

The Convenience-Compliance Nexus in Urban Parking: Evidence from Abuja, Nigeria

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Received: 10.08.2026 | Accepted: 18.09.2026 | Published: 28.09.2026

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DOI: [10.5281/zenodo.23006782](https://doi.org/10.5281/zenodo.23006782)

Abstract

Original Research Article

Illegal parking is a persistent urban management problem that affects traffic flow, pedestrian safety and the efficient use of public space. Although parking shortages are frequently identified as a cause of non-compliance, motorists also weigh proximity, convenience, time pressure and the perceived likelihood of enforcement. This study examines the convenience-compliance nexus underlying motorists' parking non-compliance in Phase I of the Federal Capital City (FCC), Abuja, Nigeria. A mixed-method design was used, combining a structured survey of 384 motorists with field observation and spatial assessment. Descriptive statistics, one-way analysis of variance and multiple linear regression were used to examine parking practices, district variation and predictors of a Parking Non-Compliance Index. Parking non-compliance was widespread: 80.5% of respondents reported having parked in an unauthorized area. Sidewalk/pedestrian-path parking had the highest behavioural mean ($M=4.20$, $SD=1.06$), followed by parking in front of shops or businesses without permission ($M=3.90$, $SD=0.99$). The reconciled regression model was statistically significant, $F(7,376)=54.27$, $p<.001$, with $R^2=.503$. Shortage of parking spaces ($\beta=.362$), convenience/time saving ($\beta=.254$), time pressure ($\beta=.218$), and weak enforcement ($\beta=.174$) were significant positive predictors of non-compliance (all $p<.001$). Social norms ($\beta=.082$, $p=.074$), parking fees ($\beta=.079$, $p=.069$), and signage clarity ($\beta=-.061$, $p=.184$) were not statistically significant. The findings indicate that parking non-compliance in Abuja is better understood as a structural-behavioural-institutional problem than as a simple failure of driver discipline. Effective management therefore requires coordinated improvement of legal parking availability and accessibility, visible and consistent enforcement, and parking arrangements that reduce the convenience advantage of illegal locations.

Keywords: parking non-compliance; illegal parking; convenience; parking supply; motorist behaviour; enforcement; Abuja; Nigeria.

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1. Introduction

Parking is a critical interface between urban transport, land use and public-space management. The problem is not simply the quantity of parking supplied, but the relationship

between where spaces are provided, when demand occurs, how accessible spaces are, and how motorists value walking distance, search time, cost and convenience. Reviews of parking research show that parking characteristics and

psychological factors influence choice and that parking policy is most effective when integrated with wider transport planning (Parmar et al., 2020). Parking demand is also closely related to land-use intensity, while uncertainty over availability and search time can alter parking location decisions (Chaniotakis & Pel, 2015).

Parking choice is therefore a behavioural decision as well as an infrastructure decision. Drivers may prefer an illegal space if it provides a shorter walk, lower search effort or greater certainty of immediate access than a legal alternative. Parking-choice models similarly demonstrate the importance of parking cost, search time, walking time, facility type and decision-maker characteristics (Hilvert et al., 2012). The enforcement literature adds a governance dimension and asserts that illegal parking can reduce traffic speeds, contribute to congestion and accidents, and undermine respect for parking regulations when enforcement is ineffective or inconsistent (Cullinane & Polak, 1992).

These issues are particularly relevant to Phase I of Abuja, the administrative, commercial and institutional core of the Federal Capital City. The field survey shows frequent parking activity: 39.8% of respondents parked daily and 32.3% parked two to four times per week. Parking was concentrated in the morning (43.8%) and afternoon (26.6%). Although designated parking facilities were present, motorists frequently used locations that were not intended for parking. The most direct indicator is that 309 of the 384 respondents (80.5%) reported having parked in an unauthorized area.

The behavioural pattern is also spatially consequential. The usual parking-location distribution shows 31.5% on-street parking, 22.7% sidewalk/pedestrian-area parking, 11.5% unauthorized green-space parking and 6.0% double parking, alongside 20.3% use of designated lots/garages. These categories should not be collapsed into a single illegal-parking share because the survey categories do not establish legal status with sufficient precision. Instead, the 80.5% unauthorized-parking experience is used as the principal indicator of exposure to non-compliant parking.

The literature gap addressed here is the limited integration of structural parking constraints with motorists' convenience preferences and enforcement conditions in an African planned-capital context. The study therefore asks not only whether parking supply is inadequate, but why motorists continue to choose non-compliant locations when formal facilities exist. The paper makes three contributions: it identifies the behavioural forms most strongly associated with non-compliance; tests the relative contribution of supply, convenience, time pressure and enforcement; and interprets the results through an integrated convenience-compliance framework relevant to planned urban public-space management.

2. Literature Review and Theoretical Framing

2.1 Parking supply, demand and accessibility

Parking demand is generated by urban activity and is spatially differentiated by land use, employment concentration, commercial intensity and trip purpose. A parking facility may therefore exist in aggregate while remaining functionally inaccessible to motorists whose destinations are elsewhere. Accessibility is not equivalent to physical provision: walking distance, entry and exit conditions, information, operating restrictions and perceived availability affect the usefulness of a space.

2.2 Convenience and parking choice

Parking choice literature treats the selection of a parking location as a utility-based decision involving competing costs and benefits. Search time, walking time, availability, parking cost and facility type can all influence choice (Hilvert et al., 2012). Under uncertain availability, motorists may tolerate search time when the probability of finding a suitable space is attractive, but availability itself remains an important determinant of location choice (Chaniotakis & Pel, 2015).

2.3 Illegal parking and enforcement

Illegal parking is both an outcome of constrained choice and a contributor to transport problems. Cullinane and Polak (1992) show that illegal parking can reduce traffic speeds, increase congestion and create safety consequences, while enforcement is a central policy response. Deterrence theory suggests that the expected cost of violation depends not only on the nominal penalty but also on the perceived certainty and visibility of enforcement.

2.4 Nigerian and Abuja evidence

Evidence from Nigerian cities identifies parking supply, roadside parking and enforcement as important components of urban traffic problems. In Abuja, Shehu, Kawu and Dere (2023) reported relationships between on-street parking,

inadequate facilities and implementation of parking/transport policies. The present study extends this evidence by explicitly modelling the behavioural mechanism linking parking-space shortage and convenience with non-compliance.

2.5 Conceptual framework

The conceptual framework at figure 1 operationalises the theoretical proposition as a sequence from urban structure and land use intensity to parking demand pressure, legal parking availability/accessibility, perceived convenience and parking choice, followed by compliance/non-compliance and urban outcomes. Governance conditions especially enforcement visibility, restrictions, signage, fees, clamping/towing and payment systems moderate the pathway.

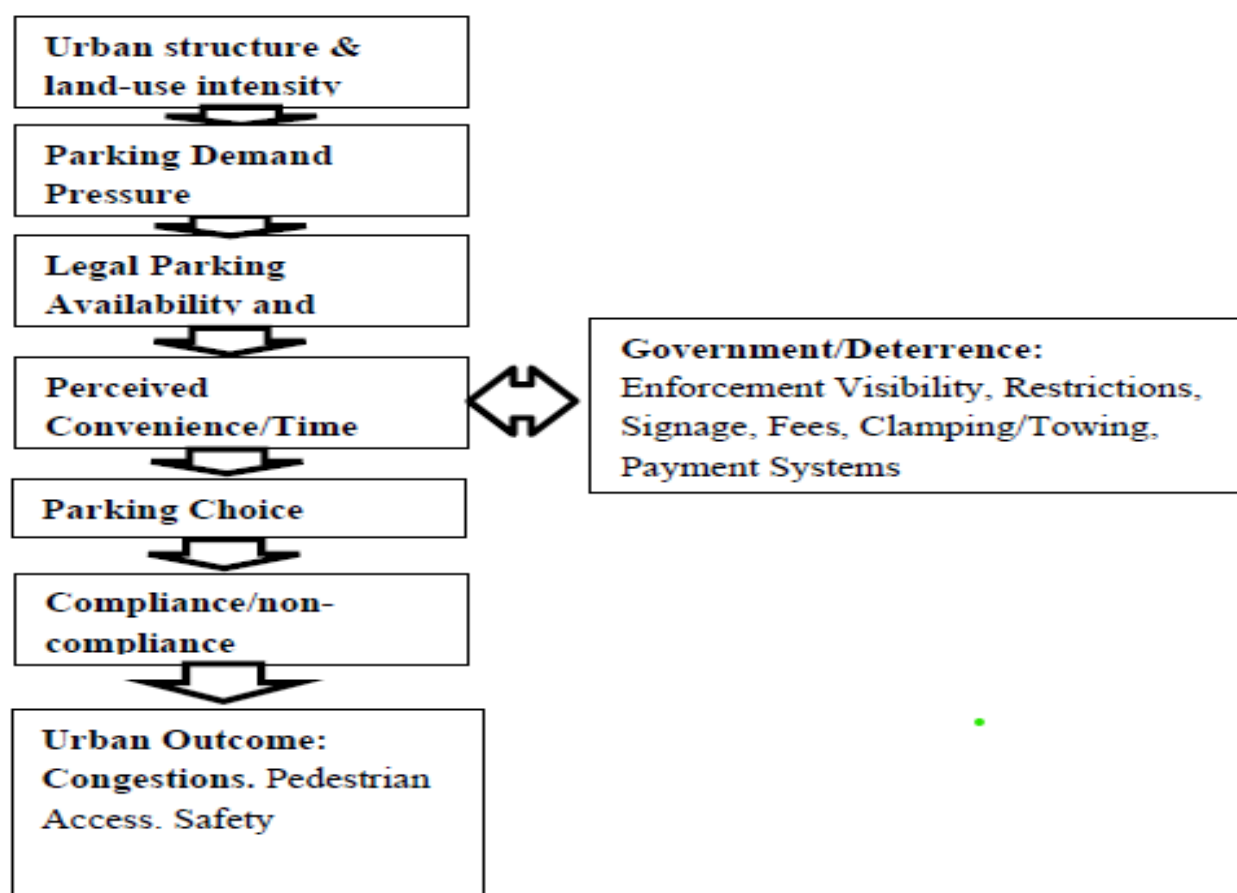


Figure 1: Integrated conceptual framework for the convenience-compliance nexus.

Source: Researcher, 2026

2.6 Theoretical framework

Three complementary perspectives are integrated as shown in figure 2. Parking Choice/Random Utility Theory explains why motorists compare legal and illegal parking alternatives according to perceived utility. A land use-transport interaction/accessibility perspective explains why demand pressure

varies spatially with activity intensity and access to destinations. Deterrence Theory explains the role of enforcement visibility and expected sanctions. The integrated proposition is that motorists are more likely to choose non-compliant parking when the perceived utility of a convenient illegal location exceeds the utility of legal alternatives plus the perceived expected cost of violation.

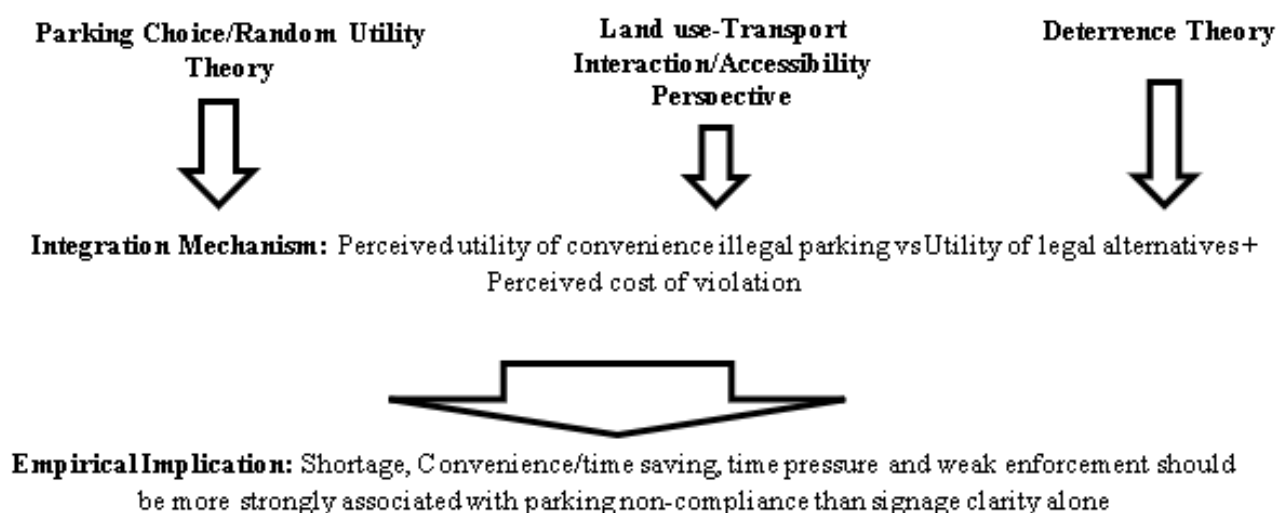


Figure 2: Integrated theoretical framework.

Source: Researcher, 2026

3. Materials and Methods

The study used a mixed-method design in Phase I of the FCC, Abuja. The empirical unit was the motorist, supplemented by field observation and spatial assessment of public parking facilities. The survey sample comprised 384 respondents, allocated as 48 questionnaires to each of eight Phase I districts. The thesis reports purposive, stratified and simple-random sampling components. Data collection instruments included a structured questionnaire, observation,

interviews and spatial tools including Google Earth Pro, GPS and GIS.

The questionnaire captured parking frequency, time, usual parking location, behavioural practices, experience of unauthorized parking, perceived parking problems, behavioural factors and perceived effectiveness of traffic-management strategies. Likert-type items were summarized using means and standard deviations. One-way ANOVA was used to examine district differences. Multiple linear

regression modelled the Parking Non-Compliance Index using shortage of parking spaces, convenience/time saving, time pressure, weak enforcement, social norms, parking fees and signage clarity as predictors.

A reconciliation audit was undertaken before reporting the regression model. The table calculations reported $R=.742$ and $R^2=.551$, but these do not agree with the reported sums of squares: $142.38/283.30=.5026$. Using the sums of squares gives $R^2=.503$, $R\approx.709$ and adjusted $R^2\approx.493$; the reported $F=54.28$ is consistent with the sums of squares and degrees of freedom. The coefficient table also reports social norms at $p=.074$, so it is treated as non-significant. The disputed one-sample t-test for traffic-management effectiveness is not used because the reported t-values are inconsistent with the reported mean, SD and sample size. Finally, the previously stated aggregate 48.2% non-designated-location share is not used because the listed location categories sum to 40.2% when the three explicitly non-designated categories are

combined.

The study is interpreted as associational rather than causal because the data are cross-sectional and several behavioural measures are self-reported. Field observation and spatial assessment provide contextual corroboration but do not convert the regression into a causal design.

4. Results

4.1 Parking supply and activity pattern

The inventory in tables 1-4 and figures 3-4 identified seven designated public parking facilities covering 17.92 ha. The Old Parade Ground accounted for 34.54% of the inventoried area, followed by the Central Area Bus Terminal (17.97%) and Eagle Square (14.56%). The facilities are spatially associated with administrative, commercial, transport, religious and event-oriented activity nodes.

Table 1: Designated public parking facilities and spatial share.

Facility	Area (ha)	Share (%)
Old Parade Ground	6.19	34.54
Central Area Bus Terminal	3.22	17.97
Eagle Square Parking Space	2.61	14.56
Garki Market Parking Space	2.08	11.61
Wuse Market Parking Space	1.85	10.32
Ecumenical Centre	1.14	6.36
Building Material Market, Wuse	0.83	4.63

Source: Field Survey (2026).

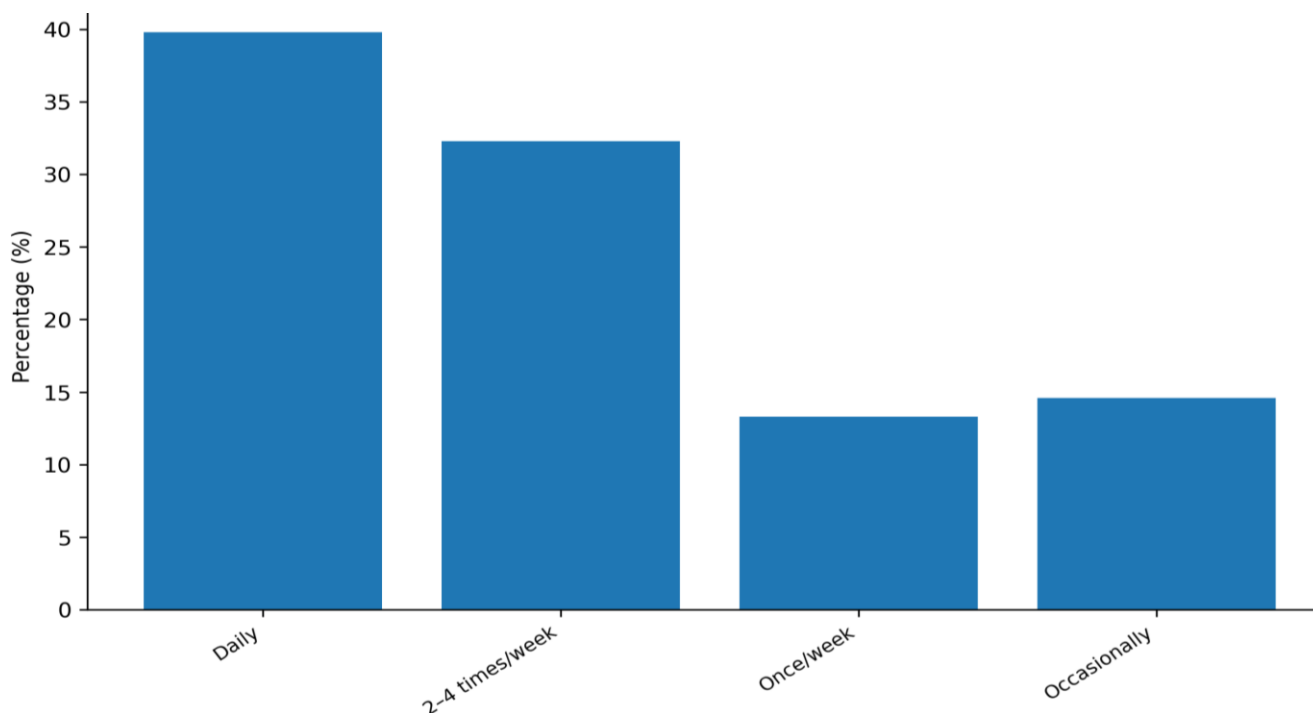


Figure 3: Parking frequency of respondents.

Source: Field Survey (2026).

Table 2: Parking frequency of respondents.

Frequency	n	%
Daily	153	39.8
2–4 times/week	124	32.3
Once/week	51	13.3
Occasionally	56	14.6

Source: Field Survey (2026).

Table 3: Usual time of parking.

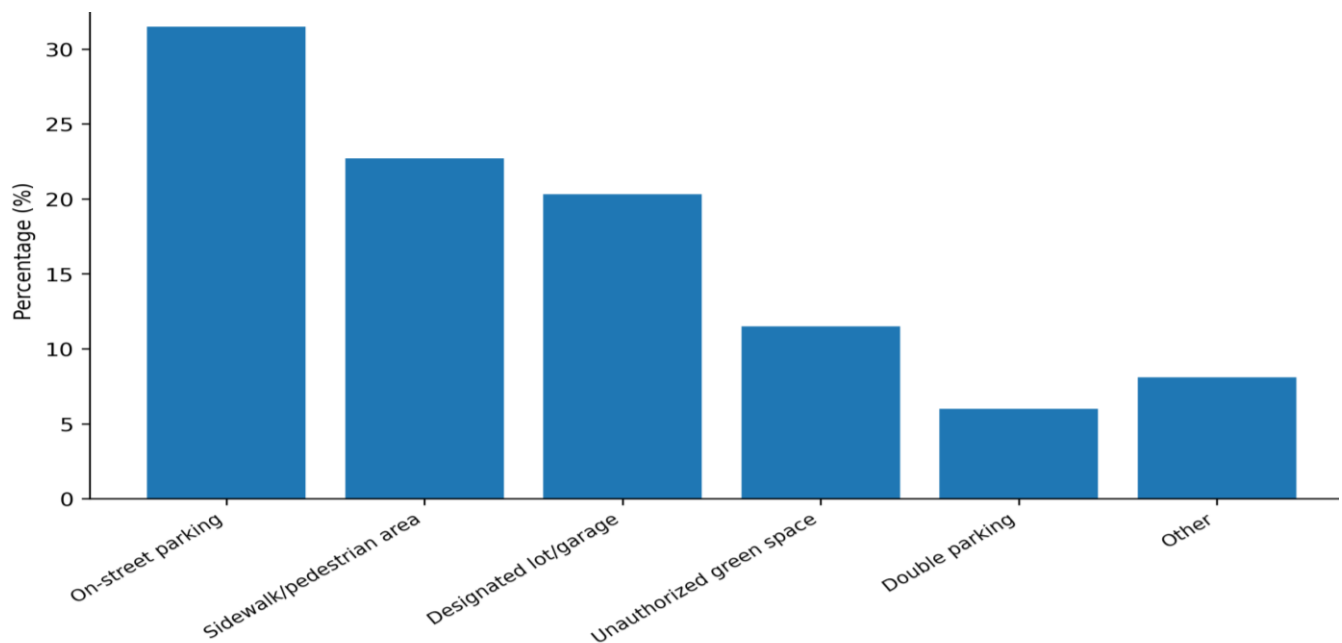
Time	N	%
Morning	168	43.8
Afternoon	102	26.6
Evening	91	23.7
Night	23	6.0

Source: Field Survey (2026).

Table 4: Usual parking location.

Usual parking location	%
On-street parking	31.5
Sidewalk/pedestrian area	22.7
Designated lot/garage	20.3
Unauthorized green space	11.5
Double parking	6.0
Other	8.1

Source: Field Survey (2026).

**Figure 4:** Usual parking location.

Source: Field Survey (2026).

4.2 Parking behaviour and unauthorized parking

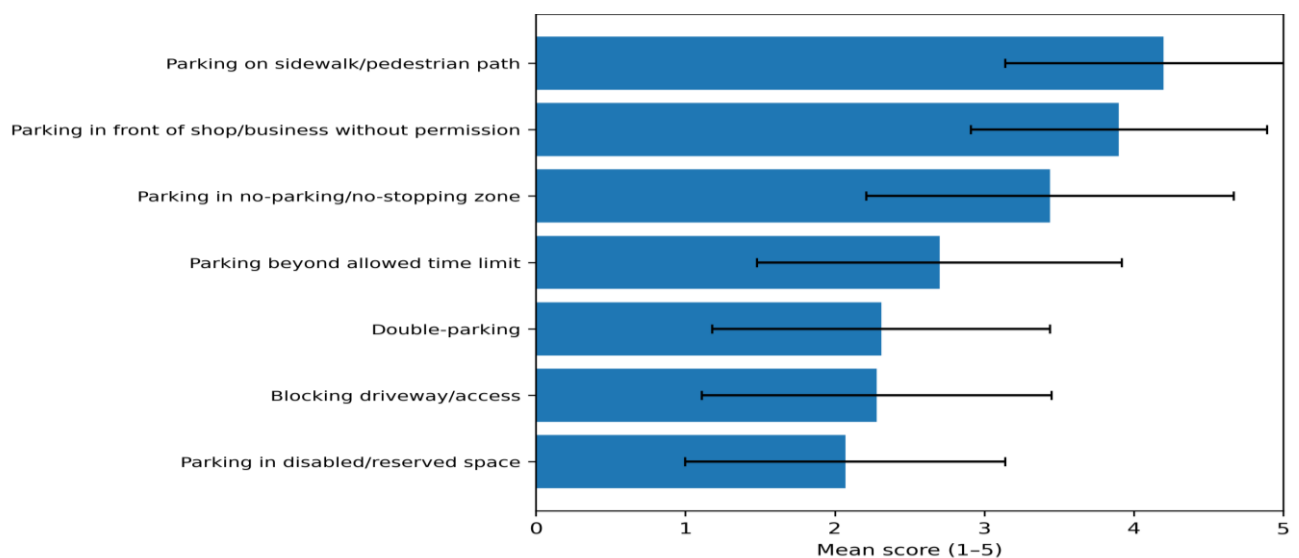
Parking on sidewalks/pedestrian paths was the most frequently reported behaviour ($M=4.20$, $SD=1.06$), with 84.4% reporting it often or

always. Parking in front of shops/businesses without permission was second ($M=3.90$, $SD=0.99$), with 68.8% reporting often or always. Parking in no-parking/no-stopping zones also had a relatively high mean ($M=3.44$, $SD=1.23$) (Tables 5-6 and Figure 5).

Table 5: Reported parking behaviour engagement.

Parking behaviour	Mean	SD
Parking on sidewalk/pedestrian path	4.2	1.06
Parking in front of shop/business without permission	3.9	0.99
Parking in no-parking/no-stopping zone	3.44	1.23
Parking beyond allowed time limit	2.7	1.22
Double-parking	2.31	1.13
Blocking driveway/access	2.28	1.17
Parking in disabled/reserved space	2.07	1.07

Source: Field Survey (2026).

**Figure 5:** Reported parking behaviours (mean $\pm$ SD).

Source: Field Survey (2026).

Table 6: Experience of parking in an unauthorized area. Source

Unauthorized-area parking	N	%
Yes	309	80.5
No	75	19.5
Total	384	100.0

Source: Field Survey (2026).

4.3 Parking-related problems

Table 7 shown problems related to illegal parking within the FCC. Respondents rated illegal parking causing traffic jams ($M=3.69$,

$SD=1.20$) and shortage of legal parking spaces during peak hours ($M=3.68$, $SD=1.25$) as the most severe problems. Safety risks were also prominent ($M=3.59$, $SD=1.21$).

Table 7: Perceived severity of parking problems.

Problem	Mean	SD
Illegal parking causing traffic jams	3.69	1.2
Shortage of legal parking during peak hours	3.68	1.25
Safety risks to pedestrians/other drivers	3.59	1.21
Damage to vehicles/property	3.5	1.28
Lack of enforcement	3.11	1.36
Inadequate signage/road markings	2.99	1.31
Poor lighting/security	2.97	1.33

Source: Field Survey (2026).

4.4 Factors contributing to parking non-compliance

The strongest perceived factor was insufficient legal parking during peak hours ($M=4.05$, $SD=1.05$), followed by convenience/time saving ($M=3.84$, $SD=1.14$) and weak enforcement

($M=3.73$, $SD=1.20$). Clear signage had a comparatively high mean ($M=3.49$, $SD=1.22$), but the regression indicates that signage clarity did not independently predict non-compliance after the other predictors were considered (Table 8).

Table 8: Factors contributing to motorist parking behaviour.

Factor	Mean	SD
Not enough legal parking spaces during peak hours	4.05	1.05
Illegal parking saves time/is more convenient	3.84	1.14
Enforcement of parking rules is generally weak	3.73	1.2
Time pressure/being in a hurry	3.2	1.31
Social norms/others park illegally	2.82	1.28
Parking fees are too expensive	2.92	1.25
Fear of fines/clamping	2.64	1.24
Clear signage	3.49	1.22

Source: Field Survey (2026).

4.5 District differences

The proposition identifies significant district differences in several parking-related factors. In particular, shortage of legal parking spaces, convenience/time saving and weak enforcement varied significantly across districts. High-

activity districts such as Central Area, Wuse II, Garki II and Wuse I exhibited greater parking pressure, while Asokoro, Maitama and Guzape generally exhibited lower pressure. However, the ANOVA result in table 9 identify district-level differences in perceptions than an absolute interpretation as causal effects.

Table 9: ANOVA of selected factors contributing to parking behaviour across districts.

Factor	F	df1	df2	p
Shortage of legal parking spaces	4.39	7	376	<.001
Convenience/time saving	3.92	7	376	<.001
Weak enforcement	4.11	7	376	<.001
Time pressure	2.74	7	376	0.009
Social norms	2.31	7	376	0.027
Parking fees	1.96	7	376	0.061
Fear of fines/clamping	1.72	7	376	0.101
Clear signage	3.18	7	376	0.003

Source: Field Survey (2025).

4.6 Multiple linear regression

The regression model shown in tables 10-11 and figure 6 is reconciled. The model was statistically significant, $F(7,376) = 54.27$, $p < .001$. Based on the reported sums of squares, the model explains approximately 50.3% of the variance in the Parking Non-Compliance Index ($R^2 = .503$;

adjusted $R^2 \approx .493$; $R \approx .709$). Shortage of parking spaces was the strongest standardized predictor ($\beta = .362$), followed by convenience/time saving ($\beta = .254$), time pressure ($\beta = .218$) and weak enforcement ($\beta = .174$). All four were statistically significant at $p < .001$. Social norms, parking fees and signage clarity were not statistically significant.

Table 10: Regression model summary and ANOVA.

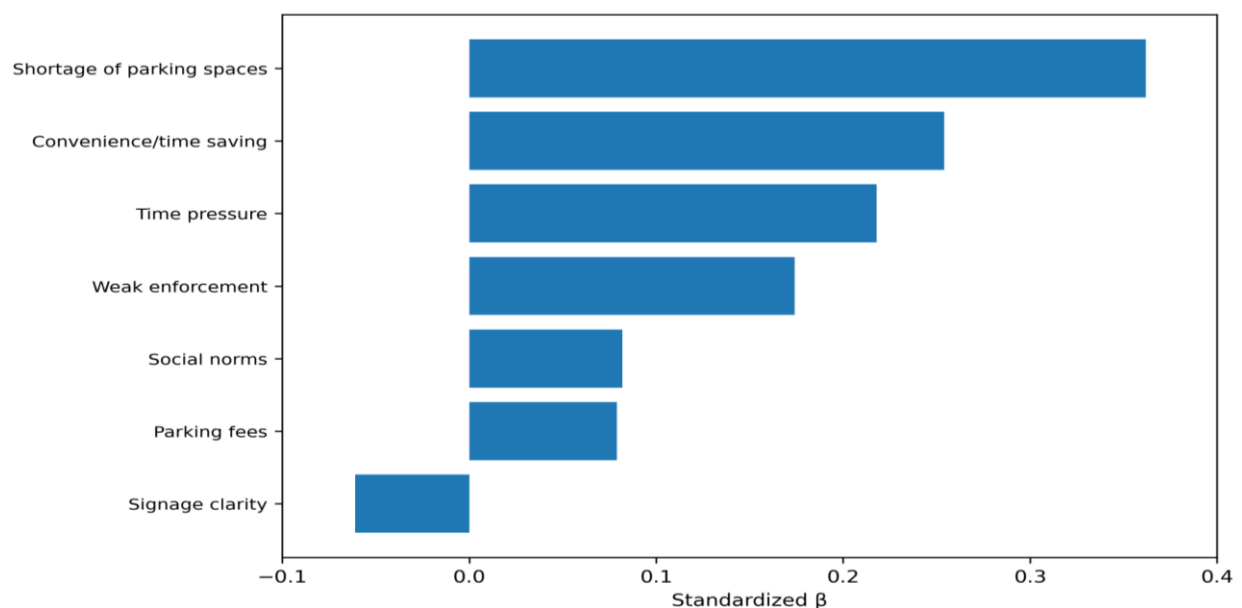
Component	R	R ²	Adj. R ²	SE / SS / df / MS
Model	0.709	0.503	0.493	0.612
Regression	142.38	7	20.34	
Residual	140.92	376	0.375	
Total	283.3	383	-	

Source: Field Survey (2026)

Table 11: Regression coefficients predicting parking non-compliance.

Predictor	B	SE	β	t	p
Shortage of parking spaces	0.398	0.052	0.362	7.65	<.001
Convenience/time saving	0.285	0.058	0.254	4.91	<.001
Time pressure	0.224	0.049	0.218	4.57	<.001
Weak enforcement	0.192	0.054	0.174	3.56	<.001
Social norms	0.086	0.047	0.082	2.89	0.074
Parking fees	0.082	0.045	0.079	1.82	0.069
Signage clarity	-0.064	0.048	-0.061	-1.33	0.184

Source: Field Survey (2026).

**Figure 6:** Standardized regression coefficients predicting parking non-compliance.

Field Survey (2026).

4.7 Traffic-management effectiveness

Generally, the perceived effectiveness of traffic-management strategies shown in table 12 was $M=3.25$ ($SD=1.13$), interpreted as moderately effective. Traffic wardens/enforcement officers

had the highest mean ($M=3.87$), followed by on-street parking restrictions ($M=3.76$) and signage/road markings ($M=3.73$). Clamping/towing ($M=2.49$) and payment systems ($M=1.94$) were substantially weaker.

Table 12: Perceived effectiveness of traffic-management strategies.

Traffic-management strategy	Mean	SD
Traffic wardens/enforcement officers	3.87	0.96
On-street parking restrictions	3.76	0.95
Signage and road markings	3.73	1.2
Designated parking lots/garages	3.49	1.19
Pedestrian protection (bollards)	3.45	1.28
Clamping/towing	2.49	1.24
Payment systems (meters/apps)	1.94	1.14

Source: Field Survey (2026).

4.8: Discussion

The central finding is that parking non-compliance in Abuja reflects the interaction of structural scarcity and behavioural convenience. The strongest predictor in the regression is shortage of parking spaces, indicating that non-compliance is partly a response to constrained legal alternatives. This supports the parking literature that links land-use activity and parking generation with demand pressure (Parmar et al., 2020). It also supports Abuja evidence that inadequate parking facilities are associated with on-street parking and policy-implementation challenges (Shehu et al., 2023).

Convenience/time saving is the second strongest predictor. This is theoretically important because motorists do not simply respond to whether a legal space exists; they compare the effort and time associated with legal alternatives with the immediate benefit of parking close to the destination. Parking-choice studies similarly identify search time, walk time, availability and cost as important determinants of location choice (Hilvert et al., 2012; Chaniotakis & Pel, 2015).

Weak enforcement is also significant, consistent with deterrence theory and the established literature on illegal parking. The finding does not mean that enforcement alone is sufficient. The strongest predictors are structural and convenience-related, while the effectiveness

assessment shows that visible wardens and restrictions perform better than clamping/towing and payment systems. This points toward a balanced strategy in which enforcement increases the expected cost of non-compliance while planning interventions improve the attractiveness and accessibility of legal alternatives.

The non-significance of signage clarity is noteworthy. Signage is useful for communicating rules, but information alone may not overcome a large convenience differential when legal parking is unavailable or inconvenient. This cautions against treating signage as a substitute for supply, accessibility and consistent enforcement.

The district pattern reinforces the importance of spatial context. High-activity districts such as Central Area, Wuse II, Garki II and Wuse I combine strong trip attraction with intense competition for limited public space. A district-blind parking policy may allocate resources inefficiently; interventions should be targeted according to land-use intensity, peak demand, pedestrian exposure and enforcement conditions.

4.9: Planning and Policy Implications

Align parking provision with land-use intensity and observed peak demand rather than relying on

aggregate citywide supply.

Improve the accessibility of legal parking by strengthening pedestrian links, directional information, entry/exit arrangements and visibility from major destinations.

Use visible, consistent and location-specific enforcement in high-pressure districts, with clear escalation from warning to penalties and towing where appropriate.

Prioritise pedestrian protection where sidewalk parking is prevalent, including physical protection and continuous accessible walkways.

Develop shared and time-managed parking arrangements around complementary land uses so existing facilities can serve different activities across the day.

Integrate parking management into development control, transport planning and public-space management rather than treating parking as an isolated traffic-enforcement issue.

Pilot digital payment, parking information and monitoring systems only alongside adequate legal supply and credible enforcement; technology should not substitute for basic parking provision.

5: Limitations and Future Research

The study is limited geographically to Phase I and temporally to the field-survey period. Parking demand is dynamic and can vary by day, time, events and season. Several variables are self-reported and may be affected by recall or social-desirability bias. The study does not provide a continuously updated parking occupancy dataset paired with capacity and demand at the same spatial-temporal scale; consequently, a formal supply demand mismatch index is not calculated. Future research should use longitudinal occupancy counts, parking duration/turnover observations, GPS or sensor data, and before-after evaluation of enforcement or pricing interventions.

6: Conclusion

The evidence shows that parking non-

compliance in Phase I of Abuja is neither simply a problem of driver indiscipline nor solely a shortage-of-spaces problem. It is produced by the interaction of limited legal parking availability, the convenience and time-saving value of informal locations, situational time pressure and weak enforcement. Four predictors such as parking-space shortage, convenience/time saving, time pressure and weak enforcement remain statistically significant in the regression, while social norms, parking fees and signage clarity do not. The planning implication is a shift from enforcement-only responses toward integrated parking management. Abuja requires legal parking options that are sufficiently available, accessible and convenient at the places and times where demand is generated, combined with visible and consistent enforcement.

7: Recommendations

First, the FCT Administration and relevant planning authorities should adopt a **demand-responsive parking provision and accessibility strategy** that prioritises areas where parking pressure is greatest, particularly high-activity commercial and administrative districts. The emphasis should not be solely on increasing the total number of parking spaces, but on providing legal spaces that are located within reasonable walking distance of major destinations and are accessible during peak demand periods. Existing public parking facilities should therefore be better integrated with pedestrian networks, directional signage and destination-based parking information, while opportunities for shared parking between complementary land uses should be explored. Development control and planning approvals should also require parking demand to be considered alongside land-use intensity and expected trip generation. Such an approach would reduce the structural incentive for motorists to substitute convenient illegal locations for distant, unavailable or difficult-to-access legal parking.

Second, parking management should adopt a **targeted, visible and consistent enforcement system** rather than relying predominantly on

disciplinary interventions such as clamping and towing. Enforcement resources should be concentrated in locations and periods where illegal parking is most prevalent, particularly around commercial centres, major pedestrian areas and congested road corridors. Traffic wardens, VIOs, police and relevant FCT/municipal authorities should operate within clearly defined institutional responsibilities to eliminate uncertainty over who is responsible for parking control. Enforcement should combine clear restrictions, visible personnel, warnings and graduated penalties, supported by adequate road markings and pedestrian-protection measures. Because weak enforcement was a significant predictor of non-compliance, the objective should be to increase motorists' perception that parking regulations are consistently monitored and applied, while ensuring that enforcement is accompanied by realistic legal parking alternatives.

Third, the FCT Administration should develop an **integrated behavioural parking-management programme** that explicitly addresses motorists' preference for convenience and time saving. Parking policy should recognise that motorists are more likely to comply when legal parking is easier, faster and more predictable than illegal alternatives. Parking information systems, clearly identified short-stay spaces, time-managed parking, shared parking arrangements and appropriately designed payment systems should therefore be introduced progressively, particularly in high-demand areas. However, technology and payment mechanisms should not be implemented in isolation where basic parking supply remains inadequate. Regular parking occupancy and turnover surveys should also be institutionalised to monitor peak demand, identify emerging pressure points and evaluate whether interventions actually improve compliance. This would enable Abuja to move from reactive enforcement toward an evidence-based parking management system in which **adequate supply, accessibility, convenience and credible enforcement operate together to improve motorists' compliance and protect traffic flow, pedestrian movement and public-space quality.**

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