating new “bottlenecks” in urban transport.

Although this study provides important insights into the willingness to pay of commuters for an electric tram, there are several limitations that should be considered when interpreting the results. First, the study was based on a hypothetical scenario. Respondents were asked to imagine a situation in which they would have to pay for a tram that did not exist. Although the CVM method is standard for evaluating public goods that are not market-valued, there is a possibility that passengers’ actual decisions would differ from their hypothetical responses. This difference between hypothetical and actual behavior is known as “hypothetical bias” and can lead to overestimation of willingness to pay. Second, the study was conducted in only two locations (the port and the city center) and in only two seasons (summer 2023 and summer 2024). These limitations may affect the representativeness of the sample. Commuters arriving in the summer may have different characteristics than those arriving in other seasons. Additionally, passengers interviewed at the port may be different from those interviewed in the city center.

Third, the study only included cruise tourists, not residents or other types of tourists. Local residents may have different preferences and willingness to pay than cruise passengers. This perspective should be included in future research to gain a more comprehensive view of public support for the tram. Fourth, the study did not consider the possibility that passengers might use alternative modes of transport (bus, taxi, walking, cycling). The actual demand for the tram may be lower than the estimated willingness to pay if low-cost alternatives are available. Fifth, the study used a relatively small sample of 223 respondents (after data cleaning). While this is satisfactory for CVM studies, a larger sample could provide more precise estimates. This study opens several important directions for future research in the field of sustainable urban mobility and port tourism. A longitudinal study should be conducted to track actual use of the tram after it is built. This study

could test the hypothesis of “hypothetical bias” and show how much actual behavior differs from hypothetical responses. In addition, a longitudinal study could show how preferences change over time and how the tram experience affects passenger satisfaction. The study should be extended to include residents and other types of tourists (other than commuters). This perspective could show whether there is a consensus among different user groups on the value of the tram, or whether different groups have different preferences. An analysis of alternative scenarios should be carried out that would include different prices, frequencies and tram features. This analysis could show how passengers are sensitive to different aspects of the service and which combination of features would be optimal. A study should be carried out to analyse the impact of the tram on air quality, noise and congestion in the city. This study could show the real external benefits of the project and be used to assess the overall value of the investment. A comparative study between different Mediterranean ports should be carried out to understand how preferences for sustainable mobility differ between different cities and regions. This study could provide insights that would be applicable to a wider geographical area. A study should be conducted that would analyze the impact of different communication strategies on the perception and willingness to pay for the tram. This study could show how education and information campaigns can be used to increase public support for sustainable transport projects.

This study shows that cruise passengers in Zadar showed a significant and robust willingness to pay for an electric tram connecting the port of Gaženica with the historic city center. The mean estimate of €11.88 per passenger, confirmed through three complementary robustness checks (Turnbull nonparametric method, starting-point bias test, and bivariate logit model), represents a valid monetary signal for investments in sustainable urban mobility in the context of port tourism. The results show that economic factors (transport costs) and environmental attitudes (perception of the tram) are more crucial factors than sociodemographic characteristics in shaping willingness to pay. This study also shows that Zadar is an ideal location for a pilot electric tram project, given the significant willingness to pay and the specific logistical situation where the terminal was relocated to Gaženica. The implications of this study extend beyond Zadar. In the context of the broader discourse on sustainable tourism development, this study shows that it is possible to quantify the monetary support of passengers for low-emission urban mobility. This value can be used as a basis for financial analysis of the project and for determining the optimal level of compensation. In addition, the study shows that education and communication with passengers are key to increasing acceptance and willingness to pay for sustainable transport solutions. We conclude that an electric tram between Gaženica and Poluotok is not only technically feasible, but also a financially viable option that is supported by a significant willingness to pay from cruise passengers. The implementation of this project could be an example of how port authorities and city governments can use economic values to shape sustainable urban mobility policies. In the context of climate change and increasing pressures on urban centers, this study shows that passengers are willing to pay for solutions that reduce emissions and improve the quality of life in cities.

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Abbreviations

The following abbreviations are used in this manuscript:

WTP	Willingness to pay
CVM	Contingent valuation method
DBDC	Double-bounded dichotomous choice

BID A price of a tram ticket for which a cruise tourist is willing to pay
 GEE Generalized Estimating Equations

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