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**Diciunaite-Rauktiene, R, Gurskiene, V, Burinskiene, M and Maliene, V (2018)
The Usage and Perception of Pedestrian Zones in Lithuanian Cities:
Multiple Criteria and Comparative Analysis. Sustainability, 10 (3). ISSN 2071-
1050**

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Article

The Usage and Perception of Pedestrian Zones in Lithuanian Cities: Multiple Criteria and Comparative Analysis

Rūta Dičiūnaitė-Rauktienė¹, Virginija Gurskienė¹, Marija Burinskienė² and Vida Maliene^{1,3,*} 

¹ Institute of Land Management and Geomatics, Faculty of Water and Land Management, Aleksandras Stulginskis University, Studentu 11, Akademija, LT-53361 Kaunas distr., Lithuania; diciunaite200@gmail.com (R.D.-R.); virginija.gurskiene@asu.lt (V.G.)

² Road Department, Faculty of Environmental Engineering, Vilnius Gediminas Technical University, Sauletekio ave. 11, LT-10223 Vilnius, Lithuania; marija.burinskiene@vgtu.lt

³ Department of the Built Environment, The Built Environment and Sustainable Technologies Research Institute, Faculty of Engineering and Technology, Liverpool John Moores University, Byrom street, Liverpool L3 3AF, UK

* Correspondence: v.maliene@ljmu.ac.uk; Tel.: +44-151-231-2854

Received: 19 February 2018; Accepted: 10 March 2018; Published: 15 March 2018

Abstract: As pedestrian zones are public spaces in urban areas, they are important in terms of meeting people's needs. However, it is worth noting that attention should be paid not only to the development of the physical infrastructure, but also to a sustainable balance between the socio-economic and environmental aspects. To guide urban planning and management initiatives towards more sustainable patterns, it is essential to re-examine the already existing characteristics of cities, establishing how they are used and perceived by inhabitants. The present research suggests environmental, economic and social criteria that determine a greater vitality of pedestrian zones in cities and better life quality for the inhabitants. A questionnaire survey was used to assess common attitudes regarding the research topic in major cities in Lithuania. The multiple criteria decision-making COPRAS (COmplex PROportional ASsessment) method was used for the formation of a priority queue. The research results showed the attitudes of inhabitants towards pedestrian zones in Vilnius, Kaunas and Klaipėda. The inhabitants of these three cities regarded social and environmental criteria groups as the most significant. Contrary to what was expected and anticipated, respondents do not consider economic criteria as playing a key role in the sustainable preservation and development of pedestrian zones.

Keywords: Pedestrian zones in cities; sustainability of pedestrian zones; criteria for successful pedestrian zones; multiple criteria analysis; assessment of pedestrian zones in Lithuania

1. Introduction

Pedestrian zones are public spaces in cities and towns intended for the use of pedestrians. They are characterised by a partial or full restriction of vehicle traffic. Pedestrian zones are created to provide improved accessibility and mobility for pedestrians, to enhance economic activities in the given city/town area through its shopping and other businesses and to improve an area in terms of its environment by reducing air pollution and noise, as well as socially by increasing safety and providing space for human health improving activities such as walking and cycling. Public spaces are important for the meeting of public needs, socialisation, social gatherings and active recreation [1–6]. It is argued that public spaces can be perceived as a mirror of social customs, values and culture [7–11] that reveal

themselves gradually over time and are best recognised in old, traditional parts of the city or in the centre, as these places serve the most public functions [12]. These are public spaces that greatly affect the image of the city, and their functions and aesthetic quality determine the viability of public spaces [13].

From ancient times to the end of the 19th century, town squares and central streets generally served to meet the needs of the town and its inhabitants [14]. Public spaces in towns were used as a place to meet the basic needs of living, communication and entertainment. They also fulfilled political, religious, commercial, civil and social functions [6]. Later on, at the end of the 19th century and due to the growth of industry and rapid increase in population, these streets served more the purposes of trade and services; however, they were still considered places for social gatherings and communication. Since the 1960s, cities in developed and some developing countries were planned and built to increase and maximise automobile traffic flow, reducing the amount of space suitable for pedestrian zones. This trend is still being accelerated as a consequence of ongoing industrialisation and urbanisation in developing countries [15,16].

Notably, for over twenty years, in both developed and developing countries, there has been increasing concern over the possible negative social and environmental effects of traffic flow maximisation and pedestrian zones' decline [17,18]. Inevitably, the rising concern has resulted in pedestrianisation schemes, which have been adopted to redevelop the structure of cities in such a way as to restrict or remove automobile traffic from the street, making it suitable for pedestrian use only [19].

There has been wide interest in pedestrianisation and the analysis of pedestrian zones in both developed and developing countries such as Germany [19,20], the UK [19], the USA [21], India [18], Turkey [22], Malaysia [23] and others. The findings of these and other studies highlight that pedestrian zones have a significant impact on the following issues: (1) environmental impact, including reductions in environmental and noise pollution; (2) economic impact, such as an increase in rent value and (3) positive social impacts, including an increase in safety and improved attraction of location and visitor attitudes [19,24–27]. Therefore, it might be assumed that one of the ways to return life quality to cities is to dedicate urban spaces to pedestrians.

In order to create proper conditions for the satisfaction of human needs, great attention should be paid not only to the development of physical infrastructure, but also to other aspects that help to create a sustainable balance between social, economic and environmental factors [28–31]. However, interactions between these factors can be quite complex, especially as they are viewed differently by diverse stakeholder groups [31].

The aim of this article was to determine the social, economic and environmental criteria that influence the vitality of pedestrian zones and evaluate the sustainability of pedestrian zones in major cities in Lithuania. Social, economic and environmental criteria determining the viability of main pedestrian zones and a better quality of life for inhabitants were suggested based on the literature review and primary research (survey). The research was used to determine and compare the main social, environmental and economic criteria that are most important with regard to the main pedestrian zones in different cities. The attitude of the inhabitants of major Lithuanian cities towards the sustainable use of pedestrian zones was also determined. Finally, an analysis was conducted on which socio-demographic groups visit pedestrian zones and for what purposes.

2. Research Methodology

2.1. Data Collection

The data collection process included the following stages: determining the criteria, determining criteria weights, selecting objects of study (alternatives) for comparison, calculating criteria values for each alternative and forming a decision-making matrix.

A system of criteria for defining the perception of pedestrian zones was identified via an extensive literature review. A total of 21 criteria were identified. Subsequently, the criteria system was validated and weighted via a questionnaire survey.

As part of the aim of the article was to determine the attitude of inhabitants towards pedestrian zones, the selected qualitative method helped to reveal common attitudes in terms of each criterion. The respondents evaluated each statement based on a five-point Likert scale [32] from ‘insignificant/least important’ to ‘very significant/most important’ (a lower number indicates that respondents regard the statement to be less suited to them). The respondents were asked for the following information: the frequency of their visits to the main pedestrian streets in their cities, their age, education and social status—all of which are factors that may affect their attitude towards the sustainable use of pedestrian street land in major cities.

In order to evaluate the use of land in pedestrian zones in major Lithuanian cities, 100 inhabitants in each city—Vilnius, Kaunas and Klaipėda—were surveyed. The total sample of survey responses obtained was 300, which is a 100% response rate. All respondents were interviewed during the day-time in the pedestrian zones of each case study city. Respondents aged over 18 and above were approached randomly.

2.2. Statistical Tests Used for Questionnaire Data Analysis

The data from the surveys were calculated using SPSS (*Statistical Package for the Social Sciences*) software, which is suitable for processing and working with collected data, its analysis and the determination of data correlation. The data obtained during the survey were processed with SPSS 17 and the figures were created using Microsoft Office Excel 2007.

Presentation of data analysis: The analysis was conducted in writing. The method of visualisation of presented data comprised diagrams and tables. For the data expressed in Likert scales, means (M) and standard deviations (SD) were calculated, while the number of respondents (N) was presented. For the data expressed in ordinal or nominal scales, the percentage was calculated (pct.). In order to compare the differences between the obtained results for the various socio-demographic groups of respondents, the following statistical criteria were used:

- (a) *Mann-Whitney test*—used to determine the differences between two populations when the compared variable was an ordinal or interval one and the conditions of the parameter criteria were not met (this criterion is an analogue of an independent sample t-criterion). The criterion assumes that value distribution in both populations is equal, while in one population the distribution might be shifted in respect to the other population and in the samples, the compared variable shall be of no lower measurement level than the ordinal variable. Furthermore, a large number of combined ordinals should be avoided, that is, the ordinal variable should have a sufficient number of different values (usually, seven are sufficient) [33].
- (b) *Kruskal-Wallis* is a non-parametric equivalent of one-factor analysis of variance. Based on this criterion, relative/interval and ordinal variables can be compared in three or more independent samples) [33].
- (c) *Pearson χ^2 criterion of compatibility* (*‘chi-square’*) (when the results are expressed in nominal or ordinal scales).

In all cases, the difference is considered statistically significant when its reliability is higher than 95 per cent, that is, when $p < 0.05$.

2.3. Multiple Criteria COPRAS Assessment Method

Since the aim of this article was to evaluate the sustainability of pedestrian zones in major cities in Lithuania, multi-purpose solution methods (MSM) are used to compare alternatives [34]. The simplest method of the MSM methods group is the multiple criteria, complex proportional assessment of alternatives, COPRAS method [35]. The sustainability of pedestrian zones in each city has been

assessed using the COPRAS assessment method. Three criteria were selected and validated in order to apply this method, each of which is then elaborated. As a result, the assessment has been done against 21 distinguished criteria.

The main principle of the COPRAS method is the relative importance of the compared alternatives. Q_i is determined on the basis of the defining positive S_{+i} and negative S_{-i} features. The greater the value of Q_i , the more the alternative is in line with the needs of the decision maker. Six stages constitute the algorithm of the method.

Stage 1 By using the data from the solution table, a decision matrix $X = [x_{ij}]_{[m \times n]}$, ($i = \overline{1, m}$; $j = \overline{1, n}$) is compiled where rows denote the analysed alternatives (m is the number of alternatives) and the columns denote efficiency indicators (n is the number of efficiency indicators) based on which the alternatives are assessed.

Stage 2 The elements of the decision matrix X are normalised in accordance with the equation:

$$\bar{x}_{ij} = \frac{x_{ij}}{\sum_{i=1}^m x_{ij}}, (i = \overline{1, m}; j = \overline{1, n}), \quad (1)$$

where x_{ij} is the value of the j th indicator of the i th alternative.

Stage 3 By multiplying the elements of the decision matrix by the importance values of the respective efficiency indicators, the weighted normalised decision matrix $D = [d_{ij}]_{[m \times n]}$, ($i = \overline{1, m}$; $j = \overline{1, n}$) is obtained, the elements of which are calculated in accordance with the equation:

$$d_{ij} = \bar{x}_{ij} \cdot q_j, (i = \overline{1, m}; j = \overline{1, n}) \quad (2)$$

where (q_1, q_2, \dots, q_n) is the vector of importance values of efficiency indicators.

Stage 4 i th alternatives are calculated, the weighted normalised sums of maximised and minimised indicators, S_{+i} or S_{-i} , respectively:

$$S_{+i} = \sum_{j=1}^k d_{ij}, (i = \overline{1, m}) \quad (3)$$

$$S_{-i} = \sum_{j=1+k}^n d_{ij}, (i = \overline{1, m}), \quad (4)$$

where k is the number of maximised indicators; n is the number of minimised indicators.

Stage 5 The relative importance of alternatives (efficiency) Q_i is determined in accordance with the equation:

$$Q_i = S_{+i} + \frac{\sum_{i=1}^m S_{-i}}{S_{-i} \cdot \sum_{i=1}^m \frac{1}{S_{-i}}}, \quad (5)$$

The higher the value of Q_i , the greater the rationality (efficiency) of the alternative [36].

Stage 6 By using the relative importance of alternatives Q_i , the degree of efficiency N_i of each i th alternative is calculated:

$$N_i = \frac{Q_i}{Q_{\max}} \cdot 100\% \quad (6)$$

where Q_{\max} is the highest assessment of an alternative obtained using the COPRAS method, which will be used to compare assessments of other alternatives Q_i obtained using the COPRAS

method. On the basis of efficiency assessments of alternatives N_i , the alternatives are listed by priority.

3. Object of the Study

The object of the study is the pedestrian zones in three major Lithuanian cities—Kaunas, Vilnius and Klaipėda. See Figure 1.



Figure 1. Map of Lithuania.

Kaunas is the second-largest city in Lithuania and was the temporary capital of the country from 1919 to 1940. Data provided by Statistics Lithuania show that in 2015, 301,357 people were living in Kaunas [37]. Laisves Avenue is the main street in the New Town (Figure 2); it was reconstructed in 1982 and made into a pedestrian boulevard. Along with the central Vilnius Street in the Old Town, it constitutes the longest pedestrian zone in Eastern Europe [38]. The Old Town is located at the confluence of the Nemunas and Neris rivers with its main objects being the castle, the town hall and the surrounding streets. Many significant architectural monuments of the city are located here.



Figure 2. Kaunas: Laisves Avenue and the Old Town.

Vilnius is the capital of Lithuania. Data provided by Statistics Lithuania show that in 2015, 531,910 people were living in Vilnius [37]. Gediminas Avenue and the Old Town are the main pedestrian zones in Vilnius (Figure 3). Gediminas Avenue is 2 km long the central street of Vilnius, which connects four squares. Also, Gediminas Avenue links the historical city (old town) with Vilnius city centre (the Cathedral Square and the Seimas Palace). Vilnius Old Town is the first Lithuanian cultural heritage site to be recognised globally, having been included in the UNESCO World Heritage List in 1994 for preserving an impressive complex of Gothic, Renaissance, Baroque and classical buildings as well as its medieval layout and natural setting [38].

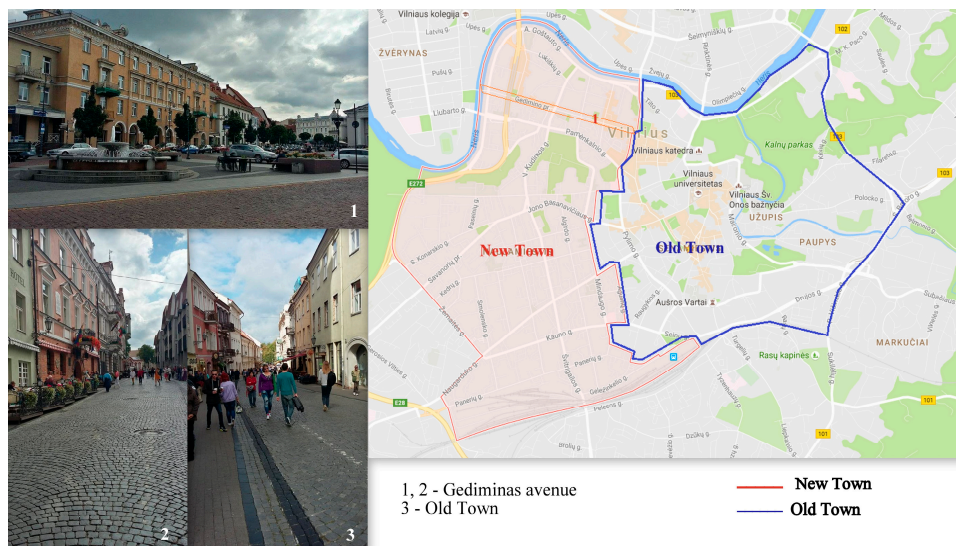


Figure 3. Vilnius: Gediminas Avenue, Old Town.

Klaipeda is the oldest city in Lithuania, first mentioned as Memelburg in 1252 [38]. Data provided by Statistics Lithuania show that in 2015, 156,141 people were living in Klaipeda [37]. Klaipeda Old Town (Figure 4) is distinguished by its fachwerk-style architecture and the planned structure of the streets which is atypical of all other Lithuanian old towns.



Figure 4. Klaipeda: Old Town.

4. Results

4.1. Criteria System for Appraising the Perception of Pedestrian Zones and Criteria Weights

Developing pedestrian zones is important in order to separate citizens from vehicle traffic and encourage people to return to safe, comfortable and interesting environment in city centres. Thus, when assessing pedestrian zones, environmental, economic and social criteria are all important. The criteria were determined after completing the literature review (Table 1).

Table 1. Criteria for successful pedestrian zones as public spaces.

Criteria	Criteria Derivation: Literature
C1. Noise protection: protection against vehicle noise	[14,39].
C2. Air pollution: protected against road transport pollution	[14,39–43].
C3. Presence of trees and green zones	[43–47].
C4. Clean environment: recycling bins, tidy and clean streets and footpaths	[48]
C5. Commerce and meeting visitors' needs	[3,6,39].
C6. Job creation	[39,49,50].
C7. Incentives for small and medium businesses	[14,39,50,51].
C8. Tourism development	[14,49,52].
C9. Customer friendly parking prices	This study
C10. Comfortable and safe space for cyclists	[4,53].
C11. Comfortable and safe space for pedestrians	[4,53].
C12. Space adapted for relaxation and recreation	[4,39,54,55].
C13. Safety and low crime rates	[4,6].
C14. Night-time street lighting	[53,56,57].
C15. Developing communities: space for meetings and interaction	[4,54,55].
C16. Entertainment: attractive space for entertainment, culture, art projects, city festivals, fairs and other events	[4,6,49,58].
C17. Cultural space: aesthetic appearance of the streets and buildings, architectural and cultural heritage monuments and their preservation	[6,39,49,59].
C18. Promoting healthy lifestyle: space for cyclists, athletes and people who engage in other types of active leisure	[60]
C19. Residential area: apartments, hotels and homes	This study
C20. Accessibility via public transport	[49,54,55].
C21. Accessible parking (in terms of distance)	This study

The majority of criteria were defined using a critical analysis of topic-related literature (peer review academic papers) and some criteria, such as C9, C19 and C21, were added as important to take into account following the survey results.

The criteria for successful pedestrian zones as public spaces listed in Table 1 can be divided into environmental, economic and social criteria, described as follows.

4.1.1. Environmental Criteria

C1. Noise protection: protected against vehicle noise—due to growing urban automobilisation, city centres have become abundant with cars, which has resulted in noisy streets [14]. Pedestrian zones

should be areas where people enjoy spending time and want to return, so successful pedestrian zones should be protected against vehicle noise [39].

C2. Air pollution: protected from road transport pollution—due to growing urban automobilisation, city centres have become abundant with cars, which has resulted in streets becoming polluted with dust and gas [14]. According to the European Economic and Social Committee (ECO/273, 2010), air pollution caused by vehicles is considered to be the most severe issue in major cities [40–43]. Good pedestrian zones should therefore be protected against pollutants emitted by vehicles [39].

C3. Presence of trees and green zones—the European Economic and Social Committee (ECO/273, 2010) has said that preserving biodiversity and focusing on protecting green zones is important [43,44]. Deveikis et al. (2014) also wrote about the importance of green zones, claiming that they protect against noise and pollution by suppressing between 20% and 80% of dust [45]. Beatley and Newman (2013) advocate for ‘biophilic cities’ that can provide close contact with nature [61]. Such cities foster social and landscape resilience, contributing to sustainable development [47].

C4. Clean environment: recycling bins, tidy and clean streets and footpaths—good pedestrian zones are comfortable. Comfort encompasses cleanliness, among other things, while recycling bins are required to conserve the environment; thus, they are important for the sustainable use of pedestrian zones [48].

Consequently, successful and good pedestrian zones, as public spaces for people, should be safe (in terms of motor and non-motor vehicles) as well as protected against the pollution and noise caused by cars. Trees, green zones and a clean environment are important in order to preserve ecological balance.

4.1.2. Economic Criteria

C5. Commerce and meeting visitors’ needs—good and successful pedestrian zones should contain shops, cafés [39] and other service vendors, because various shopping [3], dining [6] and interaction opportunities are important.

C6. Job creation—as tourism [49] and small and medium businesses [50] grow in good and successful pedestrian zones, investment attraction also grows [39], which results in job creation.

C7. Incentives for small and medium businesses—vital pedestrian zones contain many business opportunities [51] since frequent visits by people and walkability allow businesses to grow [50].

C8. Tourism development—scientists claim that the infrastructure of pedestrian zones in cities, which has been fixed and adapted for larger visitor flows, attracts more tourists [49,52] resulting in additional income from tourism [14].

C9. The authors of this study believe another important economic factor is customer friendly parking prices—it is presumed that in countries where salaries are below the EU average, this is an important factor that can affect how cities are visited.

Thus, successful and vital pedestrian zones can lead to economic benefit by attracting more visitors which in turn leads to income. Vital pedestrian zones offer many new business opportunities: since companies that provide services and shopping opportunities are important here, jobs are created as a result.

4.1.3. Social Criteria

C10. Comfortable and safe space for cyclists/C11. Comfortable and safe space for pedestrians—as a good public space, pedestrian zones should be comfortable and convenient [4]. Comfort also encompasses the understanding of safety [53].

C12. Space adapted for relaxation and recreation—Sisman (2013) and Asadi-Shekari et al. (2015) claim that good pedestrian zones should be safe (in terms of motor and non-motor vehicles) [54,55]. Gehl (2010) and Blaga (2013) believe that good public spaces (pedestrian zones) have areas for walking, recreation, sitting and watching [4,39].

C13. Safety and low crime rates—a good public space must ensure the feeling of security and have protection against traffic and possible crimes [6].

C14. *Night-time street lighting*—lights provide a sense of safety and protect against accidents (such as stumbling on the footpath, etc.) in the night-time and help to find the way [56,57]. Thus, good pedestrian zones should be lit [53].

C15. *Developing communities: space for meetings and interaction*—Sisman (2013) and Asadi-Shekari et al. (2015) claim that good pedestrian zones should encourage communal activities, improve communication in the community and offer discussion [54,55] and improvement [18] opportunities.

C16. *Entertainment: attractive space for entertainment, culture, art projects, city festivals, fairs and other events*—a good public space should offer meaningful activities [4,6] and entertainment, that is, things that encourage people to return [49]. The review of various studies has shown that people depend on the functional, social and leisure activities [58] provided on the streets as well as their attractions [49].

C17. *Cultural space: aesthetic appearance of the streets and buildings, architectural and cultural heritage monuments and their preservation*—good public spaces should be of high aesthetic quality [59]. Mehta (2014) also notes distinguished environmental visualisation and the quality of the space [6]. How the public space is managed is also important, that is, whether the ground coverings are high quality for walking. Cultural heritage is also important and affects the appeal of pedestrian zones [39]; they can also serve as attractions [49].

C18. *Promoting healthy lifestyle: space for cyclists, athletes and people who engage in other types of active leisure*—successful pedestrian zones and streets should be designed in such a way that makes them suitable for cyclists and other fans of active leisure. It is also important to ensure the safety of bikes, that is, offer ways to leave a bike, lock it etc. [60].

C19. *Residential area: apartments, hotels and homes*—this is important for tourism development as well as people who want to live in the pedestrian zone.

C20. *Accessibility via public transport*—Sisman (2013) and Asadi-Shekari et al. (2015) claim that good pedestrian zones should ensure direct and convenient transportation [54,55]. Accessible areas are distinguished by convenient public transport [49].

C21. *Accessible parking (in terms of distance)*—the authors of this paper believe that accessible parking, in terms of distance, must also be included. This is especially relevant to families with minors or seniors as well as the disabled who are also drivers.

Consequently, good and successful pedestrian zones should be adapted for recreation and tourism and encourage communities and the growth of a healthy lifestyle. Pedestrian zones should be lit at night and protected against vehicle traffic and crime. Cultural heritage monuments are also important as attractions as well as for the aesthetic appearance of the streets and buildings. Furthermore, pedestrian zones should be accessible via public transport or convenient, accessible parking.

4.2. Survey and Usage of Pedestrian Areas

In order to determine how city residents use and view pedestrian zones in Kaunas, Vilnius and Klaipėda, a survey was conducted with 100 residents who walked through the pedestrian zone during the day time in each city. The total sample of all residents (Kaunas, Vilnius and Klaipėda) was 300 (100% of response rate). The respondents over 18 and above age were approached randomly, however the socio-demographic characteristic of respondents were noted (see Table 2).

The results presented in Table 2 show the ratio of men and women was similar among respondents in all three cities. Most of the participants in the study were over 60 years old in all city groups. More than half of the respondents in all three cities had higher university education. As can be seen from Table 2 and according to the distribution of respondents by social status, most of them were unemployed and seniors.

It was found that only 14% of respondents visit pedestrian zones in major Lithuanian cities once or twice per week while 23% said they visit them several times per month. Meanwhile, almost one fifth of correspondents visit such areas only a few times per year and the remaining 44% visit them once or more per month. As seen in Figure 5, the frequency of respondents' visits to pedestrian zones varies significantly ($p < 0.05$). It was determined that residents of Vilnius visit pedestrian zones significantly

more frequently (a few times per month) than residents of Klaipėda or Kaunas. Meanwhile, residents of Kaunas visit pedestrian zones significantly less frequently (only a few times per year) compared with residents of the other cities.

Table 2. Socio-demographic characteristics of respondents.

		City					
		Vilnius		Kaunas		Klaipėda	
		N	%	N	%	N	%
Sex	Woman	20	20.0	31	31.0	50	50.0
	Man	80	80.0	69	69.0	50	50.0
Age	18-30	7	7.0	4	4.0	9	9.0
	31-45	0	0.0	0	0.0	8	8.0
	46-60	26	26.0	7	7.0	26	26.0
	>60	67	67.0	89	89.0	57	57.0
Education	Basic	5	5.0	7	7.0	7	7.0
	Secondary	13	13.0	15	15.0	15	15.0
	Higher university	64	64.0	60	60.0	57	57.0
	Higher non-university	18	18.0	18	18.0	21	21.0
Social status	Student	15	15.0	16	16.0	13	13.0
	Unemployed	29	29.0	48	48.0	26	26.0
	Senior	26	26.0	28	28.0	34	34.0
	Employed	30	30.0	8	8.0	27	27.0

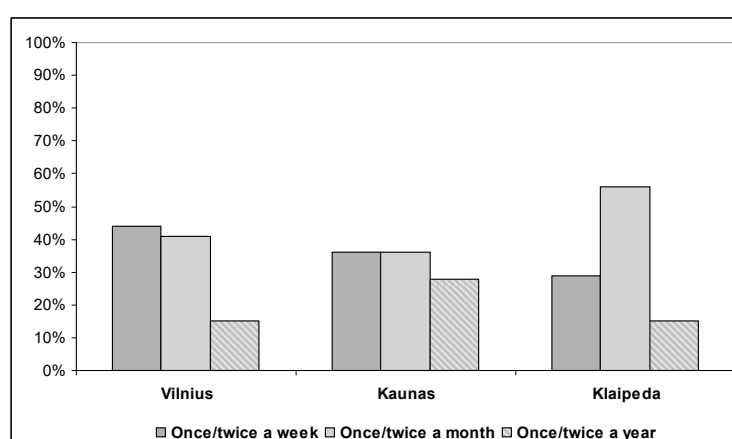


Figure 5. Distribution of respondents by frequency of being in pedestrian zones in different city groups ($\chi^2 = 18.652$, $df = 8$, $p = 0.017$), %.

The data provided in Table 3 show the purpose of respondents' visits to pedestrian zones. It was determined that in the case of Vilnius, shopping activity significantly varied: residents shop in Gediminas Avenue much more often than in the Old Town ($p < 0.05$). Meanwhile in the case of Kaunas, all three activities varied significantly: it was determined that residents of Kaunas choose Laisves Avenue much more often for walks and shopping and the Old Town zone is frequented due to cultural activities and entertainment.

Table 3. The distribution of the frequency of residents' activities in separate pedestrian zones in the analysed cities, %.

Activities	Vilnius		Kaunas	
	Pedestrian Zone		Pedestrian Zone	
	Gediminas Ave.	Old Town Zone	Laisves Ave.	Old Town Zone
Relaxing, walking	18.0	22.0	39.0	25.0
Shopping	12.0	2.0	14.0	5.0
Culture and entertainment	75.0	86.0	65.0	85.0

In both cities, respondents engage in cultural activities and entertainment the most, about one fourth of respondents go on walks and only the minority go shopping. It should be noted that activities in different zones varied significantly in the cases of shopping and culture ($p < 0.05$), which shows that in terms of statistical significance, residents more often choose Gediminas Avenue and Laisves Avenue for shopping and the Old Town pedestrian zones for cultural activities and entertainment.

4.3. The Importance of the Criteria

In order to determine how respondents perceive pedestrian zones based on the criteria described in Section 4.1, the importance of the criteria was first determined. Respondents assessed the significance of criteria on a five-point Likert scale where 1 means ‘the least important’ and 5 means ‘the most important.’ The questions to be answered were:

- How do urban residents perceive the importance of pedestrian zones in their cities?
- Which environmental, economic and social criteria are the most important with regard to the main pedestrian streets in cities?

It was determined that tourism development (C8) and incentives for small and medium businesses (C7) were the most important of the economic criteria, safety and crime rates (C13), comfortable and safe space for pedestrians (C11) and night-time street lighting (C14) were the most important of the social criteria, while clean environment (C4), noise levels (C1) and pollution levels (C2) were seen as the most important of the environmental criteria (Figure 6).

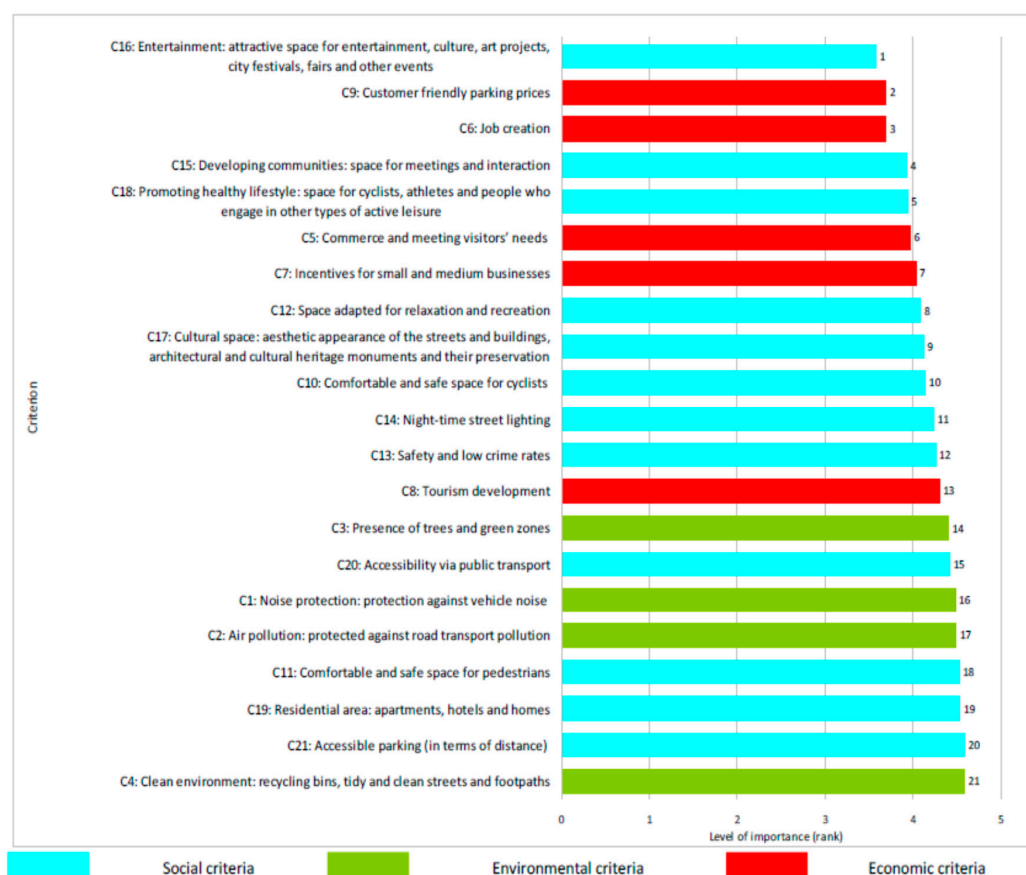


Figure 6. Average assessment of the importance of the main criteria for pedestrian streets.

Overall, respondents see social criteria as the most important for attracting people to pedestrian zones while economic criteria are seen as the least important.

The assessment of these criteria, required to attract (or return) people to city centres, varied with respect to statistical significance only in the case of economic criteria ($p < 0.05$). It was determined that residents of Klaipeda consider economic and environmental criteria as more statistically significant with respect to making people return. Meanwhile, social criteria were more important to the residents of Vilnius and Kaunas than to the residents of Klaipeda (Figure 7).

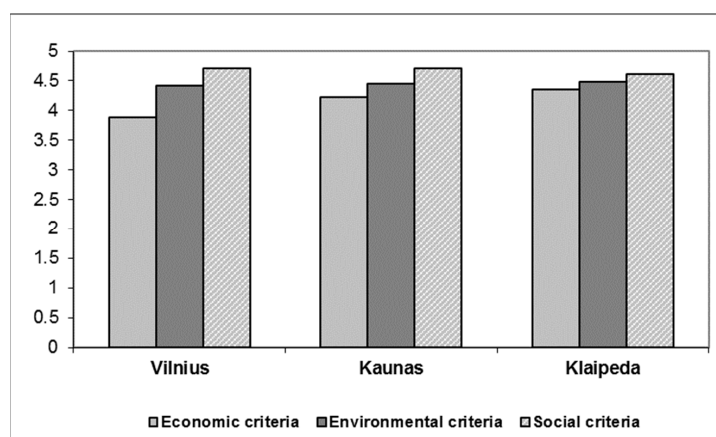


Figure 7. Assessment of the importance of environmental ($H = 0.346$, $p = 0.841$), economic ($H = 17.249$, $p = 0.000$) and social ($H = 4.125$, $p = 0.127$) criteria scales in different cities.

Table 4 presents the assessments of the importance of environmental, economic and social criteria for pedestrian streets in three different cities while Table 4 shows the Kruskal-Wallis test of importance comparison between different cities.

Table 4. Comparison of criteria importance by city.

Criterion			Criterion Importance			Average Level of Criteria Importance by City					
						Vilnius		Kaunas		Klaipeda	
						Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
C11	Comfortable and safe space for pedestrians	1	4.74	0.54	4.59	0.74	4.69	0.46			
C13	Safety and low crime rates	2	4.73	0.57	4.63	0.69	4.65	0.5			
C14	Night-time street lighting	3	4.71	0.57	4.66	0.61	4.47	0.59			
C4	Clean environment: recycling bins, tidy and clean streets and footpaths	4	4.6	0.59	4.58	0.79	4.61	0.49			
C3	Extinction of biodiversity, decrease in green spaces	5	4.61	0.67	4.39	1.05	4.4	0.59			
C2	Air pollution: protected against road transport pollution	6	4.31	0.69	4.39	0.98	4.66	0.52			
C12	Space adapted for relaxation and recreation	7	4.33	0.85	4.46	0.7	4.63	0.49			
C8	Tourism development	8	4.64	0.63	4.43	0.9	4.31	0.54			
C1	Noise: protected against vehicle noise	9	4.21	0.81	4.46	0.83	4.59	0.64			
C16	Entertainment: attractive space for entertainment, culture, art projects, city festivals, fairs and other events	10	4.27	0.9	4.42	0.73	4.48	0.61			
C17	Cultural space: aesthetic appearance of the streets and buildings, architectural and cultural heritage monuments and their preservation	11	4.44	0.76	4.44	0.72	4.18	0.63			

Table 4. Cont.

Criterion	Criterion Importance	Average Level of Criteria Importance by City						
		Vilnius		Kaunas		Klaipeda		
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	
C20	Accessibility via public transport	12	4.2	0.8	4.47	0.73	4.18	0.61
C10	Comfortable and safe space for cyclists	13	3.88	1.17	4.2	1.07	4.31	0.6
C21	Accessible parking (in terms of distance)	14	3.7	1.08	4.37	0.8	4.32	0.65
C5	Economic space: commerce and meeting visitors' needs (the number of shops, cafés and other service vendors)	15	3.96	0.67	4.27	0.86	4.08	0.76
C7	Incentives for small and medium businesses	16	4.09	0.9	4.09	0.89	4.11	0.76
C15	Developing communities: space for meetings and interaction	17	3.82	0.96	4.07	0.88	4.32	0.62
C9	Customer friendly parking prices	18	3.68	1.21	4.24	1	3.94	0.78
C18	Promoting healthy lifestyle: space for cyclists, athletes and people who engage in other types of active leisure	19	3.3	1.36	4.15	0.87	4.33	0.57
C6	Job creation	20	3.54	0.78	3.71	1.04	4.08	0.79
C19	Residential area: apartments, hotels and homes	21	3.57	1.08	3.56	0.98	3.88	0.66

We found that of the economic criteria, residents of Klaipeda viewed job creation (C6) as significantly more important while residents of Vilnius found tourism development (C8) more important ($p < 0.05$). Among the social criteria, residents of Klaipeda viewed comfortable and safe space for cyclists (C10), space adapted for relaxation and recreation (C12), developing communities (C15), promoting healthy lifestyle (C18) and residential area (C19) as significantly more important, while residents of Vilnius attached significantly more importance to criteria such as night-time street lighting (C14) and cultural space (C17) and residents of Kaunas found cultural activities (C17) and accessibility (C21) to be more important ($p < 0.05$). Meanwhile, among the environmental criteria, residents of Klaipeda saw noise levels (C1) and pollution levels (C2) as significantly more important while residents of Vilnius attached importance to the presence of trees and green zones (C3) ($p < 0.05$). See Table 5.

Table 5. Significant results of Kruskal-Wallis test when comparing cities.

Criteria	Results of the Kruskal-Wallis Test
C1: Noise protection: protection against vehicle noise	$H(2) = 13.694, p = 0.001 (p < 0.01)$
C2: Air pollution: protected against road transport pollution	$H(2) = 14.089, p = 0.001 (p < 0.01)$
C3: Extinction of biodiversity, decrease in green spaces	$H(2) = 13.653, p = 0.001 (p < 0.01)$
C5: Economic space: commerce and meeting visitors' needs (the number of shops, cafés and other service vendors)	$H(2) = 12.654, p = 0.002 (p < 0.01)$
C6: Job creation	$H(2) = 20.124, p = 0.000 (p < 0.01)$
C8: Tourism development	$H(2) = 20.802, p = 0.000 (p < 0.01)$
C9: Customer friendly parking prices	$H(2) = 15.621, p = 0.000 (p < 0.01)$
C10: Comfortable and safe space for cyclists	$H(2) = 6.693, p = 0.035 (p < 0.01)$
C14: Night-time street lighting	$H(2) = 13.544, p = 0.001 (p < 0.01)$
C15: Developing communities: space for meetings and interaction	$H(2) = 14.039, p = 0.001 (p < 0.01)$
C17: Cultural space: aesthetic appearance of the streets and buildings, architectural and cultural heritage monuments and their preservation	$H(2) = 13.375, p = 0.001 (p < 0.01)$
C18: Promoting healthy lifestyle: space for cyclists, athletes and people who engage in other types of active leisure	$H(2) = 35.286, p = 0.000 (p < 0.01)$
C19: Residential area: apartments, hotels and homes	$H(2) = 7.803, p = 0.020 (p < 0.05)$
C20: Accessibility via public transport	$H(2) = 13.080, p = 0.001 (p < 0.01)$
C21: Accessible parking (in terms of distance)	$H(2) = 30.642, p = 0.000 (p < 0.01)$

To identify in which city respondents' opinions showed a statistically significant difference, a post-hoc Mann Whitney test was conducted using the significant criteria listed in Table 6. The number of comparisons required was: $3(3 - 1)/2 = 3$. Bonferroni adjustment: $0.05/3 = 0.0167$ (new alpha/significance level).

By conducting the Mann-Whitney test, the differences in assessments of environmental, economic and social criteria for the main pedestrian streets were determined separately for Vilnius and Kaunas, Vilnius and Klaipeda and Klaipeda and Kaunas (Table 6). After evaluating the differences in assessment of environmental, economic and social criteria between residents of Vilnius and Kaunas with respect to statistical significance, we discovered that, from the economic criteria, residents of Kaunas appreciated economic space (C5) and accessibility (C9) more than residents of Vilnius in terms of statistical significance ($p < 0.05$). Among the social criteria, residents of Kaunas assessed comfortable and safe space for cyclists (C10), promoting healthy lifestyle (C18) and accessible parking (C21) more highly with respect to statistical significance ($p < 0.05$). Of the environmental criteria, in terms of statistical significance ($p < 0.05$), residents of Kaunas found noise protection (C1) and absence of air pollution (C2) more important than residents of Vilnius. Having assessed the statistically significant differences between residents of Vilnius and Kaunas, we determined that with respect to statistical significance, of the economic criteria, residents of Klaipeda valued job creation (C6) more, while residents of Vilnius prioritised tourism development (C8); residents of Klaipeda valued the comfort and safety of space for cyclists (C10), adapting the space for recreation and relaxation (C12), night-time street lighting (C14), developing communities (C15), promoting healthy lifestyle (C18), residential area (C19) and accessible parking (in terms of distance) (C21) more, while residents of Vilnius prioritised cultural spaces (C17) more than residents of Klaipeda. With respect to statistical significance, of the environmental criteria, residents of Klaipeda valued noise protection (C1) and pollution (C2) significantly ($p < 0.05$) more than residents of Vilnius; however, residents of Vilnius attached more importance to the presence of green spaces (C3) than did residents of Klaipeda.

Having assessed the statistically significant differences between the residents of Kaunas and Klaipeda, we determined that—with respect to statistical significance—of the economic criteria, residents of Kaunas valued economic area (C5), tourism development (C8) and customer friendly parking prices (C9) more than did residents of Klaipeda, but residents of Klaipeda saw job creation as much more significant. Of the social criteria, with respect to statistical significance ($p < 0.05$), residents of Kaunas found night-time street lighting (C14), cultural spaces (C17) and accessibility via public transportation (C20) more important than did residents of Klaipeda. However, residents of Klaipeda perceived residential area (C19) as more important with respect to statistical significance ($p < 0.05$). Meanwhile, among the environmental criteria, residents of Klaipeda valued the presence of green zones (C3) much more highly than did residents of Kaunas with respect to statistical significance ($p < 0.05$).

Table 6. Significant differences in perception of criteria contributing to the pedestrian zones based on city.

City	Criterion	Mann-Whitney Result	Rank of Criterion
More important to residents of Vilnius and Kaunas than residents of Klaipeda	C14: Night-time street lighting	U = 3836.500, $p = 0.001$ ($p < 0.0167$) and U = 4050.500, $p = 0.006$ ($p < 0.0167$)	3
More important to residents of Vilnius than residents of Klaipeda and more important to residents of Klaipeda than residents of Kaunas	C3: Extinction of biodiversity, decrease in green spaces	U = 3902.500, $p = 0.002$ ($p < 0.0167$) and U = 3855.000, $p = 0.001$ ($p < 0.0167$)	5
More important to residents of Klaipeda than residents of Vilnius	C2: Air pollution: protected against road transport pollution	U = 3648.000, $p = 0.000$ ($p < 0.0167$)	6
More important to residents of Vilnius and Kaunas than residents of Klaipeda	C8: Tourism development	U = 3354.000, $p = 0.000$ ($p < 0.0167$)	8
More important to residents of Kaunas and Klaipeda than residents of Vilnius	C1: Noise protection: protection against vehicle noise	U = 4059.500, $p = 0.011$ ($p < 0.0167$) and U = 3724.000, $p = 0.000$ ($p < 0.0167$)	9
More important to residents of Vilnius and Kaunas than residents of Klaipeda	C17: Cultural space: aesthetic appearance of the streets and buildings, architectural and cultural heritage monuments and their preservation	U = 3820.000, $p = 0.002$ ($p < 0.0167$) and U = 3827.000, $p = 0.002$ ($p < 0.0167$)	11
More important to residents of Kaunas than residents of Vilnius and Klaipeda	C20: Accessibility via public transport	U = 4046.000, $p = 0.010$ ($p < 0.0167$) and U = 3661.500, $p = 0.000$ ($p < 0.0167$)	12
More important to residents of Kaunas and Klaipeda than residents of Vilnius	C21: Accessible parking (in terms of distance)	U = 3081.500, $p = 0.000$ ($p < 0.0167$) and U = 3346.000, $p = 0.000$ ($p < 0.0167$)	14
More important to residents of Kaunas than residents of Vilnius	C5: Economic space: commerce and meeting visitors' needs (the number of shops, cafés and other service vendors)	U = 3662.500, $p = 0.000$ ($p < 0.0167$)	15
More important to residents of Klaipeda than residents of Vilnius	C15: Developing communities: space for meetings and interaction	U = 3558.000, $p = 0.000$ ($p < 0.0167$)	17
More important to residents of Kaunas than residents of Vilnius and Klaipeda	C9: Customer friendly parking prices	U = 3603.500, $p = 0.000$ ($p < 0.0167$) and U = 3708.000, $p = 0.001$ ($p < 0.0167$)	18
More important to residents of Kaunas and Klaipeda than residents of Vilnius	C18: Promoting healthy lifestyle: space for cyclists, athletes and people who engage in other types of active leisure	U = 3227.500, $p = 0.000$ ($p < 0.0167$) and U = 2828.500, $p = 0.000$ ($p < 0.0167$)	19
More important to residents of Klaipeda than residents of Vilnius and Kaunas	C6: Job creation	U = 3218.000, $p = 0.000$ ($p < 0.0167$) and U = 4069.000, $p = 0.016$ ($p < 0.0167$)	20
More important to residents of Klaipeda than residents of Kaunas	C19: Residential area: apartments, hotels and homes	U = 4046.000, $p = 0.011$ ($p < 0.0167$)	21

4.4. Evaluating the Sustainability of Pedestrian Zones Based on the COPRAS Method

Having summarised the survey results, we compiled a solution table, the data from which will be used to evaluate five alternatives (Table 7).

Table 7. Values of alternative indices.

Criteria	Criterion Values				
	Kaunas		Vilnius		Klaipeda
	A1	A2	A3	A4	A5
Environmental Criteria					
C1. Noise: protection against vehicle noise	0.79	0.865	0.7525	0.8375	0.8675
C2. Air pollution: protected against road transport pollution	0.8225	0.8475	0.7925	0.8575	0.88
C3. Presence of trees and green zones	0.88	0.8475	0.82	0.8475	0.8325
C4. Clean environment: recycling bins, tidy and clean streets and footpaths	0.9175	0.895	0.88	0.895	0.8575
Economic Criteria					
C5. Economic space: commerce and meeting visitors' needs (the number of shops, cafés and other service vendors)	0.6925	0.7575	0.77	0.7375	0.6125
C6. Job creation	0.62	0.69	0.6525	0.6175	0.645
C7. Incentives for small and medium businesses	0.7025	0.73	0.695	0.74	0.725
C8. Tourism development	0.8	0.87	0.8225	0.8675	0.755
C9. Customer friendly parking prices	0.7775	0.74	0.5175	0.54	0.62
Social Criteria					
C10. Comfortable and safe space for cyclists	0.7575	0.7175	0.75	0.65	0.69
C11. Comfortable and safe space for pedestrians	0.8525	0.85	0.895	0.915	0.8225
C12. Space adapted for relaxation and recreation	0.7575	0.7875	0.7275	0.8475	0.8425
C13. Safety and low crime rates	0.8275	0.8675	0.86	0.855	0.77
C14. Night-time street lighting	0.8875	0.875	0.895	0.895	0.8025
C15. Developing communities: space for meetings and interaction	0.685	0.755	0.685	0.705	0.74
C16. Entertainment: attractive space for entertainment, culture, art projects, city festivals, fairs and other events	0.8	0.865	0.8025	0.895	0.87
C17. Cultural space: aesthetic appearance of the streets and buildings, architectural and cultural heritage monuments and their preservation	0.7975	0.8725	0.86	0.8725	0.8625
C18. Promoting healthy lifestyle: space for cyclists, athletes and people who engage in other types of active leisure	0.665	0.695	0.5375	0.5875	0.8025
C19. Residential area: apartments, hotels and homes	0.69	0.63	0.6175	0.635	0.8175
C20. Accessibility via public transport	0.8675	0.8275	0.8725	0.77	0.8425
C21. Accessible parking (in terms of distance)	0.8225	0.8025	0.7	0.66	0.74

Kaunas: Laisves Ave.—A1; Old Town—A2; Vilnius: Gediminas Ave.—A3; Old Town—A4; Klaipeda: Old Town—A5.

In order to determine the importance of the 21 criteria for alternative evaluation, residents of each city were surveyed independently so that we could determine which criteria were the most important to residents of which city. The combined values of criteria importance are used in further calculations (Table 8).

Table 8. Criterion weight based on the survey results from the residents of Kaunas, Vilnius and Klaipeda.

Criteria	Criterion Weight			
	Kaunas	Vilnius	Klaipeda	Combined
Environmental Criteria				
C1. Noise: protection against vehicle noise	0.0556	0.0563	0.0511	0.049039873
C2. Air pollution: protected against road transport pollution	0.0555	0.0581	0.0521	0.049818152
C3. Presence of trees and green zones	0.0577	0.0634	0.0484	0.050733731
C4. Clean environment: recycling bins, tidy and clean streets and footpaths	0.0572	0.0632	0.0514	0.051531218
Economic Criteria				
C5. Economic space: commerce and meeting visitors' needs (the number of shops, cafés and other service vendors)	0.0475	0.0477	0.0439	0.040428158
C6. Job creation	0.0394	0.0410	0.0439	0.036246311
C7. Incentives for small and medium businesses	0.0449	0.0498	0.0443	0.040329736
C8. Tourism development	0.0498	0.0587	0.0471	0.045006413
C9. Customer friendly parking prices	0.0463	0.0432	0.0419	0.038277789
Social Criteria				
C10. Comfortable and safe space for cyclists	0.0437	0.0396	0.0471	0.047515092
C11. Comfortable and safe space for pedestrians	0.0490	0.0515	0.0525	0.055930576
C12. Space adapted for relaxation and recreation	0.0472	0.0458	0.0517	0.052785724
C13. Safety and low crime rates	0.0472	0.0513	0.0520	0.055881803
C14. Night-time street lighting	0.0495	0.0510	0.0494	0.055049413
C15. Developing communities: space for meetings and interaction	0.0499	0.0388	0.0473	0.046593132
C16. Entertainment: attractive space for entertainment, culture, art projects, city festivals, fairs and other events	0.0467	0.0450	0.0496	0.051535071
C17. Cultural space: aesthetic appearance of the streets and buildings, architectural and cultural heritage monuments and their preservation	0.0469	0.0473	0.0453	0.051092147
C18. Promoting healthy lifestyle: space for cyclists, athletes and people who engage in other types of active leisure	0.0430	0.0316	0.0474	0.044242872
C19. Residential area: apartments, hotels and homes	0.0349	0.0354	0.0410	0.040569919
C20. Accessibility via public transport	0.0474	0.0440	0.0453	0.049950499
C21. Accessible parking (in terms of distance)	0.0460	0.0371	0.0473	0.047442372

Residents of all three cities view social criteria as the most important, with environmental criteria second and economic criteria being the least important (Table 9).

Table 9. Combined importance of environmental, economic and social criteria.

Type of Criteria	Combined Importance for KAUNAS	Combined Importance for Vilnius	Combined Importance for Klaipeda
Environmental	0.33236994	0.34131737	0.33397129
Economic	0.31021195	0.28842315	0.32057416
Social	0.35741811	0.37025948	0.34545455

Results obtained by evaluating five alternatives based on the COPRAS method are provided in Table 10.

Table 10. The rationality of alternatives based on the COPRAS method.

Alternative	Alt. Nr.	S+	S−	Qi	Ni	Rank
Kaunas: Laisves Ave.	A1	0.2009	0	0.2009	97.83	2
Kaunas Old Town	A2	0.2053	0	0.2053	100.00	1
Vilnius Gediminas Ave.	A3	0.1945	0	0.1945	94.72	5
Vilnius Old Town	A4	0.1984	0	0.1984	96.63	4
Klaipėda Old Town	A5	0.2009	0	0.2009	97.81	3

The results of the study have shown the sustainability of the pedestrian zone in Kaunas Old Town to be the best, with Laisves Avenue in Kaunas second, Klaipėda Old Town third and Vilnius Old Town and Gediminas Avenue last in terms of the sustainability of pedestrian zones.

Having taken into consideration the fact that the values of alternate indices were determined in accordance with the opinion of the residents of that single city, we can state that residents of Kaunas view the sustainability of pedestrian zones in Kaunas much more positively than residents of Klaipėda or residents of Vilnius view theirs.

5. Discussion and Conclusions

The survey showed that the majority of urban residents in Lithuania visit pedestrian zones several times a month, while another majority visits pedestrian streets as frequently as several times per week. In the analysed pedestrian zones, residents mostly engage in leisure activities and cultural or other forms of entertainment. Compared to the conclusions and studies conducted by other scientists, these results differ significantly: for example, in the United Kingdom, residents visit pedestrian streets mostly for shopping and work while only a minority go there for leisure [3]. The authors of this paper believe that this might contribute to real estate in pedestrian zones in Vilnius, Kaunas and Klaipėda not being used to their full extent. They contain few establishments that meet residents' needs such as for shopping, so the results of the survey have shown that residents tend to go out for walks on pedestrian streets, while only the minority shop there. This can also be influenced by improvements in technology and tools that enable communication and online shopping which reduce the need for shopping in brick-and-mortar stores and being in a space. This influences the processes of suburbanisation in cities and is likely causing the crisis related to public spaces in cities [62]. However, Rudokas (2013) believes that shopping centres, in shaping a new leisure culture, have caused the public space crisis in Lithuania [63].

This study has also shown that economic criteria such as economic space (commerce and meeting the needs of visitors (the number of shops, cafés and other various establishments)), job creation and customer friendly parking prices are not of much importance to residents of major Lithuanian cities. Economic criteria were the second most important for residents of major Lithuanian cities while tourism development was the most important.

By focusing more on the importance of economic criteria, it is important that residents of Lithuania understand that it is not only tourism that is important to the main pedestrian streets in cities, but also incentives for small and medium businesses, since the latter greatly contribute to the national economic situation and solve employment issues by creating jobs [64]. Despite small and medium businesses constituting as much as 99.8% of all companies operating in Lithuania, according to Statistics Lithuania, small and medium businesses go bankrupt very frequently because, in the author's opinion, of the tax burden being too large. In order to revive pedestrian streets in major Lithuanian cities and attract more visitors, it is essential to incite businesspeople to develop business on pedestrian streets because there are too few opportunities to shop in major Lithuanian cities; with the exception of cafés, there are very few stores. In other countries, shopping opportunities attract more visitors to pedestrian streets [19,62,65]. Regardless of Lithuanian economic development strategies claiming that the state must engage in entrepreneurship policy and create a business-friendly environment by focusing on job creation in new companies as well as developing the service sector, in Lithuania it is especially

important to support and facilitate as well as offer exemptions for businesses on streets [62] because of very high rental prices on pedestrian streets [3]. A good business environment would be mutually beneficial: an increase in visitors would not only benefit companies but the state would also get income from sales and jobs.

As mentioned before, economic criteria were the least important to the residents of all three major cities. The most important criteria were social, with environmental criteria second. A convenient and safe space for pedestrians, a space suitable for leisure and recreation, safety and crime rates as well as night-time street lighting were among the most important social criteria. Social criteria are often considered to be the most important for pedestrian streets [4,39,53–55] as more activities lead to more vitality there [23,65]. Safety is also often mentioned because good pedestrian streets must be safe both in terms of motor and non-motor vehicles [54,55], as well as possible crime [6,33].

A clean environment, noise and air pollution are among the most important environmental criteria. As mentioned before, good pedestrian zones must be protected against vehicle noises and pollutants [39] and be clean [48]. However, even though residents of Lithuania do not consider trees and green zones to be very important, preserving green zones is important even in pedestrian zones [43,44]. since green zones protect against noise and pollution, suppressing from 20% to 80% of dust [45].

The results of the study show that the most sustainable pedestrian zone in Lithuania is Kaunas Old Town, then the second sustainable pedestrian zone is Kaunas (Laisves Avenue), the third is Klaipeda Old Town, the fourth is Vilnius Old Town and the fifth is the Gediminas Avenue in Vilnius. The residents of each city assess the criteria that they find the most important best; however, it is evident that there is no significant importance of social, economic or environmental criteria. This shows that residents of Kaunas, Vilnius and Klaipeda find all the aforementioned criteria (environmental, social and economic) important. Thus, in order to improve the image of a city and attract more people, the sustainable development of pedestrian streets is important. The development of the infrastructure of pedestrian zones should be viewed as an investment into complex problem-solving, encompassing economic, social, health, environment, city development and other aspects.

Following the secondary and primary research results, the authors think that for future research it is also essential to study the attitudes of other groups—such as small and medium businesses—towards the importance and significance of social, economic and environmental criteria, also the attitudes of environmentalists and municipal officers towards the importance and significance of particular environmental criteria in the main pedestrian zones in Lithuanian cities.

Author Contributions: Rūta Dičiūnaitė-Rauktienė conducted the interviews, analysed the data and drafted the paper. Virginija Gurskienė contributed to the design of the study and to the draft of the paper. Marija Burinskienė contributed to the data analysis and revision of the paper. Vida Maliene developed the concept and the design of the study, led the development and application of the methodology, analysed data, drafted the paper and led the final revision and improvement of the paper. All authors have read and approved the final version.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Jankauskaitė, A.; Olšauskaitė-Urbonienė, R.; Abromas, J. The City Public Spaces (Squares) Planning Features after Lithuania's Restoration of Independence. Klaipeda Square "Atgimimas" example. *Form. Urban Green Areas* **2014**, *1*, 90–98.
2. Dringelis, L. Town squares: Experience and results of the reconstruction. *Town Plan. Arch.* **2011**, *35*, 200–211. [[CrossRef](#)]
3. Carmona, M. London's local high streets: The problems, potential and complexities of mixed street corridors. *Prog. Plan.* **2015**, *100*, 1–84. [[CrossRef](#)]
4. Gehl, J. *Cities for People*; Island Press: Washington, DC, USA, 2010; pp. 266–278.
5. Brunnberg, L.; Frigo, A. Placemaking in the 21st-century city: Introducing the funfair metaphor for mobile media in the future urban space. *Digit. Creat.* **2012**, *23*, 113–125. [[CrossRef](#)]

6. Mehta, V. Evaluating Public Space. *J. Urban Des.* **2014**, *19*, 53–88. [[CrossRef](#)]
7. Sepe, M. Urban history and cultural resources in urban regeneration: A case of creative waterfront renewal. *Plan. Perspect.* **2013**, *28*, 595–613. [[CrossRef](#)]
8. Kratochvíl, P. Urban public spaces in the Czech Republic. *J. Arch. Urban.* **2013**, *37*, 173–181. [[CrossRef](#)]
9. Urbonaitė, I. Transformations in spacial expression of urban recreational functions in post—Soviet urban public spaces. Vilnius case. *J. Arch. Urban.* **2013**, *37*, 194–209. [[CrossRef](#)]
10. Lubyte, E. Art in public urban spaces: Value integrity between authors, customers and the public. *Town Plan. Arch.* **2011**, *35*, 38–50. [[CrossRef](#)]
11. Young, A. Cities in the City: Street Art. *Enchant. Urban Commons Law Lit.* **2014**, *26*, 145–161. [[CrossRef](#)]
12. Stauskis, G.; Eckardt, F. Empowering public spaces as catalysers of social Interactions in urban Communities. *Town Plan. Arch.* **2011**, *35*, 110–116. [[CrossRef](#)]
13. Grunskis, T.; Mankus, M. The system of urban public spaces in the postcommunist sociocultural context. *J. Arch. Urban.* **2013**, *37*, 210–217. [[CrossRef](#)]
14. Jakovlevas-Mateckis, K. Some aspects of the formation of pedestrian streets and zones in the new public spaces of urban centre. *J. Arch. Urban.* **2012**, *36*, 252–263. [[CrossRef](#)]
15. Liu, Y.; He, S.; Wu, F.; Webster, C. Urban villages under China’s rapid urbanization: Unregulated assets and transitional neighbourhoods. *Habit. Int.* **2010**, *34*, 135–144. [[CrossRef](#)]
16. Chen, M.; Liu, W.; Tao, X. Evolution and assessment on China’s urbanization 1960–2010: Under-urbanization or over-urbanization? *Habit. Int.* **2013**, *38*, 25–33. [[CrossRef](#)]
17. Jim, C.Y. Sustainable urban greening strategies for compact cities in developing and developed economies. *Urban Ecosyst.* **2013**, *16*, 741–761. [[CrossRef](#)]
18. Soni, N.; Soni, N. Benefits of pedestrianization and warrants to pedestrianize an area. *Land Use Policy* **2016**, *57*, 139–150. [[CrossRef](#)]
19. Hass Klau, C. Impact of pedestrianization and traffic calming on retailing a review of the evidence from Germany and the UK. *Transp. Policy* **1993**, *1*, 21–31. [[CrossRef](#)]
20. Ward, S.V. What did the Germans ever do for us? A century of British learning about and imagining modern town planning. *Plan. Perspect.* **2010**, *25*, 117–140. [[CrossRef](#)]
21. Robertson, K.A. Pedestrianization strategies for downtown planners: Skywalks versus pedestrian malls. *J. Am. Plan. Assoc.* **1993**, *59*, 361–370. [[CrossRef](#)]
22. Dokmeci, V.; Altunbas, U.; Yazgi, B. Revitalisation of the main street of a distinguished old neighborhood in Istanbul. *Eur. Plan. Stud.* **2007**, *15*, 153–166. [[CrossRef](#)]
23. Ghahramanpouri, A.; Lamit, H.; Sedaghatnia, S. Behavioural observation of human stationary and sustained activities in pedestrian priority streets of Johor Bahru. *J. Constr. Dev. Countr.* **2012**, *17*, 105–116.
24. Sandahl, J.; Lindh, C. Impact of improving the attractiveness of town centers. *Transp. Policy* **1995**, *2*, 51–56. [[CrossRef](#)]
25. Isaacs, R. The urban picturesque: An aesthetic experience of urban pedestrian places. *J. Urban Des.* **2000**, *5*, 145–180. [[CrossRef](#)]
26. Middleton, J. Sense and the city: Exploring the embodied geographies of urban walking. *Soc. Cult. Geogr.* **2010**, *11*, 575–596. [[CrossRef](#)]
27. Castillo-Manzano, J.I.; Lopez-Valpuesta, L.; Asencio-Flores, J.P. Extending pedestrianization processes outside the old city center; conflict and benefits in the case of the city of Seville. *Habit. Int.* **2014**, *44*, 194–201. [[CrossRef](#)]
28. Maliene, V.; Durney-Knight, N.; Sertyesilisik, B.; Malys, N. Challenges and Opportunities in Developing Sustainable Communities in the North West of England. *Challenges* **2012**, *3*, 133–152. [[CrossRef](#)]
29. Nevado-Peña, D.; López-Ruiz, V.R.; Alfaro-Navarro, J.L. The Effects of Environmental and Social Dimensions of Sustainability in Response to the Economic Crisis of European Cities. *Sustainability* **2015**, *7*, 8255–8269. [[CrossRef](#)]
30. Prochorskaite, A.; Couch, C.; Malys, N.; Maliene, V. Housing stakeholder preferences for the “soft” features of sustainable and healthy housing design in the UK. *Int. J. Environ. Res. Public Health* **2016**, *13*, 111. [[CrossRef](#)] [[PubMed](#)]
31. Gollagher, M.; Hartz-Karp, J. The role of deliberative collaborative governance in achieving sustainable cities. *Sustainability* **2013**, *5*, 2343–2366. [[CrossRef](#)]

32. de Winter, J.C.F.; Dodou, D. Five-Point Likert Items: T test versus Mann-Whitney-Wilcoxon. *Pract. Assess. Res. Eval.* **2010**, *15*, 2–16.
33. DeCoster, J. Testing Group Differences Using T-Tests, ANOVA, and Nonparametric Measures. 2006. Available online: https://www.researchgate.net/publication/238574780_Testing_Group_Differences_using_T-tests_ANOVA_and_Nonparametric_Measures (accessed on 3 March 2017).
34. Malienė, V. Specialised property valuation: Multiple criteria decision analysis. *J. Retail Leis. Property* **2011**, *9*, 443–450. [CrossRef]
35. Ustinovicus, L.; Zavadskas, E.K.; Podvezko, V. Application of a quantitative multiple criteria decision making approach to the analysis of investments in construction. *Control Cybern.* **2006**, *36*, 251–267.
36. Zavadskas, E.K.; Kaklauskas, A. *Multiple Criteria Evaluation of Buildings*; Technika: Vilnius, Lithuania, 1996; p. 279, ISBN 9986052823.
37. Official Statistics Portal, Lithuania. Available online: http://osp.stat.gov.lt/documents/10180/3329771/Gyventoju_skaicius_miestuose.pdf/21c3b6a1-2d4c-4599-bcaa-944b1b04f485?version=1.0 (accessed on 20 December 2016).
38. Andriukevičiūtė, J.; Martišiūtė, J.; Kandrotienė, D. *Lithuania Travel Guide*; Terra Publica: Vilnius, Lithuania, 2015; pp. 99–146, ISBN 9786098090819.
39. Blaga, O.E. Pedestrian ones as important urban strategies in redeveloping the community—Case study: Alba Iulia Borough park. *Transylvanian Rev. Admin. Sci.* **2013**, *38*, 5–22.
40. Baltrėnas, P.; Vaitiekūnas, P.; Vasarevičius, S.; Jordanech, S. Modelling of motor transport exhaust gas influence on the atmosphere. *J. Environ. Eng. Landsc. Manag.* **2008**, *16*, 65–75. [CrossRef]
41. Guerreiro, C.B.B.; Foltescu, V.; Leeuw, F. Air quality status and trends in Europe. *Atmos. Environ.* **2014**, *98*, 376–384. [CrossRef]
42. Vlachokostas, Ch.; Nastis, S.; Achillas, Ch.; Kalogeropoulos, K.; Karmiris, I.; Moussiopoulos, N.; Chourdakis, E.; Baniyas, G.; Limperi, N. Economic damages of ozone air pollution to crops using combined air quality and GIS modelling. *Atmos. Environ.* **2010**, *44*, 3352–3361. [CrossRef]
43. Urban Regeneration: Integrated Approach. ECO/273. 2010. OPINION of the European Economic and Social Committee on the Need to Apply an Integrated Approach to Urban Regeneration. Available online: <http://www.eesc.europa.eu/?i=portal.en.eco-opinions.10006> (accessed on 5 May 2014).
44. Balaban, O.; Puppim de Oliveira, J.A. Understanding the links between urban regeneration and climate-friendly urban development: Lessons from two case studies in Japan. *Local Environ.* **2014**, *19*, 868–890. [CrossRef]
45. Deveikis, S.; Deveikienė, V.; Deveikytė, O. Park's Creator Charles Thays (1849–1934)—The European Tradition in South America and Its Feedback to us. *Form. Urban Green Areas* **2014**, *1*, 34–49.
46. Beatley, T.; Newman, P. Biophilic cities are sustainable, resilient cities. *Sustainability* **2013**, *5*, 3328–3345. [CrossRef]
47. Romolini, M.; Bixler, R.P.; Grove, J.M. A social-ecological framework for urban stewardship network research to promote sustainable and resilient cities. *Sustainability* **2016**, *8*, 956. [CrossRef]
48. Rehan, R.M. Sustainable streetscape as an effective tool in sustainable urban design. *HBRC J.* **2013**, *9*, 173–186. [CrossRef]
49. Kelly, J.F. Social Cities. 2012. Available online: https://grattan.edu.au/wp-content/uploads/2014/04/137_report_social_cities_web.pdf (accessed on 5 May 2014).
50. Rangwala, K. Walking. *Econ. Dev. J.* **2014**, *13*, 39–46.
51. McNally, K. Design Guidelines for Walkable Communities. Available online: https://www.uc.edu/cdc/niehoff_studio/programs/great_streets/w10/reports/design_guidelines.pdf (accessed on 5 May 2014).
52. Newman, L. The virtuous cycle: Incremental changes and a process-based sustainable development. *Sustain. Dev.* **2007**, *15*, 267–274. [CrossRef]
53. Mulliner, E.; Malienė, V. An introductory review to the Special Issue: Attractive places to live. *Urban Des. Int.* **2011**, *16*, 147–152. [CrossRef]
54. Sisman, E.E. Pedestrian Zones. *Environmental Sciences—Advances in Landscape Architecture*. 2013. Available online: <http://www.intechopen.com/books/advances-in-landscape-architecture/pedestrian-zones> (accessed on 5 May 2014).

55. Asadi-Shekari, Z.; Moeinaddini, M.; Shah, M.Z. Pedestrian safety index for evaluating street facilities in urban areas. *Saf. Sci.* **2015**, *74*, 1–14. [CrossRef]
56. Lester, T. Public Lighting for Safe and Attractive Pedestrian Areas. NZ Transport Agency Research Report. Available online: <http://www.nzta.govt.nz/assets/resources/research/reports/405/docs/405.pdf> (accessed on 2 February 2017).
57. Ferrer, S.; Ruiz, T.; Mars, L. A qualitative study on the role of the built environment for short walking trips. *Transp. Res. Part F Traff. Psychol. Behav.* **2015**, *33*, 141–160. [CrossRef]
58. Mehta, V. Lively streets, determining environmental characteristics to support social behaviour. *J. Plan. Educ. Res.* **2007**, *27*, 165–187. [CrossRef]
59. Walljasper, J. Public Spaces Make the World Go Round. Available online: <http://www.shareable.net/blog/public-spaces-make-the-world-go-round> (accessed on 5 May 2014).
60. Shigematsu, R.; Sallis, J.F.; Conway, T.L.; Saelens, B.E.; Frank, L.D.; Cain, K.L.; Chapman, J.E.; King, A.C. Age differences in the relation of perceived neighborhood environment to walking. *Med. Sci. Sports Exerc.* **2009**, *41*, 314–321. [CrossRef] [PubMed]
61. Beelen, R.; Hoek, G.; van den Brandt, P.A.; Goldbohm, R.A.; Fischer, P.; Schouten, L.J.; Armstrong, B.; Brunekreef, B. Long-term exposure to traffic-related air pollution and lung cancer risk. *Epidemiology* **2008**, *19*, 702–710. [CrossRef] [PubMed]
62. Parker, C.; Ntounis, N.; Quin, S.; Grim, I. High Street research agenda: identifying High Street research priorities. *J. Place Manag. Dev.* **2014**, *7*, 176–184. [CrossRef]
63. Rudokas, K. The shift of the public space paradigm in postsoviet Lithuania. *Logos* **2013**, *1*, 211–222.
64. Garlauskaitė, A.; Zabarauskaitė, R. Lithuanian population aging factors analysis. *Sci. Futur. Lithuania* **2015**, *7*, 199–209. [CrossRef]
65. Yiu, C.Y. The impact of a pedestrianization scheme on retail rent: An empirical test in Hong Kong. *J. Place Manag. Dev.* **2011**, *4*, 231–242. [CrossRef]



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