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Music and al-Quran sounds effects on driver behaviour due to road safety purposes

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Abstract. The road safety issues had cover many issues such as speeding, mobile phone, motorcyclist and other issues that may related with safety on road. The road users had differently behaviour while driving their vehicles on the road and may have distractions that can cause an accident, such as using hand phone, hearing the music, eat, drink and etc. This paper describes one approach to explore the driver behaviour based on listening music and Al Quran recitation. In traffic engineering, the approach of evaluating driver behaviour is based on traffic parameters that are normally considered and measured such as by vehicle type, speed, gap and others. The method use in this paper is using vehicle with V-Box and Race Logic technique for data collection. The data analysis are focused on speed trend and patterns indicate the music and Al Quran recitation that effects on driver behaviour. Five types of the categorization during driver drive the vehicles (e.g. car) were presented and discussed. The finding shows that this study enables the relationship between music and Al Quran recitation due to speed parameter and it show how significance that driver behaviour reaction (e.g. aggressiveness) on them especially due to road safety purposes.

1. Introduction

In traffic engineering, the approach of evaluating driver behaviour is based on traffic parameters that are normally considered and measured are vehicle type, speed, gap and others. To relate the relationship between traffic engineering and music can be as a complicated task. [1] showed that during driving, most drivers like to hear music while they drive. [4] had researched on the effect of music types on driver behaviour based on happy, sad, neutral music and no-music cases. Through this study, results showed that happy music distracted drivers the most as their mean speed unexpectedly decreased and their lateral control deteriorated. Sad music influenced drivers in a different way as they drove slowly and kept their vehicle in its lane. While [2] had made study on driver behaviour only based on No Song – no music, Balada – slow music, Etnik & Creative – traditional music and Pop Rock – heavy music. Other researcher, [3] is based on brain signal analysis using different type of music in order to improve certain functions of human body physiologically and psychologically.

While [5] had develop the heart rate detection of individual autonomic response on music and Quran recitation. This paper generally describes an approach of evaluating driver behaviour based on music



and Al Quran recitation effects. The objective of this study is to develop the effect of music and Al Quran recitation that effect on driver's driving behaviour based on speed trends. Five types of music categorization (No Song – no music, Balada – slow music, Etnik & Creative – traditional music, Pop Rock – heavy music and Al Quran recitation) taken while drivers were driving their vehicles (e.g. car) are presented and discussed. The method use in this paper is using vehicle with V-Box and Race Logic technique for data collection. This scope of this study enables the relationship of without music, with music, Al Quran recitation and speed parameters that indicate the significance of driver behaviour regarding with the one of the factor of road safety purposes.

2. Methodology

Figure 1 shows the process and sequence of data collection technique employed in this study. A suitable site was identified that suits the criteria specified in the study. The site selection is based on daytime under normal traffic conditions where the road type was four-lane divider. For this study, only one driver had been selected, a male, aged between 20 to 25 years old who uses a car as the vehicle. The driver needs to do four times with different sound categories, which are driving with No Song, Balada, Ethnic & Creative, Pop Rock and Al Quran recitation categories. Five (5) types of music categorization taken while driving the vehicle (e.g. car) was tested along three (3) km of the same site. The equipment that were used in the study were V-Box with its accessories, computer for data recording and retrieval, and Race Logic software. This paper had a limitation of test procedure in determining the result and analysis of music effect on driver driving behaviour based on speed trends.

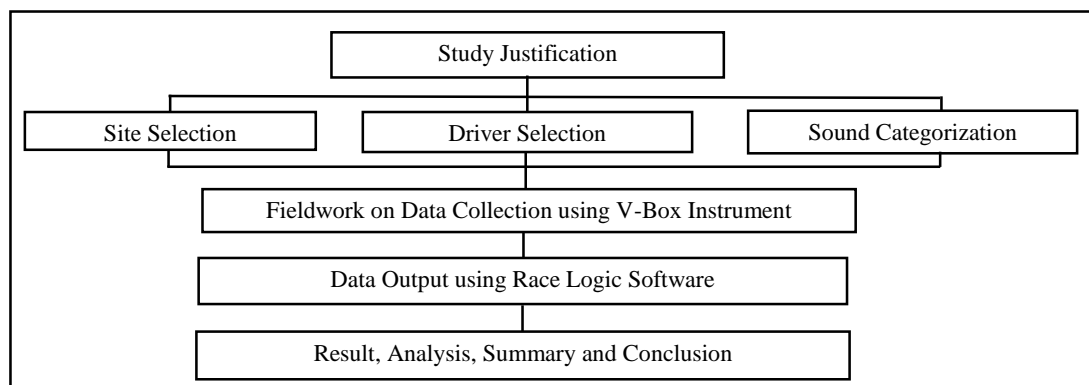


Figure 1. Methodology Flowchart

2.1 Fieldwork on Data Collection using V-Box Instrument

The V-Box components are V-Box 'ANT' socket, central controller (cables included), battery charger and V-Box GPS. Figure 2 shows the set-up and calibration of V-Box during fieldwork can be refer to [6].

Fundamental to any traffic engineering study is to ensure accurate and adequate traffic information (data) being collected and analyzed according to the study objectives. In this study, the data collected was running speed by using V-Box instrument. Normally, this instrument is put at the back seat. For the first time, it was used to test whether the result appears while driving the car. After all were tested to satisfaction, the driver needed to do four times with different music categories which are driving with No Song, Balada, Ethnic & Creative, Pop Rock categories and Al Quran recitation. It should be noted that, before the process in identifying the data collection, the instrument is the most important to be prepared before use. The instrument can be used by checking it the day before field data collection is needed (e.g. whether the battery is full charge if the instrument using power supply).



Figure 2. The set-up of V-Box Instrument

2.2 Data Output using Race Logic Software

Vehicle movement (running speed data) was stored directly in the laptop/computer. Data stored in the laptop/computer was retrieved using race logic software (see Figure 4). The data will then be analysed in the laboratory/office (see Figure 5). The default format which comes from Race Logic is in *.VBO format. This format can be converted into *.XLS format for excel user friendly to analyse the result due to speed and etc. From Figure 5, there are four outputs: No. 1 shows the parameters profiles (e.g. speed of vehicle one distance travelled). No. 2 shows the exact location where the parameters were highlighted. No. 3 shows which data that the user can select for generate the results. No. 4 run and generates the output results based on data selected in No.3. In this study, the speed profiles were categorized into 4 types: No Song Category, Balada Category, Etnik & Creative Category, Pop Rock and Al Quran recitation Category. Figure 3 shows an example of output results from the used of V-Box Instrument (e.g. No Song category).

Report Generator - JazanInterface (modified)					
Speed(km/h)	Speed(km/h)	Time(s)	Dist(m)	Graph run	Description
36.05	36.05	254.39	2995.00		Distance Line
35.00	35.00	254.90	3000.00		Distance Line
35.08	35.08	255.42	3005.00		Distance Line
35.17	35.17	255.94	3010.00		Distance Line
33.34	33.34	256.48	3015.00		Distance Line
30.86	30.86	257.04	3020.00		Distance Line
28.67	28.67	257.64	3025.00		Distance Line
26.55	26.55	258.31	3030.00		Distance Line

Figure 3. Output Results (e.g. No Song category)

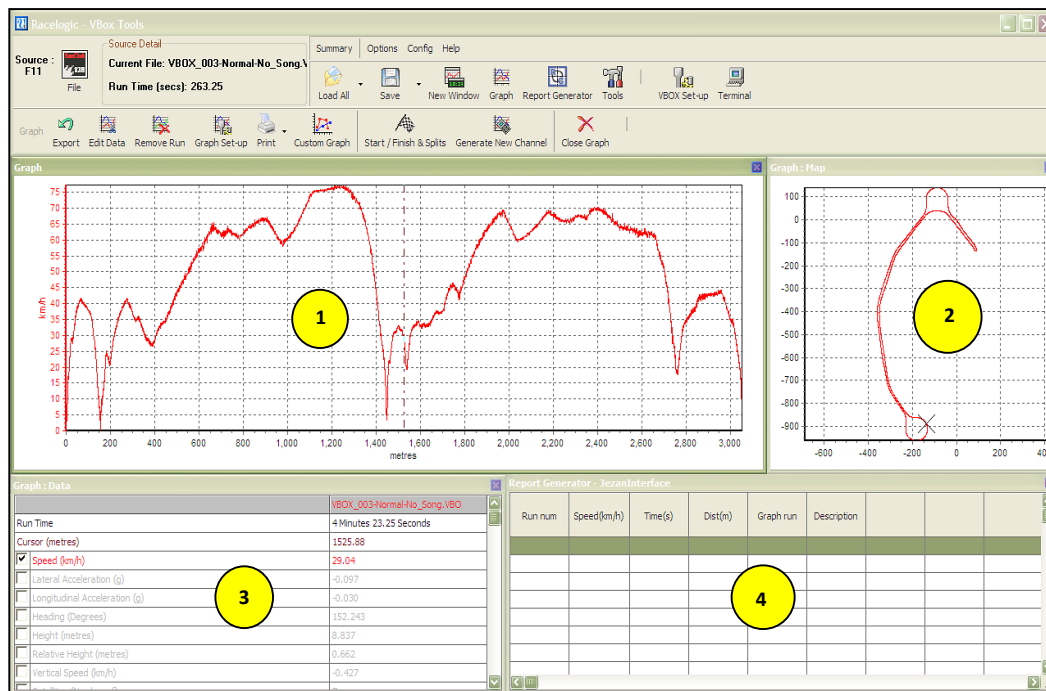


Figure 4. The traffic data result from Race Logic program

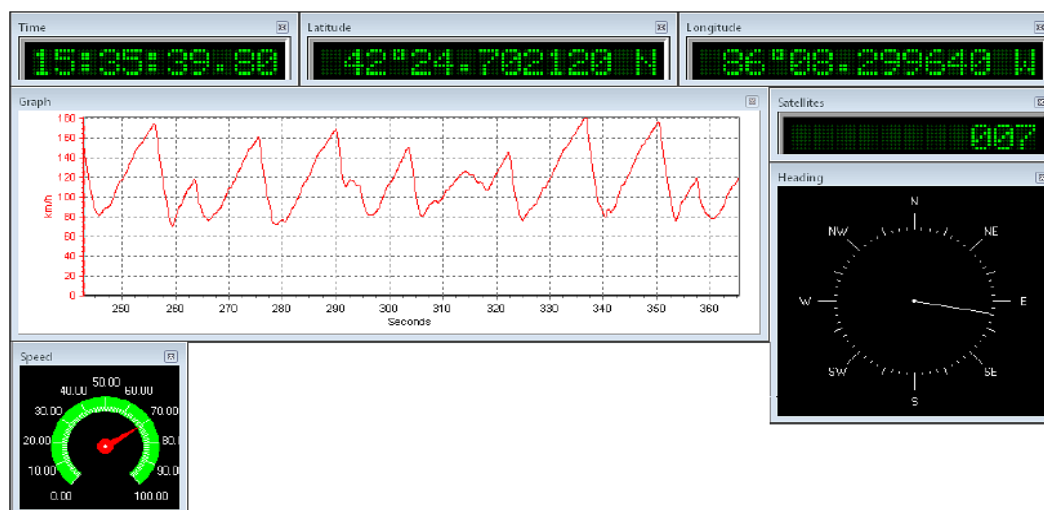


Figure 5. The traffic data retrieve from Race Logic program

3. Results and discussions

The following section show the relationship between running speeds related to music.

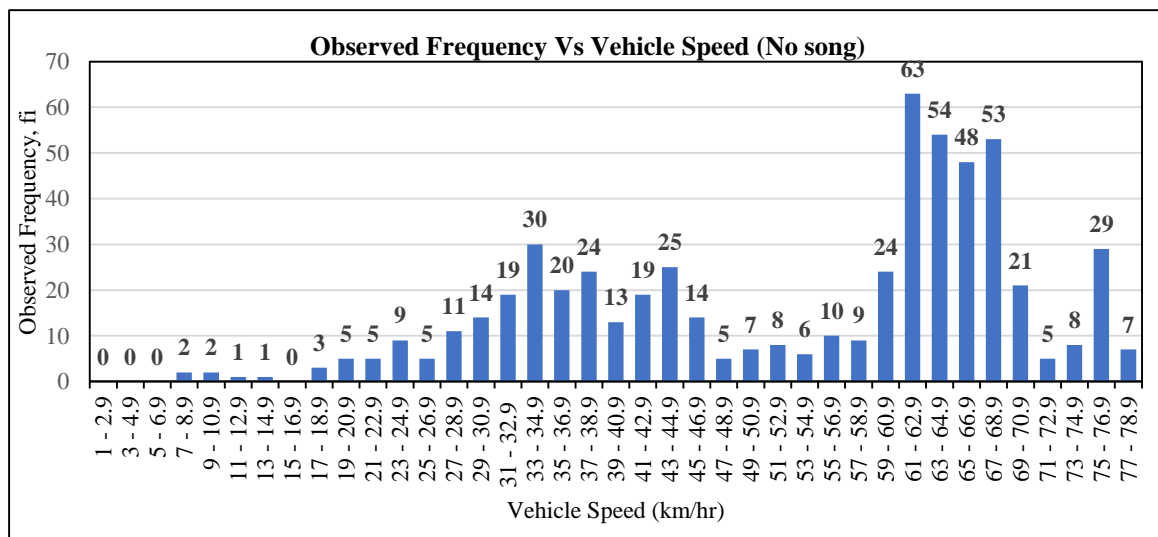
3.1 Relationship of Music and Driver Behaviour based on Speed Parameter

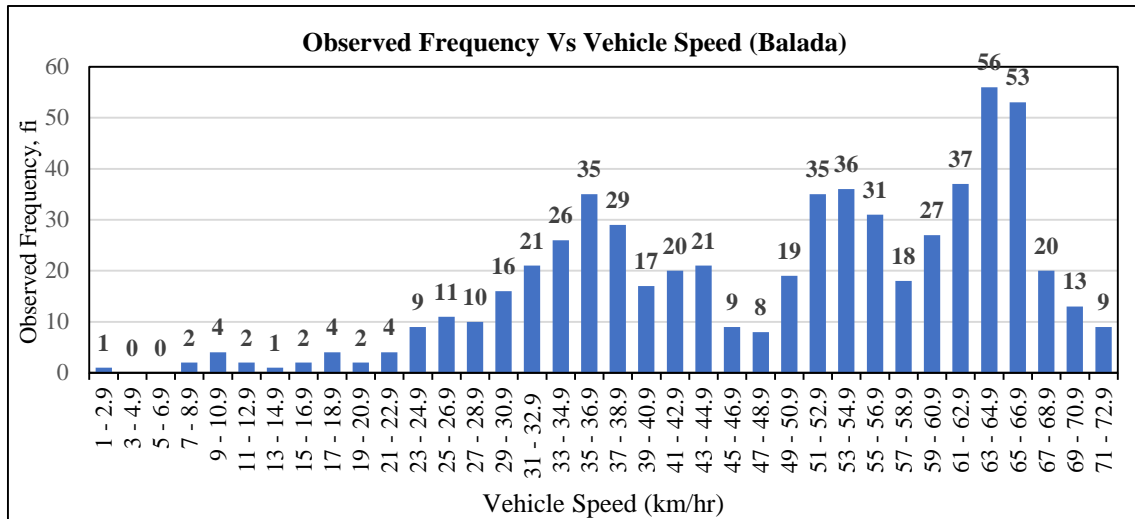
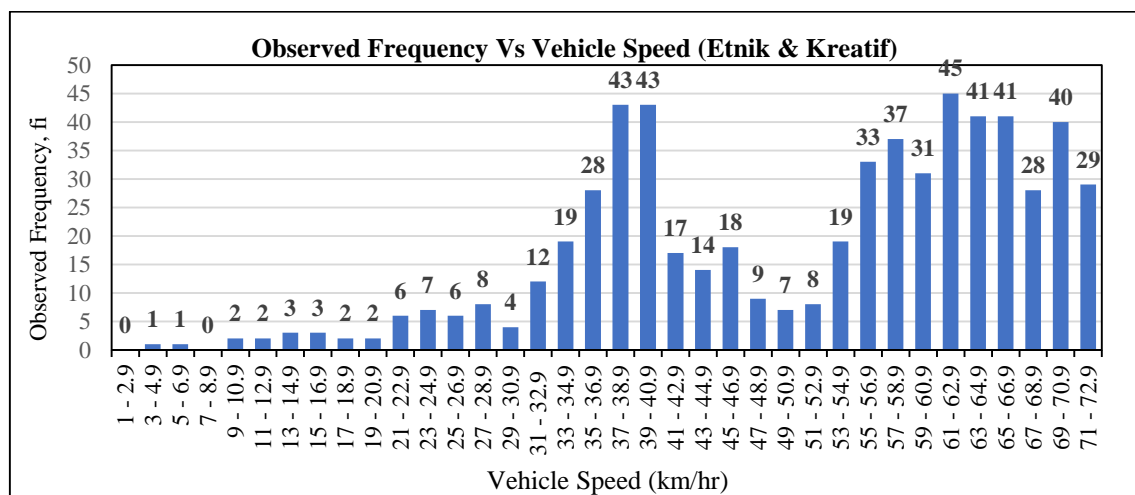
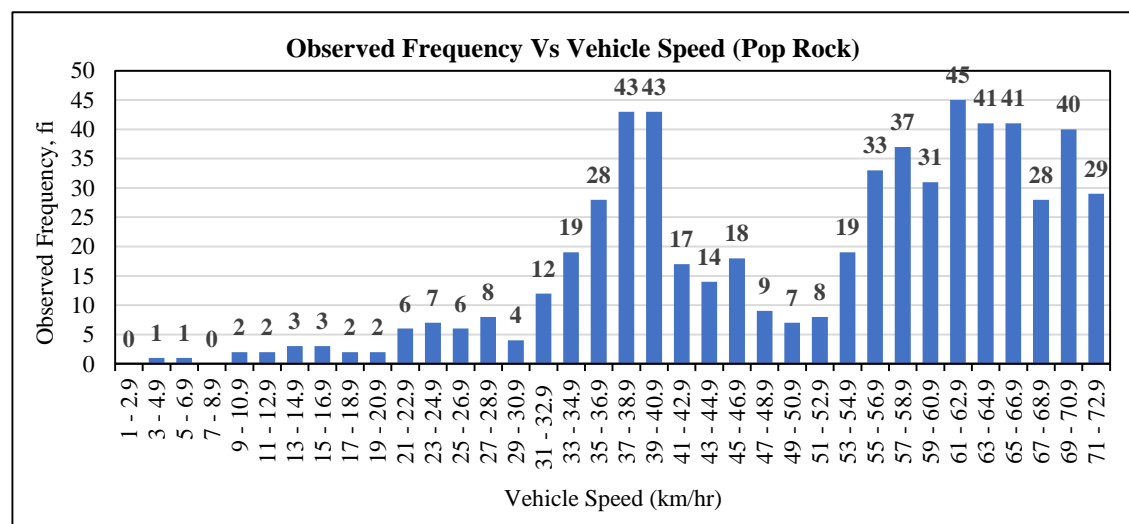
The traffic speed data was retrieved using Race Logic program, the format in (*.VBO) format. The traffic speeds were detected by output of V-Box instrument. Table 1 shows the statistics of skewness and kurtosis for all parameters and the values are small which means that the data is approximately normal. Summary of the Descriptive Statistics performed using MINITAB Software from the Master Database is as shown in Table 1. From Table 1, the values for skewness and kurtosis are relatively small for all variables which confirmed that the data is approximately normal.

Table 1. Summary of the overall descriptive statistics

Variable (Category)	Speed Sample	Mean	Median	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
No Song	579	52.9	60.5	16.259	8.0	76.9	-0.52	-0.89
Balada	579	49.9	53.7	14.483	1.7	71.5	-0.62	-0.48
Etnik & Creative	579	52.0	56.6	14.503	6.2	71.9	-0.64	-0.45
Pop Rock	579	58.0	62.3	16.470	4.6	81.2	-0.54	-0.60
Al Quran Sound	579	27.6	28.9	15.129	2.5	54.1	-0.16	-0.66

Figure 6a – 6e shows the histogram and cumulative frequency distribution curve of observed vehicles speed results based on different types of music in Race Logic program. It shows that a similar pattern on driver behaviours while driving and hearing different types of music with different speed magnitudes. Comparing the mean speed obtained from the cumulative frequency distribution curve, it was observed that the categories of mean speed in No Song = 52.9 km/hr, Balada = 49.9 km/hr, Etnik and Creative = 52.0 km/hr, Pop Rock = 58.0 km/hr and Al Quran recitation = 27.6 km/hr. Thus, it can be deduced that the driver may behave aggressive in Pop Rock categories, while more relaxed or comfortable driving can be found in Al Quran recitation categories.

**Figure 6a.** The histogram of traffic speed data for No Song category

**Figure 6b.** The histogram of traffic speed data for Balada Song category**Figure 6c.** The histogram of traffic speed data for Etnik & Kreatif Song category**Figure 6d.** The histogram of traffic speed data for Pop Rock Song category

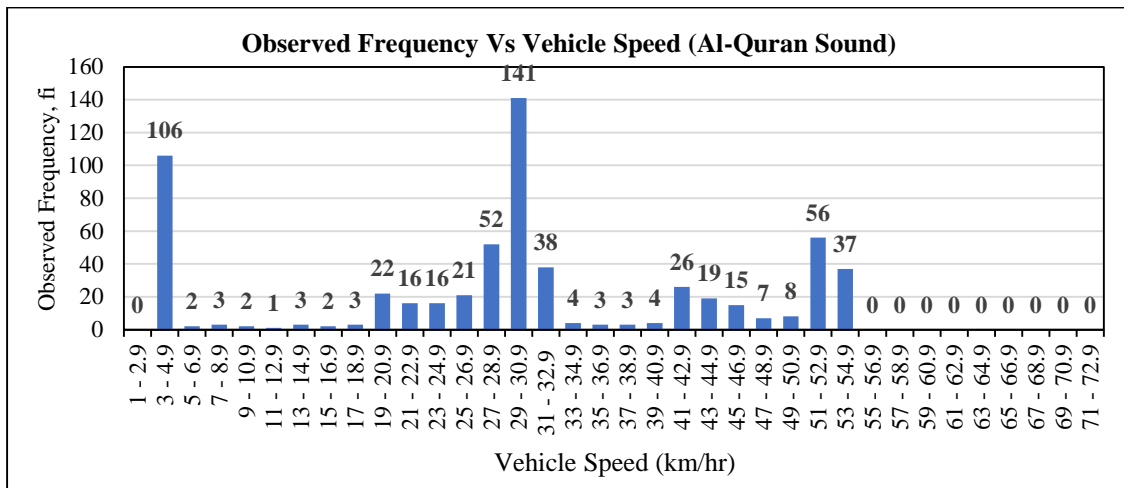


Figure 6e. The histogram of traffic speed data for Al-Quran Sound category

The results are summarized in Figure 7. The results show that the relationship of music and driver behaviour can be predicted through speed parameters. Based on road safety issues, this study can give good impact to driver behaviour based on their aggressiveness on road in normal traffic condition.

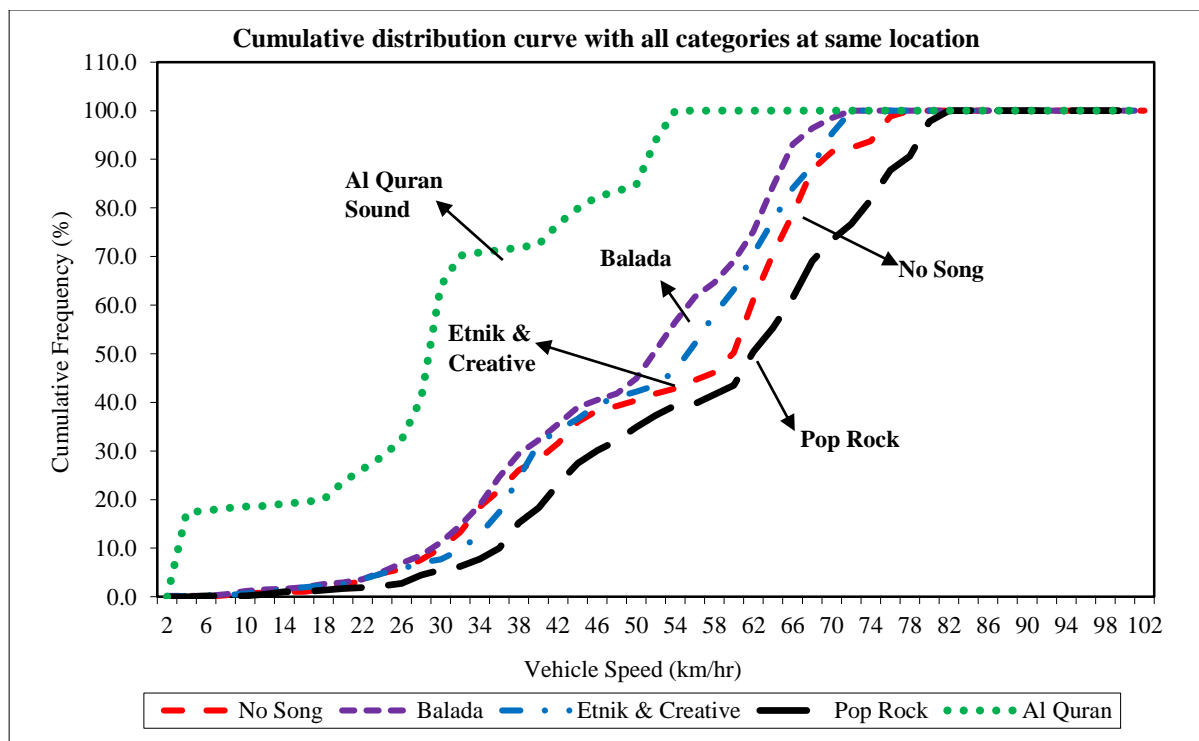


Figure 7. Cumulative distribution curve with all categories at same location

4. Conclusions

This paper described the technique of analysing and evaluating the effect of music on driver behaviour using V-Box instrument and Race Logic software based on speed data for traffic movement along a 3 km road length taken as case study. The study focused on the patterns and variations of vehicle running speed when a driver was subjected to different types of music (i.e. magnitude of the music). The instrumentation used was able to relate the vehicle speed which the driver had full control and the music played/listened during driving. Similar speed trends shown for all the five (5) categories, with respect to location but of different magnitude, with pop rock showing higher values possibly indicating that the driver acted and reacted to being affected by the music.

There is a lot of potential for future research in this area related to driver alertness and road safety such as different gender and age type, road category and last but not least long-distance travel. In this study, the approach of evaluating driver behaviour was based on vehicle running speed data. Sample of data were presented and discussed where the observed speed patterns and cumulative frequency of vehicles speed was noted. However, the main advantages of this methodology of data analysis using v-Box can be upgraded in additional instrument such as medical instrument (blood pressure devices or etc.). Hence, it can give more relationship of music affects in measuring and identifying the driver behaviour alertness. Next research will be in developing a model of driver behaviour with such parameters that affected the characteristic of the driver. Finally, the finding shows that this study enables the relationship between music and Al Quran recitation due to speed parameter and it show how significance that driver behaviour reaction (e.g. aggressiveness) on them especially due to road safety purposes in normal traffic condition.

5. References

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