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Initiatives to reduce transport-related pollution in selected Polish cities

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Abstract

According to the reports of WHO, air quality is deteriorating year after year. This phenomenon mainly originates in energy, industrial and transport activities of countries and cities, becoming the direct cause of global problems associated with the greenhouse effect, acid rains or the ozone hole. The fastest growing metropolitan areas are also the most contaminated ones where the protection of people, animals and plants poses a serious challenge. Although the analysis of recent years clearly indicates that air quality in Polish cities is getting better, the indicators of pollution are still too high. According to the norms for gas and dust, the most polluted places in Poland are the Cracow metropolitan area and Upper Silesia. The significance of transport is conditioned by the fact that, in Europe, transport is responsible for more than half of total emissions of nitrogen oxide and nearly half of carbon dioxide. Nationally, the level of emissions of these gases amounts to about one third. In addition, the significant problems of road transport are numerous traffic accidents and impediments in the flow of traffic, observed especially in urban areas. The aim of the paper was to evaluate the impact of transport-related pollution on the functioning of urban areas. The obtained results will allow for the review of the most effective solutions which provide guidelines for development for smaller cities towards the environmental protection and optimization of the level and type of transport to reduce the phenomenon of congestion.

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Introduction

Transport is one of more important elements of business functioning on the market, and therefore introduction of standards, among others, aimed at reduction of exhaust emissions is a measure which is both needed and necessary nowadays (Pardo, 2012). More than half of total emissions of nitrogen oxide and carbon monoxide corresponds to road transport. In addition, significant problems include numerous road traffic accidents and traffic flow obstructions observed especially in urban areas. These problems motivate for a more detailed discussion contained in this article.

The economic development has a major impact on an increase in the significance of transport for the social and economic life. The contemporary desire of people to relocate and to carry goods has brought about significant changes in road transport, which undoubtedly has affected the natural environment. Pollution resulting from an increasing number of vehicles, among others, caused by an increase in interest in logistics services, has a negative impact on living conditions. However, it should be pointed out that the necessity of development in this field of social life is the result of the progress of civilization. Actions carried out by countries, governments and private institutions aim at reducing the negative impact of transport on the natural environment and living conditions. It is very important for all institutions and organizations to join their activities to achieve a common goal. Each enterprise ought to include the environmental aspect in their operation strategy on markets. Implementation of any modernization allowing for reduction of negative effects of conducting business activity should be appreciated by customers, since it leads to improvement of living conditions. In large cities with busy transport routes, apart from exhaust fumes, there may be a lot of other adverse effects affecting the quality of life and the natural environment, such as congestion, noise, the wear of infrastructure, etc. Due to the lack of possibility of transport elimination, various initiatives are applied, aiming at reduction of negative impacts of transport in cities. Pollution in cities is the result of many factors, therefore, it is important to look after the natural environment as early as today to prevent problems in the future.

Cognitive and practical objectives were realized based on the conclusions of the study. The research process consisted of the following steps:

- desk research,
- research analysis of statistical data.

Pollution in cities

The impact of pollution on the quality of life and the environment is significant due to the increasing influence of harmful substances, particularly in urban areas (Nitkiewicz, 2009). It is assumed that transport brings about air pollution amounting to as much as 40%. Table 1 presents the breakdown of substances affecting human health.

Table 1. Types of substances released by vehicles (Przybyłowski, 2011)

Substance	Formation
CO, carbon monoxide:	The substance released during rapid and incomplete combustion of fuel, especially during traffic jams. Carbon monoxide combines with oxygen in the atmosphere to form carbon dioxide CO ₂ .
CO₂, carbon dioxide:	The substance is the result of exhaust emissions. In natural conditions (without pollution) it occurs in small amounts in the air, playing an important role in vegetation processes, in the course of photosynthesis. Nowadays, there is too much of it for plants to absorb.
NO_x, nitrogen oxides:	Substances formed by combination of nitrogen and oxygen in high temperature in the air, e.g. in engines of vehicles during traffic jams. NO _x appears in the form of the so-called acid rains which produce the characteristic fog - smog.
HC, hydroxides	Substances formed as a result of incomplete combustion of fuel and motor oils, particularly in

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