EFFECT OF BUS IDLING ON URBAN AIR POLLUTION IN MALAYSIA

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ABSTRACT

High level socio-economic development in Malaysia has led to increased urban population and more demand for public transportation. Public buses offer cheaper commuter prices and convey more people at a time thereby reducing traffic jams and the number of vehicles on urban roads. Despite the various benefits derivable from public bus transportation, public buses have also increased the health hazards in urban areas. Most public buses use diesel engines which releases over 40 chemicals and toxic air contaminants. Epidemiological studies shows that the risk of lung cancer among people having been exposed to diesel exhaust is approximately 1.2 to 1.5 times more than the people who are not exposed. The situation is worse at the bus stations due to long idling time of public buses. Consequently, this study assessed the implications of bus idling at bus stations in Malaysia using Gombak Bus Station as the case study. Data were gathered through direct recording of arrival and departure times of public buses at the station. The analysis of data used both descriptive and inferential statistical tools via the SPSS 24 software. The findings indicate that an average of 94 buses, managed by different bus service providers, arrive at the Gombak bus station daily. The total daily idle time of these buses is 3515 minutes. Using the US Environmental Protection Agency standard, the study showed that these buses waste 7030 liters of diesel/day at Gombak station during their idling time thus amounting to a monetary cost as high as RM5,363,890/annum. The situation becomes even more worrisome when the health implications of exhaust-related diseases such lung cancer and other environmental problems are factored in. The study recommended that in addition to sensitization of bus drivers to turn off their engines during idle periods, the government should also implement policy regulations and fines to deter such negative and costly practices.

Key words: Urban pollution, Sustainability, Public transportation, Bus idling, Gombak Bus Station, Malaysia

1. INTRODUCTION

Transportation is the livewire that connects many areas of the urban center. Commuting to work, school, visits or leisure purposes has been facilitated through a connection of road and rail networks. The increasing urban population has resulted in more demand for transportation. While many urban dwellers use cars for commuting, the use of public buses have also increased in different parts of the world. Public buses offer cheaper commuter prices and conveys more people at a time thereby reducing the number of vehicles and traffic jams on urban roads. Indeed, an efficient public bus system contributes to the growth and development of urban centers.

Despite the various benefits derivable from public bus transportation, buses have also increased the health hazards in urban areas. Most public buses use diesel engines because it lasts long and require less maintenance costs compared to gasoline engines but they also generate more pollution. For instance, research has shown that over 40 chemicals from diesel exhausts are considered as toxic air contaminants (Yarlagadda, 2016). These emissions have negative impacts on the human health, environment, production of smog, acid rains, hydrocarbons and air toxins (Sydbom, et al 2001 and Cicero-Fernández, 1997), with far-reaching implications on mortality, chronic bronchitis, and respiratory tract infections. Yarlagadda's study presented an epidemiological report confirming the risk of lung cancer among people having been exposed to diesel exhaust is approximately 1.2 to 1.5 times more than the people who are not exposed.

While these statistics on dangers of diesel engines are alarming enough, it is surprising that many public bus drivers contribute more to the pollution problem through bus idling- a situation where the bus driver leaves the engine running even though the bus is stationary. Bus idling consumes diesel for a little or no benefit, and when this is combusted it releases varying quantities of air pollutants such as Particulate Matter (PM), Nitrogen Oxide (NOx), and CO2 which is a greenhouse gas (GHG). Bus idling is estimated to produce emissions that account for between 5- 25% of total PM emissions and 15-25% of total NOx emissions (TTR, 2010). These particles have been linked to health complications, respiratory disease, heart attacks and even premature deaths (Israel, 2009 and EPA, 2013).

Consequently, this study aims to assess the extent of bus idling at bus stations in Malaysia using Gombak Bus Station as the case study. The two key research questions are: 1. what is the extent of bus idling at Gombak station? 2. Is the average idling time at Gombak station significantly higher than recommended global average?

This study makes major contributions to ongoing global debate on urban air pollution particularly as each country strives to attain the Sustainable Development Goals (SDG). The increasing growth of urban population and demand for urban facilities has resulted in high pollution levels in urban areas. While pollution is generated from different urban activities, emissions from diesel engines pose highest threat to a healthy and sustainable urban living. Public buses are a major source of diesel emissions,

and efforts to reduce bus idling especially at bus stations will go a long way in achieving healthier living for urban dwellers. Moreover, while there has been different studies and efforts on achieving a sustainable environment in Malaysia, none of these studies has focused on bus idling and its impact on urban air pollution, hence the need for this study.

2. LITERATURE REVIEW

Urban air pollution as the air pollution experienced by populations living in and around urban areas. The subject of urban pollution has gained wide attention for a long time particularly in the developed countries. For instance, the environmental justice movement started public sensitization campaign on the negative effects of toxic waste landfills in minority communities in the United States (Samet and White, 2004). In recent times, there has been increased awareness on the dangers of air pollution especially in the urban areas. An ever increasing number of epidemiological studies have linked urban air pollution, particularly particulate matter, to increased risk for morbidity and mortality (EPA, 2002a).

2.1 ENVIRONMENTAL LAWS ON BUS IDLING

2.1.1 United States of America

To curb the menace of bus idling, different governments have promulgated laws guiding operations of public buses. For instance, in New York City, the authorities have promulgated laws that require buses to shut down their engines when stationary. The New York Department of Environmental Conservation granted traffic enforcement officers the authority to ticket buses that violate the idling laws. The fines begin at $220, and reach $2,000 for repeat offenders. Although, these laws are poorly enforced (Israel, 2009), it is a good starting point in curbing the menace of bus idling. In 2003, the state of California promulgated laws to ban idling of school buses. Under the state law, California school bus drivers must turn off their engines when they arrive at the schools and restart them no earlier than 30 seconds before departing. At least 17 other states in the US also have state or local rules that limit idling time of buses.

2.1.2 Efforts on vehicular emissions in Europe.

Considering the negative consequences of emissions on human health and the environment, many countries across the European Union have proposed a legislation to ban the sale and use of petrol and diesel vehicles across the network of roads in the different EU countries. The Union also provided incentives to encourage the production and use of electric-powered vehicles. The proposition which was initiated by Norway, gained full approvals from other EU countries such as Germany, France, Netherlands, among others. For instance, in its deliberations in October 2018, the EU agreed to force carmakers to slash CO2 emissions by 3 percent from earlier approved level of 95 grammes per kilometer (G/km) for 2021. The EU also operates Low Emission Zones (LEZ) across the member countries. LEZ are areas—usually within cities and larger towns—with various restrictions on the operation of more polluting, typically older vehicles. The LEZ are established to achieve drastic reduction in the three main air pollutants of concern in Europe- emissions of fine particles, nitrogen dioxide and ozone.

Although the LEZ idea started in Sweden in 1996, the wide reduction in air pollutants recorded within the delineated areas facilitated its adoption in many EU countries[1]. Vehicles are classified into different categories- from Euro 1 through Euro 6- based on the level of capacity, production date, engine type and emission levels. According the EU report on Urban Access Regulation, the typical LEZ requirements include:

1. A ban on higher emission vehicles—Vehicles below a certain EU emission level are not allowed to enter the LEZ. Some of the LEZs also have different standards for petrol and diesel vehicles based on the different emissions of PM and NO2. For instance, only Euro 4 and later vehicles may be allowed, while Euro 3 and older vehicles cannot enter the zone.
2. Retrofit options—This involves an upgrade to a vehicle's emission ratings through reroofing the vehicle with an emission control device, such as a diesel particulate filter (DPF). For example, a Euro 3 vehicle retrofitted with a DPF may be considered equivalent to a Euro 4 vehicle in the zone.
3. Charging schemes—Vehicles having higher emission level than the standard set for the zone may be charged a fee to access the LEZ, while vehicles that comply with the set standard access it for free.

2.1.3 The United Kingdom

Air pollution from particulate matter (PM) contributes to 40,000 deaths a year in the UK and causes long-term health problems for hundreds of thousands of people especially the children and poorer Londoners (Taylor, 2018). To curb this menace, the UK government has issued laws to control idling. The laws empowers the local authorities to issue fixed penalty notices of up to 40 pounds or more to motorists that do not turn off their engines while stationary. To further reduce toxic air pollution and

[1] Urban Access Regulations in Europe http://urbanaccessregulations.eu/

protect public health in the capital city, the Mayor of London, Sadiq Khan, announced the implementation of a 24-hour, seven day a week Ultra Low Emission Zone (ULEZ), inside which vehicles will have to meet tough emissions standards or face a daily charge of £12.50 (around $16) for some cars, vans and motorbikes and £100 ($130) for trucks, buses and coaches. The announcement which was made on April 08, 2019 effectively positions London as the first city in the world to implement the ULEZ system.

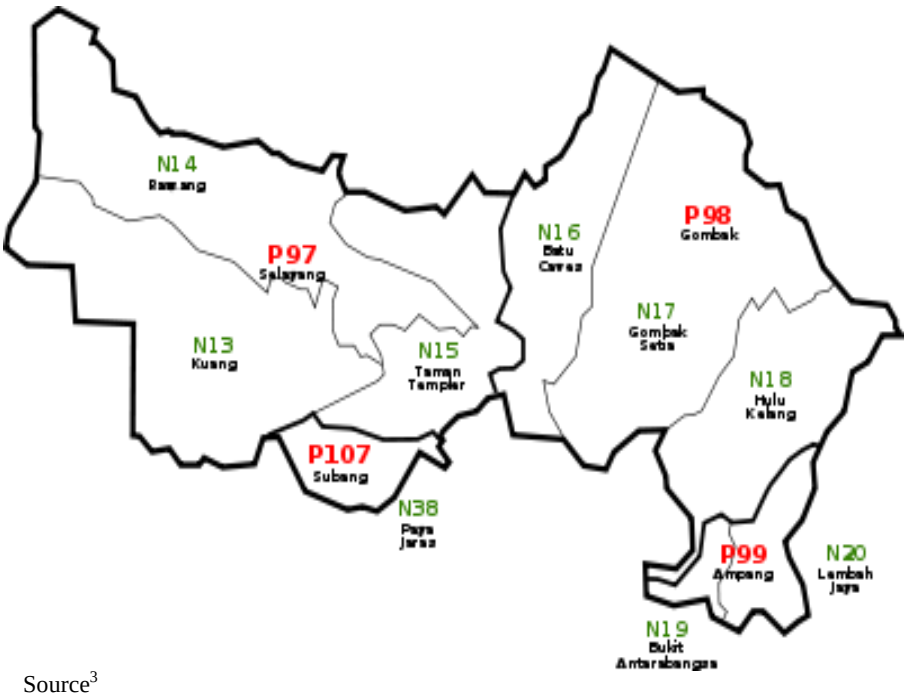
2.1.4 Environmental laws in Malaysia

The government of Malaysia has passed some important laws and policies to promote sustainable environment, such as the Environment Quality Act 1974 and its Regulations 1989, the Environmental Quality Order 1989, the Protection of Wildlife Act, the National Forestry Act 1984, the Fisheries Act 1985, the National Parks Act 1980, and the International Environmental Laws. Although, the laws aim to achieve a cleaner and sustainable environment, they have not been properly implemented due to some problems such as non-coordination, weak enforcement and customary attitudes (Muhammed, 2011). Moreover, none of the current environmental laws specifically addressed nor limit the idling time of public buses as practiced in some of the countries in the world. Hence, there is the need for the government to promulgate laws that specifically controls emission from public buses particularly during the idle period. Existing provisions on the environment could also be amended and broadened to cover issues of buses emissions and idling periods.

3.0 THE STUDY AREA: GOMBAK BUS STATION

To ensure the subject is put in proper perspective, this paper determines the idling time of buses at the Gombak Bus Station. Gombak is an administrative district located on Coordinates 3°16′27.3″N 101°34′14.6″E in the State of Selangor, Malaysia. Information contained on the district's website indicates that the district was created on February 1, 1974; and divided into 4 *mukims* (localities)- Batu, Rawang, Setapak and Ulu Klang (Portal Rasmi PDT Gombak Perutusan Pegawai Daerah Gombak, 2019[2]). The map below shows borders of Gombak district and the mukims.

Figure A: Location of Gombak District in Selangor Darul Ehsan



Source[3]

[2] http://www2.selangor.gov.my/gombak.php/pages/view/206?mid=26.
[3] http://www2.selangor.gov.my/gombak.php/pages/view/206?mid=26.

Gombak rail and bus station is the terminus of the Kelana Jaya rail Line, as well as other public bus services such as Genting Islands, Rapid KL, CyberJaya, Odyssey, Meteor Travels among others. The bus station also has a fee-based multi-level car parking facilities to aid ease of use of public transport facilities to different parts of the Kuala Lumpur. On a daily basis, thousands of people travel through the Gombak station to different locations. Many of the passengers wait for buses to their destinations and are thus exposed to first level emissions from bus idling.

4.0 METHODOLOGY

Data for the study were gathered through direct recording of arrival and departure times of public buses at the Gombak bus station on different days of the week in March 2019. The researcher stayed at the Gombak station throughout the data gathering period to have first-hand experience and information on idling times. Data were gathered on 6 key variables- arrival time, bus service provider, engine mode while bus is stationary at the bus station (on/off), departure time.

To achieve the set aim of the research, two hypotheses were formulated:

Hypothesis 1:
H0- There is no significant difference between the average idle time of the buses at Gombak station
H1- There is a significant difference between the average idle time of the buses at Gombak station

Hypothesis 2:
H0- The average idle time of the buses at Gombak station is not significantly higher than recommended global average.
H1- The average idle time of the buses at Gombak station is significantly higher than recommended global average.

The Statistical Package for Social Scientists (SPSS) v.24 was used for the data analysis. Both descriptive and inferential statistical tools were utilized. Descriptive statistical tools describe the data and group them in a specified order. Descriptive tools used include frequency tables, bar-diagrams, line graphs, mean and standard deviation. Inferential statistical tools establish the relationships that exist between or within variables so as to allow for comparison and inferences. The tools used in this category include T-Test and Regression Analysis.

5.0 ANALYSIS AND DISCUSSION OF FINDINGS

5.1 Number of buses, bus service providers and Idling time

Information contained in Table 1 below indicates the number of buses that use the Gombak bus station daily. Information in the table indicates that an average of 94 buses arrive at the Gombak bus station on a daily basis. The major service provider using the Bus station is the Rapid KL with 53 buses (T200 and T201 buses) representing over 56 percent of the total bus count. This is mainly due to the fact that Rapid KL is a private bus service provider that covers wider areas within Kuala Lumpur. The State government free bus service-Majlis Perbandaran Selayang (MPS) bus service came second with a bus count of 20. The findings indicate that the private and public buses visit the Gombak station at regular intervals during the day.

Table 1: Number of buses and the respective bus service provider

Total duration (minutes)	**MPS 1**	**Campus Shuttle (Rapid T200)**	**Cyber Jaya**	**T201**	**Genting Island**	**Odyssey**	**Others (T202, Not-in-service Bus & Meteor Travels bus)**	**Total**
7-9am	4	7	1	5	1	0	0	18
9-11am	3	4	2	4	1	1	0	15
11-1pm	3	5	1	4	2	0	0	15
1-3pm	3	3	0	3	1	1	1	12
3-5pm	3	4	1	4	2	1	1	16
5-8pm	4	5	2	5	1	0	1	18
	20	28	7	25	8	3	3	94

A central focus of this research is the idling time of the buses at the bus station. Consequently, information contained in table 2 below indicates that different public and private sector bus service providers using the Gombak station. These include RapidKL buses, MPS, CyberJaya, Genting Highland buses, Odyssey buses as well as the Meteor travels.

Table 2: Bus service providers at Gombak Station (in minutes)

Time period during the day	**MPS 1**	**Campus Shuttle (Rapid T200)**	**Cyber Jaya**	**T201**	**Genting Island**	**Odyssey**	**Others (T202, Not-in-service Bus & Meteor Travels bus)**
7-9am	19	207	70	15	43	0	0
9-11am	20	252	278	9	4	2	0
11-1pm	34	478	106	54	118	0	0
1-3pm	47	285	0	18	50	4	34
3-5pm	12	280	81	72	103	4	8
5-8pm	69	389	194	94	59	0	3
	201	**1891**	**729**	**262**	**377**	**10**	**45**
Total duration							**3515 minutes (or 58.5833333 hours)**
Total duration (in hours)/month							**21382.91665**

Furthermore, Figure A shows that the idling time of the buses varies during different periods of the day. The figure also indicates that the Rapid KL Buses T200 account for the highest idling time at the Gombak station with a total of 1891 minute. This represents 54 percent of the total idle time and diesel exhaust emissions at the station. With a daily idling time of 729 minutes, CyberJaya buses account for the second highest idling emission at Gombak station while Odyssey buses account for the least idling record at the station. The result indicates that the T200 campus shuttle buses represent the highest contributor to the idle-time diesel exhaust and pollution at the Gombak Station. Although, the number of Odyssey buses using the station on a daily basis is relatively low, the drivers do turn off their engines while at the station. Thus, Odyssey buses have the least contribution to the idling emissions at the Gombak station.

Figure A: Idling time by different bus service providers (in minutes)

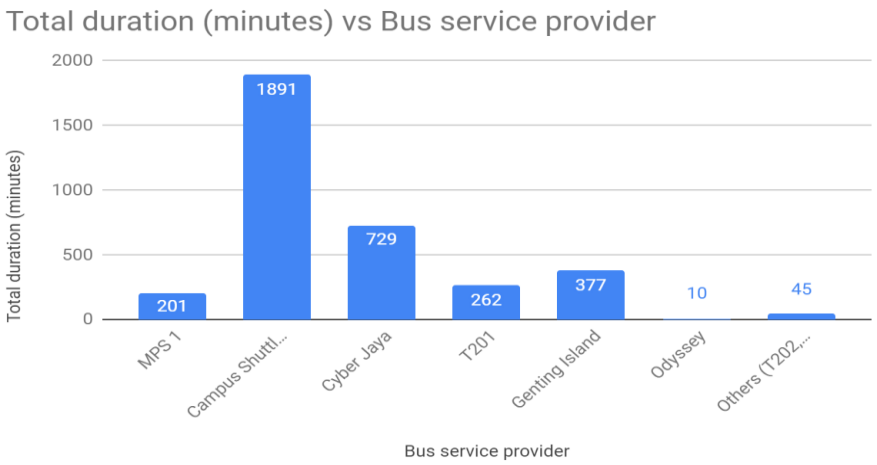
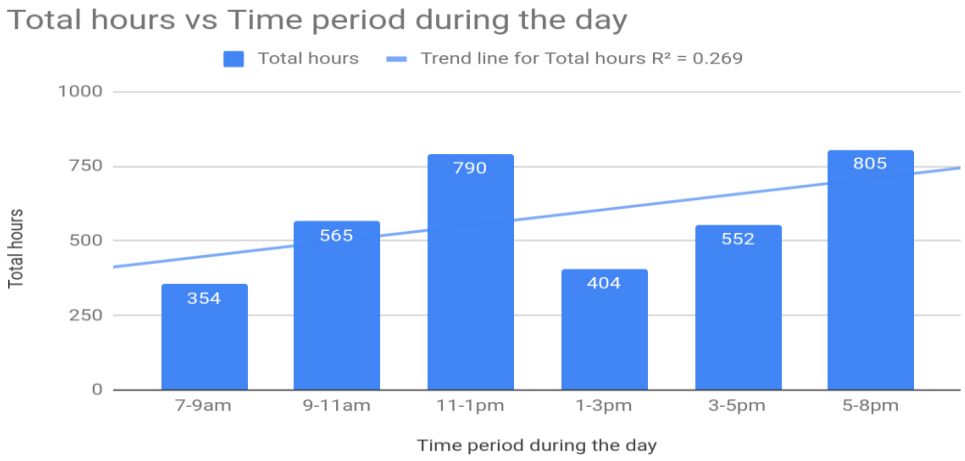


Figure B indicates the level of idling and diesel emissions at Gombak station during different periods of the day. Information contained in the figure indicates that the R-squared value of the idling times at the station is 0.269. Thus indicating that the idling times at Gombak station during the different periods of the day vary widely and do not cluster around the mean and trend line indicated in the figure. Furthermore, the figure shows the highest idling during the day is between 5pm to 8pm (805 minutes) and 11am to 1pm (790 minutes) while the lowest idling period is between 7am and 9am (354 minutes). The latter could be attributed to the fact that buses do not wait for long periods during the morning hours since they needed to quickly return to onboard more passengers during this peak period. Conversely, during the lunch hour- usually between 11am and 1pm- many bus drivers tend to relax at the bus station without turning off the engines. Hence, the relatively high idling time recorded during this period. The highest idling period between 5pm to 8pm is due to the fact that many of the bus drivers do not put off their engines while they wait at the bus station to onboard passengers who are returning from their work locations via the rail transport service.

Figure B: Total idling time at different periods in the day (in minutes)- Regression Score



5.2: Monetary Implications of Bus Idling at Gombak Station

Basis of calculation: According to the EPA (2013), "During its idling period, a typical diesel engine bus engine burns about half a gallon of fuel per hour." Thus, a bus that idles for 30 minutes each day, uses 45 gallons of fuel each year.

Application to Gombak Station

1. Average number of buses using Gombak/day 94
2. Idling for 60 mins= 2 liters (EPA, 2013)
3. Bus idling time at Gombak Bus/day Station= 3515
4. Total liter of diesel wasted during Idle time at Gombak Station/day: 7,030
5. Cost of diesel wasted during idle time at Gombak Station/day (2.18/liter)/day: RM13,325.4
6. Average Cost of diesel wasted during idle time at Gombak Station/year: RM5,363,890

The analysis above indicates that idling buses at Gombak bus station alone lead to monetary loss of RM5,363,890 per annum. When this is projected across the several bus stations in Malaysia, it shows even a greater loss to the Gross Domestic Product (GDP) of the nation.

5.3: One-sample T-Test Result

Hypothesis 1:
H0- There is no significant difference between the average idle time of the buses at Gombak station
H1- There is a significant difference between the average idle time of the buses at Gombak station

Hypothesis 2:
H0- The average idle time of the buses at Gombak station is not significantly higher than recommended global average.
H1- The average idle time of the buses at Gombak station is significantly higher than recommended global average.

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
MPS 1	3.287	19	.004	10.05000	3.6500	16.4500
Campus Shuttle (Rapid T200)	10.769	27	.000	67.53571	54.6676	80.4038
Cyber Jaya	4.856	6	.003	104.14286	51.6640	156.6217
T201	3.320	24	.003	10.48000	3.9652	16.9948
Genting Island	4.162	7	.004	47.12500	20.3520	73.8980
Odyssey	5.000	2	.038	3.33333	.4649	6.2018

The sample T-Test table above compares the mean idling time of the buses to the US EPA standard. The table indicates that the t-test results are generally significant at two-tailed test.

1. At a degree of freedom (df) of 19 and 5 percent significance level, the tabulated value of MPS idling time is 2.09 which is less than the calculated value 3.287, hence we reject the null hypothesis and accept the alternative hypothesis.

2. At a df of 27 and 5 percent significance level, the tabulated value of Rapid T200 idling time is 2.052 which is less than the calculated value of 10.769, hence we reject the null hypothesis and accept the alternative hypothesis.

3. At a df of 6 and 5 percent significance level, the tabulated value of CyberJaya Buses' idling time is 2.447 which is less than the calculated value of 4.856, hence we reject the null hypothesis and accept the alternative hypothesis.

4. At a df of 24 and 5 percent significance level, the tabulated value of Rapid T201 Buses' idling time is 2.064 which is less than the calculated value of 3.320, hence we reject the null hypothesis and accept the alternative hypothesis.

5. At a df of 7 and 5 percent significance level, the tabulated value of Genting Island Buses' idling time is 2.365 which is less than the calculated value of 4.162, hence we reject the null hypothesis and accept the alternative hypothesis.

6. At a df of 2 and 5 percent significance level, the tabulated value of Odyssey Buses' idling time is 4.303 which is less than the calculated value of 5.000, hence we reject the null hypothesis and accept the alternative hypothesis.

Hypothesis 1: Result
The sample t-test result has shown that t-values are significant. Thus, we reject the null hypothesis and accept the alternative hypothesis. This means that there are significant differences in the average idle time of the buses at the Gombak station. The result confirms the general notion that idling time between buses differ since they may be operating under different circumstances. The information will help in policy development towards reducing idling time of buses.

Hypothesis 2: Result
The recommended standard is that bus idling should be below 3 minutes (EPA, 2013). The findings in this study indicates that the average idling time of buses at the Gombak station is higher than 3 minutes. Hence, we reject the null hypothesis and accept the alternative hypothesis. The result confirms the buses at the Gombak station have idling time in excess of the standard. This means there is need for an urgent action to forestall health and environmental problems especially at the bus stations. The finding has also provided required information to implement policy actions on bus idling in Malaysia.

6.0 SUMMARY AND IMPLICATIONS OF FINDINGS

6.1 Summary of findings

The study has shown that public buses in Malaysia idle for long hours at the bus stations. This has huge monetary costs and effects on human health and the environment. Also, the findings indicate that different bus service providers use the Gombak bus station and contribute to the idling time diesel emissions. The study further shows that there is a significant difference between the idling time of public buses at the Gombak station. Also, the average idle time of the buses at the station is significantly higher than recommended global average.

6.2 Implication of findings

The cost implications of bus idling are quite high and avoidable. For instance, This study has shown that the idling buses at Gombak bus station alone lead to monetary loss of RM5,363,890 per annum. When these costs are calculated across thousands of bus stations in Malaysia it will indicate even a higher monetary, health and environmental implications..

6.2.1 Health Implications of Bus Idling

Information from World Health Organization (WHO) indicated that there is a growing cases of exhaust-related diseases in Malaysia[4]. Moreover, previous studies in other climes such as Israel (2009), Yarlagadda (2016), Ris (2007) as well as the EPA (2013) indicate a strong correlation between emissions from diesel engines and increasing rates of mortality, cardiovascular and respiratory diseases. In fact, diesel exhaust particle emissions are considered to be carcinogenic and toxic (EPA, 2002). Reports have proved that particulate matter from automobiles have had more serious health impacts than that produced from other sources (WHO, 2002).

The increasing rate of lung cancer and respiratory diseases in urban areas in Malaysia could also be linked to increased exposure to emissions from diesel engines especially since millions of passengers are exposed to this toxic wastes while going to, and returning from their workplaces and other intra-national travels.

6.2.2 Environmental implications

Different studies have also linked diesel exhausts and emissions to climate change and increased global warming. These have adverse effects on the atmospheric condition, plants, animal and aquatic lives. For instance, Sher (1998) gathered that primary pollutants such as Nitrogen oxides (NO + NO2) produce photochemical smog, acid rain, and nitrate particulates that destroys the stratospheric ozone. Also, particulates from diesel-exhaust lead to reduced atmospheric visibility. A reduction in bus idling time will go a long way in reversing the adverse effects of these phenomena.

6.2.3 Observation at a National Scale

There are thousands of public buses travelling through the network of roads in Malaysia. For instance, information available on the website of Rapid Buses- one of the major bus service providers in Malaysia- indicate that the company has over three thousand buses. Current research has shown that many of these bus drivers do not put off the bus engines at the bus stations thus spewing volumes of diesel exhausts on millions of passengers with attendant negative effects human health and the environment. It is high time the Malaysian government initiate and implement effective laws to ban bus idling across the country.

7.0 RECOMMENDATION AND CONCLUSION

7.1 Recommendations

To mitigate the effects and costs of bus idling the study recommends that:

1. Government should enact a policy towards limiting the idling time of buses especially at bus stations
2. Bus service providers should be sensitized on the impacts of bus idling so they can ensure proper training of the drivers on such phenomenon.
3. Government should partner with the private sector and NGOs to ensure regular training and retraining of bus drivers.
4. Fines should be included in the policy document on bus idling to curb the practices. Such fines should be borne by both bus service providers and the respective drivers.
5. Effective regular public sensitization programmed should be conducted on the dangers of bus idling. Members of the public should be enlightened on ways they can also contribute to the solution.
6. Government should ensure that buses that emit black smoke are banned from the roads to avoid further risk to urban health.

7.2 Conclusion

This study examined the effect of bus idling at bus stations in Malaysia, case study of Gombak station. The paper indicated the negative impacts of bus idling on the human health, environment with far-reaching implications on mortality, chronic bronchitis, and respiratory tract infections. To achieve its aim, the study developed two hypotheses. Data were gathered through direct observation and recording of the arrival and departure periods of buses at the Gombak station. The study observed that most of bus drivers that use the Gombak Bus station do not turn off their engines during their idling periods thus exposing thousands of

[4] https://www.who.int/gho/countries/mys/country_profiles/en/

passengers to carcinogenic exhausts which endangers the health conditions of these passengers. Furthermore, bus idling at Gombak station alone costs the economy monetary value of over RM 5.36 million/per annum, with even greater costs on human health and the environment.

This paper also identified the health and environmental implications of bus idling at Gombak and national level. The study examined efforts by governments in different jurisdictions towards curbing the menace of bus idling. It is noted that the Malaysian government is yet to implement any law to control bus idling and emissions at bus stations. This study thus represent the first major step towards drawing government's attention to the menace of bus idling in Malaysia. The paper recommends that in addition to the training and retraining of bus drivers on the dangers of bus idling at bus stations, government should promulgate laws that will deter these practices. Furthermore, stakeholders in the public and private sectors should be encouraged to conduct sensitization programmed to raise public awareness on the impact of bus idling.

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