THE IMPACT OF SUBSIDY REMOVAL ON THE EFFICACY AND ADOPTION OF CASUAL CARPOOLING SCHEMES IN NIGERIA

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Abstract

This study analyses the impact of fuel subsidy removal on the adoption and effectiveness of casual carpooling schemes in Nigeria. Historically, fuel subsidies have provided short-term price stability at the cost of long-term fiscal, governance, and environmental challenges. The removal in 2023 led to a sharp increase in fuel prices, prompting commuters to explore cost-sharing options, such as carpooling. A cross-sectional survey was conducted to assess hypothesised relationships among economic factors, effectiveness, perception, subsidy removal, and carpooling adoption using Partial Least Squares Structural Equation Modelling (PLS-SEM). Results indicate that financial pressures and the withdrawal of subsidies have a positive and significant influence on carpooling behaviour, while effectiveness and perception did not have direct significant impacts, though their indirect effects were notable. The moderation analysis also shows that gender and income significantly influence the relationship between subsidy removal and carpooling adoption, whereas age and educational qualification are not significant moderators. These findings underscore the role of subsidy reforms in changing travel behaviours and positioning carpooling as a sustainable transportation option. The research recommends awareness campaigns, supportive policies, and technological platforms to boost carpooling adoption.

Keywords: Carpooling behaviour; Energy subsidy; Structural Equation Model; Sustainable transport.

JEL classification codes: Q01, Q40 & R41

1. Introduction

Since Nigeria's independence, its economic structure has been deeply intertwined with its vast oil reserves, leading to heavy reliance on fossil fuels. Among the most significant policy instruments has been fuel subsidies, introduced as a fiscal tool to stabilise domestic fuel pump prices and shield citizens from the volatility of global oil markets (Chikwendu et al., 2015; McCulloch et al., 2021; Nwachukwu & Chike, 2011). Even though subsidies offered temporary relief to consumers by reducing the fuel prices, they caused drastic fiscal and developmental problems in the long term. The increasing expense started to burden the national budget, restricting its spending on infrastructure, healthcare, and education (IMF, 2022; Oxford, 2023).

The debate on the sustainability of subsidies escalated with the rise in national debt and the fact that they are not compatible with fiscal prudence (Omotosho, 2020). Government efforts to remove subsidies repeatedly faced opposition as people considered subsidies to be a kind of social protection. The suggestion of increases in fuel prices was regularly followed by protests, riots, and unrest (Chikwendu et al., 2015; Houeland, 2020).

Moreover, the subsidy regime also fostered corruption, fraud, smuggling, and false claims, which drained billions from public coffers (Akov, 2015; Soile & Mu, 2015; Ukonze et al., 2020). To address these issues, President Tinubu announced the removal of full subsidies in 2023. While financial analysts hailed the move as fiscally responsible, it ignited heated debates about its socioeconomic consequences, particularly its effects on household welfare and transportation costs (Nwachukwu & Tumba, 2023).

With higher fuel prices, Nigerians began exploring alternatives such as casual carpooling as a cheaper mode of travel. This policy shift, therefore, provides a unique opportunity to study how subsidy removal may reshape travel behaviour and accelerate the adoption of sustainable transport practices.

To guide the empirical investigation, the following hypotheses are proposed:

H_{01}: Fuel subsidy removal has a significant positive effect on the adoption of carpooling in Nigeria.

H_{02}: Economic factors have a significant positive impact on carpooling adoption in Nigeria.

H_{03}: The perceived efficacy of carpooling has a positive effect on carpooling adoption in Nigeria.

H_{04}: There is a significant positive effect of public perception on carpooling adoption in Nigeria.

H_{05}: There is a significant positive moderating effect of socio-economic factors on carpooling adoption in Nigeria.

2.0 Literature Review

Fuel subsidies have long dominated Nigeria's policy discourse, primarily framed around fiscal sustainability, corruption, and governance. Scholars have highlighted their budgetary burden, with resources diverted from social investment into recurrent subsidy payments (Abdul-Baki et al., 2021; IMF, 2022). Others emphasised the subsidies' role in perpetuating rent-seeking, fraud, and smuggling, undermining the efficiency of the oil sector and eroding public trust (Akov, 2015; Soile & Mu, 2015; Ukonze et al., 2020). Studies also document the political dimensions, where governments oscillated between fiscal reform and electoral expediency, often abandoning subsidy removal in the face of mass protests (Chikwendu et al., 2015; Houeland, 2020).

Beyond governance, research has assessed subsidies' ripple effects across manufacturing, energy access, and household incomes (Adekunle & Oseni, 2021; Gidigbi & Bello, 2020; Inegbedion et al., 2020). Yet, while economic and political implications are widely studied, the behavioural and transport-related consequences of subsidy removal remain underexplored.

Globally, sustainable transport has become a critical response to urbanisation challenges, including congestion, emissions, and resource inefficiencies (Bao et al., 2023; Zhao et al., 2020). Carpooling, where multiple individuals share a vehicle, has been identified as a cost-effective and environmentally beneficial solution, reducing traffic congestion, pollution, and travel costs (Molina et al., 2020; Zhou et al., 2020).

However, barriers exist, particularly in developing countries. Cultural perceptions, such as car ownership as a status symbol, and concerns about security and trust discourage ride-sharing (Aguiléra & Pigalle, 2021; Xu et al., 2021). Institutional challenges include weak regulatory frameworks, lack of incentives, and absence of formalised platforms to coordinate carpooling (Gandia et al., 2021; Neoh et al., 2017).

In Nigeria, cheap petrol previously reinforced single-car ownership and underutilization of public and shared transport, contributing to congestion, environmental pressure, and inefficiency (Aluko et al., 2022). Subsidy removal has altered this dynamic, making private travel more expensive and positioning carpooling as an attractive, cost-sharing alternative (Abdul-Rahman, 2019; Nwaigwe et al., 2019).

Despite the extensive body of research on subsidy removal's economic, political, and governance implications, there remains a significant gap regarding its influence on travel behaviour and adoption of sustainable mobility solutions (Akinyemi et al., 2015; McCulloch et al., 2021). This study addresses that gap by examining the relationship between subsidy removal and carpooling adoption in Nigeria, thereby contributing to transport economics and providing policy insights for sustainable mobility transitions.

3.0 Research Methodology

The research hypotheses of the study were tested using a cross-sectional survey method. The research utilised the Partial Least Squares Structural Equation Modelling (PLS-SEM) method by Smart PLS-4 as a tool. PLS-SEM has received empirical support when estimating cause-and-effect relationship models in management research. The study sample comprised 214 respondents and was selected using a stratified random sampling procedure. This technique was adopted to ensure that the sample obtained reflects the population distribution based on age, gender, income, and education level. The sample size of 214 respondents is justified based on methodological adequacy and representativeness. Using a stratified random sampling approach ensured that the sample reflected the population distribution across key demographics such as age, gender, income, and education. Furthermore, the sample size exceeded the minimum requirement of the "10-times rule" for PLS-SEM, thereby providing sufficient statistical power to detect relationships among constructs. With over 200 responses, the study achieved both robustness for structural equation modelling and practical feasibility for data collection, making the sample appropriate for analysing the impact of fuel subsidy removal on carpooling adoption in Nigeria.

The survey used closed questions in an online questionnaire to capture demographic information on the respondents and their carpooling behaviour, and views and opinions on eliminating petroleum subsidies. The questionnaire was distributed among people through social media platforms. The participants filled out the questionnaire comprising thirty questions divided into three parts. Section A contains questions related to socio-demographic data, including but not limited to age, gender, income, academic qualification, and so on. Section B contains detailed questions about the adoption of an informal carpooling scheme. The last of these is section C, split into economic impact, efficacy effect, subsidy removal, and perception and acceptance. All items were measured using a **five-point Likert scale,** ranging from **1 = Strongly Disagree** to **5 = Strongly Agree.**

3.1 The Conceptual Research Model

The conceptual research model developed in this study examines the adoption of carpooling in Nigeria within the context of fuel subsidy removal. It draws on behavioural intention theories, particularly the Theory of Planned Behaviour (Ajzen, 1991), and insights from the sustainable transportation literature, while also integrating policy-specific realities of the Nigerian economy.

The model assumes that individuals' decisions to engage in carpooling are shaped by four interrelated determinants: economic factors, efficacy, subsidy removal policy, and perception and acceptance.

Economic factors are particularly important because the removal of subsidies has directly increased the cost of fuel, thereby creating financial pressure on individuals and households. This situation encourages cost-sharing mechanisms, such as carpooling, as a more affordable mobility option (IMF, 2022; Abdul-Rahman, 2019). Alongside this, efficacy captures the degree to which carpooling is perceived to be effective, reliable, and convenient. If users see it as a practical and efficient mode of transport, they are more likely to embrace it as a long-term solution (Molina et al., 2020; Zhou et al., 2020).

The third determinant is subsidy removal policy, which represents the broader structural and policy environment created by the government's decision to eliminate fuel subsidies. By altering the transportation cost structure, this policy acts as a push factor that compels individuals to reconsider their existing travel behaviour and explore alternatives such as carpooling (Chikwendu et al., 2015; McCulloch et al., 2021). Finally, perception and acceptance reflect the socio-cultural dimension of transport behaviour. Issues such as trust, safety, social norms, and cultural attitudes influence the willingness of individuals to share rides with others, which in turn shapes the overall level of adoption (Aguiléra & Pigalle, 2021; Xu et al., 2021).

Taken together, these four determinants provide a multidimensional framework for understanding the adoption of carpooling in Nigeria. The model illustrates how economic realities, perceived efficacy, structural policy changes, and cultural perceptions collectively shape transportation choices in a post-subsidy context. As shown in Figure 1, the framework positions carpooling adoption as the dependent outcome, influenced by these four interrelated factors.

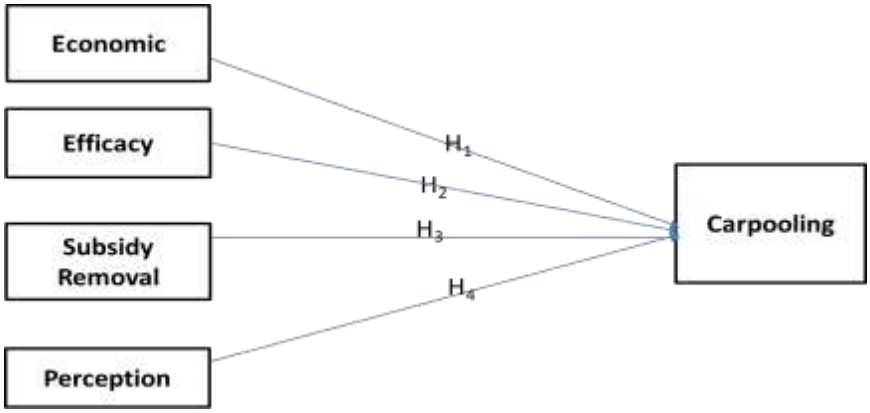

Figure 1: Conceptual model

Source: Author's Computation, 2023

4.0 Data Analysis

The survey data were quantitatively analysed using Structural Equation Modelling (SEM) in SmartPLS 4.

4.1 Data Screening and Assumptions

Before modelling, data screening included checks for completeness and distributional properties. Although PLS-SEM does not require multivariate normality, distribution diagnostics inform robustness. Normality was examined using skewness and kurtosis coefficients. Values within

±2.0 (Hair et al., 2006) were considered acceptable, indicating only moderate departures from normality.

4.2 Descriptive Statistics

Table 1 reports the mean, standard deviation, skewness, and excess kurtosis for all indicators. The results show that most items fall within acceptable thresholds. Three subsidy-related indicators (SUB1, SUB4, SUB9) exhibit kurtosis slightly above +2.00, while the remaining indicators display skewness between −1.541 and −0.191 and kurtosis broadly within the −0.2 to +0.2 band, suggesting approximate normality for the majority of measures.

Table 1: Descriptive Statistics

S/N	Indicators	Mean	Standard deviation	Excess kurtosis	Skewness
1	CARP1	3.033	1.58	-1.529	0.047
2	CARP2	1.615	0.616	-0.202	-0.093
3	CARP3	1.736	0.843	-1.395	0.533
4	CARP5	2.323	1.524	-0.903	0.239
5	CARP6	3.61	1.329	-0.622	-0.782
6	CARP7	3.446	1.34	-0.844	-0.655
7	CARP8	3.866	1.154	1.022	-1.322
8	SUB1	4.365	1.184	2.488	-1.924
9	SUB2	3.568	1.586	-1.146	-0.703
10	SUB3	2.861	1.442	-1.329	0.116
11	SUB4	4.317	1.168	2.912	-1.972
12	SUB5	3.975	1.31	0.142	-1.171
13	SUB6	3.612	1.499	-0.948	-0.754
14	SUB7	3.859	1.467	-0.354	-1.073
15	SUB8	3.856	1.426	-0.136	-1.133
16	SUB9	4.229	1.225	2.166	-1.805
17	SUB10	4.085	1.311	1.125	-1.541
18	ECO1	3.492	1.511	-1.062	-0.669
19	ECO2	3.53	1.539	-1.063	-0.711
20	ECO3	3.874	1.394	0.059	-1.189
21	ECO4	3.889	1.366	0.123	-1.196
22	ECO5	3.1	1.64	-1.619	-0.191
23	ECO6	3.561	1.589	-1.08	-0.754
24	ECO7	3.647	1.504	-0.75	-0.89

25	ECO8	3.538	1.5	-0.894	-0.796
26	ECO9	3.919	1.343	0.286	-1.241
27	ECO10	4.016	1.245	1.04	-1.436
28	EFC1	3.393	1.602	-1.33	-0.565
29	EFC2	3.342	1.631	-1.428	-0.504
30	EFC3	3.5	1.47	-0.958	-0.698
31	EFC4	3.309	1.567	-1.339	-0.498
32	EFC5	3.273	1.558	-1.388	-0.446
33	EFC6	3.376	1.549	-1.278	-0.556
34	EFC7	3.775	1.418	-0.303	-1.042
35	EFC8	3.129	1.615	-1.583	-0.276
36	EFC9	3.597	1.452	-0.675	-0.865
37	EFC10	3.517	1.47	-0.863	-0.774
38	PER1	3.505	1.518	-0.961	-0.766
39	PER2	3.681	1.471	-0.545	-0.977
40	PER3	3.611	1.47	-0.752	-0.85
41	PER4	3.541	1.521	-0.997	-0.752
42	PER5	3.317	1.529	-1.296	-0.519
43	PER6	3.432	1.52	-1.126	-0.657
44	PER7	3.455	1.514	-1.071	-0.682
45	PER8	3.335	1.559	-1.321	-0.527
46	PER9	3.208	1.565	-1.442	-0.41
47	PER10	3.761	1.394	-0.214	-1.058

Source: Author's Computation, 2023

4.3 Descriptive Statistics for Socio-Demographic Factors

The descriptive statistics for the socio-demographic factors are presented in Table 2. The categorical information and percentages, cumulative percentages, mean, and standard deviation for each variable are provided.

Table 2: Socio-Demographic Factors of Respondents

		Per cent	Cumulative Percent	Mean	Standard Deviation
Gender	Female	34.4	34.4	.6558	.47621
	Male	65.6	100.0		
Age	Below 20	.9	.9	3.2791	.79501
	20-29	18.6	19.5		
	30-39	32.1	51.6		
	40-49	48.4	100.0		
Income	Below N19,999	2.8	2.8	4.0930	1.73493
	N20,001-N50,000	13.0	15.8		
	N50,001-N100,000	26.5	42.3		
	N100,001-N200,000	25.1	67.4		
	N200,001-N300,000	14.0	81.4		
	N300,001-N400,000	6.0	87.4		
	N400.001-N500,000	6.0	93.5		
	Above N500,000	6.5	100.0		
Academic Qualification	Secondary School certificate	1.9	45.6	2.9330	2.82763
	N.C.E	1.9	46.6		
	B.Sc/B.A/HND	39.1	68.3		
	PGD	3.3	70.1		
	MSc	19.6	89.7		
	PhD	13.5	97.2		
	Others	5.1	100.0		

Source: Author's Computation, 2023

The age distribution reveals diverse age groups among the respondents, as presented in Table 2. Within the sample, 0.9% fall below the age of 20, 18.6% fall within the age range of 20 to 29,

32.1% are aged 30 to 39, and the majority, constituting 48.4%, fall within the age range of 40 to 49. The mean age is approximately 32.39, and the standard deviation is around 16.06.

4.4 Factor Loading, Reliability and Convergent Validity Testing

Table 3 displayed each construct's indicators and their corresponding factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE). These statistics were used to assess the validity and reliability of the measurement model. The Carpooling construct shows good reliability, as indicated by Cronbach's alpha (0.795), composite reliability values (0.798 and 0.88), and high factor loadings for the three indicators. All other indicators were removed because they were poorly loaded for the construct. The AVE, which represents the proportion of variance captured by the construct, is also reasonably high at 0.709. The Economic construct demonstrates good reliability based on Cronbach's alpha (0.847 and 0.889) and composite reliability values (0.876 and 0.889). The AVE of 0.618 indicates that this construct captures moderate variance.

The Efficacy construct demonstrates good reliability based on Cronbach's alpha (0.893) and composite reliability values (0.9 and 0.914). The AVE of 0.572 indicates that this construct captures moderate variance. In addition, the Perception construct shows good reliability statistics based on Cronbach's alpha (0.888) and the composite reliability values (0.895 and 0.909). The AVE of 0.528 indicates that this construct captures moderate variance. The Subsidy construct also shows acceptable reliability based on Cronbach's alpha (0.748) and composite reliability values (0.8 and 0.808). However, the AVE of 0.382 indicates that this construct captures a lower variance than others.

Table 3: Factor Loadings, Reliability, and Convergent Validity of Constructs

Indicators	Factor Loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CARP6	0.828	0.795	0.798	0.88	0.709
CARP7	0.875				
CARP8	0.822				
ECO2	0.808	0.847	0.876	0.889	0.618
ECO3	0.734				
ECO6	0.792				
ECO7	0.872				
ECO10	0.714				
EFC1	0.741	0.893	0.9	0.914	0.572
EFC2	0.735				
EFC3	0.738				
EFC4	0.789				
EFC6	0.717				
EFC8	0.737				
EFC9	0.803				
EFC10	0.784				
PER1	0.64	0.888	0.895	0.909	0.528
PER2	0.749				

PER3	0.747				
PER4	0.756				
PER5	0.781				
PER6	0.758				
PER7	0.681				
PER8	0.705				
PER9	0.71				
SUB2	0.57	0.748	0.8	0.808	0.382
SUB4	0.515				
SUB5	0.612				
SUB6	0.801				
SUB7	0.712				
SUB8	0.552				
SUB9	0.508				

Source: Author's Computation, 2023

4.5 Discriminant Validity Test

Discriminant validity is carried out to ensure that each concept of each latent variable is different from other variables. The results of discriminant validity testing were obtained as follows:

Table 4: Discriminant Validity (Fornell-Larker Criterion)

	Carpooling	Economic	Efficacy	Perception	Subsidy
Carpooling	**0.842**				
Economic	0.495	**0.786**			
Efficacy	0.38	0.714	**0.756**		
Perception	0.396	0.658	0.763	**0.726**	
Subsidy	0.438	0.673	0.58	0.56	**0.618**

Source: Author's Computation, 2023

The Fornell–Larcker criterion results in Table 4 show that most constructs satisfy discriminant validity, as the square root of AVE values on the diagonal are greater than the inter-construct correlations. However, two exceptions are observed: the correlation between Efficacy and Perception (0.763) slightly exceeds their respective √AVE values (0.756 and 0.726), and the correlation between Economic and Subsidy (0.673) is higher than the √AVE of Subsidy (0.618). These findings suggest some overlap between the constructs, indicating potential issues with discriminant validity that warrant further examination.

Table 5: Discriminant Validity Result based on HTMT

	Carpooling	Economic	Efficacy	Perception	Subsidy
Carpooling					
Economic	0.575				
Efficacy	0.443	0.815			
Perception	0.451	0.75	0.857		
Subsidy	0.479	0.83	0.673	0.671	

Source: Author's Computation, 2023

The HTMT results indicate that most construct relationships fall below the conservative threshold of 0.85, supporting discriminant validity. However, two values, Efficacy–Perception (0.857) and Economic–Subsidy (0.83), are close to or slightly above this threshold, suggesting possible discriminant validity concerns. This implies that while the constructs are largely distinct, some overlap exists between Efficacy and Perception as well as Economic and Subsidy, which may require further refinement or robustness checks.

4.6 Variance Inflation Factor.

The VIF values (ranging from 1.22 to 2.37) presented in Table 6 confirm the absence of multicollinearity among the measurement items, indicating that the discriminant validity concerns identified through the Fornell–Larcker and HTMT tests are not due to statistical redundancy but likely arise from conceptual or wording similarities between constructs.

Table 6: **Variance Inflation Factor**

CARP6	1.77	PER1	1.497
CARP7	1.978	PER2	2.278
CARP8	1.521	PER3	2.15
ECO10	1.602	PER4	2.119
ECO2	1.789	PER5	1.945
ECO3	1.757	PER6	1.931
ECO6	1.894	PER7	1.759
ECO7	2.365	PER8	2.236
EFC1	2.009	PER9	2.246
EFC10	2.003	SUB2	1.221
EFC2	2.069	SUB4	1.302
EFC3	1.979	SUB5	1.305
EFC4	2.229	SUB6	1.477
EFC6	1.772	SUB7	1.505
EFC8	1.825	SUB8	1.485
EFC9	2.18	SUB9	1.454

Source: Author's Computation, 2023

4.7 Hypothesis Testing

The structural equation modelling (SEM) method was used to perform the hypothesis test of the study. The graphical model using standard estimates is presented in Figure 2, while the direct results are shown in Table 7. This study's hypothesised path coefficients are H1, H2, H3, and H4. The coefficients of economic impact and subsidy removal were statistically significant because their p-values were below the standard significance level of 0.05, as presented in Table 7. In contrast, the coefficient of efficacy and perception exhibit a p-value of 0.342 and 0.148, respectively. As a result, H1 and H4 were supported, while H2 and H3 were rejected.

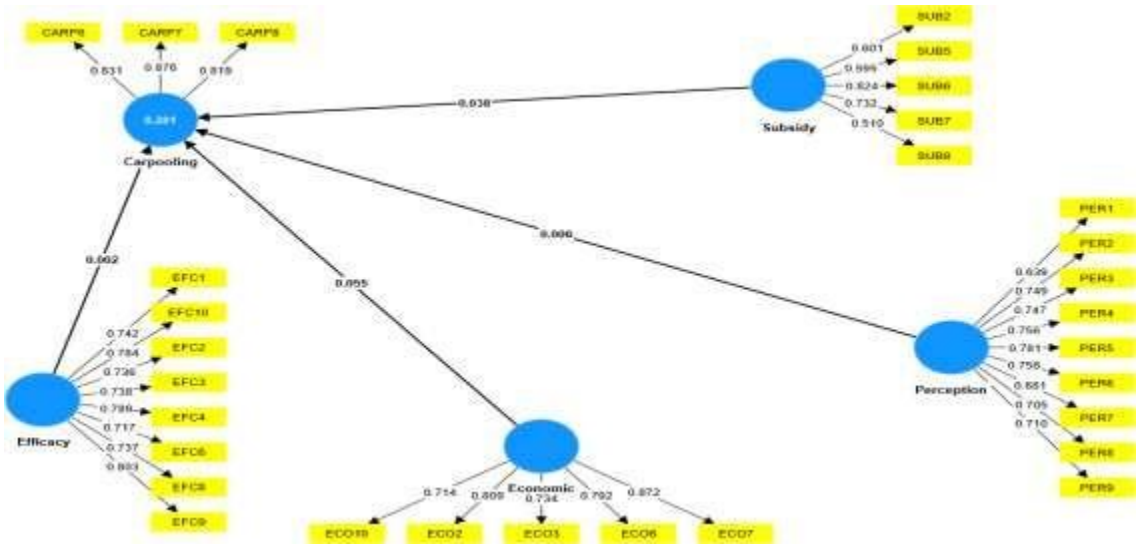

Figure 2: Structural Equation Model

Source: Author's Computation, 2023

Table 7: Direct Effect Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Economic -> Carpooling	0.338	0.336	0.104	3.261	0.001
Efficacy -> Carpooling	-0.048	-0.046	0.119	0.406	0.342
Perception -> Carpooling	0.112	0.112	0.107	1.047	0.148
Subsidy -> Carpooling	0.176	0.194	0.096	1.844	0.033

Source: Author's Computation, 2023

The results of the model fit are presented in Table 8, and they show that the model is a good fit. The model fit indices presented for both the saturated and estimated models are commonly used to assess the goodness-of-fit of a Partial Least Squares (PLS) structural equation model. Standardised square residual (SRMR) considers the discrepancy between the observed

correlations and the correlations implied by the model. The SMSR result of 0.071 is less than the 0.08 threshold, suggesting that the estimated model fits the data and the saturated model.

Table 8: Model Fit for SEM

	Saturated model	Estimated model
SRMR	0.071	0.071
d_ULS	2.64	2.64
d_G	0.987	0.987
Chi-square	1086.174	1086.174
NFI	0.708	0.708

Source: Author's Computation, 2023

The Normed Fit Index (NFI) measures the proportion of the model-implied variance and Covariance that accounts for the observed variance and Covariance. Higher values indicate a better fit. In this case, both models have the same NFI value of 0.708, indicating that the estimated model provides a fit that is comparable to the saturated model.

Table 9: Summary of the Moderation Effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Gender x Subsidy -> Carpooling	-0.26	-0.256	0.137	1.897	0.029
Income x Subsidy -> Carpooling	0.168	0.164	0.058	2.896	0.002
Age x Subsidy -> Carpooling	-0.061	-0.066	0.072	0.848	0.198
Qualification x Subsidy -> Carpooling	0.038	0.037	0.068	0.563	0.287

Source: Author's Computation, 2023

The moderation results presented in Table 9 show the interaction effects between different moderator variables (Gender, Income, Age, and Qualification) and the predictor variable (Subsidy) on the outcome variable (Carpooling). The interaction between Gender and Subsidy has a significant effect on Carpooling. The negative effect size indicates that the relationship between Subsidy and Carpooling varies based on Gender. Given the above analysis, the t-statistic of 1.897 was then compared against the standard deviation to determine the significance of the interaction effect. Given the p-value of 0.029, the existence of this effect cannot be thoroughly attributed to chance.

The analysis also showed that there is a moderate effect of the independent variables income and subsidy on carpooling. This interaction indicates that the level of Income has an impact on the nature of the effect between subsidy and carpooling. The result (0.168) shows that the findings reveal the presence of subsidy impact on carpooling, which is more significant for high-income

people. This could mean that removing subsidies distorts the carpooling tendency of respondents in a way that is more profound for those with higher incomes. The t-statistic (2.896) also confirms that this interaction effect is statistically significant, and further, the small p-value (0.002) shows that this finding is not likely to result from random chance. However, the moderation effect of age and qualification between subsidy and carpooling is insignificant at 0.05 per cent using the t-statistic (0.848, 0.63) and the p-value (0.198 and 0.287) confirms the insignificance respectively.

4.8 Discussion of Results

The results of this research are compared with existing empirical data to highlight the originality and relevance of the findings. The study revealed that economic factors significantly influence carpooling adoption. This supports the idea that economic impacts, such as increased fuel costs and spending on transportation services, are key drivers of behavioural shifts towards ride-sharing. This finding also aligns with empirical evidence showing that carpooling is a cost-effective and environmentally friendly transport option that can be promoted during economic hardship (Molina et al., 2020; Zhou et al., 2020). Similarly, the fiscal cost of subsidies and the restructuring of mobility decisions following reforms have been a focus of Nigerian research, yet few studies quantify this relationship at the commuter level. Consequently, this research provides new empirical data by demonstrating the direct effect of economic pressure on carpooling adoption in Nigeria after the subsidy withdrawal in 2023.

There was also a significantly positive relationship between the removal of fuel subsidies and the adoption of carpooling, which showed that the policy change in 2023 directly influenced people to choose ride-sharing as a coping strategy. Although previous studies in Nigeria mainly focused on the fiscal and governance aspects of subsidy removal, such as corruption, fraud, and political opposition (Akow, 2015; Soile and Mu, 2015; Chikwendu et al., 2015; Houeland, 2020), they rarely examined the behavioural aspect. Therefore, the present study extends the literature by empirically confirming that one outcome of subsidy removal is a behavioural change, particularly an increased willingness to adopt carpooling.

Interestingly, there was no statistically significant effect on carpooling adoption from perceived efficacy and the public perception constructs. This contrasts with previous research based on the Theory of Planned Behaviour (TPB), which identified attitudinal factors as key drivers of carpooling intention (Aguilera and Pigalle, 2021; Neoh et al., 2017; Xu et al., 2021). The differing results may be explained by contextual and temporal differences. In the initial days after the fuel subsidy was removed, it was reasonable to assume that economic need outweighed attitudinal factors, meaning commuters were more concerned with cost than perception or convenience. Therefore, the economic influence observed in this research indicates that there is a short-term adjustment period during which price sensitivity outweighs attitude-driven decisions.

The moderating analysis also showed that gender and income significantly moderated the relationship between subsidy removal and carpooling adoption, more so than age and qualifications. This provides new insights into the influence of socioeconomic differences on adapting to changes in transport policy. The results indicate that male and low-income commuters were more likely to adopt carpooling as an adaptive behaviour, highlighting the varied effects of subsidy withdrawal across demographic groups. Such micro-level heterogeneity has not been adequately captured in previous studies conducted in Nigeria, which tended to focus more on aggregate welfare effects.

5.0 Conclusion and Recommendations

The study investigates the impact of various factors, such as economic conditions, efficacy, perception, and subsidy removal, on individuals' carpooling behaviour in the context of petroleum subsidy removal. The findings revealed a statistically significant positive impact of economic factors and subsidy removal on carpooling behaviour, emphasising the critical role of economic conditions and government policies in shaping transportation choices. The study also emphasises the important role of removing petroleum subsidies in influencing individuals' transportation choices, guiding them towards more sustainable options like carpooling. As subsidies are removed, the cost advantage of driving alone diminishes, making carpooling more appealing financially. This finding is particularly crucial for policymakers and governments aiming to reduce fuel consumption and traffic congestion.

Therefore, a multifaceted approach is recommended to promote carpooling and sustainable transportation. Firstly, governments and transportation authorities should focus on public awareness campaigns and educational programs. These efforts should aim to positively shape perceptions of carpooling, underlining benefits like reduced fuel costs, environmental sustainability, and alleviated traffic congestion. Furthermore, the strategic implementation of subsidy removal policies is vital. Such policies should be designed to make sustainable alternatives, including carpooling, more financially attractive. This approach stems from findings suggesting that removing petroleum subsidies can significantly influence transportation preferences towards more sustainable options. Incentivising carpooling is another effective strategy. This could include measures like reducing transportation fares for those who participate in carpooling, making it a more appealing option.

Lastly, leveraging technology is essential in facilitating carpooling. The development and promotion of mobile applications and online platforms can greatly aid in connecting individuals looking for carpooling opportunities. These technologies can simplify finding carpool partners, planning routes, and sharing costs, making carpooling more accessible and convenient. These recommendations can foster a more sustainable and efficient transportation system, aligning with broader environmental and economic goals.

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