Equity And Fairness, An Attribute for Effective Urban Road Congestion Pricing on Low-Income Users of Lekki Toll Gate Lagos, Nigeria: A Review

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Abstract
Quite a number of development partners and transportation expert were of the opinion that congestion pricing minimise traffic congestion, improve the reliability of highway system performance, improve the quality of life for residents, and many of whom are experiencing intolerable traffic congestion across the country. The federal government of Nigeria renounced its commitment to the procurements of twelve federal highway roads to concession under Highway Development and Management Initiatives (HDMI) heralding the development of toll gates on Nigerian roads. The study aimed to review the reasons attributed to the abolition of the toll gate and the exemption of the Lekki toll gate in Lagos. The Lagos state government pioneered 30 years Lekki-Epe expressway toll road concession as a public-private partnership project (PPPP) to rehabilitate and upgrade two-lane routes to a three-lane highway strategic policy to reduce traffic congestion. The new policy introduces electronic toll collection (ETC) devices to replace manual toll booths. The study further examines the relationship between the toll manual method and electronic toll collection devices. The reasons for abolishment of toll gate includes non-remitting usage fee or funds generated into state and federation account, delay in a transaction of user's balance, and vehicular queuing. The study revealed that the new electronic toll collection method is faster than the old toll booth system. The study revealed no statistically significant relationship between manual toll fee and electronic toll collection (ETC) method though it is based on pay as you pass (PAYPASS). This study would provide a level ground for all agencies involves in decision making and other professionals in transportation system on the merits and demerits of toll gate system in Nigeria.
Keywords: Equity and Fairness; Road congestion pricing; Low-income users; Manual toll booth, Electronic toll collector.

1. Introduction

Globally, the development of transportation infrastructure, road toll collections, and congestion pricing of any given nation cannot be effectively and efficiently utilised where equity, fairness, and distributive social justice failed in the hands of authority concerns. Lagos State Government under her jurisdiction had been at the forefront amongst all the 36 states that continued with tolls gates collection system after a nationwide abolishment by the Federation Government of Nigeria in 2004.

Nigerians have expressed concern over the re-establishment of toll gates in twelve designated dual carriageways across the country by the Federal Government. Cities planners believe that congestion pricing provides an alternative for the Government to completely reduce traffic congestion, improve the reliability of highway system performance and improve the standard of life of the people. Inversely, the delay and waiting time of drivers in a toll plaza depend on the service time arrival rate, quick service time, and the number of toll booths that can reduce the time wasted in the queue.

The development of any country depends upon its basic infrastructure, and travellers may experience a long queue at each toll plaza on expressways may lead to a waste of time, fuel, and emissions of carbon monoxide [1]. An automated toll system would successfully remove unnecessary traffic delays; keep an eye on any car that might not be correctly registered or number plates exchanged [1]. Toll financing is one of the techniques in which revenue is collected from road users for the service rendered to them.

This in turn leads to the development of queues at a particular junction, especially where toll booths are erected [2]. In addition, an electronic Toll system is an electronic card that is used to pay toll road fees and E-Toll users only need to stick to the card to pay for the toll which is faster than paying in cash.

Big Data is a technology system that is introduced to tackle the explosion of information in line with the growth of mobile and internet data users [3]. Automated toll collection is a strategy by which to control objections from drivers with respect to the burdens engaged with physically making instalments at the tollbooths [4]. As long as people need to wait in a queue to pass through a toll gate, provide balance to the toll gate manager, take a ticket, and return change, then the manager will raise the gate for the vehicle to pass through it; the entire process is time-consuming [5].

Highway toll plazas consist of a structure positioned on the highway which forces drivers to reduce their velocity or completely stop to carry out payment for the service provided by the plaza operator [6]. Toll generates revenue and congestion pricing creates an avenue for the Government which not mostly tied to an annual budgetary plan but, can be used as collateral to raise funds under public-private partnership projects for the expansion of regional and highway networks.

The time required by a car and pay a toll manually is 6o seconds, if a car passes the toll seven times a week, 60*7 =420 seconds, for a year = 1800*12 months = 21600 divided by 60 seconds =360 divided by 60 minutes = 6 hours a year [7].

Congestion pricing refers to the amount of money been charging the vehicle for the use of a certain road during a certain period of the day [8]. Growth and movement of people led to transport demand, slums, and sprawl [9]. Abandoned roads, limited capacity, poor maintenance culture, lack of facilities and furniture, traffic bottlenecks, crime, and crash incidents [10]. Previous studies revealed that many hours are wasted due to the high traffic congestion on roads in highly populated cities with relative loss of labour productivity [11].

In developing countries like Nigeria, the general public perceived toll roads and congestion pricing as a form of regressive taxation that favour the management operators, and wealthiest citizens than the common or less privileged citizens. This paper aimed at reviewing the concept of toll gate systems, congestion pricing as well as the challenge of new electronic toll

collection devices (ETC). The study also discussed the advantages and disadvantages of Manual Toll collection (MTC) systems and Electronic Toll Collection devices (ETC).

Road tolling and congestion pricing can be implemented for revenue generation, cost of building, operating, and maintenance of the facility which has become a robust means of funding transportation. Toll road financing project is fast operational principle than waiting for tax revenue to accomplish. To save time, reduce congestion and avoid delays at toll gates, toll payments can be made in advance using an android app together with Radio Frequency Identification (RFID) tag. Toll revenues contribute much more in developed countries where toll revenue was used to expand and maintain highway networks. Toll revenue can also be used to promote regional equity through subsidisation of highway construction and maintenance.

2. Literature Review

[12] investigates the effect of manual toll collection and electronic toll collection charges in reducing traffic congestion on the highway. the study opined that after full implementation of electronic toll collection, a significant reduction in both ultrafine particle number concentration and pm respectively. [13] introduced and promote the automated operation of the vehicle selection system.

The measures of traffic flow and speed can be based on vehicle disturbances to geomagnetism and uses the slotted aloha protocol to communicate between data nodes [14][15]. Nevertheless, wireless sensor network to record the speed position of vehicles. the numerical experiment shows that incremental noise addition, complexity trend of periodic data, random data, and chaotic data is different [14].

[16] examines the principal components analysis, topssis, and fuzzy algorithm to evaluate the bus system. the study derived an evaluation framework through infrastructure services. the study suggested a meaningful public transit system. [1] examine the image of the number plate, and of the vehicle as well and develop a system that would pay the toll automatically and reduce the queue at the toll booth. the study employed a high-resolution camera to capture the image of vehicle number.

[2] examine car arrival, number of lanes, service time, waiting time, and merging area parameters to analyse toll congestion. [17] examine traffic flow and travel time models, and rejected Weilbull distribution. Therefore, recommended gamma and burr; found no supportive evidence on the level of service and relationship between variability and reliability [17].

[18] investigates new approaches to analyse the impact of locational distribution on traffic congestion in Shillong using the Chi-square test of goodness fits to determine the difference in the distribution of institutions within the city. [19] investigates traffic congestion from occupancy parameters based on traffic flow theory and observation data; further employed a geographic information system (GIS) to identify traffic points [20].

[21] examine traffic congestion and the resultant effect of road density and its implication to urban roads standard. [22] examines the difference between four standard-setting methods which include modified Cohen's, and borderline regression. [23] investigate how stopping and starting vehicles in congested queues consume a high rate of fuel than the smooth rate of travel on open highways. the researcher employed an agent-based model (ABM) to test the

empirical relationships of traffic flow parameters in terms of density, flow, acceleration, deceleration, speed, time lost, and fuel consumption.

[24] examine dynamic traffic flow under static traffic assignment (STA) models. the study aimed to identify errors in the static traffic assignment model to estimate emission through quasi-dynamic network loading using HBEFA emission factors. the queue theory was developed to describe the behaviour of a system providing services for randomly arising demands. [3] focused on the utilisation of big data and artificial intelligence to facilitate the electronic.

[4] examine the toll accumulation framework using aloof radio frequency identification (RFID) as a solution for manual toll gathering strategy utilises at toll gates. the RFID peruses the label and connects with a Windshield of the vehicle. [25] compared vehicle operating cost (VOC) from and to the city centre through toll roads or non-toll roads. [9] employed statistical analysis to assess components of fixed variable costs.

Growth; and movement of people led to transport demand, slums, and sprawl. [5] studied the acronym for RFID technology and the acronym for RFID system. the researcher developed a wide RFID tag that can be read at a much greater distance and pull information from a tag at a distance of up to 300 feet. the researcher further discusses active tags and passive tags transmitters using a micro-simulation model.

The utilisation of big data and artificial intelligence to facilitate the electronic toll system. the study aimed to determine the constraints that commuters feel while using automated toll gates, especially in suburban areas of Indonesia [3]. [6] analyse the service level offered in highway toll plazas and test the influence of operational and human factors on manual customer service.

The study revealed that the combined method allows for the development of a robust empirical model of the customer service process. added that, the human agent interacts and interferes in the manual payment process. [26] compared manual toll collection with an automated toll collection system and proposed the idea of toll collation using RFID. [4] programmed a toll charge instalment framework and the sum exchange data sends to the mobile phone of the drivers through the gsm modern innovation. the average speed model, Translog, and Cobb-Douglas models.

[27] investigated fuel wastage, particulate matter particle pollution, and noise pollution at three toll booths near the district of Varanasi, India. [7] examine a mathematical formulation of queuing observations for assessment of fuel wastage due to vehicle idling at toll booths and revealed that the handheld device was successful. [8] discussed an optimal control technique to approach congestion pricing using the Hamilton Jacob bellman equation and obtained the optimal control law which minimised the function. a logit model to establish a relationship between the price and driver's choice behaviours.

The amount of patronage linked with individual or group economic, socio-cultural, political, and defensive protection influences the distinctiveness of public transportation [28]. Because they were unable to address contemporary concerns, terminal coordination, and administrators were conducted in conformity with worldwide standards. However, inadequate operating efficiency has resulted in a deterioration in the port area.

[29] examines the advantages and disadvantages of combining dry and multimodal transportation. Knowing the fundamental elements of a stable national system is a critical step toward controlling and increasing people's well-being [30]. [30] assessed the Trans Sumatra Toll Roll's significant achievements, as well as the advantages of optimising and minimising the potential for people's choices and well-being. [31] studies the effects of the Trans Java Toll in Capili along the Pantura National Highway Pavement Service Life as part of the Indonesian government's endeavour to enhance transportation.

2.1. Concept of Tolling and Congestion Pricing

The concept of tolling and congestion pricing is based on charging for access and use of roadway network [32], it places responsibility for travel choice squarely in the hands of the individual traveller, where it can best be decided and managed. The Vehicle Toll Collection Devices automatically detect vehicles and gather machine-readable transmit details on tolls for automobiles driving on the road [33].

[13] investigated how computerised control device located along the toll line will transmit the registration signal as the car is reaching the registration point and will determine the toll to be debited and transfer the toll electronically to the account of the individual vehicle.

[2] classified toll collection system into open toll and closed toll system. The open toll system is normally located at outs ketch or urban fringe and not all patrons are charged a toll while, in a closed toll system, plazas are located at the entry and exit points which the patron receive a ticket upon the entering system; patrons pay the toll based on miles of travel on the facility and category of vehicle.

Upon exiting, the patron submits the tickets to the collector and is charged a prescribed fee based on the category of vehicle and distance travelled. The advantage of RFID is the high score on reliability and its disadvantage is the difficulty in duplicating tags [5].

[26] Categorised road electronic toll system into three which include open toll, closed toll, and electronic toll collection (without manual toll booth).

2.2. Vehicle Toll Collection Systems

i. Automated Vehicle Identification: This determines the identity of a car to be charged through automated vehicle recognition (AVI). It uses a bar code for such vehicles for optical reading at the mailing stand. The optical system shows low readability during bad weather.

ii. Automated Vehicle Classification: Known as Automated Vehicle Recognition (AVI) differentiate vehicles that pass through the toll network

iii. Transaction Processing: Transaction management includes business accounts, shipping toll transfers, consumer account fees, and customer demand. Transaction management balance would be prepayment as consumers finance an account balance that is exhausted as peak purchases take place.

iv. The prepaid balance is displayed to the driver through the minor in the automobile system.

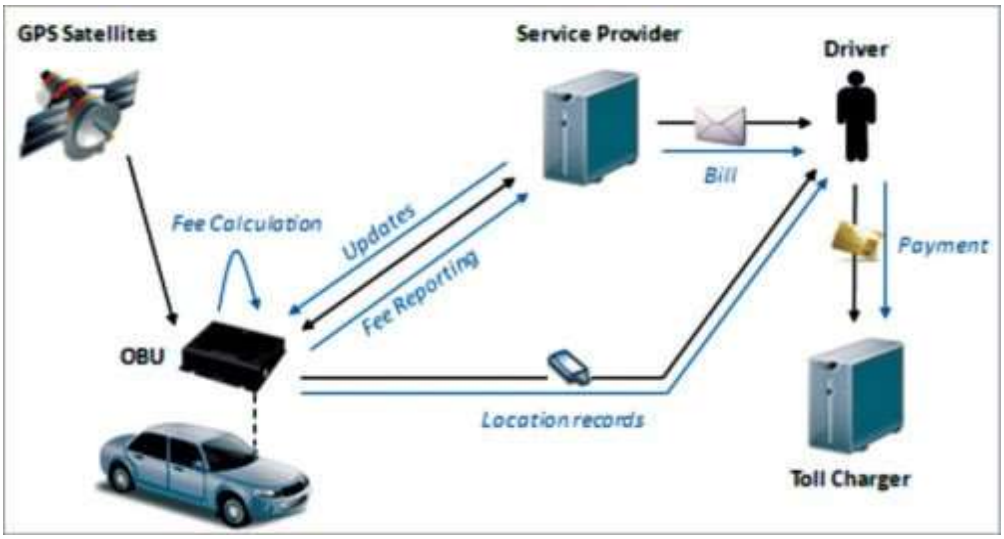

Figure 1 Electronic toll collection system using radio frequency identification (RFID)

2.3. Purpose of the Study

This paper reviewed the concept of a toll gate system, congestion pricing as well as the challenge of electronic toll collection devices (ETC). The study also discusses the ingredients of toll gate and road congestion pricing the advantages and disadvantages of Manual Toll collection (MTC) and Electronic Toll Collection devices (ETC).

Toll gate and congestion pricing as an indicator under the new modern electronic toll collection device works perfectly in reduced congestion. In many parts of the world, toll collection fees had contributed immensely to development whereas, in Nigeria, the concept has not been significantly seen as a way of improving urban congestion and transport system.

This study will help communities, groups, and development partners on the importance of the toll collection system and its contribution towards the improvement and development of the transport system. The study also suggests the involvement of stakeholders, youth leaders, and non-governmental organisation to be actively involved and participate in decision-making on any meaningful project like toll gates that will impact positively the lives of people in order not to jeopardise government efforts.

3. Methodology

For the purpose of this study, the researchers adopt both descriptive and analytical statistics. Four hundred and eighty (480) questionnaires were designed and administered through closed-ended approaches with the aid of motor park officials using a proportional sampled method to avoid bias in the choice of the target respondents who were mostly roads users including National Union of Road Transport Workers (NURTW); National Association of Road Transport Owners (NARTO).

Forty questionnaires were administered at each motor park, making a total of four hundred and eighty (480). Responses were also derived from road users' re-establishment of toll gates, toll performance, and congestion. The impact of manual toll collection and electronic toll collection devices. linker scaler was appropriately used.

The twelve sites were already designated by the federal government of Nigeria as a foundation for this study and questionnaires were used as a tool for the measurements of the variables identified. The study further employed a linear regression, and Chi-square

goodness of fit and determine the correlation coefficient between the manual method and the new electronic toll collection devices.

Abolishment and re-establishment, level of user satisfaction with policy, and distribution of justice on the operational management. Nevertheless, the study revealed no significant relationship between manual toll collection and electronic toll collection system, congestion, and pricing.

3.1. Research Hypothesis

H_0: There is no significant relationship between manual toll collection system and electronic toll collection system.

H_1: There is significant relationship between manual toll collection system and electronic toll collection system.

H_0: There is no significant relationship between toll gates and road congestion

H_1: ≠ Alternate hypothesis. There is significant relationship between toll gates and road congestion

H0 will be accepted; if H_0 is true

Degree of Freedom (df) / Level of significance (if)

$\alpha = 0.05$

$\alpha = 0.1$

If the observed value is equal to the expected value, reject H0

If the observed value is less than the expected value, accept H1

4. Result and Discussion

Firstly, the researchers critically reviewed the theoretical concept of congestion, congestion pricing. The advantages, and disadvantages of manual toll collection (MTC) and electronic toll systems rely on the success of electronic toll collection in other parts of the world. The researcher's development hypothesis is to define the relationship between road user satisfaction, and policy, manual toll collection and electronic toll collection system and toll and congestion pricing.

Table 1 New toll gate tariff in Nigeria

Vehicle type	Toll fee (₦) Nig. Naira	Malaysia Equivalent (RM)	Percentage
Commercial buses	150	1.30 cent	09.09
Cars	200	1.74 cent	12.12
SVU Car's	200	1.74 cent	12.12
Jeeps	300	2.60 cent	18.18
Private buses	300	2.60 cent	18.18
Trucks	500	4.35 cent	30.30
Total	1650		100.00%

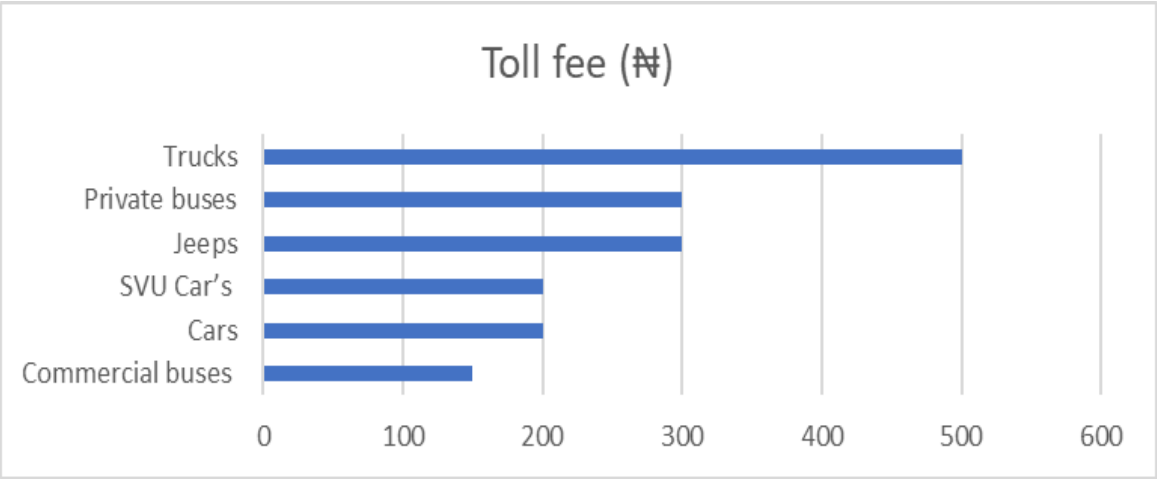

Figure 2 toll tariff and charges per type of car. (Federal Ministry of Works and Transport, (2021).

Table 2. User's satisfaction and new toll policing

S/N	State and location of newly proposed toll gates	Strongly satisfy	Satisfy	Neutral	Dissatisfied	Strongly dis-satisfy	% of Rejected
1	Benin-Asaba	3	5	-	23	9	80%
2	Abuja-Lokoja	5	10	-	19	6	52%
3	Kano-Katsina	2	3	-	25	10	52%
4	Onitsha-Owerri - Aba	3	8	-	21	8	60%
5	Shagamu-Benin	4	9	-	24	3	56%
6	Abuja-Keffi-Akwanga	2	5	-	25	8	69%
7	Kano-Maiduguri (Kano-Shuari; Potiskum Damaturu)	3	2	-	31	4	73%
8	Lokoja-Benin	3	4	-	26	7	68%
9	Enugu-Port Harcourt	5	6	-	23	6	60%
10	Ilorin—Jebb	4	7	-	19	10	60%
11	Lagos- Ota-Abeokuta and Lagos	7	10	-	18	5	48%
12	Lagos-Badagry highway	6	12	-	16	6	46%
	Total	47	81	-	270	82	

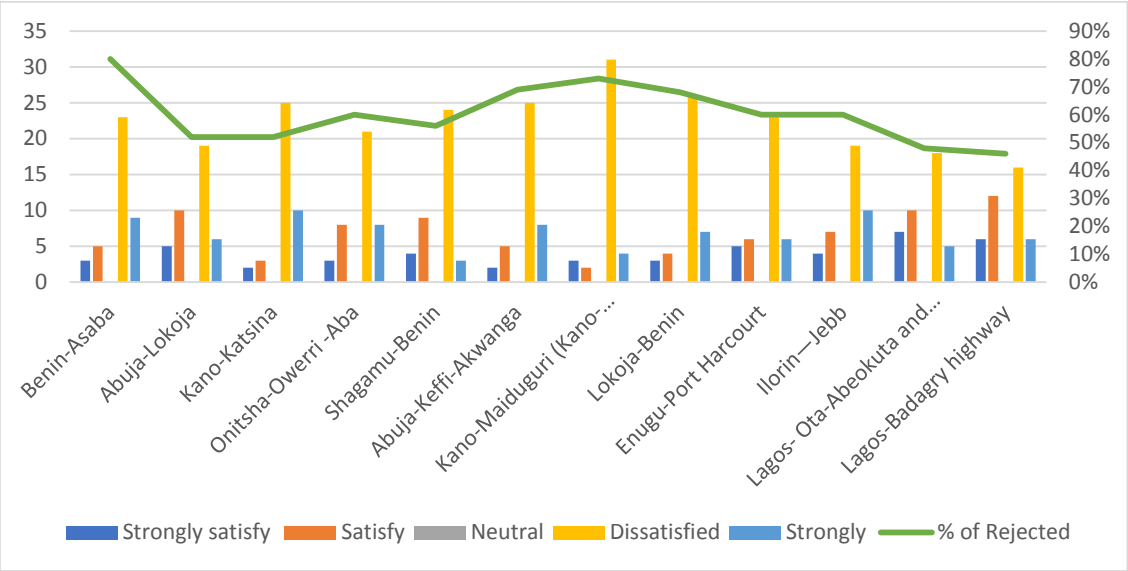

Figure 3 Public perceptions and responses on re-establishment of toll gate.

The table above revealed that 73% respondents reject re-establishment of toll gate system. Therefore, there is need for a rigorous campaign and public enlightened on the importance of toll gates after been abolished for decade.

Table 3. Correlation between user's satisfaction with new toll policing

S/No.	X Manual toll	Y Electronic toll	XY	X^2	Y^2
1	8	32	256	1024	64
2	15	25	375	625	225
3	5	35	175	1225	25
4	11	29	319	841	121
5	13	27	351	729	169
6	7	33	231	1089	49
7	5	35	175	1225	25
8	7	33	231	1089	49
9	11	29	319	841	121
10	11	29	319	841	121
11	17	23	391	529	289
12	18	22	396	484	324
Total	∑X 128	∑Y 352	∑XY3538	∑10542	∑1582

$$R = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][[n\sum y^2 - (\sum y)^2]}}$$

$$r = - \frac{12*(3538) - 128 * (352)}{\sqrt{[12* 158^2 - (128)^2\}[12*1054^2 - (352)^2}}$$

$$r = \frac{42456 - 4505}{\sqrt{[18984 - 16384]\,[126504 - 123904]}}$$

$$r = \frac{42456 - 4505}{\sqrt{[18984 - 16384]\,[126504 - 123904]}}$$

$$r = \frac{2600 = -2600 = -1}{\sqrt{6760000\ 2600}}$$

Df = 12 - 2 = 10

r = computed value = -1 = 0.14686 P ($Z \leq z$) less than computed value therefore, rejected H_0

Df = 10

r = - 1

Df = 12 - 2 = 10

r = computed value = -1 = 0.14686 P ($Z \leq z$) less than computed value therefore, rejected H_0

Df = 10

r = - 1

Critical value -1 = 1.812 (p-value). The calculated value is less than the critical value therefore, H_1 accepted, H_0, rejected. Therefore, no significant relationship between user's satisfaction and toll policing.

Figure 4 Lagos/Lekki ENSARS Mass Protest, 2020

Figure 5 Lagos city traffic situation at the toll gate

Table 4. Correlation between manual toll collection system and electronic toll

S/No.	Manual toll X	Electronic toll Y	XY	X^2	Y^2
1	12	18	216	144	1840
2	11	19	209	121	361
3	6	24	144	36	576
4	10	20	200	100	400
5	9	21	189	81	441
6	8	22	176	64	484
7	12	18	216	144	324
8	14	16	224	196	256
9	12	18	216	144	324
10	11	19	209	121	361
11	14	16	224	196	256
12	13	17	221	169	289
	∑X132	∑Y 228	∑XY 2444	∑ X^2 1516	∑ Y^2 5912

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x2 - (\sum x)2]\,[n\sum y2 - (\sum y)2]}}$$

$$r = \frac{12*(2444) - 132*(228)}{\sqrt{[12*1516 - (132)2]\,[12*5912 - (228)2}}$$

$$r = \frac{12*(2444) - 132*(228)}{\sqrt{[12*1516 - (132)2]\,[12*5912 - (228)2]}}$$

$$r = \frac{29328 - 30096}{\sqrt{[18192 - 17424]\,[70944 - 51984]}}$$

$$r = \frac{-768}{768*18960}$$

$$r = \frac{768 = -768 = -0.20}{\sqrt{14561280\ 3815.9245}}$$

r = - 0.20
Df = 12 * 2 = 10
Computed value = - 0.20
Critical value = 0.4013 (1.4%)
Df = 12 - 2 = 10
r = computed value = - 0.2 = 0.4013 P ($Z \leq z$).
Df = 10
r = - 0.2

Computed value -0.2 > 1.812. The computed value is greater than the critical value therefore, H_0 rejected and H_1 accepted. Therefore, no significant relationship between manual toll collection system and electronic toll collection device

Table 5. Coefficient of correlation between toll gate and road congestion

S/N	Toll system O	Congestion pricing E	O-E	$(O-E)^2$	$\frac{(O-E)^2}{E}$
1	8	32	-24	576	18
2	15	25	-10	100	4
3	5	35	-30	900	25.71
4	11	29	-18	324	11.17
5	13	27	-14	196	7.26
6	7	33	-26	676	20.48
7	5	35	-30	900	25.71
8	7	33	-26	676	20.48
9	11	29	-18	324	11.17
10	11	29	-18	324	11.17
11	17	23	-6	36	1.57
12	18	22	-4	16	0.73
	∑O= 128	∑E = 352		∑5048	∑15645

$X^2 = \sum \frac{O-E^2}{E}$

$X^2 = \frac{5048}{352} = 14.3409$

$X^2 = 14.3409$
$\alpha = 0.05$
$\alpha = 0.1$
df = 2 – 12 = 1 = 11

Decision: Since > 0.05

X^2 = 14,3409 > critical value 19.67514

Computed value 14.3409 is less than the critical value 19.67514. H_0 rejected and H_1 accepted. therefore, no relationship between toll gate and road congestion pricing.

4.1. Discussion

Firstly, the researchers critically reviewed the theoretical concept of congestion, congestion pricing, advantages and disadvantages of manual toll collection (MTC) and electronic toll system, the success of electronic toll collection in other parts of world. The researcher's development hypothesis to defined the relationship between road user's satisfaction and policy, manual toll collection and electronic toll collection system and toll and congestion pricing. In table 2., the researcher employed linear regression analysis and the result indicated no significant relationship between computed and expected critical.

The critical value is higher than the computed value and based (α 0.05 and df 11) on this fact, the null hypothesis was rejected and accepted alternate hypothesis. In (table 3) the computed value is (- 1) showing a very strong weak relationship. The level of user's satisfaction and government policy as it was against the opinions of average Nigerians. The study revealed that 73% of respondent rejects the return of toll gates (strongly agreed and disagreed). Table 4, discussed about the effectiveness of electronic toll collection compared to manual tolling system and does not yield a positive result because of internet banking system that require banking or savings account. The computed value is less than the critical value and shows no significant relationship between manual toll collection system and electronic toll collection device.

4.2. Basis for Equitability and Fairness in Tolling and congestion pricing

- Toll system should be constructed in such a way that users severely not deprived in relation to other road users.
- Level of service Improvements: Tolls should be located on strategic areas or roads of high standard.
- Minimum and frequent beneficial or user discounts: Users of highways with large volume and frequent traffic passing through toll gates should be given ample opportunity and frequent discounts to reduce financial bottleneck on the users.
- Provision of a parallel road: A free parallel roads ensure that low-income users who cannot afford to pay a toll can be access to lane of the road. Preferably, toll should be located far away from high density area rather than provide a toll-free means route.
- Discount through means of payment: The cost of toll varies depending on technology used.
- Distance between toll gates: Toll gate should not be close to each other in such a way that users will be over burden with toll payment.

4.3. Patterns and Methods of Toll Collection

Toll collection are categorised in to manual tolling; mixed tolling and electronic tolling. The most common and old system is traditional type of toll collection is the manual payment of cash or coins at the toll gate. The system is slow and insincerity where toll operator gives waivers to friends and relatives. The modern system of Open Road Tolling (ORT) where drivers do not necessarily stop to pay toll with barrier. The electronic systems allow all toll users to move with tags in their vehicles or vehicle registration plate to be registered to an

account. Provided, toll gantries pass and the tag or registration plate is identified and the toll account of the highway user debited immediately.

4.3.1. Advantages of Drivers and Customers Benefits

- Absences of long queues at toll plaza by increasing toll services turnaround rates.
- Fast and more efficient service
- The facilities to make payment by keeping a balance on the bank account.
- Provide summary of prepaid toll statements, SMS on mobile and email. (No need for receipt of hard copy)
- Fuel savings and reduced mobile emissions by reducing or eliminating deceleration, waiting time and acceleration.
- Low toll rate collection cost by operators
- Accountability and good audit control by the centralising user accounts.
- Expand capacity without building more infrastructures.

4.3.2. Disadvantages of E-Toll Collection System Over Big Data Artificial Intelligence

- Driver must have an active bank account
- Users cannot top up with E-Toll card
- Must link to account
- Optical character recognition
- Balance check reminder
- More secure than E-Toll system

4.3.3. Consequence of Tolling and Congestion Pricing in Nigeria.

- **Cost recovery system.** Toll tariff and congestion pricing cannot be efficient to cover all cost with that of construction, operational cost and maintenance because of low tariff compared to developed countries.
- **Revenue uncertainty.** The income background of toll and road user affect the out turn of revenue thereby making toll revenue insufficient to cover debt payment and operational cost.
- **Social impacts.** The positive and negative impact result from potential inequality from charging low-income user particularly, those who use road frequently.
- **Political and public masterminds on toll collection.** Congestion pricing has not been significant in Nigeria due to misconception that toll was created as an indirect form of multiple taxation to discourage private car owners from fly the toll and major highways.

5. Conclusion

Toll's pricing can contribute significantly to make Nigerian transport system more efficient if management adopt the principle of equity, fairness and social justice in discharge of their task. Congestion pricing reduce the negative impacts routes were incentivising the functional use of clean and sound cars. Toll can serve as source of revenue for Nigerian Government when add to national budget without negatively impacting the movement and price of goods.

The study also found in most of the study that, inter arrival between vehicle reduced at toll, waiting time in queuing reduced, Toll tariff and congestion pricing should be instituted base on vehicle classification, time of the day of the week, social consideration, geographic area,

Toll roads, time taken stop and clear toll fee, cost of toll booths operator up to about 80% revenue in some cases, Automated toll paying device reduce it.

Government should create an enabling app that will help motorist know all the toll gate they will encounter on their journey; where they can pay online on all the toll gates, they will pass through to their destination with their plate number. This should then generate a barcode they can use to travel. They should scan as driver or road user access toll point by doing that, can reduce high level of corruption that may arise with toll activities in to equity, fairness and distributive social justice.

The study revealed, no enough evidence to suggest the proportion of responses of all the variable (plate II). The revealed that, electronic toll collection system influence operational capacity of toll gate in most developed countries, reduced waiting time in queuing and significantly improve on the level of service for toll users. This paper provides an insight, the advantages and disadvantage of old manual toll collection method and modern electronic toll collection device as well as other newly improve method using RFID and Big Data Artificial intelligence.

5.1. Recommendation

Nigeria, a country with verse land, abundant human and natural resource yet standards of living is high and individual wages is low compare to developed countries. To avoid benefit and doubt, there may be uncertainty that toll gate fees will be sufficient to cover all the costs of construction, maintenance and operational cost. Prospective or probable strategies should be adopted to promote tolling on equity and fairness in to cognisance and should be vary according to the form and position of the toll gate.

6. Acknowledgement

For the purpose of this review paper, our gratitude goes to Centre for Innovative Planning and Development for providing us with the relevant material supportably and fusion in this research. Special thanks to Ts, TPR, Dr, Gobi Krishna Sinniah for cross examine the paper to the fullest and encouraged the group for the development of this work in different angles at any given period.

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