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Traffic compliance in Kigali city, case: Giporoso and Rwandex

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Abstract
Compliance with traffic rules is important key to minimize the injuries and increase the safety of road users especially at intersection. The main purpose of this study was to observe vehicles at critical locations and recording their adherence to -or defiance of- traffic control devices. Two intersections have been selected in Kigali City such as Giporoso and Rwandex, two approaches were determined and analyzed to determine the adherence or defiance of the vehicles to traffic control devices in this case the red light scenario (light on) used as a reference, it was accomplished during a peak hour of the day, at Giporoso intersection results indicated that Complete Stop (S) were between 34.27% and 53.73%, Rolling Stop (R) were between 9.64% and 24.36%, No Stop (N) were between 13.02% and 28.98% and Stopped by Traffic (T) were between 10.47% and 2.55%, at Rwandex intersection, results indicated that Complete Stop, Rolling Stop, No Stop, Stopped by Traffic are 76%,19%, 0.00%, 0.05% respectively.

Keywords: Traffic compliance, Giporoso and Rwandex, Kigali City

Introduction

Location of the area of the study

This study was conducted at Giporoso and Rwandex intersections where there is a wide range of traffic coming from different places of the country; the traffic is generated from the Eastern part of the country, from Kanombe Airport and its vicinity, or from the Remera terminal, Kigali town and other traffic from roads that converge directly to these intersections; it is the two of the very busy intersection in the city of Kigali.

Scope of the study

During this compliance study, a sample of one hundred vehicles (100) was analyzed. The first scenario was that of Vehicles coming from Kicukiro and Kisimenti to Kabeza (which was a right turn, the vehicles which were respecting the red light or not and their behaviors were assessed); the second scenario was that of Vehicles coming from the East of the country, Kanombe and its surrounding areas moving towards Giporoso terminal and Kimironko (which is a right turn as well) were assessed and their adherence or defiance to the red light was determined. This study also examine the behavior of vehicles at Rwandex intersection from Sonatube round about, Kicukiro, Gikondo and City Centre.

Data Analysis

The following Tables cover the compliance data with “Right-turn-on-Red” regulations at signalized intersection located at Giporoso-Remera during Pick hour 7H00’ in the morning since non-compliance can be expected to be its highest when traffic flow is at the highest . The confidence level of 95% was used to compare the two approaches and the intervals of the true proportions of the different drivers’ behaviors arising during pick-h.

Approach 1 (Confidence level 95%)

Summary of Observations			
Action	**Number Observed**	**Frequency (p)**	**q= (1-p)**
Complete Stop (S)	44	0.44	0.56
Rolling Stop (R)	17	0.17	0.83
No Stop (N)	21	0.21	0.79
Stopped by Traffic (T)	18	0.18	0.82
Total	100	1	
Confidence Level = 95%			
Action	**Observed (Lower end)**	**Observed (Upper end)**	**Limit**
Complete Stop (S)	0.342708159	0.537291841	0.097291841
Rolling Stop (R)	0.096375971	0.243624029	0.073624029
No Stop (N)	0.130167586	0.289832414	0.079832414
Stopped by Traffic (T)	0.104699259	0.255300741	0.075300741

Confidence Level = 95%		
Action	**Observed**	**Confidence limits**
Complete Stop (S)	Between 34.27% and 53.73%	(+/-) 9.73%
Rolling Stop (R)	Between 9.64% and 24.36%	(+/-) 7.36%
No Stop (N)	Between 13.02% and 28.98%	(+/-) 7.98%
Stopped by Traffic (T)	Between 10.47% and 2.55%	(+/-) 7.53%

Approach 2 (Confidence level 95%)			
Summary of Observations			
Action	**Number Observed**	**Frequency (p)**	**q= (1-p)**
Complete Stop (S)	50	0.5	0.5
Rolling Stop (R)	11	0.11	0.89
No Stop (N)	37	0.37	0.63
Stopped by Traffic (T)	2	0.02	0.98
Total	100	1	
Confidence Level = 95%			
Action	**Observed (Lower end)**	**Observed (Upper end)**	**Limit**
Complete Stop (S)	0.402	0.598	0.098
Rolling Stop (R)	0.048673608	0.171326392	0.061326392
No Stop (N)	0.275370356	0.464629644	0.094629644
Stopped by Traffic (T)	-0.00744	0.04744	0.02744

Confidence Level = 95%		
Action	**Observed**	**Confidence limits**
Complete Stop (S)	Between 40.2% and 59.8%	(+/-) 9.8%
Rolling Stop (R)	Between 4.87% and 17.13%	(+/-) 6.13%
No Stop (N)	Between 27.54% and 46.46%	(+/-) 9.46%
Stopped by Traffic (T)	Between 0% (-0.74%) and 4.74%	(+/-) 2.74%

Results interpretation at 95% confidence interval, at Giporoso intersection

- **For Approach 1**

The population proportion of complete Stop (S) mode is between 34.27% and 53.73% which is around the mean of the population, Rolling Stop (R) mode is between 9.64% and 24.36% which is around the fifth and the quarter of the population, No Stop (N) mode is between 13.02% and 28.98% which is around the fifth of the population and Stopped by Traffic (T)" mode is between 10.47% and 2.55% which is around the 20th of the population.

- **For Approach 2**

The population proportion of complete Stop (S)" mode is between 40.2% and 59.8% which is around the mean of the population, Rolling Stop (R)" mode is between 4.87% and 17.13% which is around the fifth and the quarter of the population, No Stop (N)" mode is between 27.54% and 46.46% which is around the third of the population, Stopped by Traffic (T)" mode is between 0% (-0.74%) and 4.74% which is around the 20th of the population.

Rwandex intersection Data analysis

Approach No.1		
Summary of Observations		
Action	**Number Observed**	**Frequency**
Complete Stop=S	76	0.76
Rolling Stop=R	19	0.19
No Stop=N	0	0.00
Stopped by Traffic=T	5	0.05
Approach No.2		
Summary of observations		
Action	**Number Observed**	**Frequency**
Complete Stop=S	80	0.80
Rolling Stop=R	19	0.19
No Stop=N	1	0.01
Stopped by Traffic=T	0	0.00

Approach No. 1.

	Confidence Level. 95%				
Action	**Observed**	**Confidence Limits**	90%	95%	99%
Complete Stop=S	0.76	0.76±0.07=[0.68, 0.84]	0.07	0.084	0.11
Rolling Stop=R	0.19	0.19±0.06=[0.11, 0.27]	0.06	0.077	0.10
No Stop=N	0.00	0±0=[]	-	-	-
Stopped by Traffic=T	0.05	0.05±0.04=[0.01, 0.09]	0.04	0.043	0.06
		% Confidence Range			
	Complete Stop=S	67.6 to 84.4%			
	Rolling Stop=R	11.3 to 26.7.0%			
	No Stop=N	0%			
	Stopped by Traffic=T	0.7 to 9.3%			

Approach No. 2

	Confidence Level 95%				
Action	**Observed**	**Confidence Limits**	90%	95%	99%
Complete Stop=S	0.80	0.8±0.08=[0.72, 0.88]	0.07	0.08	0.10
Rolling Stop=R	0.19	0.19±0.08=[0.11, 0.27]	0.06	0.08	0.10
No Stop=N	0.01	0.01±0.02=[0, 0.03]	0.02	0.02	0.03
Stopped by Traffic=T	0.00	0±[]	-	-	-
		% Confidence Range			
	Complete Stop=S	72.16 to 87.84%			
	Rolling Stop=R	11.31 to 26.69%			
	No Stop=N	0 to 2.95%			
	Stopped by Traffic=T	0%			

I am about 95% confident that the difference means for 100 observations on Rolling Stop with Right-Turn-on-Red at two approaches is between 0.48 and 1.7.

Results interpretation at 95% confidence interval, at Rwandex intersection

For Approach 1

The population proportion of complete Stop (S) mode is between 67.6 and 84.4%, Rolling Stop (R) mode is between 11.3 and 26.7.0%, No Stop (N) mode is 0% and Stopped by Traffic (T)" mode is between 0.7 and 9.3%.

For Approach 2

The population proportion of complete Stop (S)" mode is between 72.16 and 87.84%, Rolling Stop (R)" mode is between 11.31 and 26.69%, No Stop (N)" mode is between 0 and 2.95%, Stopped by Traffic (T)" mode is 0%.

Conclusion

During the traffic data collection, some special observation have affected the quality of the data which was the high speed of vehicles some of the time; but we are confident that the data collected can give us an overview of what is happening at the intersection of Giporoso (Remera /Kigali) and Rwandex during pick-hours.

The traffic compliance on one approach is not significantly different from the other even though the data were collected from two different spots of the same intersection; here the vehicles analyzed were coming from two opposite directions.

Using the same confidence limits of the estimates for each approach, comparing the behaviors of the drivers we find that there is no big difference as the estimates for each approach overlap. The action that occurs more often is the "Complete Stop (S)".

Considering that the population that adhere to/obey the regulations are those either in "complete stop (S)" mode or "rolling stop" mode therefor the study conclude that more than half to about 75% of the population respect the "Right-turn-on-Red" regulations, the driver do not defiance the traffic control devices.

However to prevent the other proportion of the population to defiance the "Right-turn-on-Red" it would be better to avail traffic police agent to monitor and regulate traffic mainly during pick-hours when most drivers tend to defiance the traffic control devices as the drivers tend to hurry towards their destination during pick-hours when there are at the same time high traffic from different regions of the country which might generate unforeseen accident; this should therefore be prevent at all cost.

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