

# CHAPTER I

## INTRODUCTION

### 1.1 BACKGROUND

Fast growing population, in addition to socio-economic growth, has contributed to impact on number of vehicles operating on the road. The more dense population, the more vehicles to be operated as transportation device. Large number of vehicles and their growth rate are believed to be the major factors, which have been placing the transportation sector as the leading contributor of CO anthropogenic emission (Lopez, 2002).

Urban transportation, which Indonesians call it, minibus, is one of example of public transport. This type of transportation device has been largely used in the country. Minibus acts as a good alternative for fulfilling the needs for economical transportation. Minibus has been popular in Indonesia, in particular for those with low income. However, some problems may be present, such as inadequate condition of the vehicles to be operated. Such condition affects the satisfaction rate of the people as the users.

The above paragraph illustrates a contradicted situation, in which on one hand people need public vehicles to transport them from one place to another, but on the other hand the number of the operating vehicles ignores the environmental aspects.

This research uses Mangkang Bus Station as the object of examination. The station is closely related to people-related activities. The CO contents found at the location, based on sampling result from minibus, shows threatening impact due to pollution. The impact does not only apply to the commuters, but also to the passengers as well as the people living nearby the researched location.

Emission derived from motor-vehicles consists of hydrocarbon, carbon monoxide, nitrogen oxide, sulphuric oxide, and particles such as smoke. Carbon monoxide (CO) is the most dominating motor-vehicles-born pollutant contained in the contaminated air compared with the other pollutants (Ferdiaz, 1992, in Purwani, 2004).

Carbon monoxide (CO) is a kind of polluting gas compound due to incomplete ignition from fossil fuels. Transportation sector continues to be the largest CO emission contributor to the environment (Cooper and Alley, 1994). Many studies have focused on carbon monoxide level

because the pollutant correlates to serious health effect and because of its easily identified source (Sakena *et al.*, 1992).

## **1.2 RESEARCH PROBLEM**

Increasing number of population has caused increasing growth rate and number of motor vehicles as transportation device. Due to economic reason most Indonesian people have tended to choose minibuses as their transportation device. However, most minibuses are in poor condition. The poor condition relates to irrelevant machine operating condition. Most minibuses have likely to pollute the air with their overloaded emission. The passengers and the commuters are exposed with CO substance derived from the motor vehicle. This condition will surely haphazard the health quality of the affected individuals. Accordingly, a research aiming to find out the CO's concentration rate is deemed necessary, as the researcher did at the Mangkang Bus Station sampled inside and outside the minibus. In addition the research was projected to find out determining factors, such as number of vehicles and air ventilations. Furthermore, the research is important to extend the scope of scientific studies on the CO concentration in public transport, especially minibus.

## **1.3 RESEARCH QUESTION**

The problem discussed in this research is explored by means of research questions, as follows:

1. How much CO concentration inside minibus ?
2. How much CO concentration at Mangkang Bus Station ?
3. Is there any relation between CO concentration and time (morning, daytime, night time)?

## **1.4 RESEARCH SCOPE**

Problem limitation of this research is determined according to available time, cost, and ability of the researcher by considering the following aspects:

1. The research takes place at Mangkang Bus Station, Semarang
2. The quality of ambient air in question is carbon monoxide (CO), one of the largest pollutant contributors derived from motor vehicles.

3. The research does not deal with the effect of CO gas on individuals living nearby the researched site, but analyzes the CO gas in ambient air inside minibus and outdoor at Mangkang Bus Station, assesses the effect of the number of vehicles on the measurable CO concentration.
4. In line with time dimension, the measurement will be performed when the minibus turn on.

## **1.5 RESEARCH OBJECTIVES**

This research as purposes as the followings:

1. To measure CO gas concentration inside minibus.
2. To measure CO gas concentration outside minibus..
3. To find out the relation of CO gas concentration with time (morning, daytime, night time).

## **1.6 RESEARCH ORIGINALITY**

Researches on air quality inside and outside motor vehicles (i.e., school bus), have been performed in the United States, in particular in Washington and Central Texas. The parameters to be measured in Central Texas were nitrogen oxyde, sulphuric compounds, CO<sub>2</sub>, and PM<sub>2,5</sub> (Donghyun Rim *et al.*, 2008). Whereas the Washington case used PM<sub>2,5</sub> as the parameter for the research (Sara D. Adar *et al.*, 2008).

The previous researches have not included CO concentration so that it is necessary for the current research to perform a calculation of the CO gas concentration, in this case, inside and outside the public transport. The subject of the study will be minibus public transport at Mangkang Bus Station, Semarang. Furthermore, the ongoing research deals with assessment toward the effect of the number of vehicles entering and leaving the bus station, the number of vehicles with turned-on machine status, and air ventilation (for a condition inside the minibus) on the CO concentration.