Conference on Research in Engineering

| 15th Sept 2020 | CREATE Melaka |

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POSTED SPEED LIMIT.
DO THEY CARE?

Do you feel OK driving at Jalan Negeri with speed

60 km/h....?

Do you feel OK driving at Jalan Persekutuan with

speed 90 km/h....?

Do you feel OK driving at Expressway/highway with speed 110 km/h....?

Presentation Layout

1. Introduction
2. Literature Review
3. Methodology
4. Data Analysis
5. Result & Discussion
6. Conclusion

Introduction
&
Literature Review

Introduction

- Road speed limits are used to set the maximum speed (or minimum, in some cases) at which drivers may legally travel on particular stretches of road – basically, the approach is to deter drivers from driving at any speed of their choice.

- In Malaysia, for instance, a maximum speed limit on expressways is usually set not to exceed 110km/h, federal roads is set not to exceed 90km/h while for state roads is normally 60km/h (JKR, 2015; JKR, 2018).

- Unfortunately, speed is still found to be one of the main causes of road accidents.

Introduction

TheStar

StarPlus News Asean+ Business Sport Metro Lifestyle Food Tech Education Opinion

TOPICS

We have the third highest death rate from road accidents

HEALTH

Tuesday, 14 May 2019
6:10 AM MYT

By DR MILTON LUM

The reasons for road traffic accidents are multiple and include rapid urbanisation, poor safety standards, lack of enforcement, people driving distracted or fatigued, influence of psychoactive drugs and alcohol, speeding, and failure to wear seat belts or helmets.

TheStar

Road traffic accidents lead to injuries and deaths affecting individuals, families and communities.

It burdens the healthcare delivery system with occupation of limited hospital beds and utilisation of resources, as well as results in loss of productivity and income, with

Source : L. Milton (2019)

Introduction

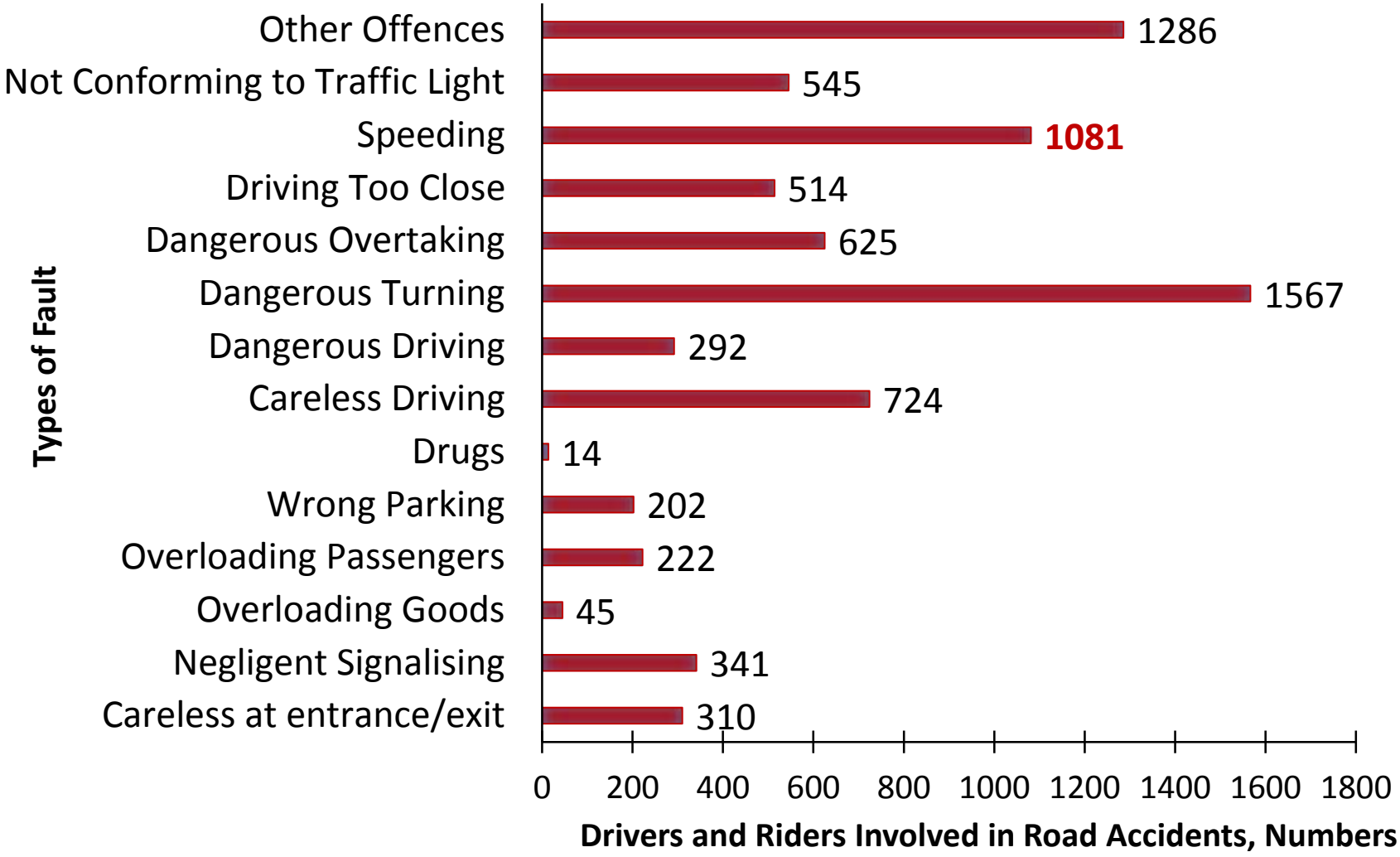
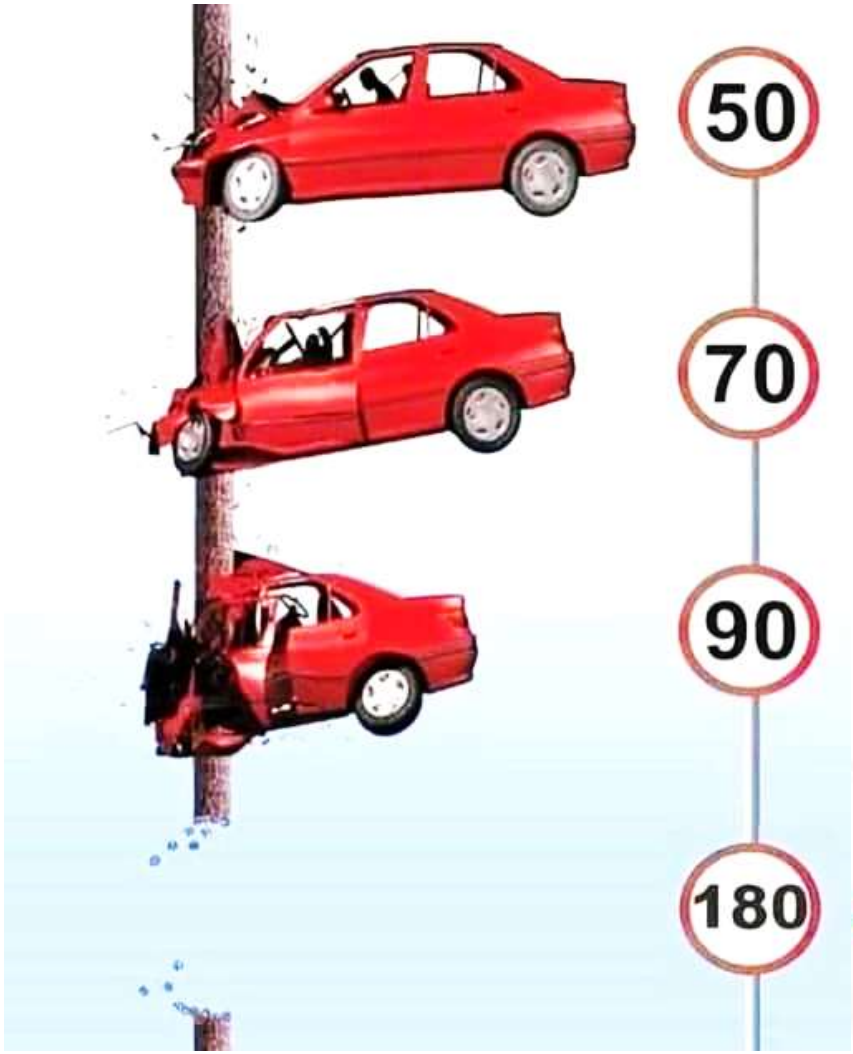


Figure : Drivers and Riders Involved in Road Accidents in year 2013 (PDRM, 2013).

Introduction



PURPOSE OF THE STUDY

- To determine the drivers' degree of speed limit compliance based on different posted speed limits.

  Motorists driving higher than the posted speed limit are considered as non–compliant motorists.

- To identify the optimum speed limit based on driver's degree of compliant.

Methodology

Sites selection

- Ten road segments of various posted speed limits, i.e. 60, 70, 90 and 110 km/h, were considered.
- Selection was based on a stratified random sampling technique.
- Each of the selected segments is characterised by an uninterrupted flow condition and located on the interstate expressway, federal or state road.
- Site must be flat and straight to control the effect of other parameters.

Site Location

Table : Site location

Site No.	Site ID	Location	Posted Speed Limit, km/h
1.	P/P145/1A	Valdor, Pulau Pinang	60
2.	S/SA2/1B	Kinarut, Sabah	60
3.	J/J46/1A	Ulu Choh, Johor	70
4.	C/FT003/1A	Sg. Ular, Cherating, Pahang	70
5.	C/FT003/1B	Sg. Ular, Cherating, Pahang	90
6.	J/FT003/1A	Kota Tinggi, Johor	90
7.	J/FT003/1B	Kota Tinggi, Johor	90
8.	J/FT001/60	Senai-JB, Johor	60
9.	J/FT001/70	Senai-JB, Johor	70
10.	J/E3/110	Lebuhraya Link Kedua, Johor	110

Sites Location

Figure : Site Location

Data collection

- Instruments used were an **automatic traffic counter** (ATC) and a **speed radar meter.**

- Speed radar meter was used to sample the vehicle at sites where the installation of an ATC was not possible and were conducted during off-peak hour periods to ensure that the speeds observed were not influenced by heavy traffic flow conditions.

Methodology







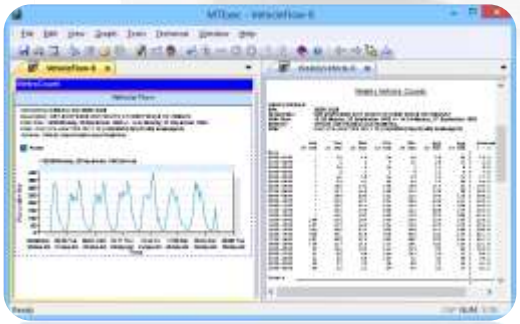





Figure : Automatic Traffic Counter (Metrocount 5600) and accessories.

Laying the tubes at 1 meter apart

Connecting the tubes to the ATC

The ATC is locked to a permanent pole

Data recording in progress

Figure : Site activities for Automatic Traffic Counter

Methodology

Figure : Site activities for Automatic Traffic Counter

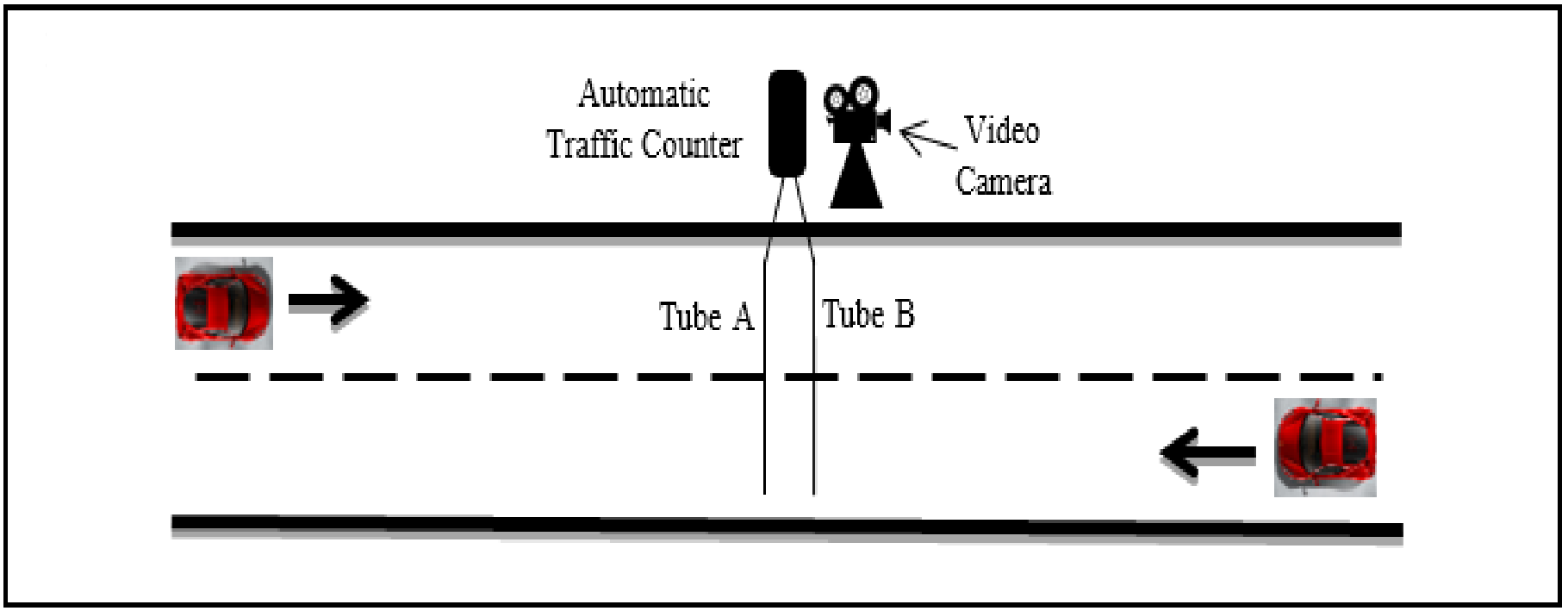


Figure : Setup of Site Survey

Speed measurements using Speed Radar Meter

Senai-JB, Johor

Speed Radar Meter

Lebuhraya Link Kedua, Johor

Figure : Speed Radar Meter and Site Location

Data Analysis

Data Analysis

- Percentage of compliance for each sites were extracted from ATC (Metrocount 5600) software.
- The value were plotted over posted speed limit using regression technique.
- Best trendline that suit the basic theory were chose.

SpeedStatHour-213

Site: C/FT003/1A.2.0NS

Descriptio **peringatan laju**

Filter time **7:50 Friday, 3 October, 2014 => 12:19 Sunday, 12 October, 2014 (With Exclusions)**

Scheme: Vehicle classification (Scheme F)

Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12 13) Dir(NESW) Sp(0,200) Headway(>0)

Vehicles = 109392

Posted speed limit = 70 km/h, Exceeding = 65488 (59.87%), Mean Exceeding = 81.90 km/h

Maximum = 191.7 km/h, **Minimum** = 0.0 km/h, **Mean** = 73.8 km/h

85% Speed = 86.0 km/h, **95% Speed** = 97.6 km/h, **Median** = 72.7 km/h

20 km/h Pace = 62 - 82, **Number in Pace** = 67422 (61.63%)

Variance = 193.75, **Standard Deviation** = 13.92 km/h

Hour Bins (Partial days)

Time	B	in	Min	Max	Mean	Median	85%	95%	>P	SL
									70	km/h
0	2209	2.00%	1.5	148.3	78.8	77.8	93.2	104	1616	73.20%
100	1708	1.60%	1.3	146.2	83.3	82.4	97.6	109.1	1433	83.90%
200	1286	1.20%	0.9	153.6	84.9	84.6	100.1	112	1065	82.80%
300	1089	1.00%	15.4	158.1	85.1	82.8	101.2	115.6	921	84.60%
400	976	0.90%	37.1	153.2	82.1	79.9	100.8	115.6	715	73.30%
500	996	0.90%	1	178.4	80	76.7	98.3	113.4	691	69.40%
600	1464	1.30%	1.2	157.4	78.8	76	97.9	114.5	948	64.80%
700	2980	2.70%	0	169.2	74.7	73.4	91.8	105.8	1829	61.40%
800	3857	3.50%	0.6	157.5	76.7	75.2	91.8	106.2	2524	65.40%
900	4085	3.70%	0.7	162.5	75.7	74.2	90.7	103.7	2560	62.70%
1000	5290	4.80%	1.2	191.7	74.8	73.8	87.1	97.9	3349	63.30%
1100	6039	5.50%	0.4	176.3	74.2	73.4	86	95.8	3787	62.70%
1200	6956	6.40%	1.2	149.1	71.7	70.9	82.8	92.9	3782	54.40%
1300	6535	6.00%	0.9	166.5	73.4	73.4	85.7	94.7	4093	62.60%
1400	6779	6.20%	0.8	164.6	73.9	73.4	85	94.3	4348	64.10%
1500	7505	6.90%	0.9	152.3	72.8	72	84.2	93.2	4370	58.20%
1600	7494	6.90%	28.2	145.6	73.8	73.1	84.6	93.6	4613	61.60%
1700	8040	7.30%	2.1	141.5	72.3	71.6	82.8	91.8	4637	57.70%

Figure : Hourly speed data extracted from ATC

- Sample data plot for speeds of all vehicles on one of road segment posted with 60 km/h speed limit:

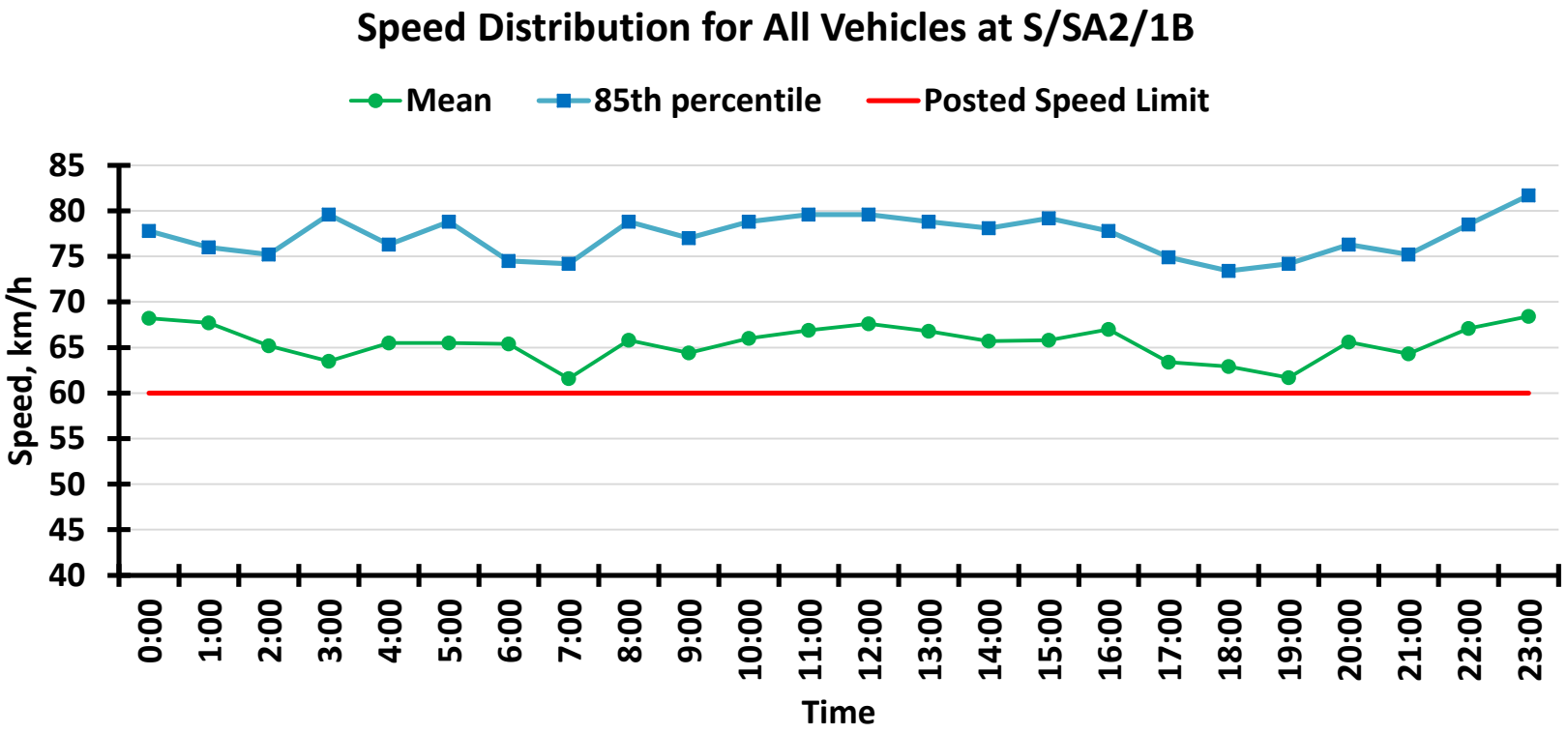


Figure : Example of Speed Distribution at 60km/h

- Sample data plot for speeds of all vehicles on one of road segment posted with 70 km/h speed limit:

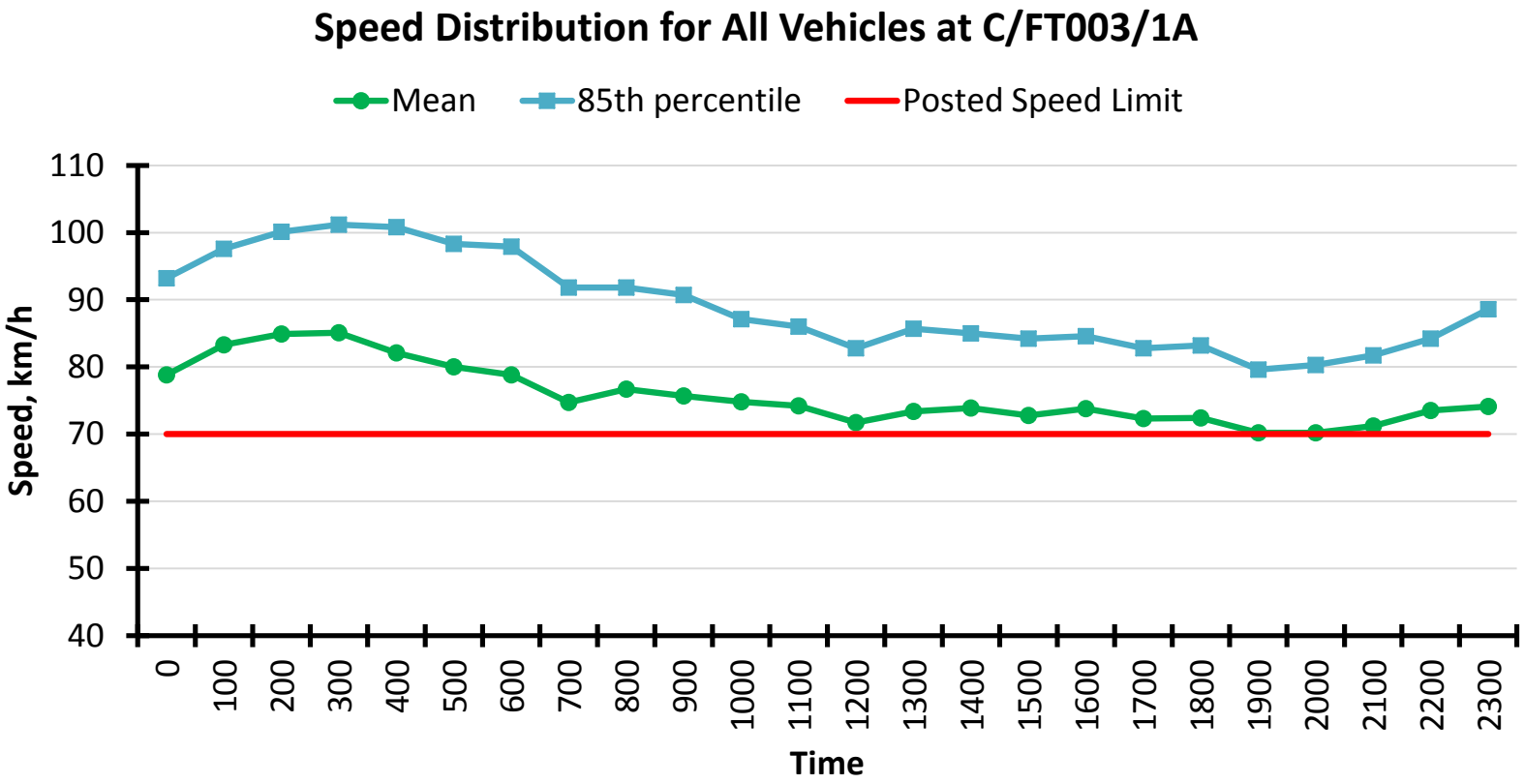


Figure : Example of Speed Distribution at 70km/h

- Sample data plot for speeds of all vehicles on one of road segment posted with 90 km/h speed limit:

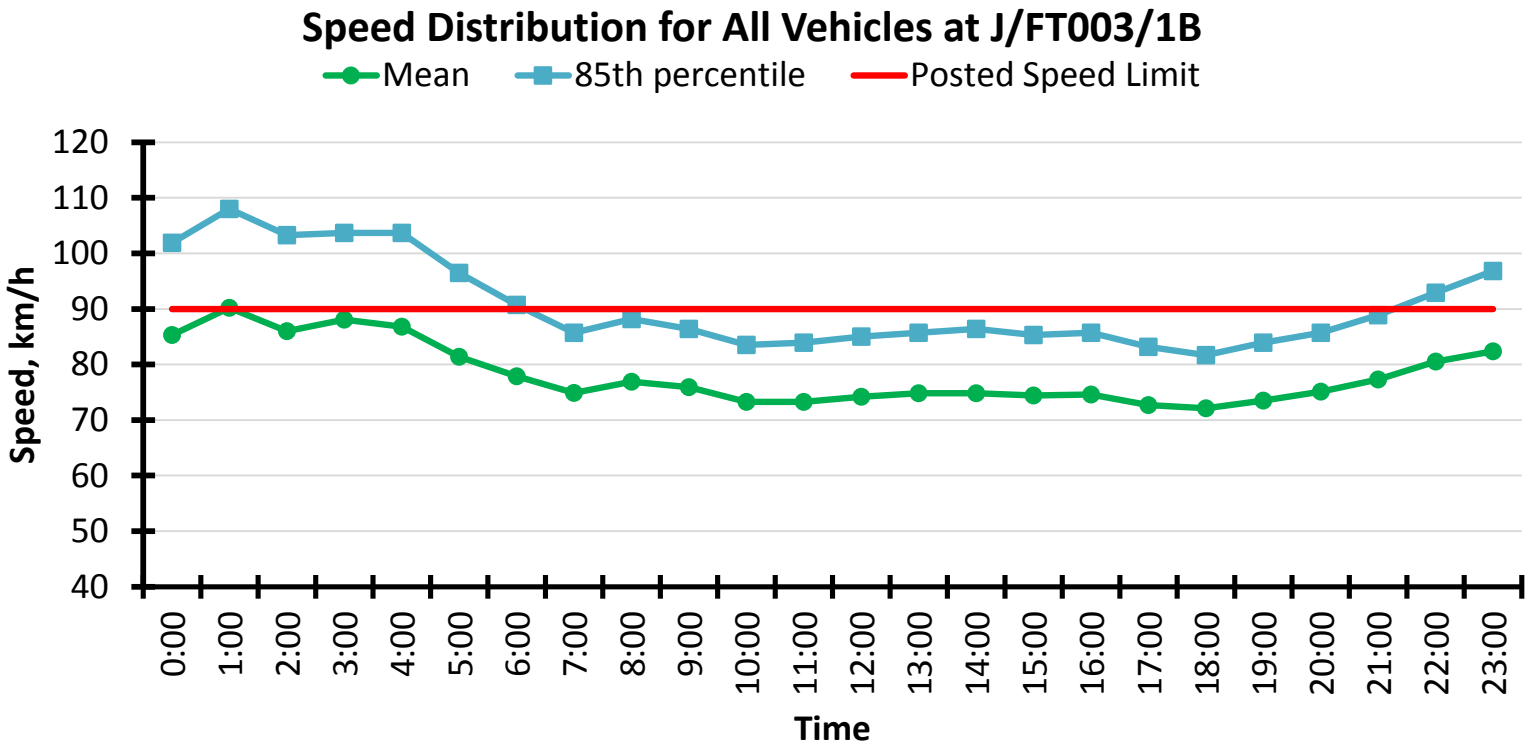


Figure : Example of Speed Distribution at 90km/h

Result & Discussion

Table : Degree of Speed Limit Compliance

Site No.	Posted Speed Limit, km/h	Percentage of Compliance, %
1	60	59.4
2	60	33.0
8	60	22.1
3	70	54.6
4	70	40.1
9	70	36.0
5	90	95.4
6	90	71.1
7	90	89.2
10	110	79.4

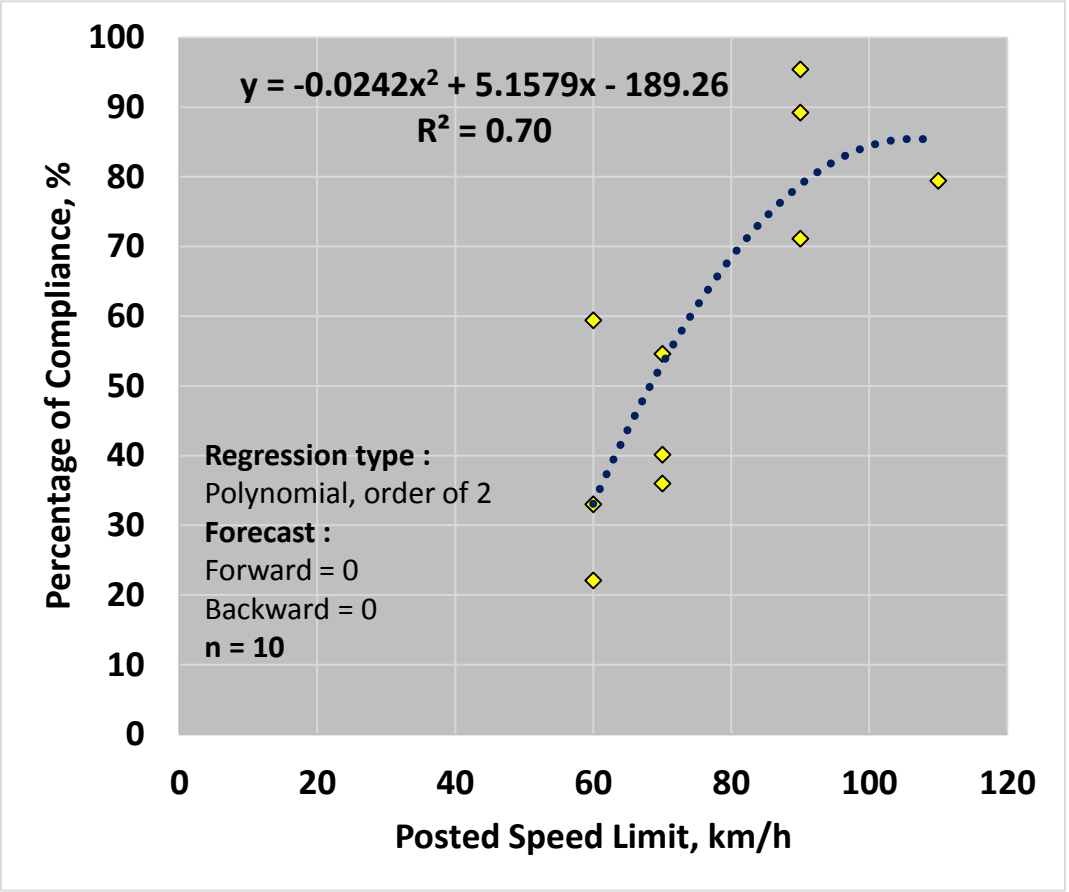


Figure : Posted speed Limit, km/h versus percentage of compliance, %

Point 1 :

The higher the speed limit the higher the percentage of compliance.
However, the trend change at certain speed.

Optimum Posted Speed Limit

As the optimum posted speed limit is concerned, the maximum value of y can be determined by differentiating the Eqn. as follows :

$y = -0.0242x^2 + 5.1579x - 189.26$

$\delta y/\delta x = 0$

$0 = 2(-0.0242x) + 5.1579$

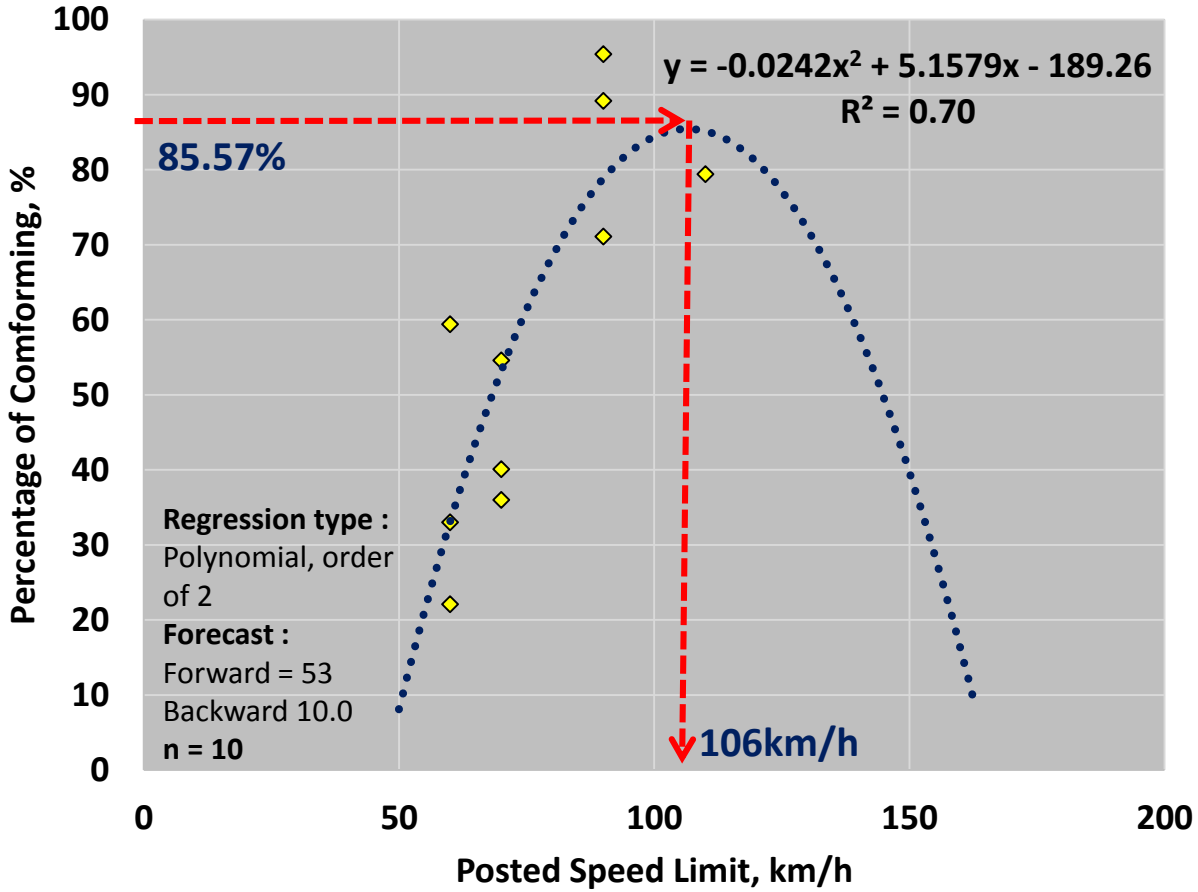
$x =$ **106.57km/h**

with maximum percentage of compliant, %

$y = -0.0242x^2 + 5.1579x - 189.26$

$y = -0.0242(106.57)^2 + 5.1579(106.57) - 189.26$

= **85.57%**



Point 2 :

The highest percentage of compliant on posted speed limit (85.57%) resulting optimum posted speed limit approximately 106km/h.

Conclusion

FINDINGS

- **Quadratic form of relationship** between posted speed limit and percentage of compliant performed the best and strong relationship of mathematical equation with R2 of 0.70.
- The degree of compliance **increases** with the speed limit.
- The result of the analysis showed that the optimum speed limit with highest percentage of compliance of **85.57% is 106km/h.**

Conclusion

RECOMMENDATIONS

Safety aspect

- Effective **approaches to control non–compliant drivers** other than traditional approach such as 'manual on-site observation' need to be formulated and enforced especially on suburban and rural highways (60, 70 & 90km/h).

Design aspect

- This study would recommends that the proposed speed limit should also consider the compliant factor at certain **suitable** road geometry (flat & straight terrain).

Research aspect

- However, noted that the **higher the speed will increase the road accident**.
- Therefore, **further study on these parameters**, percentage of compliant and road accident towards the speed limit on Malaysian travel behavioural (bigger scale) should be regressed together to obtain the correlation.

THANK YOU

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