

# IMPACT OF CAR-FREE DAY ON AIR POLLUTION AND ITS MULTIFARIOUS ADVANTAGES IN SUDIRMAN-THAMRIN STREET, JAKARTA

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**ABSTRACT:** Jakarta is one of the most polluted cities in the world. The Jakarta Government led the Car-Free Day (CFD) with aims to reduce the pollution and uses of public transportation. Based on the high participation of citizen, CFD can be a potential initiative to engage in car-free life and become a solution to reduce pollution. The evaluation of CFD impact will be done by knowing the effect through environment and participant. To know the impact on the environment, we focus on the air condition. The data from The Environmental Agency of Jakarta was used and the manual measurement that contains PM<sup>10</sup>, SO<sub>2</sub>, CO, O<sub>3</sub>, and NO<sub>2</sub> level was performed. The deeper understanding of the problem gets by observing the CFD Sudirman-Thamrin and doing an in-depth interview with participants. Analysis pattern of participant behavior will help to know how to change their perception about CFD without side effect such as a decreasing amount of participant. Understanding three main issues of CFD can be lead into improvement at planning and policy implementation, there are an environmental effect, transportation choices, and the multifarious effect such as CFD as the recreational area and the profitable area in the sight of participants. The result shows that CFD is not optimal in terms of the environment effect, but it is very good to maintain the program because it can be as a good health campaign tools, familiarize a healthy lifestyle and as a public space. However, the implementation must be improved from spatial planning and waste management.

*Keywords: Car-Free Day, Evaluation, Air Pollution, Environment*

## 1. INTRODUCTION

Jakarta is the center of the economy and government in Indonesia. As the capital city of the country, Jakarta is the most attractive place for newcomers to make a fortune. Every year an estimated 100,000 new arrivals enter Jakarta [1], making Jakarta a city with a high level of urbanization in Indonesia. Jakarta is a megapolitan area with an area of 662.33 km<sup>2</sup> [1], surrounded by supporting cities resulting from agglomeration from activities in Jakarta which are often called Jabodetabek (City of Bogor, Depok, Tangerang, and Bekasi). Based on the Air Quality Index, Jakarta is a city with the worst air quality index compared to other cities in Indonesia. Whereas in the world, Jakarta is in 50 cities with the highest levels of air pollution.

According to data from the Lead Removal Committee on Public Discussion Environmental Outlook 2018: *Menuju Keadilan Sosial dan Ekologi*, the highest source of pollution in Jakarta is caused by the use of motorized vehicles [2]. Motorized vehicles in Jakarta continue to increase every year because access to owning motorized vehicles is quite easy,

from the easy to get installments to the ease of getting a driver's license. Congestion increases, then the volume of roads is added by making flyovers, so pollution increases again. In addition, the cause of pollution in Jakarta is from industrial activity, domestic and construction project.

To overcome this problem, since 1970, the government has issued macro-micro environmental policies to minimize the negative impacts of air pollution in the capital. One example of a macro program is the Langit Biru program to control and prevent air pollution [3]. The Langit Biru program reviews the level of air pollution in cities in all provinces in Indonesia [4]. Macro programs or policies cannot work alone, they need to be supported by micro-scale programs that are directly related to the community.

One example of a micro-scale program is the Car Free Day Program. This program was officially held in 2007 in Jakarta with limited intensity at several points only because it was still in the habitual stage [2]. The Car Day program was held in several places in Jakarta and centered on Jalan Sudirman-Thamrin. CFD located on Jalan Sudirman-Thamrin (Fig.1) is

held every Sunday from 06.00 a.m. to 11.00 a.m. At that time, along the protocol road, it was closed for private vehicles, but the rapid transportation (TransJakarta) bus was still permitted to pass special lanes. Every week, the event was attended by participants from various regions in Jabodetabek. The 6.7km Sudirman-Thamrin CFD road stretches from the north of Arjuna Wiwaha Horse Statue (MH Thamrin Street) to the south of Pemuda Membangun Statue (Sudirman Street).

Along the way full of tall buildings with offices, retail malls, hotels and several embassies that make Jalan Sudirman and Jalan MH Tharin the main corridors of economic activity in Jakarta, apart from being close to the center of government and state landmarks (Monumen Nasional). This road is always crowded at rush hours on weekdays. The transportation facilities available along Sudirman-Thamrin Street are quite diverse such as the Commuter Line, BRT, Airport Train, Local Bus and MRT which will operate in 2019. It can be concluded that this corridor is a place where mass will gather and the number of vehicles passing, then the placement of CFD programs on this road is quite strategic.

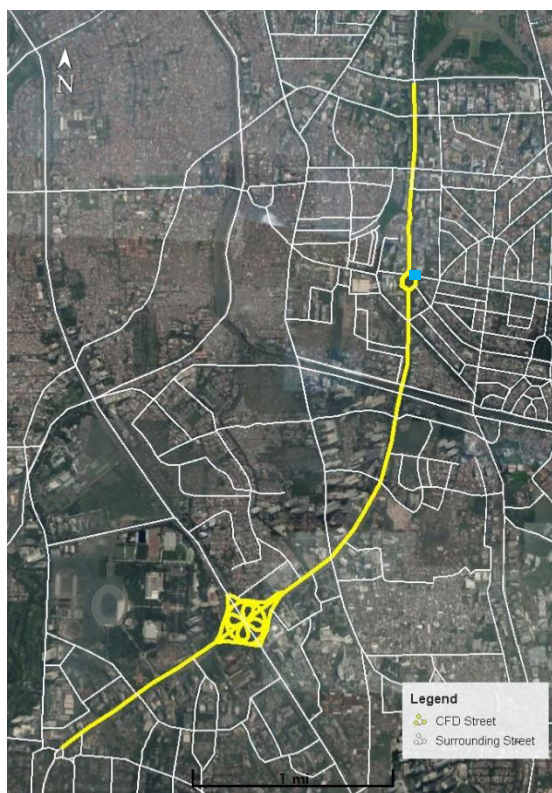


Fig. 1 CFD street area, surrounding street and the air control station (blue square). Source: Google Earth with personal processing, 2018

The implementation of the CFD involves many government institutions, one of the most significant being the presence of the Department of Transportation [5]. They began to close the Sudirman-Thamrin road at 6:00 a.m. by using patrol

cars, motorbikes, sirens, installing traffic cones and portable bulletin boards. Quickly, street vendors have started to fill the sidewalk. The most crowded time visited by participants is at 06.30-09.30 in the morning. The CFD line was reopened for private vehicles at 10:55 a.m.

The car-free program first began in Netherland 1956 [6], after that in France, 1997 under the name "No Car Day" [7]. Within 3 years, this program has been adopted by various countries in Europe. Beginning in the early 21st century, CFDs began to be applied in various cities in Asia. Car Free Day was held for 3 main objectives, namely to minimize private vehicle use, campaign for public transportation and improve air quality. There is a lot of literature that focuses on CFD air quality, but it is still rare to discuss CFDs in terms of significant transportation preferences and changes in community behavior. With this CFD, it is expected that the community can adopt a healthy lifestyle and minimize the use of private vehicles. But the factors that influence people to use public transportation are quite diverse such as the level of comfort, security, affordability of the place of origin and the purpose, cost and effectiveness of time travel. City governments in the world restrict the ownership of private vehicles through high tax pricing policies, expensive road fares and parking. There are also personal factors in personal vehicle use preferences, such as pride in owning your own vehicle, feeling safer and more comfortable. In addition, the CFD program is expected to be the first step to creating a pedestrian-friendly city.

In CFD implementation, local governments usually work with environmental institutions to calculate the impact of CFD implementation on air quality in the environment. The calculated air aspects include CO, NO, NO<sub>2</sub>, NO<sub>x</sub>, O<sub>3</sub>, SO<sub>2</sub>, benzene, toluene, ethylbenzene, *-o*, *-m* and PM<sup>10</sup> [8]. In Jakarta, air quality that measures among others PM<sup>10</sup>, SO<sub>2</sub>, CO, O<sub>3</sub>, NO, NO<sub>2</sub>, NO<sub>x</sub>, THC, NMHC, and CH<sub>4</sub>. The data obtained becomes information for the community to make health efforts, such as whether to use masks or other actions.

From its intensity, CFD only has a slight impact on reducing air pollution levels. This will be proven quantitatively later. It is necessary to review how significant the presence of CFDs is in the level of air pollution in Jakarta and why the Jakarta Government maintains this program if the impact is insignificant, whether there are other reasons or benefits from implementing CFDs. Therefore, the researcher evaluated the impact of the Sudirman-Thamrin CFD program to find out what urban space interventions and which activities were held at Sudirman-Thamrin CFD which needed to be improved.

## 2. METHODS

To find out how significant the effect of CFD is on the level of air pollution, air measurements were obtained from the Department of Environment data through measurements at the DKI 1 air control station, namely at the *Bundaran HI*. The *Bundaran HI* is the center of the mass when the road is converted into a space for Car Free day activities. Data obtained in the form of daily average data during 2015, 2016 and 2017 with parameters PM<sup>10</sup>, SO<sub>2</sub>, CO, O<sub>3</sub>, NO, NO<sub>2</sub>, NO<sub>x</sub>, THC, NMHC, and CH<sub>4</sub>.

From this data it can only be concluded on a daily average, there is no information on the intensity of pollution at certain hours. To complete this data, research is supplemented with data from air quality measurements using air monitoring tools. Measurements using this tool are carried out at the time of the CFD and the working day sample. Parameters that can be measured from this tool include AQI, PM2.5, and CO2. Measurements were made at 4 specific points on Jalan Sudirman-Thamrin (Fig.2).



Fig. 2 The locations of air monitoring during CFD and non-CFD.

The air quality criteria used to assess include the Ministry of Environment and Forestry Number: KEP-45 / MENLH / 10/1997 and air standards from WHO in 2005 [9]. The final results of air measurements will be compared with the standards of the Ministry of

Environment of the Republic of Indonesia and standards from WHO.

Table 1 Air Pollution Index (ISPU) Decree of the Head of Bapedal No. 107 of 1997 concerning: Calculation and Reporting and Information on Standard Index of Air Pollutants

ISPU	PM <sup>10</sup> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
Good					
1-50	<50	<80	<5	<120	-
Moderate					
51-100	<150	<365	<10	<235	-
Unhealthy					
101-199	<350	<800	<17	<400	<1130
Very Unhealthy					
200-299	<420	<1600	<34	<800	<2260
Hazardous					
300-more	>420	>1600	>34	>800	>2260

Table 2 Air quality standard from WHO, 2005.

Air Pollutants	Standard WHO
PM <sup>2.5</sup>	10 µg/m <sup>3</sup> annual mean
	25 µg/m <sup>3</sup> 24-hour mean
PM <sup>10</sup>	20 µg/m <sup>3</sup> annual mean
	50 µg/m <sup>3</sup> 24-hour mean
O <sub>3</sub>	100 µg/m <sup>3</sup> 8-hour mean
NO <sub>2</sub>	40 µg/m <sup>3</sup> annual mean
	200 µg/m <sup>3</sup> 1-hour mean
SO <sub>2</sub>	20 µg/m <sup>3</sup> 24-hour mean
	500 µg/m <sup>3</sup> 10-minute mean

After getting a general conclusion from the air quality evaluation, if it is not significant, the researchers indirectly suggest stopping the CFD program. Researchers look for other benefits gained by the government and participants so that the CFD program is worth maintaining. To find out this, in-depth interviews were conducted with CFD participants and direct observation. Using a qualitative approach, researchers interviewed in depth 10 participants who could be considered to represent a population consisting of street vendors, participants who exercise or recreation. Interviews are conducted by asking open questions to allow participants to answer according to their preferences without being limited by the opinion of the researcher. But there is some mandatory information that is asked, such as self-identity, address, occupation, mode of transportation that is used to get to the site, the intensity of participating in CFDs and what activities are usually done in CFD. The importance of

information from each participant will be summarized into conclusion points which can then be developed as arrangements for space interventions and CFD programs.

To see how CFDs actually work from the government side, researchers interviewed the Environment Office, Transportation Agency and the Office of Small and Medium Enterprises. Data on interviews obtained from this service will be combined with information from participants and will be a meaningful input for future CFD implementation.

### 3. RESULTS AND DISCUSSION

#### 3.1 Air Pollution Impact

Air quality measurement in Jakarta has become the duty of the Environment Agency of DKI Jakarta (*Dinas Lingkungan Hidup*). The measurements are using the automatic ambient air quality station, the data obtained is valid for the last 24 hours. In Jakarta there are 5 air quality measurement points, the point closest to the CFD is at *Bundaran HI*, DKI 1 Air Control Station.

The air measurement station obtains the raw number of air concentration on a particular day. Air quality measurements based on the Jakarta Environmental Agency standard will be converted to ISPU (Air Pollution Index) numbers. Equation (1) is the formula for converting ambient values to ISPU.

$$I = \frac{I_a - I_b}{x_a - x_b}(x_x - x_b) + I_b \tag{1}$$

- $I$  = ISPU Counted
- $I_a$  = ISPU Upper limit
- $I_b$  = ISPU Lower limit
- $x_a$  = Ambient upper limit
- $x_b$  = Ambient lower limit
- $x_x$  = Real ambient level of measurement results (mg/m<sup>3</sup> or µg/m<sup>3</sup>)

The following is the measurement result of exposure from DKI 1 station.

Data were obtained 3 years of measurement at DKI 1 station. The data showed a decrease in the concentration of PM<sup>10</sup>, SO<sub>2</sub>, and CO in 2017, where the implementation of CFD was inaugurated in 2016. While the concentration of O<sub>3</sub> rose but was still below the standard. Likewise, with NO<sub>2</sub>, the concentration has increased but is still below standard. From the data, the pollution in Sudirman-Thamrin at CFD has no significant difference with the air pollution on weekdays. The program also impacts another road, because people trying to reach someplace with another road than Sudirman-Thamrin. On the other hand, CFD just moving the concentration of pollution

to the edge. Even if we had the data from another place (DKI2, DKI3, DKI4 and DKI5 Air Control Station), we cannot relate if the air pollution was increasing in another place because people lack the roads.

Table 3 Air monitoring annual mean result from the Environmental Agency (2015, 2016 and 2017).

Data Annual Mean 2015					
Items	PM <sup>10</sup> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
Concentration	67.88	31.45	1.57	58.94	55.18
ISPU	135.77	50.32	0.16	141.4	311.7
Category	Moderate	Good	Good	Good	Good
Data Annual Mean 2016					
Items	PM <sup>10</sup> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
Concentration	59.8	47.95	2.18	39.04	8.9
ISPU	119.6	76.73	0.22	93.69	50.26
Category	Moderate	Good	Good	Good	Good
Data Annual Mean 2017					
Items	PM <sup>10</sup> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
Concentration	47.42	22.72	1.68	46.49	11.85
ISPU	47.42	36.34	0.17	111.5	66.94
Category	Good	Good	Good	Good	Good

#### 3.2 Multiplier Effect of CFD Activities

A lot of people joining the CFD makes CFD more attractive than its planned. People come with their family to CFD even their home not in neighborhood scale to the CFD area. Some of them take public transportation while the other still use their private car and park it somewhere near Sudirman-Thamrin Street.

When it comes to demand, it will rise supply. Many street vendors are born in CFD. It is because of the policy difference from previous and current governors regarding the presence of street vendors.

In the weekdays, the street vendors are trading



everywhere with portable cart, mostly in Tanah Abang, near the CFD route. Some merchants who rent a place usually have better jobs on weekdays, selling at CFDs just for as a means of promotion for their business. Some of them have their own stores or have major work such as interior design/freelance. The perceived benefits for a five-time trader are the easy access for street vendors to trade in CFDs without the need for permits and rent. While the losses are in the street vendors who rent the place because it is often obstructed by new vendors coming. From a survey of some street vendors, sales profit on CFDs rose 80-200%.

CFD traders who rent tents expect CFDs to be more rigid, while merchants who do not rent space feel fine and there is no need for change. Implementation of CFD cannot be separable from the lifestyle of urban community [10]. The loose government role of the participants invites unauthorized street vendors to join the streets that should be filled by sports activities or environmental campaigns. At different points, CFDs can be interpreted differently by the participants themselves because of the dominance of activities that are not the main purpose. CFDs initially aimed at achieving environmental resilience and increasing public awareness of transportation, but then it provided a space to consume a variety of food provided by street vendors.



Fig. 3 Street vendor on *Bundaran HI*.

Based on the research result, it can be concluded that the street vendors in the area of the car-free day (CFD) program in Sudirman - Thamrin is one of the informal sector workers. The economic income for street vendors in the car-free day (CFD) program in the Sudirman - Thamrin region gets significant benefits. This is different from the income they earn on a typical day that cannot meet their daily needs and for family savings.

Participation of street vendors to sell on the car-free day (CFD) program is very high. This is because of the enthusiasm of people who visit the CFD program is very high. Activities of community

activities on Sunday around the Sudirman - Thamrin area, such as at the Hotel Indonesia and Grand Indonesia roundabout to make street vendors selling in the area.

The presence of street vendors will not be a problem because their presence also invites many participants to come to the CFD, even street vendors could be one reason why participants want to come to the CFD. This should be utilized by the management office, to be more active in campaigning for environmental awareness. In addition, there is a need to control the number and location of street vendors not to block the main purpose of the CFD. Those the implementation of CFD in Sudirman-Thamrin will become more harmonious and also economically beneficial for participants.



Fig. 4 (a) CFD as a promotion area for event (b) People enjoying the music and dance together in the CFD area.

CFD is one example of placemaking that involves people to take to the streets [11]. Community participation is very meaningful in placemaking. Similarly, on the contrary, the arrangement of the temporal public space should be based on the patterns that occur in the field to maximize the results to be achieved. Structuring with the bottom-up method will minimize the anomaly of the inherited impact. Research using the bottom-up method can be a recommendation for an academic review for regional

government policy.

#### 4. CONCLUSIONS

CFDs in Sudirman-Thamrin function more as a result of Placemaking, rather than an environmental program. But that does not mean the program is bad. This program has its own advantages in the eyes of Jakarta citizen. While the selection of transportation modes is also influenced by public transportation facilities. The tendency to use private vehicles is also a reaction to the inconvenience of road facilities and is somewhat influenced by social demands for the upper middle class. Routine micro-scale programs should be integrated with macro programs, in order to create a more comfortable and mutually supportive city between programs.

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#### 6. REFERENCES

- [1] Badan Pusat Statistik DKI Jakarta. (2017). Provinsi DKI Jakarta Dalam Angka 2017. Jakarta.
- [2] Safrudin, A. (2018b). Status dan Roadmap Pengendalian Pencemaran Udara di Indonesia. Jakarta: KPBB.
- [3] Kementerian Lingkungan Hidup Republik Indonesia. (2018). Program Langit Biru. Retrieved December 30, 2018, from

<http://www.menlh.go.id/langit-biru/>

- [4] Kementerian Perhubungan Republik Indonesia. (2005). Program Langit Biru untuk Mengendalikan dan Mencegah Pencemaran Udara. Retrieved December 30, 2012, from <http://dephub.go.id/post/read/Program-Langit-Biru-untuk-Mengendalikan-dan-Mencegah-Pencemaran-Udara703>
- [5] Gubernur Provinsi DKI Jakarta. Pergub No.12 Tahun 2016 Tentang Pelaksanaan Hari Bebas Kendaraan Bermotor, Pub. L. No. 12, 1 (2016). Indonesia. Retrieved from [www.hukumonline.com](http://www.hukumonline.com)
- [6] Safrudin, A. (2018a). Car-free Day - Hari Bebas Kendaraan Bermotor, Character Building Masyarakat Kota. Jakarta.
- [7] Rahadi, R. A., Hapsariniaty, A. W., Sarasvati, S. L., Kania, S., & Paramitha, T. P. (2012). Turning Road to a Public Place : Case Study of Car Free Day Phenomenon in Bandung, 37–46.
- [8] Masiol, M., Agostinelli, C., Formenton, G., Tarabotti, E., & Pavoni, B. (2014). Thirteen years of air pollution hourly monitoring in a large city: Potential sources, trends, cycles and effects of car-free days. *Science of the Total Environment*, 494–495, 84–96. <https://doi.org/10.1016/j.scitotenv.2014.06.122>
- [9] World Health Organization. (2006). WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide. Geneva, Switzerland: WHO Press. [https://doi.org/10.1016/0004-6981\(88\)90109-6](https://doi.org/10.1016/0004-6981(88)90109-6)
- [10] Prasetyo, F. A. (2017). *Jurnal Pemikiran Sosiologi* Volume 4 No. 1, January 2017. *Jurnal Pemikiran Sosiologi*, 4(1), 1–18.
- [11] LeGates, R. T., & Stout, F. (2011). *The City Reader*. Routledge urban reader series (6th ed.). New York: Routledge. <https://doi.org/doi:10.4324/9780203869260>

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