

TRACKING AIR POLLUTION: SOLUTIONS FROM 3 DEVELOPED CITIES

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ABSTRACT

The research paper examines the trajectory of three cities that have been affected by air pollution and continue to deal with it today. Tokyo, Oslo, and Los Angeles are seminal case studies that show how effective governmental policies can tackle pollution caused by industrialization. I analyze the methods each city used and propose the compilation of a database designed to help developing countries who are going through the same growing pains already experienced by mature economies. The database will allow countries to cherry-pick policies and initiatives that can produce optimal outcomes for their individual needs. The takeaways from an expansive city like Los Angeles may not necessarily be beneficial for highly dense urban municipalities, but other aspects of their environmental measures may be useful. The three cities used as case studies attempted to resolve air pollution and had varying levels of success. Perhaps most impressive was Oslo's bold and aggressive push for electric cars, as the research showed that electric cars were paradigm-shifting and market-altering. Developed economies also have much to gain from the establishment of an air pollution database, as it is an issue that must still be dealt with in a meaningful way in order to combat climate change. This research paper has the potential to help both developing and developed countries in facing this gargantuan task.

INTRODUCTION

Today the world is witnessing a change in the business environment but one thing remains constant that industrialization is still the main central pillar that runs the economy. However, industrial pollution is regarded as one of the major contributors to global warming and greenhouse emissions (Houghton). Fossil fuels are burned, which release chemicals and gases into the air. The temperature of the earth is increased with methane and carbon dioxide in air pollution (Houghton).

Industries in the developing countries due to improper measures, policies and strategies are not only responsible for polluting the air but harming the environment through chemicals, noise, vibrations, and radiations. Ulcers and cancers are also caused by chromium compounds of dyes and many tanneries. Air is also affected by pollen and mould that are allergens from grass and trees that mix with the air (Straif, Aaron and Sameet). These can be hazardous for human health. These are not in control of the government as they are not regulated by the government but still, human actions are directly connected through it. This becomes terrible and even more dangerous when there is water damage in the workplace, school, or homes (Magsi).

The toxic waste from industries has become an eminent issue not only in the developing countries but also in the developed ones as well.

The governments of various countries are working to find solutions for this as they have realized that it is high time now and it has become a necessity to incorporate environmental sustainability acts and make them enforce. For these global developing countries, Tokyo, Los Angeles and Oslo offer great examples. These three cities hold significant importance due to their effective governmental policies put in place to tackle the pollution caused by industrialization in their histories (Kunugi, Arimura and Iwata; Hornyak; Port of LA - CAAP). The governments of these cities are also coming up with new techniques and ways to make the population to shift to machines that are not harmful to the environment. The working thesis of the research addresses the case studies of three cities of Tokyo, Oslo, and Los Angeles to critically analyze their histories of industrialization, sources of air pollution, and governmental policies and strategies taken by these countries to tackle the environmental challenge of air pollution smartly. The rationale behind the research is to propose a compiled database of air pollution that will serve as guidelines for developing countries while still in the emerging stages of industrialization. The main aim is to identify how the

other countries can navigate air pollution policies that best match their economies, demographic and geographic.

TRACKING AIR POLLUTION

Air pollution is an issue that is a problem across territories. It has been a challenge that is faced globally since the industrial revolution came and there was a rapid increase in industrialization. According to the World Health Organization also known as WHO, there were about 3.7 million premature deaths both in urban and rural areas (Sivaramanan). There are many sources, which lead to air pollution. Transport is one of the leading sources of air pollution. The population has been increasing in all countries, which ultimately demands more transport to make it possible for those people to commute.

Developed countries have a proper system for public transport but still, many use their private transport. Electric cars are seen as a game-changer in the automobile market, which will eventually help in protecting the environment but still, it might require a lot of time in the developing nations to accept this technology of electric motors in vehicles (Mackenzie). Most people are still using combustion engines, which are very harmful to the environment. The problem does not end here with traffic on roads but it is also a serious issue at harbors. Turbine engines of huge ships emit tons of toxic particles and greenhouse gases in the air. Mostly these ships are used for the fishing industry. Considering that the fishing industry is not the only business that needs these ships because these ships with huge turbine engines are used to the transportation of goods by many manufacturing companies as well. Tons of waste by industries is burned that again is a big threat to the atmosphere because it is observed contaminating the environment with persistent organic pollutants (Nikolic, Radmila and Spiro, 120). Based on the working thesis of the research, the three case studies are analyzed firstly to address industrial histories and causes of air pollution in these cities.

HISTORY OF INDUSTRIALIZATION AND CAUSE OF AIR POLLUTION

Case of Tokyo

Tokyo, which the capital city of Japan and considered one of the busiest cities in the world is also facing tremendous problems of health due to air pollution. Industrialization is said to be a major contributor of that because Japan is recognized for its manufacturing industries all around the world. On the other hand, mobile sources also contribute a lot to air pollution through nitrogen oxide. Air pollution was not only seen as disturbing the health of the people but also

the business especially the fishing industry (Straif, Aaron and Sameet). Fossil fuels that were burned and the creation of heavy metals gradually enter the atmosphere by making their way into water bodies.

However relevant institutions and authorities of Tokyo have taken significant steps to control the air quality in recent times. It is much better than it was years back. Previously the situation was worse as one square kilometer of the city was almost blanketed by around 15 tons of soot. 0.25 to 0.35 parts per million particles of soot were recorded floating in the air in the winters. Many people from all around the world who visited Tokyo found that driving in the city was terrifying. The reason behind this was that visibility became unclear due to the emissions in the air. The government have been emphasizing a lot on this issue of air pollution from many years. In 1999, campaigns such as 'Say No to Diesel Vehicles' clearly stated the facts that how these diesel vehicles are disastrous in terms of environment (Burch and Gilchrist). Almost all the diesel vehicles were banned who did not meet the quality standards that were set by the government and the health organizations. The situation is a lot in control today but still, Japan needs to work more on sustaining the environment as the patients of asthma are growing the megacity of Tokyo.

Case of Oslo

Today the capital city of Norway known as Oslo is seen as a benchmark when it comes to controlling air quality. The city has a population of about 670,000 people but still, the government has strived for making it a city, which is clean in terms of climate and clean air. The car industry of Oslo can be regarded as the key player in this regard. The whole city prefers using cars that are zero-emission vehicles. Through this mindset and efforts, the car industry will be helping the strategy to reduce carbon dioxide by ninety-five per cent in 2030 (United Nations). The government is keen to bring electric cars into the consideration set of the people. It is seen promoting electric vehicles on every platform by giving maximum leverage and facility to users of electric cars or the people who tend to buy electric cars. Reduced taxes are one of the facilities that are being provided to the people who own an electric vehicle (United Nations).

Drivers of electric vehicles are also given access to taxi and bus lanes. Free parking and no toll are among the many rewards that they are given with. The government had also had spent money in recent years to install about 1000 charging stations. However, they plan to install more in the coming time. The government is not only implementing this on private vehicles but plans to make the public transport powered by renewable

energy by the end of the year 2020 (United Nations). The changes and progress of the city are visible if compared to the situation before 2012. There has been a major decrease in the carbon dioxide in which 35% of the contribution is due to the electric vehicles. The government is feeding people with a mindset that pedestrians and cyclists are valuable and assets to the country. The government also plans to use the parking spaces for other uses (United Nations).

Case of Los Angeles

Los Angeles is a big city of the United States of America, which is also regarded as the long beach riverside area. The city was the most ozone polluted city in 2013. The city is a megacity and ports are a major contributor to air pollution. Due to the overpopulation, there is always traffic on roads. Each family has more than one car as individuals in the family drive by their own to their workplaces this also results in more traffic on roads (Khan). The weather of the city also contributes to the formation of ozone because most of the days are sunny whereas there is very less rainfall. Not only the weather but also the local geography is an ideal ground for the creation of air pollution as the circle of mountains around Los Angeles trap the pollution within the area.

Due to this feature, the San Gabriel Valley, which lay to the east of Los Angeles was referred to as the "Valley of Smokes" by the locals even before the advent of modern transportation. It has the worst smog and the worst air quality in the country. Serious health problems of breathing and asthma are recorded in Los Angeles, which are increasing with every passing day.

Air pollution has affected the city of Los Angeles for decades, with the year 1943 being a critical moment when the smog was so thick that many believed that the city was under chemical attack of Japanese. The root cause of air pollution was later discovered to be the car industry, which at the time was the largest in the world. The problem has had adverse effects on the health of citizens, especially the children. Result of the Children's Health Study has shown that air pollution has caused asthma and other respiratory illness in children (CARB).

After an in-depth analysis of histories of industrialization in the three case cities and the causes of air pollution in these cities, the next section of the research paper addresses how the governmental policies and strategies were aligned to tackle air pollution in these cities.

THE SOLUTION TO AIR POLLUTION – ANALYSIS OF SELECTED CITIES' STRATEGIES AND POLICIES

In line with the working thesis of this paper it can be depicted that in many countries, environmental protection has been made a top priority by the government. Free parking and fewer taxes are imposed on hybrid and electric cars (Oliver and Jason). All these steps are taken by the governments to make people shift to these cars. On the other hand, concepts like carbon management accounting are followed in the companies to keep a check and balance on the amount of waste it extracts (Burrirt, Stefan and Dimitar, 82). Alongside many non-governmental organizations are striving hard to spread awareness about the dangers that the world might face in the coming future. The case cities offer significant insights and lessons in this regard.

AIR POLLUTION POLICIES AND STRATEGIES IN OSLO

Oslo's Air pollution strategies are exemplary in shaping economic activities of the city by tracking and reducing the amount of air pollution significantly. It can be determined that air pollution in Oslo city has decreased from the past 50 years. There is a significant effect of the local measures that were taken such as the introduction of plug-in electric care, movement of transportation outside the country, the transfer of shipping and service industry outside. Although there is still more work to be done. Oslo is the capital of Norway in which more than 670,000 people live and the local bodies took measures to ensure that the air quality level is optimum and not harmful for the human body (Gilliland, Avol and McConnell)

Earlier, the effects of air pollution were so severe that even the developed cities need to work to protect health and atmosphere. Oslo is one from 42 cities that has started certain campaigns along with the collaboration of WHO and UN Environment to inspire other developing cities in the run of environment protection. Vehicles having zero emissions play a major part in the strategy of the city to reduce the equivalents of CO₂ by 95% by the year 2030 (Mirza). Due to this, the officials of the city are trying to encourage the people for making the transition towards the electric vehicles.

Several benefits are also offered to the drivers via this strategy i.e. the reduced taxes, access for the lanes of bus and taxi, public ferries, free municipal parking, and free travel on the toll roads are included. Meanwhile, an emerging trend has been observed that the public transport in Oslo and the neighboring countries have shifted towards renewable energy. By the

year 2012, the electric vehicles were contributing around 35% decrease in the emissions of CO₂ in the city, which also improves the quality of the air as well as public health. Oslo is also considered as the country with the highest number of electric vehicles in the world (Grundt).

There are many ways to measure the quality of air in Oslo that were revised in the year 2017. Other developing countries can also gain a significant lesson from Oslo's policies and practices. For example, the council of the city has adopted a revised plan to improve the quality of air in the year of 2018. In this action plan, there are 40 points, which are categorized into several steps necessary for reducing high levels of air pollution and general measures for improving the air conditions (Mirza). The municipality of Oslo has also developed a contingency plan to deal with the higher level of air pollution resulting from the nitrogen dioxide. The plan covers large areas of the city with pre-determined actions. This can be implemented by other cities in the world too.

AIR POLLUTION POLICIES AND STRATEGIES IN TOKYO

Likewise, the Metropolitan Government of Tokyo has also shown great efforts in dealing with the issue of air pollution. They have regulated the air pollutants like smoke from the factories bypassing specific ordinances and other regulations. In the 1990s, there was an increase in the traffic flow, which escalated the air pollution resulting from the black smoke. Mainly, the emissions from automotive were responsible for such bad air pollution. Hence, the municipality responded promptly and developed the city's regulation to address the gas emission from the diesel-based vehicles in the year 2003. Due to such a rapid response, the air quality of Tokyo was mainly improved. The concentration of photochemical oxidants, however, still exceeded the environmental standards along with PM_{2.5} in several monitoring stations (Kunugi, Arimura and Iwata).

To improve these conditions, "Say No to Diesel vehicles" campaign was initiated in 1999 to act following the Institute for Global Environmental Strategies. At the end of 2000, the Metropolitan Government of Tokyo further amended the pollution control ordinance for the first time in the past 30 years. They passed the protection of municipal environment protection of Tokyo, which is officially known as the Environment Ordinance. The ordinance ensured the health, and safety of the citizens of Tokyo. The original ordinance had played an important role to protect the health of the citizens from the pollution of industries, which helps in improving the

urban environment (Kunugi, Arimura and Iwata). Later, Tokyo Metropolitan Government's Bureau of Transportation did initiate the services of hydrogen-powered busses to shuttle between Tokyo Station and Tokyo Big Sight in the district of Odaiba. This helped in reducing the effect of big business and their operations on the city's air environment up to a greater extent.

However, still, there is need of new approaches and regulations that are very necessary to respond to the newly emerging concerns of the environment like traffic pollution, hazardous chemical emissions, the heat island effect as well as global warming.

AIR POLLUTION POLICIES AND STRATEGIES IN LOS ANGELES

Similarly, air pollution policies and practices have also improved the air quality of Los Angeles. These have provided immense support in the zero-emission from the vehicles. Air pollution is considered as the main problem of Los Angeles after World War 2 (Payne-Sturges). There are several effective remedies, which were taken promptly and through effective coordination among the residents, government, and businesses (Gilliland, Avol and McConnell).

Several federal laws are implemented in the country like the Clean Air Act as well as the National Emission Standards for the cars. Additionally, the individual strategy of California regulatory has been playing a vital role as this was started as an antipollution effort in the 1970s. California Ambient Air Quality Standards are developed to identify the specific criteria for air pollutants to be considered by the county and districts in it. The Acts are useful in control greenhouse gas emissions from the local transportation as well as businesses. The regulations obliges the stakeholders to curtail the operations that are likely to violate rules or threaten the air quality respectively (Gilliland, Avol and McConnell).

Additionally, California has also developed 35 air quality agencies at the local level. Evidences indicate that, "*The South Coast Air Quality Management District (SCAQMD) is tasked with developing the Air Quality Management Plan (AQMP) for the South Coast Air Basin, which includes all of Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino Counties*" (Physicians for Social Responsibility Los Angeles).

Still, after these regulations, the air environment of LA contained smog in the air. To tackle the issue, marked progress was made after the adoption of the catalytic converters, which

are capable of cutting down the emissions from vehicles significantly (Gilliland, Avol and McConnell).

CONCLUSION

The main aim of the research was to track the solutions of air pollution for three of the major cities in the world, which includes Tokyo, Oslo, and Los Angeles, which helps in finding out the solution to air pollution in other cities of the world. This study includes the three case studies of these cities to analyze the sources, reasons as well as solutions for the air pollution along with the strategies and policies, formulated by the government of such countries to reduce it. This research would help other countries to navigate the air pollution policies, which fits best with their problems and resources. However, regardless of the policy selected by them, it is important to adopt the stakeholder's approach to stay successful in the outcomes. Without coordination from the regulatory as well as citizens like visible in the three case studies, governments would not be able to reduce their air pollution and improve their air quality. Citizens, businesses, regulatory as well as policy makers, all must work together.

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