

Parking Management in Bucharest - Resident Satisfaction and Local Governance Outcomes

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ABSTRACT

This study explores citizen's satisfaction with the current state of parking management in the Romanian capital. The analysis highlights the financial implications of local government efforts to ensure compliance with the relevant legislation. By examining irregularities or issues observed on the streets and in public parking areas, the study provides an empirical assessment of how parking facilities are managed within the urban domain.

A quantitative approach was employed, utilising a questionnaire completed by 1,073 residents of Bucharest. The findings reveal a significant dissatisfaction among citizens with the management of parking issues. Authorities' tolerance of parking law breaches compromises public safety and reduces the overall quality of life. Moreover, the daily presence of over 500,000 illegally parked vehicles highlights the inaction of local authorities in addressing taxpayer concerns. Two key solutions are proposed to address these challenges: (a) the strategic planning and management of modern parking facilities, and (b) a shared commitment from public authorities and citizens to fulfil their responsibilities. Furthermore, enforcing parking laws for illegal parking could potentially contribute 247.5 million RON (approximately 49.5 million EUR) to local government budgets on a daily basis. A noted limitation of this research is the relatively small sample size of the respondents. Future studies aim to expand the scope by incorporating other dimensions of parking management and adopting a comparative framework at the European level.

KEYWORDS: *illegal parking, parking management, parking taxation, sustainable development*

JEL CLASSIFICATION: *C11; D72; E26; G30; H20; R50*

1. INTRODUCTION

The sustainable development of any smart city must ensure the well-being of its inhabitants (Serikbayeva & Abdula, 2021), which is conditioned by factors (Niu et al., 2017) such as: community infrastructure (Popova, 2016), community service management, urban design and architectural features; citizen education (Constantinescu et al., 2019). Citizens' satisfaction is revealed, among other things, by their attachment to local values, which are top priorities for local government bodies (Im & Lee, 2012). In this context, every day, each of us travels through the city either as pedestrians or drivers. Navigating the streets of Romania's capital has become increasingly challenging due to the prevalence of illegally parked cars (Benezic, 2022).

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Bucharest accommodates over 1.8 million vehicles daily, yet offers only 20 thousand paid parking spaces and 300 thousand residential spaces, which is obviously insufficient, giving one parking space for 5.65 vehicles. Citizens express dissatisfaction with local authorities for not being able to solve the parking problem.

On the other hand, many people would like to park for free, considering that the charges of 5 RON (equivalent to about one EUR) for one hour and 30 RON for 24 hours are too high. And where car parks with hundreds of spaces have been built, the number of occupants is very low (around 30%), as they feel it is the authorities' obligation to provide them with parking spaces (possibly at modest rates or even free of charge).

The existing anomalies led us to carry out an empirical analysis of the way parkings are managed. And, as our survey results showed, the people of Bucharest are increasingly dissatisfied with the problems affecting their security and quality of life, some figures being eloquent in this regard: there are about 1.224 million registered vehicles (BPI - Bucharest Police Inspectorate, 2021), for a total population of more than 2.1 million inhabitants; there are almost 300 thousand residential parking spaces (Benezic, 2022), plus 20 thousand parking spaces managed by the municipality (Parking Bucharest S.A, 2022); 875 thousand cars have nowhere to park (PwC, 2020); the equivalent, in RON, of 1.7 and 1.86 million EUR in parking revenue in 2021 and 2022 respectively, in the context where the related wage costs amounted to the equivalent, in RON, of 0.9 to 1 million EUR (Benezic, 2022; Parking Bucharest S.A., 2022); 2 623 fines imposed in 2022, amounting to 262 thousand EUR for illegal parking and 16 479 thousand fines for illegal stopping, amounting to 478 thousand EUR (DMB, 2021), given that the number of illegally parked cars reaches about 500 thousand every day.

The City Hall has developed a parking strategy, but what some consider to be „smart parking management" has become a concern for raising local taxes (Dan, 2021). But if the administration and the police had fulfilled their obligations, only in 2023 the minimum fine for a driver who parks illegally would have been the equivalent of 43.5 EUR in RON.

Therefore, on a daily basis, the amount of the fines for more than 500,000 people who had parked illegally would have been the equivalent, in RON, of 21.75 million EUR. Also, in the category “administrative offences” we include the fines imposed on the 6 thousand people sanctioned in 2022 by the local police of the capital for parking on places owned for rent by other taxpayers (Benezic, 2022).

2. LITERATURE AND LEGISLATION REVIEW

Car use has long ceased to be a luxury, although discussions on the topic are still highly contradictory (Chng, et al., 2018; LaShon, 2019). Most of us use the car every day to commute to work or for personal purposes, although we may turn to other options such as public transport (Tao et al., 2018), cycling (Benedini et al., 2020; Ibsen & Olesen, 2018), scooters (Gebhardt et al., 2021), or even walking (Hatamzadeh, 2020; Yu & Wang, 2019). In many situations in large cities, finding a parking space is a matter of luck, requiring tens of minutes or even hours of searching (Collard et al., 2021). If, in the example of Bucharest, we cannot find a parking space, we choose to park our car wherever we can, disregarding the obligation to respect the regulations in force.

Moreover, as international experience shows, such situations can also arise as a result of contradictions between the demand and supply of parking (Wenneman et al., 2015). Which, in the case of Bucharest, represents a ratio of 5.65 to 1. As a consequence, as many people as possible wish to circumvent the regulations in force, preferring to park illegally (Centorrino, 2001). Illegal parking of vehicles can occur in situations where parking supply is limited and there is room for such a practice (Zoika et al., 2021).

Illegal parking is an increasingly acute problem for large urban agglomerations, generating both severe speed restrictions for vehicles (Carbonell & Cacheda, 2016) and congestion (Lazniewska et al., 2021) and traffic jams (He et al., 2018). These, in turn, result in serious pollution phenomena (Abbassi et al., 2020; He et al., 2018) and increased traffic accidents (Jetto et al., 2020).

Furthermore, decreasing and even eliminating illegal parking (including double parking or strip parking) is likely to lead to traffic flow (Chrysostomou et al., 2019), as well as reducing the costs generated by illegal parking (Morillo & Campos, 2014).

The problem of identifying the most reliable solutions to ensure the availability of public parking has been the subject of numerous studies, with concerns about the creation of smart parking (Sarangi et al., 2020); Sustainable Parking Management (Ivic et al., 2020); iParking (Yang et al., 2017); automatic detection of illegal parking (Chunyang et al., 2015); use of the theory of waiting wires and IoT (Pandey & Hanchate, 2018); application of parking violation reporting systems based on Android/BuSet Parking App (Setiono & Yulianto, 2018), etc. Called upon to ensure compliance with the rules set by administrative bodies are both local and national police (Antariksawan & Mustofa, 2020; Lazniewska et al., 2021).

The objective of our research is to evaluate the concerns of parking management authorities in the Romanian capital about the quality of life, comfort, safety, and peace of mind of residents. To pursue this aim, we analysed how parking spaces are managed both on the streets and in dedicated parking areas. Our scientific approach employs data-mining technologies, including analysis of variance (ANOVA), Factor Analysis, and Principal Components Analysis, as tools to extract meaningful insights and support our empirical investigation.

3. RESEARCH METHODOLOGY

The methodology used to achieve the objective of our study involved quantitative research. For this purpose, we used a questionnaire, distributed online, from October 28th to November 19th, 2023. The questionnaire contained 20 questions covering a wide range of parking issues in Bucharest.

Data analysis was carried out using quantitative analysis techniques: frequency of occurrence of responses; multiple response analysis; comparison of means method; analysis of variance. In order to increase the accuracy of the interpretation of the results and to highlight the polarisation of the recorded responses, we used interquartile calculations.

The target group was made up of people with permanent residence in Bucharest, car keepers (owners or simple users), aged 18 years or older.

The sample size included 1073 people who, by accessing the specially created website, provided as many valid responses as possible. The representativeness of the sample was

ensured by respecting the quantitative (to allow the study to be carried out) and qualitative requirements (the extraction of individuals from the population was done randomly, by freely expressing the option to answer to the questionnaire (Kruskal & Mosteller, 1979). For the sample size (E) of 1073 respondents, the confidence level (p) is 95% with a maximum allowable error of $\pm 3\%$. For sampling, we used the "snowball" probabilistic method (Frey, 2018), the target group being taxpayers residing in Bucharest.

Data processing was carried out in IBM SPSS.

3.1 Research hypotheses

The four working hypotheses were:

- H1 - The issue of parking management is only a declarative priority for local government bodies;*
- H2 - The problem of illegal parking in the capital is of no concern to the administration or the local police;*
- H3 - Residents of the capital are not aware that they have an obligation to comply with the law and that without paying parking fees they cannot secure the revenues that would allow the local government to build new parking lots;*
- H4 - Failure to comply with the legal regulations in force on parking has turned into a "right" for the inhabitants of the capital to perpetuate outdated, extremely dangerous and dishonourable habits (corruption, influence peddling, etc.).*

4. RESEARCH RESULTS

The questions included in the questionnaire have been structured in separate chapters to capture a more nuanced view of the many aspects of parking management in the capital.

The demographic structure of the sample included 598 women and 475 men, aged between 18 and 65. The representative segment consisted of respondents in the 30-49 age group (450 people, i.e., 41.9 % of the total) and the 18-29 age group (363 people, i.e., 33.8 % of the total). In total, of the 1 073 respondents, 713 are aged between 18 and 49 (75.8 % of the total). 952 respondents (88.7 % of the total) own at least one car. The majority of respondents (700 affirmative answers, i.e. 65.2 % of the total) have at least one parking at home for which they pay an annual fee to the district's town hall, which constitutes revenue for the local budget.

4.1 Testing research hypotheses

H1. The problem of parking management is only a declarative priority for local government bodies.

To test the first hypothesis, we formulated three questions that focused on the respondents' perception of the way public parking lots are managed, starting with the way drivers have to park their cars safely in Bucharest and continuing with their own assessments of the parking system in Bucharest, according to their satisfaction with the parking situation. The ranking of the answers allowed us to understand how the quality of the management of public car parks in Bucharest is appreciated. The questions were accessed by all study participants (Tables 2 and 3), with all responses being valid.

The analysis conducted for test *II* uses the tools of descriptive statistics, with the frequency of occurrence of responses being doubled by crosstab analysis and by multiple response analysis. These tools allowed us to group and rank the recorded responses according to the frequency of occurrence of each response category in the questionnaire content. The analysis is

completed with the method of comparison of means and analysis of variance (ANOVA) to assess the relationship between the variables investigated by grouping the data according to the variable “Satisfied”.

As a multidimensional research method, we opted for the analysis of variance (ANOVA), one of the most frequently used method in empirical research (Ostertagova & Ostertag, 2013), while the processing of the data obtained from the respondents was made with the SPSS software tool. Given a statistical population structured into n groups whose elements have a single characteristic, in ANOVA we assume that there are n normal and independent aleatory variables X_1, X_2, \dots, X_n , with an unknown mean $\mu_1, \mu_2, \dots, \mu_n$ and unknown, equal variances σ_1^2 , i.e. $\sigma_1^2 = \sigma_2^2$. This implies considering a single factor of influence with n levels, each level determining a single distribution of values for the independent variable. Verifying whether and to what extent the influence of the factor on this variable is significant or not is equivalent to checking if the n distributions have the same mean or not, or to check a null hypothesis of the form:

$$H_0: \mu_1 = \mu_2 = \dots = \mu_n = \mu, \tag{1}$$

where μ is an unspecified value.

The alternative H_1 hypothesis corresponding to the H_0 null hypothesis includes all the situations when at least two mean values μ_i and μ_j are different from each other.

In ANOVA, the individual behaviour of each aleatory variable X_{it} ($i = 1, 2, \dots, n; t = 1, 2, \dots, \tau_i$) is seen as being given by a multitude of accidental variations surrounding the average behaviour of this variable, represented by its expected value, these variations being synthesised by means of the stochastic disturbances marked as $\varepsilon_{i,t}$. This assumption is equivalent to the supposition that the individual manifestations of the behaviour of each aleatory variable X_{it} are described by the model:

$$X_{it} = \mu_i + \varepsilon_{it}, i = 1, 2, \dots, n; t = 1, 2, \dots, \tau_i \tag{2}$$

Taking into consideration this information is equivalent to a *single factor experiment, where the number of levels of the factor equals n and the number of observations per cell is variable and equals τ_i* .

We will mark as $\bar{X}_1, \bar{X}_2, \dots, \bar{X}_n$ și \bar{X}_G the estimators for each mean of the n distributions taken together, defined by the equations:

$$\bar{X}_i = \frac{1}{\tau_i} \sum_{t=1}^{\tau_i} X_{it}; \quad \bar{X}_G = \frac{1}{T} \sum_{i=1}^n \sum_{t=1}^{\tau_i} X_{it}, \tag{3}$$

where: $T = \tau_1 + \tau_2 + \dots + \tau_n$ and it represents the total number of the observations of the n samples.

The estimator of the *sum total of the squared deviations* of the T observations around the general average can be written in the following form:

$$SS_T = \sum_{i=1}^n \sum_{t=1}^{\tau_i} (X_{it} - \bar{X}_G)^2 = \sum_{i=1}^n \sum_{t=1}^{\tau_i} (X_{it} - \bar{X}_i)^2 + \sum_{i=1}^n \sum_{t=1}^{\tau_i} (\bar{X}_i - \bar{X}_G)^2 = \sum_{i=1}^n \sum_{t=1}^{\tau_i} (X_{it} - \bar{X}_i)^2 + \sum_{i=1}^n \tau_i (\bar{X}_i - \bar{X}_G)^2 \tag{3}$$

If we mark:

$$SS_W = \sum_{i=1}^n \sum_{t=1}^{\tau_i} (X_{it} - \bar{X}_i)^2 \text{ and } SS_B = \sum_{i=1}^n \tau_i (\bar{X}_i - \bar{X}_G)^2 \quad (4)$$

we obtain the following equation of the decomposition of the total sum of squares of the deviations:

$$SA_T = SS_W + SS_B, \quad (5)$$

where: SSW (estimator) is called the *sum of the squared deviations within groups*, and SSB (estimator) is called the *sum of the squared deviations between groups*, and it measures inter-group variance.

Consequently, one can say that the H0 referring to mean of the n normal distributions, $H_0: \mu_1 = \mu_2 = \dots = \mu_n = \mu$, can be tested using the following test:

$$F = \frac{\frac{1}{n-1} SS_B}{\frac{1}{T-n} SS_W}, \quad (6)$$

where the critical area is determined by the condition $F \geq F_{\alpha; n-1; T-n}$.

For a given significance threshold α , the rule for accepting or rejecting H0 is the following: if the calculated value of F test is higher than $F_{\alpha; n-1; T-n}$, i.e. $F \geq F_{\alpha; n-1; T-n}$,

Using ANOVA tests, we looked at the mean variation of the target value, i.e., respondents' satisfaction with the parking situation in Bucharest for the response categories dealing with the parking management issue. The frequency of responses to the question "*Are you generally satisfied with the parking situation in Bucharest?*" overwhelmingly indicated dissatisfaction with the parking situation (Table 1). Thus, 692 respondents (64.5% of the total) say they are totally dissatisfied with parking in Bucharest, while 351 respondents (32.7% of the total) have a reserved opinion.

Table 1. Degree of satisfaction of residents with the parking situation in Bucharest

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	2.2	2.2	2.2
	So-and-so	351	32.7	32.7	34.9
	No	692	64.5	64.5	99.4
	I prefer not to answer	6	.6	.6	100.0
	Total	1073	100.0	100.0	

Source: data processing by the authors in SPSS

Further analysis using ANOVA provided the reasons for citizens' dissatisfaction with the parking situation in Bucharest (Table 2 and Table 3). Thus, the majority of survey participants said that they have to park their car anywhere as long as there are no parking lots (789 selected responses, of which 457 people - with a mean score = 2.5 - have to park randomly, while 332 people - score = 2.8 - avoid parking on green spaces). The differences in the response preferences of the study participants are significant, with a clear hierarchy of responses (Sig = 0.000).

Table 2. The general degree of satisfaction of residents with the parking situation in Bucharest - Report

<i>As a rule, in Bucharest, park your car:</i>	Mean	N	Standard deviation
- in a specially arranged paid parking lot	2.56	123	.575
- half of the car on the sidewalk	2.76	33	.502
- the entire car on the sidewalk to keep my car safe from motor vehicles on the road	2.67	12	.651
- on the roadway, even if the “stop”/ “parking” prohibition sign is displayed	2.62	21	.590
- on the carriageway, where there is a sign (P), transversally or perpendicular to the axis of the pavement, to allow other drivers to park	2.73	64	.445
- anywhere. If there are no parking lots, you have to park somewhere, right?	2.50	457	.551
- anywhere they can, but not on green spaces	2.80	332	.450
- I prefer not to answer	2.81	31	.601
Total	2.63	1073	.537

Source: data processing by the authors in SPSS

Table 3. ANOVA Table

		Sum of Squares	df	Mean Square	F	Mr	
“Are you generally satisfied with the parking situation in the Capital?” * “As a rule, in the Capital you park your car...”	Between Groups	(Combined)	20.639	7	2.948	10.887	.000
		Linearity	1.882	1	1.882	6.950	.009
		Deviation from Linearity	18.757	6	3.126	11.543	.000
	Within Groups		288.420	1065	.271		
	Total		309.059	1072			

Source: data processing by the authors in SPSS

The assessment of the efficiency of parking management in Bucharest is highlighted through the analysis of multiple responses to the question “*I appreciate that the parking system in Bucharest is...*” (Table 4), related to the degree of satisfaction expressed by the participants in the study completed the picture of the “priority” that the local public administration gives to the good management of public parking. Most of the respondents consider that the parking system in Bucharest does not meet users’ expectations (692 responses, i.e., 64.5% of the total), as this system is meant to contribute to increasing the daily stress of each of us (460 responses, i.e., 42.8% of the total).

Moreover, the current parking system in Romania’s capital city generates high costs for the salaries of staff responsible for collecting parking fees (418 responses, representing 38.9% of the total), is chaotic and leads us to frequently rely on public transport (236 responses, representing 22% of the total).

Table 4. MS * Satisfaction Crosstabulation

“I appreciate that the parking system in Bucharest is”:		“Are you generally satisfied with the parking situation in Bucharest?”				Total
		yes	so - so	no	I prefer not to answer	
<i>Excellently reasoned and scientifically organised, for the peace of mind and in the service of taxpayers</i>	Count	0	4	0	0	4
	% of Total	0.0	0.4	0.0	0.0	0.4%
<i>Chaotic and designed to attract money to local budgets, but also to get us to rely more frequently on public transport</i>	Count	10	70	236	1	317
	% of Total	0.9	6.5	22.0	0.1	29.5
<i>Generating high salary costs for people in charge of collecting parking-related taxes</i>	Count	10	198	418	2	628
	% of Total	0.9	18.5	39.0	0.2	58.5
<i>Designed to contribute to increasing daily stress, as further proof of disrespect for the citizen</i>	Count	7	159	460	1	627
	% of Total	0.7	14.8	42.9	0.1	58.4
<i>I prefer not to answer</i>	Count	4	17	41	2	64
	% of Total	0.4	1.6	3.8	0.2	6.0
Total	Count	24	351	692	6	1073
	% of Total	2.2	32.7	64.5	0.6	100.0

Percentages and totals are based on respondents.

a. Group

Source: data processing by the authors in SPSS

The results of our analysis lead us to conclude that ***the first hypothesis of our study***, that *the issue of parking management is only a declarative priority for local government bodies, is confirmed*.

H2. The problem of illegal parking in the capital is not of concern to the administration or the local police.

The second hypothesis was tested by statistically processing the responses to four of the questions on the questionnaire. In this respect, we wanted to capture some particular aspects related to ensuring the legality of the use of parking spaces in Bucharest, such as, for example, the knowledge of the regulations on home parking and the citizens' interaction with the authorities in charge of managing parking lots, both of which are reported on the degree of satisfaction of survey participants for home parking.

The questions were accessed by all participants in the study and all responses were valid. The analysis carried out for the *I2* test was based on the same tools as for *H1*: frequency of occurrence of responses, coupled with cross-analysis of the data and multiple response analysis to assess the relationship between the variables investigated by grouping the data according to the variable „*Parking R*”.

Frequency of responses to the question “*Did you know that, according to the law, if you have an apartment with a surface area of less than 100 square meters, you are entitled to own one parking space, and if the surface area of the apartment is larger than 100 square meters, you*

are entitled to own two parking spaces for which you pay an annual fee to the city hall of the district where you live?” The survey participants are not aware of the content of the regulations governing the management of public parking (Table 5): 946 of the respondents (i.e., 88.2% of the total) say they are not aware of this legislation.

The lack of knowledge of the act is due, on the one hand, to the fact that the respondents did not inform themselves (632 answers, i.e., 58.9% of the total) and, on the other hand, to the fact that the competent bodies of the sector/capital city hall did not inform citizens about the existence of such normative acts (310 answers, representing 28.9% of the total) or, in other words, that the effort of the city hall to inform citizens is null (Table 6).

Table 5. Level of knowledge of regulations on the right to own a paid parking lot

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<i>From</i>	119	11.1	11.1	11.1
	<i>Nu</i>	946	88.2	88.2	99.3
	<i>I prefer not to answer</i>	8	.7	.7	100.0
	Total	1073	100.0	100.0	

Source: data processing by the authors in SPSS

Table 6. The most likely reason why respondents indicated “no” to the previous question is:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<i>- lack of knowledge of the legislation in force, because I didn't do my research</i>	632	58.9	58.9	58.9
	<i>- lack of knowledge of the regulations in force, because they do not, I have been informed by the appropriate bodies of the city</i>	310	28.9	28.9	87.8
	<i>- I answered "yes" to the previous question</i>	106	9.9	9.9	97.7
	<i>- I prefer not to answer</i>	25	2.3	2.3	100.0
	Total	1073	100.0	100.0	

Source: data processing by the authors in SPSS

Cross-analysis of the data (Table 7 and Table 8) confirms that the differences among the responses of the study participants are significant, with a clear hierarchy of their choices (Sig = 0.000).

Table 7. The connection between knowledge of the legislation and the causes of negative responses.

		“Did you know that, according to the provisions of the city’s resolution, if you have a home...”			Total
		yes	no	I prefer not to answer	
“If the answer to the previous question was	- lack of knowledge of the normative acts in force	5	623	4	632
	- lack of knowledge of regulations/bodies	10	300	0	310

		“Did you know that, according to the provisions of the city’s resolution, if you have a home...”			Total
		yes	no	I prefer not to answer	
‘no’, the most likely cause is”	- I answered “yes” to the previous question	101	4	1	106
	- I prefer not to answer	3	19	3	25
Total		119	946	8	1073

Source: data processing by the authors in SPSS

Table 8. Symmetric Measures

		Value	Asymp. Std. Error	Approx. Tb	Approx. Mr
Interval by Interval	Pearson’s R	-.551	.040	-21.602	.000c
Ordinal by Ordinal	Spearman Correlation	-.508	.030	-19.298	.000c
N of Valid Cases		1 073			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Source: data processing by the authors in SPSS

Surprisingly, although the answers selected reflect that the respondents face various illegalities concerning the parking of their own car on the public domain, most of the taxpayers do not file a complaint with the local police or city hall (896 answers, i.e., 81.2% of the total).

On the other hand, this category of respondents is the most dissatisfied with the residential parking in the area where they live (637 answers, i.e., 57.7% of the total). In other words, what is not reported is not known and no one is obliged to act. 81 of respondents (7.3% of total) say they *have been treated with indifference, even contempt, by those paid to be in the service of taxpayers*, and another 61 (5.5% of the total) say they have been told that *they themselves have to deal with such a problem, as it is not the duty of the police and/or the municipality to educate citizens who do not comply with the legal provisions in force*. The answers are included in Table 9:

Table 9. Citizens' perception of local authorities' responses to complaints about illegal parking

“If you have reported the matter to the local police and/or to the municipal authorities of the district in which you live”			“In general, are you satisfied with the residential parking in the area where you reside?”				Total
			yes	no	Yes, but I think the administration needs to build more parking lots	I prefer not to answer	
Settlement reported	You have been treated with responsibility and decency; your request being solved	Count	15	10	14	1	40
		% of Total	1.4	0.9	1.3	0.1	3.6
	You have been told that you have to solve such a problem yourself	Count	2	37	22	0	61
		% of Total	0.2	3.4	2.0	0.0	5.5
Appreciate that you have		Count	5	62	14	0	81

“If you have reported the matter to the local police and/or to the municipal authorities of the district in which you live”			“In general, are you satisfied with the residential parking in the area where you reside?”				Total
			yes	no	Yes, but I think the administration needs to build more parking lots	I prefer not to answer	
been treated with indifference	% of Total	0.5	5.6	1.3	0.0	7.3	
I have never used these	Count	63	637	184	12	896	
	% of Total	5.7	57.7	16.7	1.1	81.2	
I prefer not to answer	Count	5	9	6	6	26	
	% of Total	0.5	0.8	0.5	0.5	2.4	
Total	Count	90	755	240	19	1104	
	% of Total	8.2	68.4	21.7	1.7	100.0	

Percentages and totals are based on responses.

a. Group

Source: data processing by the authors in SPSS

Considering the results obtained and the analysis carried out, we can conclude that *the second hypothesis of the study*, according to which *the problem of illegal parking in the capital does not concern either the administrative bodies or the local police*, seen through the prism of the authorities’ passivity in terms of informing citizens about the existence and the content of the normative acts regulating the matter of public parking in Bucharest, is confirmed.

However, given that citizens’ complaints are a quantitative and qualitative indicator for measuring the living conditions in a community, we plan to refine the results of future research with new study variables that can equally reflect citizens’ involvement in changing the current situation.

H3. The residents of the capital are not aware that they have an obligation to observe the law and that, without paying the parking fees, they cannot provide revenues that would allow the local public administration to build new car parks.

As early as the design stage of the questionnaire, we tried to find out the extent to which citizens in the Romanian capital know and use modern parking booking tools.

To this end, we included in the questionnaire two questions with reference to the use of the digital platforms of the systems “*Parking Bucharest*” and “*I Parked*”. The frequency of occurrence of the responses shown in Table 10 indicated that most respondents did not use any of these modern parking payment instruments at the time of the survey and, therefore, were not aware that the parking tariffs of the two entities, both managed by the Bucharest City Hall, are different for the same location/area.

Table 10. Situation of the different tariffs charged by the Bucharest City Hall - Crosstabulation

Count		“Did you know that the parking rates of companies pending with the same trustee body (PGMB) are different for the same location/area?”			Total
		from	no	I prefer not to answer	
"To make parking easier, do you use digital platforms/have a subscription to the digital systems “Parking Bucharest” or “I Parked”?”	from	35	74	1	110
	no	35	881	11	927
	I prefer not to answer	4	23	9	36
Total		74	978	21	1073

Source: data processing by the authors in SPSS

The differences between the responses of the participants in the study are significant, which is reflected in the existence of a well-defined hierarchy of their choices (Sig = 0.000), as shown in Table 11.

Table 11. Symmetric Measures

		Value	Asymp. Std. Error	Approx. Tb	Approx. Mr
Interval by Interval	Pearson's R	.310	.049	10.663	.000cc
Ordinal by Ordinal	Spearman Correlation	.311	.048	10.716	.000cc
N of Valid Cases		1073			

- Not assuming the null hypothesis.
- Using the asymptotic standard error assuming the null hypothesis.
- Based on normal approximation.

Source: data processing by the authors in SPSS

The extent to which the inhabitants of the capital are aware or not of their obligation to comply with the law by paying their parking fees, which can be used to build new car parks and/or to upgrade the existing ones, is reflected in the answers to the questions described in Table 12.

Analysis of the frequency of occurrence of responses, cross-analysis of the data, and analysis of multiple responses allowed us to group and rank the recorded responses according to the frequency of occurrence of each response category in the questionnaire.

Thus, when asked *if they ever park (whether it is legal or not) and pay a sum of money to "parking guys"*, only 109 negative answers were recorded (7.2% of the total), with respondents stating that they have never done so. But respondents frequently use this method for various reasons such as vehicle safety (279 responses, i.e., 18.6% of the total), fear of retaliation from road users (345 responses, i.e., 22.9%) or simply for the sake of the vehicle (753 responses, i.e., 50.1% of the total).

On the other hand, when asked *whether they agree that those who park illegally, for whatever reason, should be penalised*, the majority of respondents believe that penalties should not be given for such practices because people are not to blame for not having parking lots available (618 answers, i.e., 32.2% of the total) or because “there is room for everyone” (391 responses, i.e. 20.4% of the total respondents).

Only 201 answers (10.5% of the total) are categorically in favour of penalising people who park illegally. With respect to the disagreement with fining people who park illegally, cross-analysis of the data allowed us to observe consensus even among people who say they have never parked illegally (51 of the responses, representing 4.7% of the total).

Table 12. The extent to which the inhabitants of the Capital comply with the legal provisions on parking/car stopping – Crosstabulation

Do you happen to park (whether it is legal or not) and “pay” an amount of 5 lei, 10 lei or even more to some “parking guys”?		Hypothesis I5: “You agree that those who park illegally, for whatever reason, should be sanctioned?”					Total
		Definitely yes! Rules and laws are made to be obeyed, whether we agree with them or not	Depends on the “moods” of the official and/or a little tip given to him	No, because people are not to blame for local authorities not providing parking spaces	Categorically “no!” because “there is room for everyone”	I prefer not to answer	
Yes, because I prefer to know my car safe	Count	70	172	167	120	2	279
	% within \$@	25.1	61.6	59.9	43.0	0.7	
	% of Total	6.5	16.0	15.6	11.2	0.2	26.0
	Count	63	243	201	132	4	345
Yes, because I fear that the evil-minded will scratch my car	% within \$@	18.3	70.4	58.3	38.3	1.2	
	% of Total	5.9	22.6	18.7	12.3	0.4	32.2
	Count	101	574	468	348	7	753
Yes, but only sometimes	% within \$@	13.4	76.2	62.2	46.2	0.9	
	% of Total	9.4	53.5	43.6	32.4	0.7	70.2
	Count	47	10	40	11	13	109
No, never	% within \$@	43.1	9.2	36.7	10.1	11.9	
	% of Total	4.4%	0.9	3.7	1.0	1.2	10.2
	Count	6	1	7	3	4	18
	% within \$@	33.3	5.6	38.9	16.7	22.2	
I prefer not to answer	% of Total	0.6	0.1	0.7	0.3	0.4	1.7
	Count	201	678	618	391	29	1073
Total	% of Total	18.7	63.2	57.6	36.4	2.7	100.0

Percentages and totals are based on respondents.

a. Group

Source: data processing by the authors in SPSS

The results of the analysis lead to the conclusion that *the fifth hypothesis of the study is confirmed: the inhabitants of the capital are not aware that they have an obligation to comply with the law and that, without paying the parking fees, they cannot provide revenues that would allow the local public administration to build new car parks.*

I4. Failure to comply with the regulations in force regarding car parking has turned into a “right” for the inhabitants of the capital to perpetuate outdated, extremely dangerous and dishonourable habits (corruption, influence peddling, etc.).

The overall picture of the situations generating stress and insecurity for drivers and others due to the lack of parking spaces in Bucharest is completed by identifying some specific elements of so-called “urban culture” and “civilization”, which are reflected in the answers to the questions in Table 13. The analysis of the frequency of answer occurrence, the cross-analysis of the data, and the analysis of multiple responses allowed in this case also to group and rank the recorded responses according to the frequency of occurrence of each response category.

When asked if *they are bothered when they see cars parked illegally*, the majority of survey participants answered that they are not bothered by this habit (1 028 answers, i.e., 59.3% of the total), with a large proportion arguing that they also park illegally sometimes (643 answers, i.e., 37.1% of the total).

Only a small proportion of participants are categorically annoyed when they see cars parked illegally (282 answers, i.e. 16.3% of the total). If someone were to happen to occupy, abusively, the residential parking space owned by the survey respondents, they would react in completely different ways, from *calling* the driver (307 answers, i.e. 19.2% of the total), going through states of *annoyance* (491 answers, i.e. 30.7% of the total), to *passive acceptance* of the situation created (334 answers, i.e. 20.9% of the total), to the *lifting of the windscreen wipers of the car illegally parked* in the lot assigned to the respondents (206 answers, i.e. 12.9% of the total) or, at the opposite pole, to *calling the local police* to report the violation of the law and to require their intervention (67 answers, i.e. 4.2% of the total number of respondents).

To conclude, the testing of the *H4 hypothesis* validated that it *is confirmed* as well. The answers to these questions lead us to conclude that *non-compliance with the provisions of the legal regulation in force concerning car parking has turned into a “right” of the inhabitants to perpetuate obsolete, dangerous and, equally, deeply dishonourable habits* (i.e. corruption, influence peddling, etc.).

Table 13. Actions taken by car owners when their parking space is illegally occupied – Crosstabulation

If someone abusively occupies the residence parking space you own:		Does it bother you when you see cars parked illegally?							Total
		Yes	Yes, but only if they are parked on the pavement	Yes, but only if they are parked both on the road and on the pavement	No	No, because I park erratically sometimes	It depends on my emotional state	I prefer not to answer	
Lift the windscreen wipers of the car illegally parked on your spot	Count	60	24	14	63	138	71	0	206
	% within\$*@	29.1	11.7	6.8	30.6	67.0	34.5	0.0	
	% of Total	5.6	2.2	1.3	5.9	12.9	6.6	0.0	19.2
Call the number left on the windshield of that vehicle	Count	134	22	14	71	109	49	10	307
	% within\$*@	43.6	7.2	4.6	23.1	35.5	16.0	3.3	
	% of Total	12.5	2.1	1.3	6.6	10.2	4.6	0.9	28.6
Call the local police to claim law infringement and to require the presence of the police staff	Count	33	8	9	8	19	11	4	67
	% within\$*@	49.3	11.9	13.4	11.9	28.4	16.4	6.0	
	% of Total	3.1	0.7	0.8	0.7	1.8	1.0	0.4	6.2
Get angry and go unnecessarily “consumed” because no you can do anything	Count	65	32	23	254	364	97	0	491
	% within\$*@	13.2	6.5	4.7	51.7	74.1	19.8	0.0	
	% of Total	6.1	3.0	2.1	23.7	33.9	9.0	0.0	45.8
Accept that “that’s it!” because no you can do anything	Count	57	29	21	158	237	70	1	334
	% within\$*@	17.1	8.7	6.3	47.3	71.0	21.0	0.3	
	% of Total	5.3	2.7	2.0	14.7	22.1	6.5	0.1	31.1
No paid parking lot	Count	77	40	19	14	133	102	5	188
	% within\$*@	41.0	21.3	10.1	7.4	70.7	54.3	2.7	
	% of Total	7.2	3.7	1.8	1.3	12.4	9.5	0.5	17.5
I prefer not to answer	Count	2	0	1	1	0	1	2	7
	% within\$*@	28.6	0.0	14.3	14.3	0.0	14.3	28.6	
	% of Total	0.2	0.0	0.1	0.1	0.0	0.1	0.2	0.7
Total	Count	282	103	69	385	643	229	21	1073
	% of Total	26.3	9.6	6.4	35.9	59.9	21.3	2.0	100.0

Percentages and totals are based on respondents

a. Group

Source: data processing by the authors in SPSS

5. CONCLUSIONS AND PROPOSALS

This research addresses the critical challenges of parking management in Bucharest, Romania. The econometric analysis confirms our hypotheses, revealing that the issue remains peripheral to administrative priorities and is often overlooked, perpetuating a persistent problem. The indifference of taxpayers and the failure to enforce parking laws contribute to a significant financial deficit and hinder the adoption of effective measures.

Despite our efforts, the study also has some limitations. It primarily relies on quantitative data, potentially overlooking qualitative nuances. Additionally, the sample may not fully represent the diversity of Bucharest's population, and the temporal constraints of the study limit its ability to capture evolving attitudes and behaviours.

When considering our proposed solutions, a comprehensive inventory and analysis of parking spaces are vital initial steps. Currently, approximately 500 thousand cars are illegally parked daily, presenting an opportunity to generate revenue through legalised parking. Estimating at least 5 million euros, based on an assumed average daily fee of 10 euros per car, this income could fund the construction of fixed and mobile multi-storey car parks.

The envisioned three-storey fixed parking units, with an estimated cost of EUR 500 thousand each, present a feasible solution to augment existing parking spaces. Cost recovery mechanisms include immediate purchases by owners or rentals, with potential rates ranging between euro 0.2 and 0.3 per hour. Furthermore, considering an annual parking subscription could contribute to amortising the investment over approximately 40 years.

Multilevel mobile car parks, accommodating 12 to 80 cars per level, offer flexibility and efficient use of space. This approach involves lifting cars on lifts and placing them on designated parking spaces, addressing the need for innovative solutions in a bustling urban environment.

Addressing one of the critical vulnerabilities in the current system, we propose legislative initiatives to sanction the police for negligence in enforcing parking laws. Such measures not only aim to restore citizens' trust, but also contribute to shaping Bucharest's image as a true European capital committed to safety and order.

Recognising the limitations of this research, we acknowledge the need for ongoing efforts to refine our understanding and proposed solutions. As we confront the challenges of parking management, these initiatives not only aim to enhance the quality of life for Bucharest's residents, but also contribute valuable insights to the broader global conversation on effective urban planning and governance. Our commitment to social progress remains unwavering as we strive for a more sustainable and civilised society.

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