Available online at www.sciencedirect.com

ScienceDirect

Transportation Research Procedia 33 (2018) 251–258

Transportation Research Procedia

www.elsevier.com/locate/procedia

XIII Conference on Transport Engineering, CIT2018

Citizens' survey for the implementation of a new means of transport

Francisco Calvo-Poyo[a,*], Susana Freiria[b], Adriana Medialdea[a], António Antunes[b]

[a]TRYSE-University of Granada, Campus de Fuentenueva, Granada 18071, Spain
[b]CITTA-University of Coimbra, R. Luis Reis dos Santos 290, 3030-788 Coimbra, Portugal

Abstract

Between 2017 and 2018, a survey was carried out in Coimbra (Portugal) on the implementation of a new mass transport system. The analysis of this survey looks into the opinion regarding two key questions: the need for this new mode of transport, and how much support is behind investing to implement. The application of Ordered Logit Models has led to identify the variables that best explain the answers to these key questions. Moreover, the marginal effects of these variables were calculated, and the conditions increasing a tendency to answer contrary opinions (agreement/disagreement) to the key questions were identified. Finally, the working hypothesis —that if the new means of transport is considered necessary, then the investment is supported— was confirmed.

Keywords: mobility, public transport, busway

1. Introduction

Traditionally, planning for public transport infrastructures in cities has taken place in technical meeting rooms, and entailed cost/benefit analysis techniques (Bickerstaff et al, 2002). In recent years however, and perhaps because of the economic crisis, regular citizens make very frequent mention of the pros and cons of public transport projects (Papagiannakis et al, 2017). After all, the citizens are the ones most affected by such projects: their everyday lives may improve (easier to commute and improved urban setting) or suffer (poor integration of the public transport infrastructures and high consumption of scarce public resources) as a consequence.

* Corresponding author. Tel.: +51202 - 958 249 452
E-mail address: fjcalvo@ugr.es

10.1016/j.trpro.2018.10.100

Given this context, it may be worthwhile to analyze the opinion of citizens regarding these projects, with a twofold focus: on the use of public funding, and on the appropriateness of such transport projects for the city and the mobility needs of its inhabitants. This type of analysis could be very useful for the authorities responsible for planning public transport, since it provides them with feedback from citizens who, after all, are the real public transport payers and users (Chowdhury et al, 2018).

The relevance of public transport and its infrastructures on daily life in cities has been frequently addressed in the literature. A great number of studies analyze the quantitative economic effects of diverse infrastructure projects involving public transport, such as those by Polzin (1999), Knaap et al. (2001), Cervero and Duncan (2002), Pucher and Renne (2003), Kahn (2007), and Goetz et al. (2010). The possible effects that such actions may have on demographics or urban society in places where public transport has a leading role have also been explored (Atkinson, 2000; Newman and Ashton, 2004; Chapple, 2009; Podagrosi and Vojnovic, 2009; Calvo et al., 2013a; Calvo et al., 2013b). Given the relevance of local transport systems, their influence on daily life, and the economic burden they may entail, some authors developed works about the process of implanting new means of transport in cities. In 1996, Edwards and Mackett examined the decision-making process for planning new urban public transport systems in the UK by studying 11 new and planned systems, relating the objectives of building the systems to transport and development issues. A number of key factors were taken into account during the decision-making process: forecast demand, image, deregulation of buses, technological innovation, private sector involvement and the funding mechanism. However, the authors finally realized that the rational planning/decision process was not considered, due to the limitations coming from the existent political framework. Since then, many other particular cases have been explored. Kato et al. (2008) analyzed the policy-making process in the Toyama light rail transit LR transit project, and discussed the role of policy process management in a public transit project —in this case unveiled through intensive interviews with local stakeholders. Three factors influencing the successful introduction of LR were therefore addressed from the viewpoint of policy management: technology and topography, financial resources, and policy process management. Meanwhile, some authors began to consider more subjective variables, such as the opinion or perception of citizens with respect to public transport and its infrastructures, even in terms of quality of life. In a study carried out by Fan and Guthrie (2009), the local social effects of public transport improvements were studied by asking citizens how transport had improved their neighborhoods. The results proved useful to segment the types of zones where perceptions were more positive, and to study the characteristics of those citizens who best perceived transport improvements. Regarding citizens' perception of the funding behind public transport infrastructures, the study by Mostafavi et al. (2014) evaluated the perception of citizens on public infrastructures in general (not just transport); but in this case the innovative focus was on the financing possibilities involved. The review by Agrawal (2015) took in 56 surveys in order to determine which queries were more closely related with perceptions of public transport. Four topics were found to stand out: the reasons why people support public transport, its quality, the importance given to it, and people´s opinion about the way in which taxes should be used to finance public transport. In sum, there is growing interest in the opinion of citizens about public transport and the inclusion, in some cases, of aspects related with investment (financing and tax expenditure).

The case study here presented is focused on a new urban transport system that arose in Coimbra in 1996, via the creation of a public company named Metro Mondego. In 2011, while studies on the urban line were still underway, and the tenders for its construction on the verge of being launched, the Mondego Metro project was canceled. At that time, 107 million euros had already been invested in the project (Nunes, P., 2016). A study was carried out in 2013 to estimate how much investment was required to complete Metro Mondego. The answer: 295.1 million euros. Finally, a new study in 2015 propose to change the projected LR to a hybrid or electric bus system with automatic guidance, called a "Busway". The investment for finishing the project was accordingly estimated at 90 million euros (LNEC, 2017). In 2017, the works were still at a halt.

In the light of current developments, it appeared important to determine the opinion of the population regarding the latest plans for the new means of transport meant to improve mobility in Coimbra. An online survey was conducted among the students and workers of the University of Coimbra. The number of valid and complete surveys collected amounted to 676, the survey sample was defined based on the University census. Considering the tense situation in Coimbra regarding implementation of a new means of local transport, two specific questions for expressing from agreement to disagreement were formulated on a Likert scale: "I think the Busway is necessary", and "I support the investment of public money —estimated at 90 million euros— for the Busway"). Unlike several works developed so far, the survey here presented is not only focused on the economic component, but also on the

social well-being. Public participation should serve to improve transport planning, and to increase the citizens quality of life.

2. Methodology

Due to the design of the survey, all the variables included in the study are categorical. These variables are related to opinions about the new means of transport, public transport habits of use, and socio-economic characteristics of the population (age, gender, educational level, etc.). For data treatment, the original Likert 5-point scale responses (1=total disagreement, 2=disagreement, 3=neutral opinion, 4=agreement, 5= total agreement), was reduced to a 3-point scale (1=disagreement, 2=neutral opinion, 3=agreement) in order to simplify computation as well as the results, while giving a higher significance between opposite positions (Jeong, 2016). Due to the existence of ordinal variables, Ordered Regression Models (ORM) are indicated for analyzing this kind of data, as stated in the bibliography: Cardamone et al., (2016, 2017) and Eboli and Mazzulla (2009) for analyzing transport transit services quality, and de Oña et al., (2014) for a road safety study. There are two methods within the ORM: the Ordered Logit Models (OLM) and the Ordered Probit Models (OPM). In the present study, both models were adjusted and compared via the AIC (estimator for the relative quality of the models), obtaining better results for the OLM. For an ordinal dependent variable Y with N categories and M independent variables, the OLM can be expressed as:

$$logit[P(Y \leq j)] = \alpha_j + X_i\beta_j + \varepsilon_j \tag{1}$$

The interpretation of coefficient is not straightforward, it being necessary to perform a transformation:

$$P(Y \leq j) = \frac{\exp(\alpha_j + X_i\beta_j)}{1 + \exp(\alpha_j + X_i\beta_j)}, \quad j = 1,2,\dots,N-1, i = 1,2,\dots,M, \tag{2}$$

where $P(Y_i \leq j)$ is the cumulative probability of being in the category j or lower versus being in categories above it. For that reason, the probability of being in the highest level is:

$$P(Y_i \leq N) = 1 \tag{3}$$

Thus, the probability of being in a particular category would be:

$$P(Y = j) = P(Y \leq j) - P(Y \leq j-1) \tag{4}$$

Besides the marginal effects of variables, it is also interesting to determine how the probability of occurrence of a particular event differs depending on the independent variable. This, in practice, reveals the strength of association between the dependent and independent variable. This quantity, known as odds ratio, plays an important role in logistic regression and particularly in OLM. To arrive at the odds ratio it is necessary first to define the odds of a given event (5), which is the occurrence probability of that event with respect to the probability of that event not happening:

$$odds = \frac{P(Y \leq j|X = i)}{P(Y > j|X = i)} \tag{5}$$

The odds ratio (6) ranges from 0 to infinity. When the odds ratio falls in the interval $[0,1)$ it indicates a lower risk of occurrence respecting to the reference category; on the contrary, values in the interval $(1,\infty)$ indicate a higher risk of occurrence. If the odds ratio is equal to one, it indicates no risk (i.e. no relationship between the two variables). Within the context of OLM, odds ratios use pairs of categories for one variable to be conditioned to all the higher (or lower) categories of the dependent variable.

$$odds.ratio = \frac{P(Y \leq j|X = i)P(Y > j|X = k)}{P(Y > j|X = i)P(Y \leq j|X = k)}, \qquad k = 1,2,\dots,M;\ i \neq k \tag{6}$$

In the context of this study, the dependent variable has three response categories; the two odds ratios to take as reference, accordingly, would be the following: 1) odds of an Agreement (A) response versus the combined Neutral (N) and Disagreement (D) responses of the dependent variable. 2) odds of a Disagreement (D) response versus the combined Neutral (N) and Agreement (A) responses of the dependent variable. Then, for each independent variable, the odds ratios will be calculated for each category of the variable, in relation to the reference category (neutral opinion).

3. Results and discussion

To analyze opinions regarding the two main questions of the survey, two OLM were developed; then the marginal effects of the variables were calculated and, finally, the odds ratio was applied.

The first OLM refers to the question: "I think the Busway is necessary". Table 1 presents the results for OLM, including the coefficient estimates, standard error and p-values to contrast the statistical significance of each coefficient. Table 1 shows that the most influencing variables on the response to the question asking about the necessity of the Busway are: the opinion regarding the construction works period, the commercial activity promotion in the area, the necessary investment for the Busway, and the consideration of oneself as a potential user. Results show that the strongest opinions are related investment support, higher than other variables such as works inconvenience. Table 2 show the marginal effect of each variable for each level of response.

Note: Residual deviance: 660.3109, AIC: 680.3109
Note: levels (D: disagreement, N: neutral, A: agreement); conditioning (D|N: disagreement vs. neutral, N|A: neutral vs. agreement).
Note: signif. codes (<0.001 (***); <0.01 (**), <0.05 (*), ≥0.05 (.))
Table 1. Busway implementation necessity: model adjustment results

			Value	Std.	P value
Intercepts (α_j)		**D|N**	-1.4428	0.3197	***
		N|A	0.6485	0.3059	*
Coefficients (β_j)	Works inconvenience acceptance	**D**	-0.6889	0.3107	*
		A	0.7842	0.2538	**
	Commercial activity promotion	**D**	-0.9829	0.3423	**
		A	0.6913	0.2418	**
	BU investment support	**D**	-1.0307	0.2743	***
		A	1.7420	0.3040	***
	BU potential user	**D**	-0.7297	0.2923	*
		A	0.5253	0.2744	.

Note: levels (D: disagreement, N: neutral, A: agreement)
Table 2. Busway implementation necessity: marginal probabilities

	Levels	D	N	*A*
Works inconvenience acceptance	**D**	0.15	**0.44**	0.41
	N	0.08	0.34	**0.58**
	A	0.04	0.21	**0.75**
Commercial activity promotion	**D**	0.19	**0.46**	0.35
	N	0.08	0.33	**0.59**
	A	0.04	0.22	**0.74**
BU investment support	**D**	0.23	**0.48**	0.29
	N	0.1	0.36	**0.54**
	A	0.02	0.11	**0.87**
BU potential user	**D**	0.14	0.42	**0.44**
	N	0.07	0.31	**0.62**
	A	0.04	0.22	**0.74**

Table 2 indicates that the dependent variable is more likely to adopt neutral or favorable values (more often) regardless of the values adopted by the independent variables. This can be interpreted as the existence of a neutral or favorable opinion (the latter prevailing) about the implementation of the Busway in Coimbra. In particular, if the opinion about the independent variable is disagreement, there will be a greater probability of expressing a neutral opinion regarding the dependent variable. On the other hand, if the opinion about the independent variable is neutral or agreement, there will be a greater probability of expressing a favorable opinion about the dependent variable.

This happens in all cases, except for the question *BU potential user*, where independently of the answer, a favorable opinion regarding the dependent variable is more likely. The probability of considering the Busway implementation necessary takes higher values when the answers to the questions of the survey express favorable opinions about different aspects of the Busway project. Therefore, an acceptance of the works period, thinking that the Busway will promote the commercial activity, supporting the investment and seeing oneself as a potential user, increase the probability of considering the Busway as necessary above 73%. Moreover, as mentioned above, a neutral opinion regarding the independent variables also leads to a higher probability of expressing//accepting the need of the Busway (above 54%). Next, according to the dependent variable categories, two odds ratios were calculated (Table 3): neutral and disagreement against agreement $(OR \rightarrow D)$, and neutral and agreement against disagreement $(OR \rightarrow A)$. These odds ratios are proportional $(OR \rightarrow D) = 1/(OR \rightarrow A)$, meaning that the tendency of the respondent to express agreement versus disagreement or viceversa can be compared. According to Table 3, when considering the comparison between favorable and unfavorable opinions with respect to the necessity of the Busway, it can be said that: 1) the probability that a respondent who supports the investment of public money in the Busway tends to consider its implementation necessary is 5.7 times greater than the probability of an individual who does not support the investment; 2) a respondent who considers that is worth supporting the works period tends to consider the Busway as necessary with a probability 2.2 times greater than another one who thinks it is not worth it; 3) a respondent who considers that the Busway will promote commercial activity in the area tends to consider the Busway as necessary with a probability twice as great as another who believes otherwise; 4) a respondent who sees himself as a potential user tends to consider the Busway necessary with a probability 1.7 times greater than another one who does not see him/herself as a potential user. The second OLM refers to the question: "I support the investment of public money (estimated at 90 million euros) for the Busway". The results of adjustment appear in Table 4.

Note: levels (D: disagreement, N: neutral, A: agreement); conditioning (D|N: disagreement vs. neutral, A|N: agreement vs. neutral, A|D: agreement vs. disagreement).

Table 3. Busway implementation necessity: odds ratios

	Levels	OR → *D*	OR → *A*
BU investment support	**D|N**	0.36	2.80
	A|N	0.06	16.00
	A|D	0.17	5.71
Works inconvenience acceptance	**D|N**	0.50	1.99
	A|N	0.23	4.36
	A|D	0.46	2.19
Commercial activity promotion	**D|N**	0.37	2.67
	A|N	0.19	5.33
	A|D	0.50	2.00
BU potential user	**D|N**	0.48	2.07
	A|N	0.28	3.51
	A|D	0.91	1.69

Table 4 shows that the most influencing variables on the support of the investment for the Busway are: the opinion regarding the works period, the commercial activity promotion in the area, the Busway necessity, the adequacy of the LR to the route, the consideration of oneself as a potential user, and gender. Regarding this question, the maximum marginal effects of the variables are dispersed among the three degrees of investment support (Table 5). In three cases (opinion regarding the works period, Busway necessity, and the consideration of oneself as a potential user), it is observed that the maximum marginal effects correspond to cases in which the degree of agreement with respect to the independent variable is equal to that of the dependent variable (i.e. when disagreeing with the independent variable, there is a higher probability of disagreeing with the dependent variable, and so for the other two levels). In particular, the cases that most increase the likelihood of supporting the investment are: agreeing that is worthwhile to withstand the works period (46%), considering that the Busway will promote commercial activity (41%), considering the Busway necessary (0.56%), having a neutral opinion regarding the suitability of LR to the Busway route (54%) and being a woman (43%). On the contrary, the cases that most increase the probability of not supporting the investment are: not considering it worthwhile to support the works period (41%), not considering the Busway necessary (72%) and not being a potential user (54%). Table 6 presents

the odds ratios for each variable. As for the previous model, two comparisons between lower and higher levels regarding all possible combinations of each two levels of independent variables are made.

Residual deviance: 759.9453, AIC: 785.9453
*Note 1: levels (M: male, F: female); conditioning (D|N: disagreement vs. neutral, N|A: neutral vs. agreement). Note 2: signif. codes (<0.001 '***', <0.01 '**', <0.05 '*' , ≥0,05 '.')*
Table 4. Busway investment support: model adjustment results

			Value	Std. Error	P value
Intercepts (α_j)		**D|N**	0.2353	0.4109	.
		N|A	2.1009	0.4264	***
Coefficients (β_j)	Route adequacy LR	**D**	-1.2452	0.3845	**
		A	-0.7112	0.3376	*
	Works inconvenience acceptance	**D**	-0.4800	0.3832	.
		A	0.8570	0.2390	**
	Commercial activity promotion	**D**	0.3125	0.4010	.
		A	0.7393	0.2335	**
	BU necessary	**D**	-1.7272	0.4206	***
		A	1.3611	0.2468	***
	BU potencial user	**D**	-0.9624	0.3412	**
		A	1.1445	0.2506	***
	Gender	**F**	0.6366	0.2023	**

Table 5. Busway investment support: marginal probabilities

	Levels	D	N	A
Works inconvenience acceptance	**D**	**0.41**	0.41	0.18
	N	0.30	**0.43**	0.27
	A	0.15	0.39	**0.46**
Commercial activity promotion	**D**	0.25	**0.43**	0.32
	N	0.32	**0.43**	0.25
	A	0.18	0.41	**0.41**
BU necessary	**D**	**0.72**	0.22	0.06
	N	0.32	**0.43**	0.25
	A	0.11	0.33	**0.56**
Route adequacy LR	**D**	0.32	**0.43**	0.25
	N	0.12	0.34	**0.54**
	A	0.21	**0.42**	0.37
BU potencial user	**D**	**0.54**	0.34	0.12
	N	0.31	**0.43**	0.26
	A	0.12	0.36	**0.52**
Gender	**M**	0.28	**0.44**	0.28
	F	0.17	0.40	**0.43**

Note: (D|N: disagreement vs. neutral); (M|F: male vs. female).
Table 6. Busway investment support: odds ratios

	Levels	OR → ***D***	OR → ***A***
Works inconvenience acceptance	**D|N**	1.61	0.62
	A|N	0.42	2.36
	A|D	0.26	3.81
Commercial activity promotion	**D|N**	0.73	1.37
	A|N	0.48	2.09
	A|D	0.65	1.53
BU necessary	**D|N**	5.62	0.18
	A|N	0.26	3.90
	A|D	0.04	21.94
BU potencial user	**D|N**	2.62	0.38
	A|N	0.32	3.14
	A|D	0.12	8.22
Route adequacy LR	**D|N**	3.47	0.29
	A|N	2.04	0.49
	A|D	0.59	1.70

Gender	**M|F**	1.89	0.53

If agreement and disagreement opinions are compared with respect to the investment of public money for the construction of the new mode of transport, it is observed that (Table 6): 1) if it is thought worth supporting the period of works to dispose of the Busway, the tendency to support the investment has a probability 3.8 times greater than if it is not believed worthwhile to support the works; 2) the probability of the tendency to support investment in the Busway is 1.5 times greater if it is considered that the Busway will promote commercial activity than if it does not; 3) the probability of the tendency to support the investment is 21.9 times higher if the Busway is considered necessary than if it is not; 4) the probability of the tendency to support investment is 8.2 times greater if the respondent considers him/herself a potential user than if not; 4) the probability of the tendency to support the investment is 1.7 times greater if the LR is considered adequate for the Busway route than if it is not considered as such; 4) the probability of the tendency to support investment is 1.9 times greater if the respondent is a woman.

4. Conclusions

A survey on the implementation of a new means of transport in Coimbra (Busway) was carried out. This survey included key questions to determine public opinion regarding the necessity of the Busway, and regarding the support behind investment for its construction. OLM were used to model the answers to the key questions according to the rest of the questions in the survey (secondary questions). According to the OLM, the variables that best explain the opinion about the Busway necessity are the questions that refer to: the acceptance of the works period, the promotion of the commercial activity in the area, the investment support, and consideration of oneself as a potential user. In general, the marginal effects of the answers to the secondary questions are maximum when the answers express favorable opinions about the project (i.e. regarding works period, investment, commercial activity and the future use of the new means of transport), and correspond with the opinion of considering the Busway as necessary. Moreover, it was found that the tendency to consider the Busway as necessary is more probable when there is an agreeable opinion with respect to secondary questions than when there is not. The secondary questions that best explain the support for spending public money on the project are those related to the works period, commercial activity, Busway necessity, considering oneself as a potential user, the adequacy of the underground to the Busway route, and gender. The marginal effects of the answers to these questions are less homogeneous than in the previous case, giving maximum values in the three levels of investment support. However, these maximum values appear more frequently in the neutral and agreement opinions regarding the support of investment in the Busway. Finally, it was found to be much more likely to support the investment when agreeing about the secondary questions than in the cases of disagreement. Specifically, the probability of supporting investment increases by 56% when the Busway is considered necessary, and the tendency to support the investment reaches a probability 21.9 times greater if the Busway is considered necessary than if it is not. Therefore, the research hypothesis put forth has been demonstrated.

Acknowledgements

The support from the Spanish Ministry of Economy and Competitiveness (Research Project TRA2015-66235-R, MINECO/FEDER, UE), co-funded with FEDER and the support from the Commission for Regional Coordination and Development of Central Region (Research Project CENTRO-01-0145-FEDER-000006), funded by Regional Operational Programme CENTRO2020 (European Union, Portugal), are gratefully acknowledged.

References

Agrawal, A. W., 2015. What Do Americans Think about Public Transit? A Review of U.S. Public Opinion Polling Survey Questions. Mineta Transportation Institute Publications.

Atkinson, R., 2000. Measuring Gentrification and Displacement in Greater London. Urban Studies, 37.1, 149-165.

Ben-Akiva, M., Morikawa, T., 2002. Comparing Ridership Attraction of Rail and Bus. Transport Policy, 9, 107-116.

Bickerstaff, K., Tolley, R., Walker, G., 2002. Transport planning and participation: the rhetoric and realities of public involvement. Journal of Transport Geography, 10.1, 61-73.

Bowes, D. R., Ihlanfeldt K.R., 2001. Identifying the Impacts of Rail Transit Stations on Residential Property Values. Journal of Urban Economics, 50, 1-25.

Brown, B. B., Werner, C.M., Kim, N., 2003. Personal and Contextual Factors Supporting the Switch to Transit Use: Evaluating a Natural Transit Intervention. Analyses of Social Issues and Public Policy, 3.1, 139-160.

Calvo, F. J., De Oña, J., Arán, F., Nash, A., 2013a. Light rail transit experience in Madrid, Spain: effects on population settlement and land use. Transportation Research Record: Journal of the Transportation Research Board, 2353, 82-91.

Calvo, F. J., De Oña, J., Arán, F., 2013b. Impact of the Madrid subway on population settlement and land use. Land Use Policy, 31, 627-639.

Cardamone, A. S., Eboli, L., Forciniti, C., Mazzulla, G., 2016. Willingness to use mobile application for smartphone for improving road safety. International journal of injury control and safety promotion, 23(2), 155-169.

Cardamone, A. S., Eboli, L., Forciniti, C., Mazzulla, G., 2017. How usual behaviour can affect perceived drivers' psychological state while driving. Transport, 32(1), 13-22.

Cervero, R., Duncan, M., 2002. Benefits of Proximity to Rail on Housing Markets: Experiences in Santa Clara County. Journal of Public Transportation, 5.1, 1–18.

Chowdhury, S., Hadas, Y., Gonzalez, V. A., Schot, B., 2018. Public transport users' and policy makers' perceptions of integrated public transport systems. Transport Policy, 61, 75-83.

Chapple, K., 2009. Mapping Susceptibility to Gentrification: The Early Warning Toolkit. Center for Community Innovation, University of California, Berkeley.

de Oña, J., de Oña, R., Eboli, L., Forciniti, C., Mazzulla, G., 2014. How to identify the key factors that affect driver perception of accident risk. A comparison between Italian and Spanish driver behavior. Accident Analysis & Prevention, 73, 225-235.

Eboli, L., Mazzulla, G., 2009. An ordinal logistic regression model for analysing airport passenger satisfaction. Euromed Journal of Business, 4.1, 40-57.

Eboli, L., Mazzulla, G., 2011. A methodology for evaluating transit service quality based on subjective and objective measures from the passenger's point of view. Transport Policy, 18, 172-181.

Edwards, M., Mackett, R. L., 1996. Developing New Urban Public Transport Systems: An Irrational Decision-Making Process. Transport Policy, 3.4, 225-239.

Fan, Y., Guthrie, A., 2009. Assessing Neighborhood and Social Influences of Transit Corridors. CTS Report 12-19, University of Minnesota.

Forester, J., 2006. Making participation work when interests conflict: Moving from facilitating dialogue and moderating debate to mediating negotiations. Journal of the American Planning Association, 72.4, 447-456.

Goetz, E., Hagar, A., Ton, H., Ko, K., Matson, J., 2010. The Hiawatha Line: Impacts on Land Use and Residential Housing Value. CTS Report 10-09. Center for Transportation Studies, University of Minnesota, Minneapolis.

Jeong, H. J., Lee, W. C., 2016. The level of collapse we are allowed: Comparison of different response scales in Safety Attitudes Questionnaire. Biometrics & Biostatistics International Journal, 4.3, 100-107.

Kahn, M., 2007. Gentrification Trends in New Transit-Oriented Communities: Evidence from 14 Cities That Expanded and Built Rail Transit Systems. Real Estate Economics, 35.2, 155-182.

Kato, H., Shiroyama, H., Fukayama, T., 2008. Process Management in public Transit planning: case study of introduction project of light rail transit in Toyama, Japan. Transportation Research Record: Journal of the Transportation Research Board, 2042, 33-40.

Knaap, G., Ding C., Hopkins L.,2001. Do Plans Matter? The Effects of Light Rail Plans on Land Values in Station Areas. Journal of Planning Education and Research, 21, 32-39.

LNEC, Laboratório Nacional de Engenharia Civil, IP Engenharia, 2017. Análise Comparada de Soluçoes Tecnológicas de Transportes para um Sistema de Mobilidade do Mondego Custo-eficiente. Retrieved July 30, 2018, from http://www.metromondego.pt/LinkClick.aspx?fileticket=3rfSu6zcKOw%3D&tabid=128

Laurian, L., Shaw, M., 2009. The Practices of Certified Planners. Journal of Planning Education and Research, 28, 293-309.

Mostafavi, A., Abraham, D., Vives, A., 2014. Exploratory analysis of public perceptions of innovative financing for infrastructure systems in the United States. Transportation Research Part A, 70, 10-23.

Newman, K., Ashton P., 2004. Neoliberal Urban Policy and New Paths of Neighborhood Change in the American Inner City. Environment and Planning, 36, 1151-1172.

Nunes, P., 2016. Metro Mondego por concluir 24 anos e 107 milhões de euros depois do início do projeto. Retrieved July 27, 2018, from http://observador.pt/2016/06/05/metro-mondego-por-concluir-24-anos-e-107-milhoes-de-euros-depois-do-inicio-do-projeto/.

Papagiannakis, A., Baraklianos, I., Spyridonidou, A., 2017. Urban travel behaviour and household income in times of economic crisis: Challenges and perspectives for sustainable mobility. Transport Policy, 65, 51-60.

Podagrosi, A., Vojnovic, I., 2009. Tearing Down Freedmen's Town and African American Displacement in Houston: The Good, the Bad, and the Ugly of Urban Revival. Urban Geography, 29.4, 371-401.

Polzin, S., 1999. Transportation/Land-Use Relationship: Public Transit's Impact on Land Use. Journal of Urban Planning and Development, 125.4, 135-151.

Pucher, J., Renne, J., 2003. Socioeconomics of Urban Travel: Evidence from the 2001 NHTS. Transportation Quarterly, 57.3, 49-77.

Van, Hulse J., Khoshgoftaar, T., Huang, H., 2007. The pairwise attribute noise detection algorithm. Knowledge and Information Systems, 11.2, 171-190.