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Do Citizens Understand the Benefits of Transit-Oriented Development? Exploring and Modeling Community Perceptions of a Metro Line under Construction in Thessaloniki, Greece

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Abstract: Transit-oriented development (TOD) is an integrated urban and transport planning approach that aims to mitigate urban sprawl and car use, enhance neighborhood livability, increase public transport use, and promote sustainable mobility. Although TOD is widely accepted by academics, planners, and policymakers, the question of how citizens acknowledge its expected benefits remains open. This paper explores citizen satisfaction and perceptions of their neighborhood and investigates their awareness of TOD's potential for sustainable revitalization and regeneration of metro areas in Thessaloniki, a compact Mediterranean city that is introducing a new urban rail system. Our research is based on a questionnaire survey, conducted within the catchment areas of two future metro stations, which present different spatial and socio-economic characteristics. For the data analysis, we use inferential statistics analysis and ordinal logistics regression to investigate the variations in citizens' perceptions. Findings reveal that even if there is a statistical difference between people's perceptions regarding the main spatial features of their neighborhoods, respondents in both areas express similar major concerns about public space, walkability issues, transit quality, and the positive effects that the metro could offer regarding urban revitalization and development. Furthermore, age, income, and personal travel behaviors appear to be significantly related to the level of satisfaction with public transport and the willingness to increase transit use because of the metro. We argue that citizens' pre-construction surveys can support local policy makers in tailing and optimizing a TOD project implementation based on the community's needs and priorities. Such surveys operate as knowledge production platforms to strengthen policy efficiency and reinforce the feelings of trust between citizens and local policy makers.

Keywords: transit-oriented development; citizens' perception; neighborhood satisfaction; public transport satisfaction; urban rail station; ordinal logistic regression; pre-construction survey; Thessaloniki; Greece

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1. Introduction

Transit-oriented development (TOD) is considered an alternative to low-density urban sprawl and car-dependent land-use patterns [1,2]. Coupling urban rail investments with compact urban development and anthropocentric placemaking around transit stations and stops could increase public transport use and promote sustainable mobility behaviors [3,4]. The notion of TOD is attributed to Calthorpe [5] who, in his book, "The Next American Metropolis", synthesized and codified the relevant guidelines for an ecological, quality, pedestrian-friendly, balanced, coherent, and sustainable urban development as follows [6]: planning compact urban development based on public transport on a metropolitan scale; developing multiple activities and mixed land uses (housing, commerce, jobs, and government services) within walking distance of public transport stations/stops; creating a

friendly and attractive environment for pedestrians that directly connects all local destinations and functions; providing a mixed housing stock, with various densities, types, and costs; preserving the natural habitat and environment and delivering high-quality open spaces; and designing public spaces in ways that enhance community life, social interaction, and neighborhood activity. It is clear that the TOD model borrows many elements from the traditional and often idealized approach to urban planning in European cities [7].

According to Curtis et al. [2] and NASEM [8], important economic and social benefits are expected from the TOD implementation both for the public and private sectors, namely, the control of urban sprawl and an increase in the use and efficiency of public transport; the reduction in energy consumption and emissions rates and the saving of resources; the reduction in infrastructure capital and operating costs for the local government; the revitalization of deprived urban areas and the enhancement of public safety; the improvement in the quality of life and creation of a sense of community; the stimulation of economic growth and an increase in employment rates; and the amplification of housing choices and an increased revenue for property owners.

A crucial question is whether the citizens recognize and understand the expected TOD benefits that are claimed by planners, policymakers, and developers. According to Lewis and Baldassare [9], residents' perceptions concerning the potential impacts of compact development could be inaccurate, negative, or positive. Thus, the success of a TOD project depends in part on the understanding of citizens' attitudes toward it, and on policymakers' actions to integrate the community's perspective into this project and its implementation process. Public participation in TOD implementation has been categorized as one of the more critical success factors [10]. In fact, as pointed out by planning theorists, public participation is a multi-way interactive process in which citizens and other players work and talk in formal and informal ways to influence action in the public arena before any final decisions are made [11]. In the case of TOD, an integrated planning process must build consensus among all stakeholders, i.e., decision makers, developers, and people living in the TOD areas [12]. A structured, transparent, trusting, and socially inclusive public participation process could lead to the more efficient design and implementation of a TOD project [13]. In such processes, public perception surveys operate as knowledge production platforms both for policymakers and local residents that are called to understand and envisage how urban and transport planning projects will be better incorporated into the local quality of life.

The spatial interactions between travel demand, mobility behavior, and the built environment have been the subject of multiple studies. A meta-analysis [14] confirms that vehicle-miles traveled, walking, and transit use are strongly related to the D variable (i.e., Density, Diversity, Design, Destination accessibility, and Distance to transit). However, research regarding citizens' perception of TOD impacts after its implementation is rather limited, and even fewer studies deal with residents' awareness of TOD benefits before its actual development and implementation [15,16]. Although there are numerous studies that evaluate existing public transport systems [17–19], only a few of them investigate the ways in which residents assess impending changes in their neighborhood before the operation of transit systems under construction, or their likelihood of using these future public transport infrastructures [20,21].

Concerning post-construction TOD impacts, many previous studies reveal that individuals living in proximity to commuter rail stations recognize that TOD enhances their communities by offering more compact development, improving walkability and accessibility to remote opportunities, enhancing social capital and interactions, and increasing local economic activity. However, some studies also mention increased traffic and pedestrian safety problems near TOD stations [12,22,23]. Additionally, residents who live near a TOD railway station may not use it if they do not perceive public space as safe and comfortable, and if they do not have a sense of freedom while walking towards the rail station, even if the transit quality of service is high [24]. It seems that transit users' satisfaction regarding a bus stop or a railway station depends more on the factors of security, personal safety,

service frequency, and reliability, and less on the station's physical characteristics and amenities [25]. Overall, in the USA, the perception of neighborhood changes caused by transit investments is positive, especially for immigrants, new residents, frequent transit riders, and carless households. Yet, there are specific groups that have negative opinions about the transitways' impacts, such as non-immigrants, car users, and longtime residents. A significant difference is observed between urban and suburban areas and between different neighborhoods [26]. For instance, Houston and Zuñiga [22] found that low-income residents living near a tramway route express lower satisfaction with neighborhood changes and greater concerns about increased housing costs, displacement, and parking.

Studies conducted in the pre-construction phase of urban rail and TOD projects have uncovered that citizen engagement with public transport is significantly affected by their perceptions of TOD usefulness and their view of the local government's capacity to promote sustainable mobility policies [16]. Furthermore, according to a before and after survey concerning the impacts of a new light rail stop [15], residents anticipated and later observed regeneration and social benefits in their neighborhood, such as better walkability, a greater sense of community, increased land and housing values, and an enhanced neighborhood image. However, in the same case, residents complained about parking problems and environmental noise pollution after the beginning of the rail stop operation. On the contrary, residents expect that the expansion of urban rail lines in their neighborhoods could also bring about a lesser sense of community due to a possible displacement of disadvantaged people caused by its potential gentrification [27,28]. Finally, Gatersleben [29], and Houston and Zuñiga [22] found that the greater the satisfaction of the residents with the character of their neighborhood, the more positive their expectations of future transit development.

As Fan and Guthrie [26] discovered, citizens' perceptions of transit corridor impacts vary significantly between neighborhoods with different spatial, demographic, and social characteristics. Urban residents who are usually more frequent transit users, are much more likely to expect positive impacts from transit development than suburban residents. These findings raise the need for the study of citizens' perceptions in relation to a TOD typology that classifies the stations' catchment areas based on their geographical location, the residential and employment densities, the land-use mixture, and other urban fabric features.

This research seeks to uncover whether citizens' satisfaction and perceptions of their neighborhood before the opening of a new metro line, as well as their appraisal of TOD forthcoming changes, vary due to the local context and their individual socio-demographic characteristics. The paper aims to address five main research questions: How does the local community evaluate the quality of the existing transport service? What are the most important problems regarding walkability and public space, which are specific to the areas around two metro stations under construction with different spatial characteristics? What are the perceptions and expectations of citizens about the potential benefits of transit-oriented development and the spatial, economic, environmental, and mobility impacts of the future metro line in their neighborhood? Are there any significant differences in the perceptions of citizens living and working in areas with different urban and mobility profiles? Finally, how do the main demographic and socio-economic factors, and mobility behaviors affect citizens' satisfaction with the public transport system without the metro, as well as their intention to increase their use of transit after the introduction of a new metro line? The study draws upon a citizens' survey in two distinct study areas in the city of Thessaloniki, Greece.

The remainder of the paper is structured as follows. Section 2 describes the study areas and the methodological approach, as well as the survey design and the main sample characteristics. Section 3 presents the results of the statistical analysis and modeling. Section 4 provides a discussion on the findings and their comparison with the findings from other studies. Section 5 concludes the paper by providing the policy implications and the study's limitations and prospects.

2. Materials and Methods

2.1. Study Area and Methodology

The study is based on data from Thessaloniki, which is a typical Mediterranean port city with a population of more than 1 million inhabitants. The urban agglomeration is characterized by high densities and mixed-use patterns throughout its main compact area, a wider area with multiple suburban settlements and sprawled development, and the absence of urban rail transit. The public transport system of the city is based solely on the bus network, a fact that makes the city lag behind many other European cities of similar size and urban form [30]. According to the Sustainable Mobility Plan of Thessaloniki [31], 59% of the total daily trips within the metropolitan area are made by motorized vehicles (44 by car, 4% by taxi, and 11% by motorcycle), while only 41% by sustainable transport modes (27% by bus, 11% on foot, and 3% by bicycle). An underground metro is under construction and is expected to be operational in 2023. The current project comprises a base line and one extension with a total length of 14.4 km, and 18 stations covering a rather short distance with respect to the entire metropolitan area (see Figure 1). Yet, it has been estimated that approximately 55–60% of the population in the compact area could be easily served by these metro lines due to high residential densities [32]. The construction of the metro was initially met with strong opposition in the city. In addition, after its initiation in 2006, financial and other critical obstacles, especially with regard to major archaeological findings, led to continuous delays, often creating a number of controversies concerning the city's political agenda. These delays, along with the long-running debates around its finance, and the in situ preservation of the archaeological findings in one of the central stations, dramatically influenced the public debate and hence the overall perception of the city's residents about this megaproject [4].

Figure 1. Thessaloniki's metro line under construction.

Against such a background, our survey attempted to raise the issue of how the city's citizens perceive the present and visualize the future of two urban neighborhoods and their potential for sustainable revitalization and regeneration based on the metro integration in the urban area. Drawing on the TOD typology proposed by Papagiannakis et al. [30], we selected two different types of metro stations (see Figure 2): (a) The station "25th Martiou" of a neighborhood-type TOD, located in the base metro line in a residential

urban area with the following spatial characteristics: a primarily residential area with up to 6-floor apartment buildings, mixed retail and leisure uses of small-sized businesses (alongside the main roads), limited open and/or green spaces, and heavy traffic on the main roads. The area is occupied by middle-class residents, but it also includes multiple enclaves of low-income groups as well. (b) The station "Kalamaria" of an urban-type TOD, located in the extension of the base metro line and in the center of a large district with the following spatial features: a primarily residential area within a lively municipal center, with mixed retail and leisure uses of small businesses, up to 5-floor apartment buildings, and larger availability of public and private, open and/or green spaces (compared to the first area). Several street-scale urban renewal interventions in the municipal center have been implemented over the years. Similar to the case of the first area, the "Kalamaria" study area is also inhabited by middle-class residents, including only a few enclaves of low-income groups.

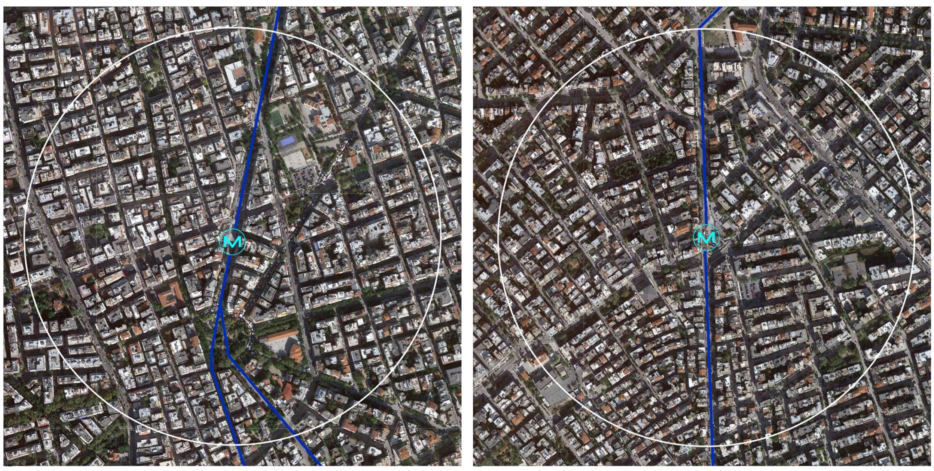

Figure 2. The 25th Martiou (**on the left**) and Kalamaria (**on the right**) metro stations.

Our research methodology comprises of the following steps:

1. A convenience survey addressed to a total sample of 200 people was conducted, within the catchment areas of the two metro stations under construction, to collect data on the perceptions and views of the neighborhoods' users regarding the local quality of life and expected TOD impacts. An effort was made to ensure the reliable representation in the sample of the two sexes and different age groups.
2. The collection of data was followed by descriptive and inferential statistical analysis, to identify possible differences in the respondents' answers between the two study areas regarding their perceptions about the spatial characteristics and problems of their neighborhoods, their satisfaction with public transport services, their expectations from the metro, and their assessment of the potential benefits of transit-oriented development. Depending on the nature of the variable being investigated for a possible dependence on the station location, the chi-squared test (for categorial variables) or Mann–Whitney U test (for ordinal variables) were applied. The null statistical hypothesis suggests that the perceptions of the respondents are independent of the station location. Consequently, a null hypothesis rejection indicated that people in the two study areas demonstrated different attitudes and opinions. The null hypothesis is rejected at the 1%, 5%, or 10% critical levels when the *p*-value of the statistical test applied is less than the significance level of a = 0.01 or a = 0.05, or a = 0.10, respectively.
3. Ordinal logistics regression was finally applied to identify the significant factors that influenced citizens' satisfaction with public transport service and the willingness to increase transit trip frequency in light of the new metro line.

2.2. Survey Design and Sample Characteristics

Initially, a pilot survey was conducted in a sample size of 10 citizens to test the questionnaire's validity and reliability. Following the pilot, improvements were realized mainly regarding the wording and codification of the questions about the TOD's benefits to make them more understandable by the respondents. Overall, 200 questionnaires were collected in the two study areas during the first week of December 2017 [33]. After deleting 13 invalid questionnaires, 187 valid copies remained for analysis, corresponding to 95 and 92 respondents who work, live, and/or visit the study areas, respectively ("25th Martiou" and "Kalamaria").

The survey was conducted by the method of personal interviews in public places and retail or leisure stores in the study areas and a printed questionnaire. This method was selected because this quantitative survey was part of a pilot research that concluded with two participatory workshops, one in each study area, in order to involve people living, working, and visiting the study areas in a future neighborhood regeneration project based on the metro stations. The same sample of citizens were asked to develop their views further and make suggestions regarding the problems and prospects of their neighborhood through open-ended questions (for more information on the results of that project, see Papagiannakis et al. [4]). The sample size of almost 100 people in each catchment area provided the opportunity to process and classify their answers to the open-ended questions of the qualitative research.

To deal with potential bias of the sample size, we verified the validity of the survey results by making comparisons with the official statistics regarding the municipality of Thessaloniki: (1) the latest published population-housing census of 2011 and (2) the sustainable mobility plan (sample size of about 10,000 households). Regarding the respondents' age classes, we limited the overrepresentation in the sample of each class to achieve an equilibrium between them. Thus, although the convenience sample size was relatively low, the estimations concerning certain basic parameters, such as sex, age, and trip-mode choice, were acceptable estimations.

The questionnaire consisted of 22 questions. The first 3 questions referred to the socioeconomic characteristics of the respondents, 4 questions concerned their urban mobility behavior, 5 questions assessed their opinion about the quality of walkability and transit and the spatial characteristics of the neighborhood, and 4 questions investigated their perceptions about the expected impacts of the metro and potential benefits of TOD in the area (see Table 1). The survey was based on closed-ended questions made on 4-, 5-, and 8-Likert-type scales depending on the subject matter [34]. Following Johns [35], the varying of question formats within a questionnaire could increase the respondents' awareness. Thus, on topics that could be unfamiliar to or ambiguous for the citizens, such as the potential benefits of TOD, a 5-point Likert scale was used to allow for the expression of a neutral or indifferent opinion. On the other hand, Johns [35] proposed to omit the midpoint when respondents are comfortable and familiar with the subject. For this reason, the midpoint was omitted to eliminate the possibility of expressing a neutral opinion when respondents were considered to have a personal experience relating to the topic, such as in the case of the evaluation of problems and the expression of perspectives on their neighborhoods. Finally, the 8-point scale was applied to allow for greater differentiation concerning the neighborhood's spatial characteristics assessment, for example the "lack of sidewalk width for comfortable walking" or the "illegal car parking on the sidewalks".

As far as the sex of the respondents is concerned, 45% of them were male and 55% were female. In fact, following the results of the census of 2011 [36], in the Municipality of Thessaloniki, 45.7% of the residents are male and 54.3% female. The percentages of respondents who belonged to the age groups 16–24, 25–34, 35–49, 50–64, and >65 years, were 23.5%, 23.5%, 27.3%, 19.8%, and 5.9%, respectively. Only the elderly class (aged 65+) was underestimated because the survey was conducted during the morning rush hour when elderly people present limited mobility. Most of the respondents were private-sector employees (31.6%), followed closely by self-employed individuals (30.5%) and university

students (16%). A total of 9.1% of them were unemployed or retired and 7% were civil servants. The rest (5.8%) of the sample included stay-at-home parents and pupils.

The main transport modes for commuting chosen by the survey participants were by car, either as a driver or as a passenger (44.1%), followed by walking (25.8%), and by bus (21.5%). Only 8.1% of the respondents used motorcycles, while 0.5% of them preferred to use a bicycle for trips between their homes and workplaces. It is noteworthy that car- and bus-use rates were verified by the modal split distribution estimated by the trip household survey conducted in the framework of the Sustainable Urban Mobility Plan of the Thessaloniki Municipality. According to this plan [31], 44% of the trips were made by car and 27% by bus. Regarding public transport, the majority of the sample (44.4%) declared that they rarely or never use the bus network, while 32.6% of them replied that they often or very often make this choice, and 23% only sometimes. It is worth mentioning that bicycle use was minimal, as only 4.8% of the respondents stated that they used it often or very often, while 7% of them used it sometimes. The rest (88.2%) of the respondents rarely or never chose cycling as a transport mode for their daily trips. The main purposes of transit trips were personal business (33.7%) and work (22.5%). Additionally, transit was chosen for education, shopping, and leisure purposes by 9.5%, 8%, and 7% of the respondents, respectively. Only 2.7% of them used public transport for medical visits, while 16.6% used it for other purposes.

Table 1. Description and measurement scale of the survey variables.

Variable Name	Variable Description	Variable Values
Metro station	Metro station area	1: 25th Martiou, 2: Kalamaria
Respondent's socioeconomic characteristics		
Sex	Sex of respondent	1: woman, 2: man
Age	Age of respondent	1: 16–24, 2: 25–34, 3: 35–49, 4: 50–64, 5: >64
Job occupation	Job occupation of respondent	1: unemployed, 2: retired, 3: housekeeping, 4: student, 5: civil servant, 6: freelancer, 7: private employee
Income	Annual income in euros	1: 0–5000, 2: 5000–10,000, 3: 10,000–20,000, 4: 20,000–40,000, 5: 40,000+
Mobility behavior		
Transit frequency	Transit frequency use	1: never, 2: rarely, 3: sometimes, 4: often, 5: very often
Transport mode	Transport mode for commuting	1: car, 2: motorcycle, 3: bus, 4: bicycle; 5: walking
Transit trip purpose	Trip purpose with transit	1: work, 2: education, 3: shopping, 4: leisure, 5: personal raison, 6: health visit, 7: other
Bicycle frequency	Bicycle frequency use	1: never, 2: rarely, 3: sometimes, 4: often, 5: very often
Neighborhood spatial characteristics evaluation		
Parking space	Parking space offer	0: lack, 1: sufficiency
Public space	Public space offer	0: lack, 1: sufficiency
Green space	Green space offer	0: lack, 1: sufficiency

Table 1. *Cont.*

Variable Name	Variable Description	Variable Values
House rent	Housing rent prices	0: low, 1: high
Center distance	City center distance	0: low, 1: high
Sidewalk bollards	Lack of sidewalk protection by bollards	8-point Likert scale 1: less important 8: more important
Traffic noise	Traffic noise level	8-point Likert scale
Sidewalk obstacles	Sidewalks interrupted by obstacles	8-point Likert scale
Sidewalk width	Lack of sidewalk width for comfortable walking	8-point Likert scale
Sidewalk surface	Insufficient sidewalk maintenance and repair	8-point Likert scale
Disabled people	Poor sidewalk quality for disabled people	8-point Likert scale
Urban equipment	Lack of appropriate urban equipment on the sidewalks	8-point Likert scale
Illegal parking	Illegal car parking on the sidewalks	8-point Likert scale
Public transport satisfaction and metro future expectations		
Transit quality evaluation	Transit quality level of satisfaction in current situation	1: not at all, 2: slightly, 3: enough, 4: very satisfied
Metro transit use	Metro could increase Transit-use frequency	1: not at all, 2: slightly, 3: enough, 4: very much
Metro attractiveness	Metro could increase neighborhood attractiveness	4-point Likert scale
Metro urban upgrading	Metro could contribute to neighborhood upgrading	4-point Likert scale
Evaluation of the importance of TOD potential benefits		
Metro accessibility	TOD could enhance public transport quality and accessibility	5-point Likert scale 1: not important, 2: slightly, 3: moderately 4: important, 5: very important
Metro travel time	TOD could reduce daily travel time	5-point Likert scale
Metro multimodal	TOD could increase urban transport choices	5-point Likert scale
Metro infrastructure	TOD could improve road and pedestrian infrastructure	5-point Likert scale
Metro city center	TOD could provide easier access to the city center	5-point Likert scale
Metro disabled people	TOD could facilitate mobility for disabled people	5-point Likert scale
Metro traffic congestion	TOD could decrease traffic congestion during peak hours	5-point Likert scale
Metro land-use mix	TOD could attract more leisure and retail businesses	5-point Likert scale

Table 1. *Cont.*

Variable Name	Variable Description	Variable Values
Metro real estate	TOD could increase real-estate prices	5-point Likert scale
Metro local economy	TOD could increase financial profit of small- and medium-sized enterprises	5-point Likert scale
Metro public space	TOD could enhance public space within the station catchment area	5-point Likert scale
Metro green space	TOD could increase green spaces within the station catchment area	5-point Likert scale

3. Results

3.1. Citizens' Perceptions of the Spatial Characteristics of the Metro Areas

The majority of the respondents highlighted the lack of green (77.5%) and parking spaces (77%), as well as high housing rent in both areas (84%), and the short distance from the city center (66.3%). However, based on the chi-squared test of independence (see Table 2), we concluded that there was a statistical dependence between people's perceptions and the location of the station for all the spatial attributes, except for parking. More people at 25th Martiou than at Kalamaria metro station declared that there was an insufficient supply of public and green spaces. More respondents in the Kalamaria than in the 25th Martiou metro station supported the notion that travel distance to the city center was long, and that housing rents were high. Nevertheless, there was no significant statistical difference between the two areas concerning the perceptions of the lack of parking spaces.

Table 2. Metro areas' spatial characteristics evaluation by the citizens.

Spatial Characteristic	Citizens' Evaluations	25th Martiou Station	Kalamaria Station	Total Sample	Chi-2 Test
Public space	Lack	64.2%	35.8%	49.7%	$p = 0.00$ [1]
	Sufficiency	34.8%	65.2%	50.3%	
Green space	Lack	85.3%	69.6%	77.5%	$p = 0.01$ [2]
	Sufficiency	14.7%	30.4%	22.5%	
Parking space	Lack	73.7%	80.4%	77.0%	$p = 0.27$
	Sufficiency	26.3%	16.9%	23.0%	
Housing rent	Low	22.1%	9.8%	16.0%	$p = 0.02$ [2]
	High	77.9%	90.2%	84.0%	
City center distance	Short	80.0%	52.2%	66.3%	$p = 0.00$ [1]
	Long	20.0%	47.8%	33.7%	

[1] Significant at 1%; [2] Significant at 5%.

The main walkability problems within the two metro catchment areas, as evaluated by the respondents, were ranked in the function of the median value of the answers. In descending order of importance, they are the following: poor sidewalk quality and accessibility for disabled people (median = 8), sidewalks interrupted by obstacles, insufficient sidewalk maintenance, lack of adequate sidewalk width, illegal parking of cars (median = 7), lack of appropriate urban equipment, lack of sidewalk protection by bollards (median = 6), and traffic noise levels (median = 5).

Based on the Mann–Whitney U test, we concluded that the central tendency of the respondents' perceptions in the two station areas was significantly different regarding only two out of the eight walkability criteria, namely, lack of sidewalk protection by bollards and traffic noise levels. Table 3 indicates the station areas for which the respondents evaluated these problems as significantly more important than others. Specifically, it is the 25th Martiou station that has the highest mean rank. In fact, as the 25th Martiou station is located in a neighborhood crossed by arterial roads, traffic noise and the lack of sidewalk protection seem to be more important problems there than in the Kalamaria station area, which is mostly crossed by local roads and pedestrian streets. At the 25th Martiou station, 62.2% and 80% of the respondents evaluated traffic noise and sidewalk protection, respectively, with a score above 4 in the 8-point Likert scale. On the contrary, at the Kalamaria station, the corresponding percentages were 42.2% and 55.4%. For the other six walkability criteria, there is no significant relationship between people's perceptions and the location of the station. In both areas, the large majority think that all walkability problems are at least important. The percentage of the respondents that declared a score above 4 on the 8-point Likert scale varies, ranging from a maximum of 96.8%/89.1% per station (25th Martiou/Kalamaria) for poor sidewalk quality for disabled people, to a minimum of 75.8%/73.9% for lack of appropriate urban equipment on the sidewalks.

Table 3. Walkability evaluation by the citizens.

Sidewalk Evaluation Criteria	Total Sample Median	Mean Rank		Independent Samples Mann–Whitney U Test
		25th Martiou Station	Kalamaria Station	
Poor sidewalk quality for disabled people	8	90.29	97.83	$p = 0.30$
Sidewalks interrupted by obstacles	7	97.04	90.86	$p = 0.41$
Insufficient sidewalk maintenance and repair	7	91.39	96.69	$p = 0.49$
Lack of sidewalk width for comfortable walking	7	91.26	96.83	$p = 0.47$
Illegal car parking on the sidewalks	7	88.09	100.10	$p = 0.12$
Lack of appropriate urban equipment on the sidewalks	6	96.35	90.53	$p = 0.45$
Lack of sidewalk protection by bollards	6	107.51	80.05	$p = 0.00$ [1]
Traffic noise level	5	105.17	82.46	$p = 0.00$ [1]

[1] Significant at 1%.

3.2. Citizens' Perceptions concerning the Metro's Expected Impacts

Concerning the quality of service of the bus network in their neighborhoods, 54% of the respondents answered that they were not at all or only a little satisfied, while 43.3% and 2.7% answered that they were satisfied enough and very satisfied, respectively (median answer = 2: little satisfaction). However, based on the Mann–Whitney U test, we observed a statistical difference in the central tendency of the respondents' answers in the two areas. Drawing on the highest mean ranks presented in Table 4, we concluded that people in the 25th Martiou station area were significatively ($p < 0.05$) more satisfied by transit quality of service than in the Kalamaria station area. In fact, citizens were less satisfied at Kalamaria (median answer = 2: little satisfaction) than at the 25th Martiou station area (median answer = 3: enough satisfaction). This finding was expected since Kalamaria is a peripheral municipality with a lower level of bus network spatial coverage. Nevertheless, in both areas, citizens had similar and generally high expectations concerning the future, positive impacts of the metro. Respondents in both station areas declared that the metro will increase their trips using public transport, enhance the attractiveness of the neighborhood around the station, and also contribute to the economic and aesthetic upgrading of their neighborhoods. In fact, the median answer for the three aforementioned metro impacts was equal to three (3: sufficient increase) in the 4-point Likert scale.

Table 4. Current situation transit quality assessment and future expectations for public transport.

Evaluation Criterion	Total Sample Median	Mean Rank		Independent Samples Mann–Whitney U Test
		25th Martiou Station	Kalamaria Station	
Transit quality level of satisfaction	2	102.55	85.17	0.02 [1]
Increase transit use	3	89.74	98.40	0.24
Increase neighborhood attractivity	3	94.54	93.45	0.88
Neighborhood upgrade	3	99.76	88.05	0.12

[1] Significant at 5%.

Regarding the expected impacts of the operation of the metro, the respondents evaluated 12 spatial, economic, environmental, and mobility characteristics of the two areas, in a 5-point Likert scale from 1 (very low impact) to 5 (very important impact). As presented in Table 5, all expected impacts were considered very important (median = 4), except for the improvement of the public space within the station catchment area and the increase in green spaces, which were evaluated as moderately important (median = 3). Based on the Mann–Whitney U test (Table 5), we concluded that the central tendency of the respondents' perceptions in the two station areas was significantly different regarding only five criteria, i.e., reduction in the daily travel time, easier access to the city center, the attraction of more leisure and retail businesses, the rise of real-estate prices, and the increase in financial profit of small- and medium-sized enterprises. Based on the highest mean ranks presented in Table 5, we concluded that citizens in the Kalamaria station area considered that the reduction in the daily travel time would be more important. Inversely, citizens in the 25th Martiou area expected higher local economic benefits than citizens in the Kalamaria station area.

Table 5. Citizens' perceptions concerning the importance of the metro's expected impacts.

Metro Expected Impacts	Total Sample Median Importance	Mean Rank		Independent Samples Mann–Whitney U Test
		25th Martiou Station	Kalamaria Station	
Enhance public transport quality and accessibility	4	88.65	99.52	0.14
Reduction in the daily travel time	4	82.06	106.33	0.00 [1]
Increase in urban transport mode choices	4	89.26	98.90	0.20
Improve road and pedestrian infrastructures	4	98.03	89.84	0.29
Easier access to the city center	4	87.67	100.54	0.07 [3]
Facilitate mobility for disabled people	4	93.09	94.93	0.81
Decrease traffic congestion during peak hours	4	95.77	92.17	0.62
Attract more leisure and retail businesses	4	100.37	87.42	0.09 [3]
Rise of real-estate prices	4	101.99	85.74	0.03 [2]
Increase financial profit of small- and medium-sized enterprises	4	100.19	87.61	0.10 [3]
Enhance the public space within the station catchment area	3	97.67	90.21	0.32
Increase in green spaces	3	96.56	91.35	0.50

[1] Significant at 1%; [2] Significant at 5%; [3] Significant at 10%.

In fact, as the distance of the Kalamaria station from the city center is greater than that of the 25th Martiou station (about 5 km as opposed to 7 km), citizens' expectations in Kalamaria are higher regarding the accessibility improvement that will be provided by the metro for trips to the CBD. At the Kalamaria station area, 59.8% and 55.4% of the respondents evaluated both travel time reduction and accessibility enhancement with a score of 5 on the 5-point Likert scale. On the contrary, in the 25th Martiou station area, the corresponding percentages are equal to 36.8% and 42.1%, respectively. Regarding the three

economy-related criteria, as the observed negative impacts of the financial crisis of the 2010s were more important in the neighborhood around the 25th Martiou station (lots of retail and leisure businesses were closed in the last 10 years), citizens in that area expect the metro to boost the local economy in a twofold manner: by attracting new small businesses in the area and by increasing housing rental prices. The percentages of the respondents that declared a score of 5 (very important increase) concerning real-estate prices and small business development are 31.6% and 29.5%, respectively, in 25th Martiou, compared to 23.9% and 26.1% in the Kalamaria station area.

3.3. Modeling Citizens' Satisfaction with and Willingness towards Public Transport

Ordinal logistics models are used to predict an ordinal dependent variable from a set of predictor independent variables (categorical, ordinal, or continuous). In this research, we developed two ordinal logistics models. With model 1, we investigated the relationship between the citizen's rating of their satisfaction regarding the transit quality of service and a number of independent variables, such as sex, age, income, mobility behavior, and metro station location. With model 2, we assessed the association between citizens' willingness to increase their transit trip frequency in light of the new metro and their socio-economic characteristics and mobility behaviors. The two dependent variables were measured on a 4-point Likert scale (1: not at all, 2: a little, 3: enough, 4: very satisfied, and 1: not at all, 2: a little, 3: enough, 4: large frequency increase, respectively).

IBM SPSS statistics 22 software was used to apply the proportional ordinal logistic regression. The developed models estimated the odds, i.e., the probability of observing the occurrence of a particular score (level of satisfaction, level of trip frequency increase) and all scores that were ordered before it, compared to the probability of those scores not occurring. The dependent variable is expressed as the logarithm of the odds, presented in the following mathematical formula [37]:

$$\ln(\theta_j) = \alpha_j - (\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n), \quad (1)$$

where

θ_j are the odds and θ_j = prob(Y <= j)/[1 − prob(Y <= j)];

Y is the ordinal dependent variable;

j = 1 . . . k – 1, where k is the number of levels (scores) of the ordinal variable Y;

n is the number of independent ordinal variables X.

Thus, for transit quality level of satisfaction, ordinal logistic regression models the following odds:

θ_1= prob(score of 1)/prob(score greater than 1);

θ_2= prob(score of 1 or 2)/prob(score greater than 2);

θ_3= prob(score of 1, 2, or 3)/prob(score greater than 3);

$$P(Y <= j) = \theta_j/(1 - \theta_j) = e^{\alpha j - \beta X}/(1 - e^{\alpha j - \beta X})$$

In Equation (1), the minus sign indicates that, when there is a positive coefficient β associated with a specific level of the ordinal independent variable X, higher scores of Y are more likely for this level of the variable X compared to its level of reference. A negative coefficient means that lower scores of Y are more likely for the specific level of variable X compared to its level of reference.

3.3.1. Model 1: Transit Level of Satisfaction

The dependent variable of model 1 is the citizen's level of satisfaction regarding the transit quality of service and it is measured on a 4-point Likert scale (1: not at all, 2: a little, 3: enough, 4: very satisfied). Table 6 presents the appropriate statistical test to evaluate the overall model goodness-of-fit and statistical significance, including the likelihood-ratio test, the Pearson and Deviance goodness-of-fit tests; the Cox and Snell, Nagelkerke and McFadden measures of R^2; and the test of parallel lines.

Table 6. Statistical overall evaluation of model 1: transit level of satisfaction.

Model Fitting Information				
Model	−2 Log likelihood	Chi-square	df	Sig.
Intercept only	249.270			
Final	217.604	31.666	9	0.000
Goodness-of-Fit				
	Chi-square	df	Sig.	
Pearson	163.980	144	0.122	
Deviance	137.072	144	0.646	
Pseudo R-Square				
Cox and Snell	0.157			
Nagelkerke	0.176			
McFadden	0.077			
Test of Parallel Lines				
Model	−2 Log likelihood	Chi-square	df	Sig.
Null hypothesis	217.604			
General	195.318	22.286	18	0.220

The chi-square tests the difference between the -2LL for the two models, the baseline model (intercept-only without any independent variable) and the final model. The statistically significant chi-square statistic ($p < 0.05$) indicates that the final model presents a significant improvement over the baseline intercept-only model. The Pearson and Deviance tests are intended to test whether the observed data are consistent with the fitted model (testing the null hypothesis that observed and expected frequencies that are similar). As the observed significance levels are large ($p > 0.05$), it appears that the model fits the data well.

Moreover, the Nagelkerke pseudo R-square statistic suggests that the final model can explain approximately 19.4% of the variance between citizens in their evaluation. Nevertheless, the model allows the investigation of the significant associations between transit satisfaction levels and the independent variables.

Finally, the test of parallel lines examines the proportional odds assumption, which is fundamental for this type of ordinal regression model. This assumption means that each independent variable has an identical effect at each level of the ordinal dependent variable.

Since the observed significance level of the chi-square statistic was large ($p > 0.05$), we can accept the parallelism hypothesis.

Table 7 presents the explanatory variables that were included in model 1, the parameter (beta) estimates, the standard error (S.E.), the Wald statistic, the significance level of the b parameter, as well as the EXP(-b) that is the odd ratio defined by dividing the odds of each class of the independent variable by the odd of the variable's reference class (inversely, EXP(b) is the odd ratio defined by dividing the odd of the independent variable's reference class by the odd of each of its classes).

Table 7. Parameter estimation of model 1: transit level of satisfaction.

Model 1									
		Estimate b	Std. Error	Wald	df	Sig.	95% Confidence Interval		
							Lower Bound	Upper Bound	Odd RatioEXP(-b)
Threshold	Transit level of satisfaction = 1	−4.900	1.104	19.702	1	0.000	−7.064	−2.737	
	Transit level of satisfaction = 2	−2.771	1.068	6.728	1	0.009	−4.864	−0.677	
	Transit level of satisfaction = 3	1.025	1.081	.898	1	0.343	−1.095	3.144	
Location	Sex = 1 (woman)	−0.360	0.293	1.506	1	0.220	−0.934	0.215	1.43
	Sex = 2 (men)	0 [1]			0				
	Age = 1 (16–24)	−1.545	0.745	4.304	1	0.038	−3.004	−0.085	4.69
	Age = 2 (25–34)	−0.802	0.729	1.210	1	0.271	−2.231	0.627	2.23
	Age = 3 (35–49)	−1.017	0.706	2.074	1	0.150	−2.401	0.367	2.76
	Age = 4 (50–64)	−1.199	0.711	2.845	1	0.092	−2.593	0.194	3.32
	Age = 5 (65+)	0 [1]			0				
	Income = 1 (0–5000)	−1.671	0.832	4.038	1	0.044	−3.302	−0.041	5.32
	Income = 2 (5000–10,000)	−0.596	0.829	0.516	1	0.472	−2.221	1.030	1.81
	Income = 3 (10,000–20,000)	−1.501	0.907	2.737	1	0.098	−3.279	0.277	4.49
	Income = 4 (20,000+)	0 [1]			0				
	Travel behavior = 1 (sustainable)	−0.837	0.295	8.033	1	0.005	−1.416	−0.258	2.31
	Travel behavior = 2 (non sustainable)	0 [1]			0				
Link function: Logit.									

[1] This parameter is set to zero because it is redundant.

Based on the results presented in Table 7, the observed difference between males and females regarding the transit level of satisfaction was not found to be statistically significant at the 0.05 level ($p = 0.220$). Nevertheless, it seems that lower scores of transit satisfaction are more likely to be granted by women than men, as they travel more often by public transport (22.3% of women are daily transit users against 11.9% of men), and thus they could more frequently encounter cases of lack of quality service. Concerning the variables of age and income, there are only two of their classes that are significant ($p < 0.05$) or marginally significant ($p < 0.10$). Usually, it is worth keeping such variables in the model since the small effects of each category accumulate and provide useful information. Young people, aged 16–24 years, are more likely to be less satisfied with transit quality than the elderly, i.e., people aged 65 or over, but also people from other age classes. This can be attributed to their more frequent use of public transport which can result in their experiencing incidents of low quality of service more often. In fact, 36.4% of young people between 16–24 years

of age used the bus network daily, as opposed to 0%, 10.8%, 7.8%, and 20.5% of people belonging to the other age classes of 65+, 50–64, 35–49, and 25–34 years.

Regarding the respondent's income, it can be observed that people with lower incomes are more likely to declare lower scores of transit satisfaction than people with higher incomes, conceivably due to their more frequent use of public transport, similar to young people. In fact, 24.5% of the people in the lowest income class (class 1) used the bus network daily, as opposed to 0% and 4.8% of people in the medium- (class 3) and high-income (class 4) classes.

Commuters with a sustainable travel behavior (i.e., public transport users, bike users, and walkers) are more likely to be less satisfied with the transit quality of services than commuters with unsustainable travel habits (i.e., car and motorcycle users). A plausible explanation is that people who choose transit and soft transport modes for commuting demonstrate a higher awareness of transit-quality issues. If we consider the ratio of the odds for lower to higher scores for women and men, we can conclude that women are 1.43 times more likely than men to grant lower satisfaction scores. People in the age class of 16–24 years were 4.69 times more likely to be less satisfied than older people over 65+ years and 1.70 times (odd ratio 4.69/2.76) more likely than those in the age class of 35–49 years. Respondents of the lowest class income (<EUR 5000 per year) were 5.32 times more likely to choose lower satisfaction scores than people in the highest income class (EUR 20,000+ per year) and 1.18 times (odd ratio 5.32/4.49) more likely than those in the medium-income class (EUR 10,000–20,000 per year). Finally, commuters with sustainable mobility behavior were 2.31 more likely to be less satisfied with public transport than those who used motorized transport modes.

3.3.2. Model 2: Willingness to Increase Transit Use

The dependent variable of model 2 is the citizens' willingness to increase their transit trip frequency because of the metro and it was measured in a 4-point Likert scale (1: not at all, 2: a little, 3: enough, 4: big frequency increase). Table 8 presents the overall fitting indices of model 2. The statistically significant chi-square statistic ($p < 0.05$) indicates that the final model presents a significant improvement over the baseline intercept-only model. The Pearson and Deviance goodness-of-fit measures have large observed significance levels ($p > 0.05$), so it appears that the model has a good fit.

Table 8. Statistical overall evaluation of model 2: willingness to increase transit use.

Model Fitting Information				
Model	−2 Log likelihood	Chi-square	df	Sig.
Intercept only	263.328			
Final	246.341	16.988	8	0.030
Goodness-of-Fit				
	Chi-square	df	Sig.	
Pearson	135.398	124	0.228	
Deviance	145.049	124	0.095	
Pseudo R-Square				
Cox and Snell	0.087			
Nagelkerke	0.095			
McFadden	0.037			
Test of Parallel Lines				
Model	−2 Log likelihood	Chi-square	df	Sig.
Null hypothesis	246.341			
General	224.780	21.560	16	0.158

From the Nagelkerke pseudo R-square statistic, we concluded that the model explained 9.5% of the variance between citizens in their willingness to increase transit use.

Finally, following the test of parallel lines ($p > 0.05$), we accepted the proportional odds assumption.

Table 9 presents the independent variables included in model 2, the parameter (beta) estimates, the standard error (S.E.), the Wald statistic, and the significance level of the b parameter. We concluded that the variables of sex and travel behavior do not seem to contribute to the model to a statistically significant degree. Yet, income appears to have a statistically significant effect on the willingness to increase transit use ($p < 0.05$), and so does the age class of 25–34 years, which is marginally significant ($p < 0.10$). Overall, the predictive accuracy of the model seems relatively low. Nevertheless, it allows us to explore and measure the effects of the basic socioeconomic variables on the dependent variable.

Table 9. Parameter estimation of model 2: willingness to increase transit use.

Model 2									
		Estimate b	**Std. Error**	**Wald**	**df**	**Sig.**	**95% Confidence Interval**		
							Lower Bound	**Upper Bound**	**Odd RatioEXP(b)**
Threshold	Increase in transit-use frequency = 1	−3.801	0.837	20.620	1	0.000	−5.441	−2.160	
	Increase in transit-use frequency = 2	−2.640	.819	10.383	1	0.001	−4.246	−1.034	
	Increase in transit-use frequency = 3	−0.322	0.801	0.162	1	0.688	−1.891	1.247	
Location	Sex = 1 (woman)	0.253	0.284	0.798	1	0.372	−0.303	0.809	1.29
	Sex = 2 (men)	0 [1]			0				
	Age = 1 (16–24)	0.183	0.440	0.173	1	0.677	−0.679	1.045	1.20
	Age = 2 (25–34)	0.774	0.432	3.207	1	0.073	−0.073	1.622	2.17
	Age = 3 (35–49)	0.121	0.393	0.095	1	0.758	−0.649	0.891	1.13
	Age = 4 (50+)	0 [1]			0				
	Income = 1 (0–5000)	−2.562	0.806	10.111	1	0.001	−4.141	−0.983	0.08
	Income = 2 (5000–10,000)	−2.010	0.799	6.335	1	0.012	−3.575	−0.445	0.13
	Income = 3 (10,000–20,000)	−2.023	0.868	5.434	1	0.020	−3.723	−0.322	0.13
	Income = 4 (20,000+)	0 [1]			0				
	Travel behavior = 1 (sustainable)	0.286	0.281	1.038	1	0.308	−0.264	0.836	1.33
	Travel behavior = 2 (non sustainable)	0 [1]			0				
Link function: Logit.									

[1] This parameter is set to zero because it is redundant.

Women are 1.29 times more likely than men to increase transit-use frequency after the start of the operation of the metro, as they already use public transport more frequently than men. Younger people are more willing to increase transit-use frequency compared to older people who are 50 years and over, possibly because they are characterized by an intense mobility behavior and they use public transport modes more often (see also model 1). In specific, people in the age class of 25–34 years appear 2.17 times more likely to increase public transport use than those in the age class of 50+ years. Respondents of the lowest and middle-income classes (<EUR 20,000 per year) appear less willing to increase transit-use frequency compared to the high-income class. If we consider the ratio of the odds for lower to higher scores for the income class "EUR 10,000–EUR 20,000" and those for the class "EUR 20,000+" (EXP(-b) = 7.56), we can conclude that people with a higher income are 7.56 times more likely to increase transit use motivated by the new metro line. Possibly, people with lower incomes have not convinced that the new metro line could significatively enhance the public transport system in the city. As shown in model 1, people with low and middle incomes use public transport more often, but they are less satisfied with the quality of service compared to people in the highest income scale. Finally, as expected, commuters with a sustainable mobility behavior are 1.33 more likely to more frequently choose public transport compared to users of motorized transport modes.

4. Discussion

The research findings, first, contribute in identifying the most important livability and mobility problems that the citizens perceived in compact and mixed land-use neighborhoods in a city that lacks an efficient public transport system. Second, they provide an assessment of the local community's satisfaction with the quality of the existing urban public transport services and the expectations for changes in the neighborhood induced by the foreseen opening of an urban rail station. Third, they evaluate citizens' awareness of TOD's potential benefits before its implementation in a city area. Fourth, they capture whether perceptions and expectations depend on neighborhood spatial characteristics. Finally, they quantify the relationship between the citizens' socio-demographic characteristics and their satisfaction regarding transit quality, as well as their willingness to increase transit use after the metro opening.

The two study areas are mainly residential areas within the compact tissue of an urban area, but they differ in various ways, including their distance from the city center, urban morphology, population density, and the socio-economic profile of their inhabitants. As expected, there is a statistical dependence between people's perceptions and the location of the station regarding all spatial attributes of the areas except for parking. The assessment of the spatial characteristics of the two areas by the citizens differs in terms of distance from the city center, traffic noise, sufficiency of public spaces and greenery, as well as real-estate prices. At the same time, however, both areas are characterized by high population densities and car-oriented urban development. Consequently, in both areas, respondents face similar problems with walkability and quality of public space and evaluate in the same hierarchy the importance of key spatial features that impede walking, such as the quality of sidewalks and illegal parking.

The level of transport offered decreases as the distance from the city center increases, and seems to differentiate the level of citizens' satisfaction between the two areas regarding the current quality of public transport services. As confirmed by other studies [19,38,39], service frequency and waiting time, network coverage and transferring convenience, and bus route design and stops' placements, are all important factors that affect the level of transit user satisfaction. Nevertheless, expectations in both areas are quite high in terms of the anticipated positive effects of the metro, which is anticipated to increase the attractiveness of and upgrade the neighborhoods, as well as promote the use of public transport. Statistically significant higher expectations for better transport connectivity are observed in the area further away from the city center (Kalamaria). On the contrary, statistically significant higher expectations regarding local economic development are

expressed by citizens in the area closer to the city center (25th Martiou), which has been hit the hardest by the negative effects of the recent economic crisis. Our results are generally consistent with the findings of previous studies that reveal the optimistic expectations of urban residents about TOD impacts in their neighborhoods [15,22,26,29]. In addition, our study also demonstrates that positive perceptions may vary depending on the area characteristics and the locally specific livability and mobility problems faced by citizens.

Apparently, socio-economic characteristics affect both citizens' perceptions of the provided transport services and their willingness to increase transit use due to the introduction of an urban rail network. Age, income, and mobility attitudes are statistically significant differentiators in terms of satisfaction with the quality of the existing bus network service. Differences are also observed between the two sexes, but without being evaluated as statistically significant. These findings are partially consistent with various studies analyzing transit satisfaction based on socio-demographic characteristics. Ibrahim et al. [40] found that the passengers' sex and age influenced their quality perception of urban rail transit service, while Stradling et al. [41] also reported the influence of age, frequency of bus use, car availability, household income, and sex on bus service dissatisfaction. Morton et al. [42] reported that females and people from the lowest-income class tended to exhibit more negative opinions regarding specific quality service attributes, such as the cabin environment of bus transit. Additionally, the younger-age classes perceived lower overall transit quality than the oldest ones. On the contrary, the study of Woldeamanuel and Cyganski [43] indicated that men expressed lower satisfaction compared to women regarding the accessibility of public transportation.

According to several studies on the socioeconomic characteristics of transit riders [44–47], it is generally observed that women, younger, and lower-income people tend to use public transport at a higher rate than men, the elderly, and affluent people. Our results are consistent, in particular, with the study of Saw et al. [48], which confirms that the more frequent transit users tend to express lower satisfaction with the quality of services.

Finally, age and income are the statistically significant factors that differentiate the willingness to increase the use of public transport due to the new metro line. Sex and mobility behaviors also influence future travel choices, but to a non-statistically significant level. Women and younger people are more willing to increase the frequency of transit use after the start of the operation of the metro, probably because they—especially females—have much more complex activity patterns and trip chains [49,50], which the urban rail could optimize. In addition, our study indicates that higher-income classes also seem more willing to use the metro. This finding is in line with Pucher's and Renne's [51] work, which confirms income disparities among transit riders, with bus riders being the poorest and commuter rail riders the most affluent.

5. Conclusions

Our study highlights that, in a Mediterranean city characterized by car-oriented urban development and a lack of sufficient transport public services, the citizens are aware of the urban rail impacts and the TOD benefits for the revitalization of their neighborhoods, and the enhancement of transit quality and accessibility. These findings indicate a rather different stance than the one that dominates the public discourse, which exclusively features the negative community perceptions because of road traffic and walkability problems, degradation images, closures of many businesses in the surrounding sites of the future metro stations, and construction delays. In compact city areas that suffer from a lack of pedestrian infrastructure and limited public and green spaces, walkability and parking problems appear to be the major concerns of citizens. As our study reveals, citizens appreciate that TOD may offer opportunities to enhance the connectivity, accessibility, and livability of public spaces for pedestrians within the metro station catchment areas. Furthermore, we demonstrated that basic demographic and socio-economic factors, such as age, income, and personal travel behavior, are significantly related to the level of satisfaction and the willingness to use public transport.

As mentioned above, this survey was part of a pilot research project that concluded with two participatory workshops, one in each study area. Hence, an important application of this survey was the use of its findings as a knowledge framework on the perceptions of local people. The purpose of that was to experimentally bring into the public the question of the future of its neighborhood in connection to a large transit infrastructure under construction. For years, this transport project has been giving rise to negative attitudes on behalf of the local residents due to its adverse effects on the area during its construction stage. These workshops were held as open interactive events on the day of the weekly open markets in the study areas and were promoted using the slogans "Imagining the future of my neighborhood" and "The Metro in our neighborhood: I participate, I propose, I make the place where I live" [4]. The entire experiment indicated that, in both study areas, a transit-oriented regeneration plan, based on the metro station, could eventually be welcomed by the local citizens.

Regarding its policy implications, our study highlights that a successful implementation of an integrated urban and transport planning strategy requires a thorough understanding of users' needs and expectations for the future of their neighborhood. Identifying the citizens' perceptions of TOD potential benefits can help planning authorities implement TOD strategies and projects to maximize public transport use. Citizens' pre-construction surveys provide planners with useful insights in the community's needs, desires, and priorities, thus informing consultation processes and fostering participatory planning. As pointed out in other studies, the public's involvement is completely absent in urban development and regeneration projects in the city of Thessaloniki, a factor that, along with the low level of synergy between involved stakeholders, leads to never-ending planning processes and great difficulties in materializing such projects [52]. Thus, from a policy point of view, such surveys act as knowledge production platforms, helping to comprehend people's views and promote public participation. They strengthen urban and transport planning efficiency by reinforcing transparency, trust, and an understanding of the "public" as the end-users of a plan or project. In the case of a TOD project, public involvement is a key determinant in tailoring station-area planning to different urban and suburban community types, optimizing the project, and achieving sustainable mobility. Such research findings can be used as a reference for local policymakers when shaping planning goals and objectives for the successful integration of public transport projects in a neighborhood, or the entire city, with the aim to enhance its livability and the quality of life of citizens.

Of course, this study has some limitations that could be addressed and explored by future research. Firstly, the convenience sampling applied could introduce a selection bias in the inferential statistics and modeling results. Despite our effort to build a representative sample regarding sex and age groups, there was still an overrepresentation of low-income persons. There is a chance that this group of respondents is more eager to report negative experiences and they are more rigorous in evaluating the neighborhood's livability than others. We would like to address the probable bias issues through future research with a larger sample size. Secondly, the two analyzed types of metro stations are from neighborhood- and urban-type TODs, respectively. The metro line under construction consists of 13 stations located in areas with diverse spatial characteristics corresponding to other TOD types as well, such as metropolitan, peri-urban, suburban, and special activity. It would be interesting to validate the study outcomes by including more metro stations of different TOD types and using random sampling to increase the sample size of the citizen survey. Finally, further research is also needed to explore and model the combined effects of the demographic and build environmental factors into travel behavior and modal choice in a compact city that introduces new urban rail systems.

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