ISSN 1611-1699 / eISSN 2029-4433

VILNIUS TECH
Vilnius Gediminas Technical University

JOURNAL of BUSINESS ECONOMICS & MANAGEMENT

2026
Volume 27
Issue 4
Pages 764–780

https://doi.org/10.3846/jbem.2026.27901

SATISFACTION WITH LIFE IN THE CITY IN THE CONTEXT OF QUALITY OF LIFE

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Article History:
- received 24 September 2025
- accepted 15 June 2026

Abstract. The quality of life in cities is reflected in satisfaction with city life. Therefore, it is necessary to assess satisfaction with living in a city in relation to the quality of city life. The objective of this study is to specify the relationship between respondents' satisfaction with life in the city and selected indicators characterizing the quality of life within the studied set of cities. The data utilized in this study were obtained from Perception survey results (Eurostat, 2024a) and derive from 77 cities across Europe in 2023. The OLS method was employed in this study. The linear model and the logarithmically transformed models were verified. In selecting a model that would satisfy the given criteria, an econometric approach was employed. This approach entailed the implementation of several tests, including the normality test, the homoscedasticity test, and the Ramsey test. The resulting logarithmic model demonstrates a substantial relationship between the indicator satisfaction with city life and the indicators of perception of safety, satisfaction with greenery in public spaces, satisfaction with educational institutions and education, and evaluation of local government expenditures. As the values of the independent variables increase, the satisfaction indicator in the city also increases, but at a decreasing rate.

Keywords: cities, satisfaction to live in city, quality of city life, human capital, OLS method, logarithmic model, model specification, model verification.

JEL Classification: F15, F31, G15.

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1. Introduction

Living in cities has always had its advantages and disadvantages throughout history. The main advantages include a wider cultural and social life. The proximity and accessibility of services and a shorter commute to work are other advantages in the city. On the other hand, less greenery (Addas, 2023), lower safety (Nicolás-Martínez et al., 2024), and increasing pollution (Abed Al Ahad, 2024) increase dissatisfaction.

It is evident that the quality of life in urban areas has a substantial influence on the overall quality of life and sustainable development in countries. According to Eurostat projections (Eurostat, 2024b), the population of almost half of all predominantly urban regions in the EU will increase by the beginning of 2051. The implication of this projection is that the organization of urban life and the behaviour of people in cities will have an increasing impact on various socio-economic domains. Considering this assumption, the identification of

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opportunities for enhancing the quality of urban life and the sustainability of urban development is a pressing issue that necessitates systematic attention at various levels. Considering the aforementioned considerations, it is imperative to approach the functioning of cities from two distinct yet interrelated perspectives: that of the residents' satisfaction and that of sustainable development and city-building. According Monzon (2015, p. 3) "as cities continue booming tirelessly, their challenges need to be carefully thought through so that population growth, economic development and social progress walk on the same path." The problems associated with the expansion of cities may increase. Tundys and Wiśniewski (2024) touch on the problems associated with urban growth. Referring to Shahid et al. (2021) report that more than 80% of the world's urban population lives in cities with high levels of pollution.

Therefore, the present necessity is to examine the satisfaction levels of individuals with the factors that contribute to sustainable development in urban areas and strategies should be developed to promote happy, healthy living and sustainable development in cities, with a focus on smart solutions. This fact is also outlined in the scientific study by Mutiara et al. (2018), which emphasizes the importance of smart cities in facilitating their transition towards sustainable economic development and a high quality of life through the following key areas: economy, mobility, environment, people, life, and governments. The European Commission's efforts to enhance citizen satisfaction in urban areas are underscored by the reports of extensive urban research findings on life satisfaction in selected European cities (Castelli et al., 2022; European Commission, 2023a, 2023b).

This study uses data from Perception survey results (Eurostat, 2024a) from 77 cities across Europe. The objective of this study is to specify the relationship between respondents' satisfaction with life in the city and selected indicators characterizing the quality of life within the studied set of cities. The studies by Castelli et al. (2022) and An et al. (2020), which examined life satisfaction and employed regression analysis, were based on the assumption that a linear regression model is an appropriate model for characterizing the relationship between life satisfaction and other factors. An increasing linear functional form posits that as the values of the independent variable increase; the dependent variable also increases linearly.

In this study, we posit that a linear model is not necessarily the only suitable model for characterizing the relationship. We also test logarithmically transformed models:

- linear-logarithmic,
- logarithmic-linear, and
- logarithmic-logarithmic.

For these, it is hypothesized that as the values of the independent variable increase, the dependent variable does not change linearly.

To illustrate, in the case of verifying the suitability of an increasing linear-logarithmic functional form, as the independent variable increases, the dependent variable also increases, however, at a decreasing rate.

To that end, an econometric approach will be employed to determine the suitability of the functional form. The following areas will be the primary focus:

1. to identify the variables that influence life satisfaction in the city;
2. to verify the suitability of the linear-logarithmic, logarithmic-linear, and logarithmic-logarithmic functional forms;
3. to identify the variables that have the greatest impact on life satisfaction in the city.

The findings will facilitate the formulation of responses to the following inquiries:

- which services should be prioritized to enhance citizen well-being and promote optimal life quality within the urban context.

- to achieve the same increase in citizens' satisfaction with city life, must cities with high values of independent variables achieve a greater increase in independent variables compared to cities with lower values of independent variables?

In the case that an increase in the independent variable is observed to correspond with an increase in the dependent variable, albeit at a decreasing rate, it can be deduced that cities with elevated values of the independent variable must attain a greater increase in the independent variable to achieve a comparable increase in citizens' satisfaction with life in the city as cities with lower values of the independent variable. This means that cities with higher values of the independent variables must make a greater effort.

Consequently, if the significance of the increasing model in linear-logarithmic form is demonstrated, the result indicates that as the independent variables increase, the value of the indicator of satisfaction with life in the city also increases, but at a decreasing rate.

The paper continues as follows: theoretical background, research objective and methodology, results and discussion, conclusions.

2. Theoretical background

The quality of life in urban areas is evaluated from various vantage points–Milivojević et al. (2017) observe that the extant literature identifies four predominant approaches for assessing the quality of life in urban environments. The following four factors must be considered when assessing urban growth and competition, as well as migration and quality of life indicators within cities: 1) urban growth and competition, 2) migration models, hedonic models, 3) quality of life indicators, and 4) city rankings. The city evaluation approach encompasses a range of models that assess cities from diverse perspectives and evaluate various dimensions. These include the concepts of eco-cities, the healthy cities approach, the smart city concept, and similar frameworks. Through a thorough analysis of these concepts, it becomes possible to ascertain the dimensions and indicators deemed significant by the authors in the context of urban quality of life.

According to Bibri (2022), environmental sustainability is a key aspect of *the eco-city approach*; for this reason, it is necessary to consider a wide range of factors, such as the protection of national parks, sustainable energy use, pollution reduction, reduced pressure on ecosystem services, and prioritized public transport, walking, and cycling. Key indicators include urban greenery as well as air quality. Based on this ecological approach, our analysis will also focus on green spaces, air quality, and public transport.

The healthy cities approach defines a healthy city as a place where the physical and social environment is created and improved. This includes a clean ecological environment, an optimal level of appropriate healthcare services, low morbidity, and other attributes of healthy living (Glouberman et al., 2006).

One of the best-known concepts of urban living today is the *concept of smart cities*. The concept of a smart city is based on the use of technology, innovation, human capital, governance and sustainable development of resource management (Jasrotia, 2026). Above all, digital technologies are of great importance. In the following section, we will focus on evaluating cities based on the smart city concept.

According to Chang and Smith (2023), recent literature has begun to emerge that has focused on the quality of life in the context of smart cities during the years 2018 and 2019. At present, numerous studies have already been published that focus on establishing a link between the sustainability of place development and the satisfaction of residents with their

quality of life in the city. These scholars emphasize the necessity of directing the evolution of the smart city in a manner that is as human-centric and human capital as possible (Silva et al., 2019; Zhu et al., 2022; Macke et al., 2018, Ji et al., 2021; De Guimarães et al., 2020; Lin et al., 2019; Xu & Geng, 2019; Zheng, 2022; Chen, 2022; Del-Real et al., 2023). The governments consider smart cities to be an important approach that aims to improve the well-being of residents (Wang & Zou, 2025). However, it should be emphasized that the focus of the government influences citizens' priorities in building a smart city (Kim et al., 2025). Therefore, there may be differences depending on the type of government.

To achieve optimal results, it is imperative to prioritize a human-centric approach and to prioritize continuous service improvement (Li et al., 2023). In particular, services such as waste management, climate actions, and green and intelligent buildings are significant (Liu et al., 2024). Improving the quality of life should be one of the fundamental goals. This is also emphasized by the following statement. "The benefits of smart cities would be the efficient use of resources, improved quality of life, and the efficiency of service management" (Regalado-Pezua & Christofle, 2025, p. 18). Concurrently, it is imperative that also citizens should be engaged in the development of citizen-centric smart cities (Leung & Lee, 2021; Cortés-Cediel et al., 2019; Xu & Zhu, 2021; Granier & Kudo, 2016).

As scientific studies show, satisfaction with life in the city is influenced by several factors. *Local government* in cities plays a pivotal role in urban development (Meijer & Bolívar, 2016). In the contemporary digital era, effective collaboration and the dissemination of *information* are paramount. Conversely, corruption has been demonstrated to impede economic growth and escalate social expenditures (Neshkova & Kalesnikaite, 2019). The inefficiency in the delivery of public services, the delayed provision of services, and systemic opacity are all incongruent with a citizen-centered approach (Hussain, 2025). If city residents consider public spending inadequate for the services provided, they view city management as ineffective, and this reflects on their attitude toward life in the city.

The urban environment is the result of deliberate urban planning. Urban planning is predicated on urban design (Bibri, 2022). The conception of urban design is incomplete without an ecological approach. The objective of this initiative is to enhance the appeal and functionality of urban areas. This includes the maintenance and creation of *green spaces* (Kolokotsa et al., 2024), within the urban environment, as well as the assurance of air quality. Urban greenery has been demonstrated to enhance the quality of life in urban areas (Belčáková et al., 2022). The practice has been shown to reduce stress (Bibri, 2022, citing Parsons et al., 1998; Ulrich, 1984). Conversely, evidence suggests a link between *air pollution* and an increased risk of depression and stress (Siddik et al., 2026). The enhancement of *public transportation* and the quality of pedestrian infrastructure constitute an integral component of the ecological approach (Bibri, 2022).

The contemporary era is distinguished by accelerated digital advancement. Achieving this objective necessitates an adequate level of *education*. Education has been demonstrated to enhance opportunities for individuals residing in urban areas (Dimitrova et al., 2024). The creation of a favorable physical and social environment within an urban context is predicated on the presence of a healthy environment. The fundamental elements of a healthy life, as outlined by Glouberman et al. (2006), encompass an optimal level of *healthcare services*, low morbidity rates, and other pertinent attributes. The foundational element underpinning all urban activities is the sense of safety experienced by the city's residents (Popp, 2021). Ensuring adequate protection of people and their property is a prerequisite for fostering a sense of *safety* within urban populations.

Węziak-Białowolska (2016, p. 93) states that there are some dependencies in the differences among cities. She notes that citizens who felt safe in the city and were satisfied with the place where they lived were also likely to be satisfied with life in the city in general. In this analysis, we consider safety in the city to be an important aspect of quality of life in the city. Consequently, the present analysis will concentrate on the question of the importance of ensuring *a safe life in the city*.

The analysis of our study focuses on the subjective perception of citizens' satisfaction with life in the city and its relationship with the quality of life within the studied set of cities. In order to ascertain which of the aforementioned factors exert the most significant influence on life satisfaction within the urban context, and to what extent their relationship with life satisfaction is specific, we will start with the assumption that life satisfaction in the city is related to:

- *local governments* with focus on corruption, fees chard by local administration and services of local public administration,
- *public transport* with focus on bus, tram and metro,
- *environment* with focus on green spaces and the quality of the air in the city,
- *living in the* city with focus on education, health provision and safe life in the city.

To identify and interpret factors, the following methods are often used in published research studies such as Exploratory Factor Analysis (Hadi & Ayyoob, 2023; El Barachi et al., 2022), regression analysis, where parameters are estimated based on the OLS method (An et al., 2020; Pengpid & Peltzer, 2019; Teixeira et al., 2019; Hlavac, 2011; Chen, 2023), or a combination of factor analysis, multiple regression and cluster analysis (Chen & Chan, 2023); logit analysis (Castelli et al., 2022; Węziak-Białowolska, 2016; Liu et al., 2024); Kendall's Coefficient of Concordance (Mirzaei & Zangiabadi, 2021); Student t-test (Vázquez et al., 2018); Structural Equation Modelling technique (Chong et al., 2023; Siokas & Tsakanikas, 2023; Wirsbinna et al., 2023; Oh & Seo, 2021; De Guimarães et al., 2020); and Technique for Order of Preference by Similarity to Ideal Solution – TOPSIS (Stankovic et al., 2017). Meanwhile, the use of Big Data Analytics is largely absent in scientific studies (Sharifi, 2019; Kourtit & Nijkamp, 2018). In our opinion, however, it is important to meet the conditions when using the above methods. Failure to meet the conditions, for example in the OLS method, may result in distorted and inconsistent estimates (Hatrák, 2007, p. 164).

3. Methodology

The present study will concentrate on the assessment of satisfied to live in this city and quality of city life.

The source of data for 2023 is Perception survey results (Eurostat, 2024a). We took data from 77 cities in March 2024. (Note: data was updated in April 2024 and data for additional cities were added). The cities were from all EU27 countries as well as Norway, Switzerland, United Kingdom and Turkey (Eurostat, 2024a).

"The survey included two data collection modes: CATI (telephone interviews with interviewer) and CAWI (online self-completion interviews)" (European Commission, 2023b, p. 15).

The objective of this study is to specify the relationship between respondents' satisfaction with life in the city and selected indicators characterizing the quality of life within the studied set of cities.

Satisfaction with life in the city is expressed by the proportion of positive responses with respondents' in the city to the statement "I'm satisfied to live in this city" obtained

from source Perception survey results (Eurostat, 2024a). Respondents had the opportunity to express themselves on a five-point Likert scale.

Selected smart city indicators are expressed by

- the proportion of positive or affirmative responses preferred compliance with respondents' (expression of satisfaction or agreement) in the city to questions in the Table 1 X_1, X_2, X_3, X_4, X_5 and X_7, X_8 X_9,
- the proportion of negative responses non- preferred compliance with respondents' in the city to question in the Table 1 X_6.

Research question is: "What is a relationship between the indicator satisfaction of respondents' to live in city, and the selected city indicators within the studied set of cities?" We expressed the independent variables as a proportion of selected responses. They are listed in Table 1.

Within the objective of this study the intention is: first, to determine whether the selected variables influence life satisfaction in the city, and second, to verify the suitability of logarithmically transformed models. The models under consideration are as follows:

- linear-logarithmic (Level-Log Model),
- logarithmic-linear (Log-Level Model), and
- logarithmic-logarithmic (Log-Log Model).

The most appropriate model will be selected based on an econometric approach.

Verifying the suitability of a functional form, such as an increasing linear-logarithmic model, involves observing the behavior of the dependent variable as the independent variable increases. It is important to note that, under these conditions, the rate of increase in the dependent variable declines as the independent variable approaches its maximum value. A decreasing rate of growth in an increasing linear-logarithmic functional form would imply that cities with high values of the analyzed independent variables must have a more significant increase in the independent variables to achieve the same increase in citizens' satisfaction with life in the city as cities with lower values of the independent variables.

Table 1. Statements for independent variables (source: Eurostat, 2024a)

Claim
X_6 There is corruption in my local public administration.
X_7 The fees charged by my local public administration are reasonable.
X_8 Information and services of my local public administration can be easily accessed online.
X_1 Public transport in the city, for example bus, tram or metro.
X_2 Green spaces such as public parcs or gardens.
X_9 The quality of the air in the city.
X_5 Health care services, doctors and hospitals.
X_4 Schools and other educational facilities.
X_3 I feel safe walking alone at night in my city.

The econometric approach is employed to determine the specification, quantification, and verification of the regression model. The OLS method is employed to quantify the parameters.

The dependent variable is the proportion of "strongly agree" and "somewhat agree" responses to the question "I'm satisfied to live in this city". The method of combining responses is also used in Castelli et al. (2022).

The other response options to the question are "strongly disagree" and "somewhat disagree" and the last response option is that the respondent did not know or did not want to answer.

The values of the independent variables are expressed as a proportion of the total number of responses illustrated in Table 1. For X_3, X_7 and X_8, the proportion of responses is expressed: "strongly agree" and "somewhat agree". For X_6, the proportion of responses is expressed as: "strongly disagree" and "somewhat disagree" (a statement is positively rated if respondents disagree with it). For X_1, X_2, X_4, X_5 and X_9 the proportion of responses is expressed as follows: "very satisfied" and "rather satisfied".

In the subsequent phase, we posit that the values of the dependent variable are contingent upon the *k* independent variables, as informed by the sources examined in the preceding section. It is assumed that this relationship is expressed using one of the following Eqs. (1)–(4).

The general model with n-units and k-independent variables can then be expressed as follows:

$$y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots \beta_k X_{ik} + e_i, \quad i = 1,2,\ldots,n, \tag{1}$$

where e_i are the residues (Hatrák, 2007, p. 63).

The subsequent phase of the process entails the formulation of a model, the quantification of its parameters, and the verification of its accuracy. We begin with the data that comprise the cross-sectional data set.

A correlation matrix is then constructed based on the nine independent variables.

Verification of the quality of the regression model

As Hatrák (2007, p. 146) notes, "in reality, we are never one hundred percent certain that the model is correctly specified." The objective is to ascertain whether there are any deficiencies in the model specification. The issue is to focus on this fact and verify whether the model is correctly specified. The model specification is verified based on the Ramsey RESET test (Adamec et al., 2017, pp. 91–92; Hatrák, 2007, p. 161). Model verification includes a test of normality of residuals and a White's test for heteroscedasticity.

The Gretl software is used for the specification and verification of the model.

In case of failure to meet the requirements for the model, the general Level-Log Model with logarithmic independent variables (2), the Log-Level Model with a logarithmic dependent variable (3), or the Log-Log Model with the logarithm of the dependent variable and the logarithms of the independent variables (4) is used.

The selected model is the one in which the model requirements are met.

The general model (2) with *n*-units can be written:

$$y_i = \beta_0 + \beta_1 \ln X_{i1} + \beta_2 \ln X_{i2} + \ldots \beta_k \ln X_{ik} + e_i, \quad i = 1,2,\ldots,n. \tag{2}$$

The general model (3) with *n*-units can be written:

$$\ln y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots \beta_k X_{ik} + e_i, \quad i = 1,2,\ldots,n. \tag{3}$$

The general model (4) with *n*-units can be written:

$$\ln y_i = \beta_0 + \beta_1 \ln X_{i1} + \beta_2 \ln X_{i2} + \ldots \beta_k \ln X_{ik} + e_i, \quad i = 1,2,\ldots,n. \tag{4}$$

(Adamec et al., 2017, pp. 32–33).

4. Results

The resulting values were subjected to a descriptive statistical analysis. The present analysis concentrated on the minimum, and maximum. The extreme values of dependent and independent variables are listed in Table 2.

Table 2. Extreme values of dependent and independent variables (source: Eurostat, 2024a)

Variable	Max (%)	Min (%)
I'm satisfied to live in this city.	Zürich/Switzerland, 97.1	Palermo/Italy, 61.1
X_1 Public transport in the city, for example bus, tram or metro.	Zürich/Switzerland, 94.5	Palermo/Italy, 20.2
X_2 Green spaces such as public parcs or gardens.	Malmö/Sweden, 91.7	Napoli/Italy, 30.3
X_3 I feel safe walking alone at night in my city.	København/Denmark, 86.5	Roma/Italy, 36.8
X_4 Schools and other educational facilities.	Antwerpen/Belgium, 85.5	Napoli/Italy, 45.7
X_5 Health care services, doctors and hospitals.	Zürich/Switzerland, 92.3	Miskolc/Hungary, 34.7
X_6 There is corruption in my local public administration.	København/Denmark, 74.6	Zagreb/Croatia, 10.7
X_7 The fees charged by my local public administration are reasonable.	Luxembourg/ Luxembourg, 80.1	Palermo/Italy, 19.9
X_8 Information and services of my local public administration can be easily accessed online.	Luxembourg/ Luxembourg, 81.9	Palermo/Italy, 47.9
X_9 The quality of the air in the city.	Zürich/Switzerland, 88	Bucuresti/Romania, 19.6

Our findings showed that the highest proportion of individuals who expressed satisfaction with urban life is in Zurich in Switzerland.

A total of 97.1% of respondents indicated a high level of satisfaction. Conversely, residents of Palermo, Italy exhibited the lowest levels of satisfaction with their urban living experience. A mere 61.1% of respondents expressed satisfaction with their quality of life in urban areas. It is noteworthy that in the Swiss city of Zurich, the highest levels of satisfaction are observed regarding the factors such as public transport in the city, for example bus, tram or metro; health care services, doctors and hospitals and quality of the air in the city. The administration, including fees and ease of access to information, is perceived as the most satisfactory aspect of city life in Luxembourg. Conversely, the city of Palermo shows the highest levels of dissatisfaction with both fees and the ease of access to information. Furthermore, residents of this city show the greatest dissatisfaction with the public transport in the city for example bus, tram or metro. It is noteworthy that Italian cities show a negative lead in several indicators.

Based on the values indicated in the correlation matrix, it can be inferred that the correlation coefficient between the independent variables is not greater than 0.8 (Hatrák, 2007, p. 236). Accordingly, all independent variables will be retained. The correlation matrix is shown in Table 3.

Table 3. Correlation matrix (source: own elaboration by Eurostat, 2024a)

X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	
1.0000	0.6856	0.4663	0.3554	0.5284	0.4198	0.4822	0.4753	0.3572	X_1
	1.0000	0.4742	0.4282	0.5680	0.4859	0.4939	0.4612	0.5279	X_2
		1.0000	0.3888	0.2767	0.4696	0.3967	0.4930	0.6167	X_3
			1.0000	0.5079	0.3250	0.4452	0.4403	0.3037	X_4
				1.0000	0.6107	0.4226	0.3567	0.3792	X_5
					1.0000	0.4280	0.6063	0.4639	X_6
						1.0000	0.5602	0.3406	X_7
							1.0000	0.3069	X_8
								1.0000	X_9

Model (*1*)

We present the results of model (1):

$$y_i = 38.9626 + 0.0305990X_{i1} + 0.175059X_{i2} + 0.218301X_{i3} + 0.110413X_{i4} + 0.0599943X_{i5} - 0.114583X_{i6} + 0.127397X_{i7} + 0.0157686X_{i8} + 0.0496642X_{i9} + e_i, \quad i = 1,2,\ldots,77, \tag{5}$$

Based on the p-level, we included the variables X_2, X_3, X_4 and X_7 in the model.

$$y_i = 40.2033 + 0.2134451X_{i2} + 0.222431X_{i3} + 0.135237X_{i4} + 0.123015X_{i7} + e_i, \quad i = 1,2,\ldots,77, \tag{6}$$

$p < 0.01$; $p < 0.01$; $p < 0.01$; $p < 0.01$.

R^2 = 77.97%.

By applying Ramsey's RESET test to the model specification at an expressed p-level of 0.002, we conclude that the null hypothesis, which asserts that the model is correctly specified, is rejected. As a result, the model may not be correctly specified. In the next step, we will look at logarithmic forms.

Model (*2*)

In order to estimate the parameters of Model 2, the logarithmic values of the independent variables were employed. The results of Model 2, including the variables X_2, X_3, X_4 and X_7.

$$y_i = -85.3512 + 11.5368\ln X_{i2} + 14.6535\ln X_{i3} + 9.43882\ln X_{i4} + 5.50397\ln X_{i7} + e_i, \quad i = 1,2,\ldots,77, \tag{7}$$

$p < 0.01$; $p < 0.01$; $p < 0.01$; $p < 0.01$.

R^2 = 79.90%.

By applying Ramsey's RESET test to the model specification at an expressed p-level of 0.109, we can conclude that the null hypothesis (H_0), which states that the model is correctly specified, is not rejected.

The subsequent step involved verifying the model. The p-level test for normality of residuals yielded a p-level of 0.104, indicating that the null hypothesis of a normal residual distribution was not rejected. In accordance with the p-level of White's test for heteroscedasticity (0.1437), the null hypothesis, saying that heteroscedasticity is absent, is not rejected. We have no evidence that the model is misspecified.

The model exhibited an explanatory power of 79.9% regarding the total variability.

Model (*3*)

In the case of implementing the Log-Level Model with the logarithm of the dependent variable and the independent variables, the model's form is (3), encompassing the variables X_2, X_3, X_4 and X_7.

$$\begin{aligned} &\ln y_i = 3.87842 + 0.00274595X_{i2} + 0.00268750X_{i3} + \\ &0.00165714X_{i4} + 0.00155247X_{i7} + e_i, \quad i = 1,2,\ldots,77, \\ &p < 0.01;\ p < 0.01;\ p < 0.01; \quad p < 0.01. \\ &R^2 = 77.45\%. \end{aligned} \tag{8}$$

Upon verification of the model specification through the Ramsey's RESET test, the p-level is determined to be 9.29e-005. We thus reject the null hypothesis that the model is correctly specified and accept the alternative hypothesis that the model is not correctly specified. As a result, the model may not be correctly specified.

Model (*4*)

In the case of employing the Log-Log Model with the logarithm of the dependent variable and the logarithms of the independent variables, the model takes the following form:

$$\begin{aligned} &\ln y_i = 2.30981 + 0.149855nX_{i2} + 0.177544\ln X_{i3} + 0.115240\ln X_{i4} + \\ &0.0708637\ln X_{i7} + e_i, \quad i = 1,2,\ldots,77, \\ &p < 0.01;\ p < 0.01;\ p < 0.01; \quad p < 0.01. \\ &R^2 = 80.15\%. \end{aligned} \tag{9}$$

Upon verification of the model specification through the implementation of Ramsey's RESET test, the p-level was determined to be 0.0167. At the 0.05 level of significance, we conclude that the null hypothesis, which states that the model is correctly specified, is rejected in favor of the alternative hypothesis, which asserts that the model is not correctly specified. As a result, the model may not be correctly specified.

Resulting model

Based on the verification of the correctness of the model specification, normality and heteroskedasticity of the residuals, we have no evidence that the model is misspecified.

$$\begin{aligned} &y_i = -85.3512 + 11.5368\ln X_{i2} + 14.6535\ln X_{i3} + 9.43882\ln X_{i4} + 5.50397\ln X_{i7} + e_i, \\ &i = 1,2,\ldots,77. \end{aligned}$$

The model above shows that when the proportion of people who answered, Green spaces such as public parks or gardens: "very satisfied" and "rather satisfied" increases by 1%, the dependent variable increases by 0.115 percentage points when there is no change in other independent variables in the model.

The model above shows that when the proportion of people who answered, "I feel safe walking alone at night in my city": "strongly agree" and "somewhat agree" increases by 1%, the dependent variable increases by 0.1465 percentage points when there is no change in other independent variables in the model.

If the proportion of people who answered, "Schools and other educational facilities": "very satisfied" and "rather satisfied" increases by 1%, the dependent variable increases by 0.094 percentage points when there is no change in other independent variables in the model.

If the proportion of people who answered, "The fees charged by my local public administration are reasonable": "strongly agree" and "somewhat agree", increases by 1%, the dependent variable increases by 0.055 percentage points when there is no change in the other independent variables in the model.

Interpretations are based on Adamec et al. (2017, p. 32) "The parameter $\beta_1/100$ expresses the change in y in the original units corresponding to the percentage change in x."

These results are very interesting. They point to factors that need to be monitored in the context of building a city. At the same time, they imply hypotheses that are important to monitor in the future. The hypotheses should be:

1. There is a relationship between satisfaction with city life and perceptions of safety.
2. There is a relationship between satisfaction with city life and satisfaction with green public spaces such as parks.
3. There is a relationship between satisfaction with city life and satisfaction with educational institutions.
4. There is a relationship between satisfaction with city life and perceptions of the adequacy of local government spending.

The findings indicate a positive relationship between the independent variables and the urban life satisfaction indicator. The value of the indicator increases with increasing independent variables, but at a decreasing rate. As a result, cities with increased values of the above-mentioned independent variables must show a more significant increase in these variables to achieve a comparable increase in citizens' satisfaction with urban life than cities with lower values of the independent variables. The challenge of increasing urban life satisfaction is therefore subject to variations in individual cities depending on the presence of different independent variables. Cities with "better" values of urban life quality indicators must make greater efforts.

5. Discussion

The objective of our study was to determine how selected variables influence the variable "satisfaction with life in the city." These findings are of particular importance to city officials tasked with determining the most effective strategies for enhancing the quality of life for urban residents.

In the study by Castelli et al. (2022), the highest regression coefficient was obtained for the variables "Safety perception" and "Green spaces" using the OLS method. In the present study, the highest regression coefficient in the final model was observed for the variable expressing the sense of safety, and the second-highest was for the "Green spaces" indicator. The findings of both studies underscore the significance of a sense of safety for people's contentment with life in the city and the pivotal role of green spaces in the urban environment. The study by Loschiavo (2021) also underscores the substantial impact of crime on life satisfaction in urban areas. In light of the aforementioned points, it is imperative for municipal governments to prioritize the cultivation of a pervasive sense of safety in urban environments. This imperative stems from the growing demand for enhanced quality of life in cities and is closely associated with the safeguarding of both the physical environment and the well-being of individuals. In this context, the reduction of criminal activity is also of significance. The findings of this study appear to corroborate the conclusions of Macke et al.

(2018), who identified "sociostructurally relations" as the most salient domain. This domain encompasses aspects such as safety, satisfaction with the condition of streets and buildings, and the quality of services provided by local governments. The findings of this study underscore the imperative for safety and sustainability in urban areas, thereby emphasizing the significance of prioritizing these domains in urban policy deliberations. Concurrently, the present findings appear to align with those of De Guimarães et al. (2020), indicating that quality of life is contingent upon and directly influenced by the components of smart governance. We concur with the position advanced by Zhu et al. (2022) that the development of a smart city must be managed in a manner that prioritizes human-cantered design and human capital. The second most significant domain identified in their analysis was "environmental well-being."

Another objective of the study was to determine whether the linear-logarithmic (Level-Log Model), logarithmic-linear (Log-Level Model), and logarithmic-logarithmic (Log-Log Model) models are more suitable for characterizing the relationship between the dependent and independent variables. The most appropriate model was selected using an econometric approach. In contrast to the model proposed by Castelli et al. (2022), the resulting model adopted in this study exhibited a linear-logarithmic functional form. The result indicates that as the independent variables increase, the value of the indicator of satisfaction with life in the city also increases, albeit at a decreasing rate. Cities with elevated values of the aforementioned independent variables must achieve a more substantial increase in these variables to attain a comparable increase in citizens' satisfaction with life in the city as cities with lower values of the independent variables.

6. Conclusions

The Article examined the potential relationships between residents' satisfaction with living in the city and selected indicators of the quality of life within the studied set of cities. The data used were obtained from Perception survey results from European Commission, Eurostat (2024a).

In the scientific study, multiple regression and an econometric approach were utilized. In addition to confirming the fulfilment of the requirements for the OLS model, an effort was made to verify the model specification's correctness using the Ramsey RESET test. After verifying the correct specification of the model, the normality and the heteroskedasticity of the residuals, it can be stated that we have no evidence that the model with logarithmic independent variables is incorrectly specified. The Level-Level Model, Log-Level Model cand Log-Log Model may not be correctly specified. The findings suggest a positive correlation between the independent variables and the indicator of satisfaction with life in the city. However, the relationship is not linear, as the value of the indicator increases with an increase in the independent variables, albeit at a decreasing rate. Consequently, cities with elevated values of the aforementioned independent variables must exhibit a more substantial increase in these variables to attain a comparable enhancement in citizens' satisfaction with life in the city as cities with lower values of the independent variables. The challenge of enhancing life satisfaction in urban areas is, thus, subject to variation across cities, contingent upon the presence of distinct independent variables.

The estimated model suggests that life satisfaction in the city is most impacted by the variable "I feel safe walking alone at night in my city" (if all other variables remain constant). Consequently, safety emerges as the paramount attribute of urban life quality. To that end,

municipal leaders committed to enhancing the quality of life within their communities must prioritize public safety.

The importance of feeling safe in the city, the presence of green spaces within urban areas, the standards of educational institutions, and the perceptions of the adequacy of local government spending in the city to be pivotal factors that ought to be accorded priority by urban policymakers. The regression model provides insight into potential relationships.

It is imperative to acknowledge the limitations of this study. Firstly, it is important to note that the analysis was conducted using secondary data. The data were obtained from a relatively small sample (77 cities), but it is believed that they are sufficient for analysis. The model offers significant insights into potential relationships that necessitate further investigation.

It is imperative that further research be conducted to investigate the relationships between the dependent and independent variables within panel data over a period of at least three years. The analysis of panel data could potentially offer novel insights into the domain of urban satisfaction. The model presented provides valuable insights into the possible links between the satisfaction of residents to live in city and selected indicators, which deserve further investigation.

Acknowledgements

This work was supported under the research project No. VEGA 1/0448/24 – Study of key determinants of human capital and economic growth in the conditions of digital economy development.

Author contributions

EG conceived the study. EG and EI were responsible for the design and development of the data analysis. EG and EI were responsible for data collection and analysis. EG and EI were responsible for data interpretation. EG wrote the first draft of the article.

Disclosure statement

The authors have stated that they do not have any conflict of interest.

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