DECISION MAKING PROCESS OF MANAGERS TOWARDS SUSTAINABILITY AND ENVIRONMENT AFFECTED BY COVID-19

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ABSTRACT

The need to behave responsibly towards the environment is an increasingly addressed topic in many areas. People are increasingly trying to behave in harmony with nature, because they are aware of the fatal consequences of human activity on the environment. The current states of the world voluntarily participate in the meet of the goals of the 2030 Agenda. In order to meet the goals of the 2030 Agenda, we need to apply "sustainable behavior". The current situation in the world during the COVID-19 pandemic "helped" us to improve air quality, which in the short term helped to acquire better air quality values. This fact applies to the goal of Agenda 2030 number 11 - Sustainable Cities and Communities, which secondarily affects other goals. The subject of the article is to record and evaluate the change in air quality during the COVID-19 pandemic on the basis of daily recorded data and make a possible options of air quality states that we can expect after the end of the pandemic based on managers decisions.

KEY WORDS: COVID-19, sustainable development, environment, economy, management.

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1. INTRODUCTION

Air pollution is one of the most important environmental problems in the world. Air quality significantly affects sustainable urban development (Tanaka, 2015). The control and recording of air pollution has recently become a major topic of socio-economic development. Ambient air quality is deteriorating significantly in developing countries. Pollution is mainly caused by production emissions (Alvarado et al., 2017). People are becoming increasingly aware that it is industry, transport and human activity that have a negative impact on the environment. It is human activity that is the cause of air pollution, which hinders the achievement of sustainable development goals. The direction of sustainable development is influenced by several environmental stimuli.

The world is currently battling the COVID-19 coronavirus pandemic, which has affected almost every country in the world. During this pandemic, we encounter much cleaner air, especially in developing countries. Manufacturing companies produce fewer products, world transport has fallen sharply, and overall industrial life has slowed. Much less emissions are released into the air, which significantly improves air quality, especially in industrial areas.

Topic of pandemic impact on environment is widely worldwide discussed (Zhang et al., 2014). The COVID-19 pandemic is causing changes in the lives of people around the world. The governments of almost all states have taken measures that have led to the cessation of industrial and transport activities to prevent people from meeting.

However, we can say with certainty that this situation is only temporary. We can notice that in places where factories have been put back into operation, air quality values are deteriorating. It is important to think about ways in which air quality values can be kept "green". Also, we need to think about how managers can be more responsible and think more environmentally in decisions carrying out production activities.

2. LITERATURE REVIEW

Polluted air has a negative impact mainly on the lives of humans, animals but also all ecosystems. The quality of water, soil, air is declining and we are growing up in a unhealthy world. Nowadays, respiratory and lung diseases, cough, asthma, skin problems, heart attacks and premature death belongs to a part of

our lives. Zhu et al. (2020) show in their study a significant synergistic impact on human mortality is due to air pollution and the extent of residential greenery around.

Air pollution is also a serious problem in Europe (Štefánik et al., 2020). In 2015-2017, 13 to 19% of the population exposed to polluted air was above daily limits (EEA, 2018). More than half of Europeans living in cities breathe excessively polluted air. The Slovak Republic is one of the countries in the European Union that has not been able to meet the goal of reducing PM2.5 particulate matter in recent years. The Slovak Republic is also one of the countries with the highest PM10 values in the European Union. Italy and the Slovak Republic are among the countries with the highest measured values of PM10 and O3.

The situation regarding air pollution in China is far worse than in Europe. China belongs to one of the most polluted countries in the world. Chinas people in ordinary life cannot imagine leaving the house without face protection, just as they forgot what the night sky looks like due to never-ending smog. Industrialization and urbanization in China is growing rapidly. Chinas GDP is high at the expense of environmental pollution.(Tao et al., 2012). Recent years in eastern and central China have been showing an increasingly negative impact on the health of people who are increasingly suffering from various respiratory diseases (Xia et al., 2017).Polluted environment is one of the biggest obstacles to achieving sustainable development goals in China. Air pollution in China is one of the largest causes of human death in the country (IHME, 2018). For example, the Beijing-Tianjin-Hebei region is one of the eight most prominent areas in China (Zhang, 2019). This region covers an area of 216 thousand square kilometers and is home to 110 million people. Air quality measurements are constantly monitored in the region, and at the same time the government is looking for new ways to prevent this negative trend of air pollution.

2.1. Pandemic COVID-19

The COVID-19 pandemic, which has been gradually affecting the whole world since 2019, has a significant impact on people's lives as well as the environment. This pandemic has significantly affected the current situation, but its consequences will persist for several years in the world. In many countries, there has been a decreasing of social life, production and transport. People spend most of their time at home, many companies have moved to an active home

office, but on the other hand, many people have lost their jobs as a result of a pandemic.

Researchers at Harvard University have found in their research that in regions where the measured value of PM2.5 is higher, there is also a higher mortality from COVID-19. This is because small particles known as PM2.5 penetrate deep into the body, thereby promoting hypertension, respiratory burns, leading to health complications in patients with coronavirus disease. Research from Manhattan (new epicenter of COVID-19 infection in April 2020) showed that if PM2.5 were lower over the last two decades, far fewer people would die (Gardiner, 2020).

According to scientists, the quality of the environment has significantly improved in the area from Wuhan Province to Italy. Even in India, a place that is one of the most polluted in the world, people can clearly see the Himalayas during a pandemic. Some people in India have not seen the Himalayas never before. This is due to a significant decrease in PM2.5 particles, the value of which has rapidly decreased by 70%.

Detels et al. (2003) found in the SARS outbreak in 2003 that the mortality rate in highly polluted areas of China was twice as high as in less polluted areas. Scientists think that viruses bind to fine particles, on which they survive longer. . Based on his own analysis, Professor Burke (2020) of the University of Stanford presented several conclusions that the disease COVID-19 causes in relation to the environment and human life. These include saving more lives in the world due to cleaner air than the number of victims with COVID-19. According to the scientist's calculations, 53-77 thousand lives will be saved in China during the coronavirus pandemic. In China, about 1.2 million people die each year as a result of air pollution.

Myllyvirta argues that we can only achieve cleaner air in the world by switching to clean energy and transport (Gardiner, 2020). According to her, cleaner air is just proof of how quickly we can reduce air pollution if we reduce the burning of fossil fuels. This fact is considered an unexplored area for the definition and design of new tools that would help maintain the "green values" of air quality in the future due to more environmentally friendly production.

3. RESEARCH METHODOLOGY

The primary aim of this article is to determine the change in air quality during the COVID-19 pandemic on the basis of daily recorded data. The secondary aim is to identify the options states of air quality that we can expect after the end of the pandemic. In order to effectively achieve the defined goals, it is necessary to analyze, compare and synthesize key findings from the available secondary data.

The first step is to define the theoretical basis for the studied domestic and foreign literature. The second step consists in obtaining primary data. We obtained these data through daily recording of average air quality values in selected territorial units - Slovakia, Italy and the province of Wuhan in China. The data was provided to us by a company that continuously records air quality data through government sensors, satellite data, meteorological and other information. The data are further processed using algorithms to calculate air pollution. The company that displays the current data of air pollution quality is based in Israel. We chose it as the primary source of relevant data due to the high number of displayed air pollutants (Figure 1). I recorded the data every day during the first month of the pandemic COVID-19 in Europe from 22 March 2020 to 22 April 2020. The purpose of the data was to detect changes in air quality due to government measures resulting from the COVID-19 pandemic.

Pollutant	Sources of Pollution	Health and Environmental Impact
PM10	Combustion processes (fire), Mechanical processes (construction building, agriculture) Biological processes (Bacteria and Fungi)	Cough, heart and lung diseases, rarely death
O3	It is the result of a chemical reaction between nitrogen oxides, carbon monoxide, organic compounds, atmospheric oxygen in the presence of sunlight	Cough, respiratory diseases
PM2,5	Power plants, exhaust gases, transport, Mechanical processes (construction, mineral dust), Biological processes (viruses and bacteria)	Respiratory diseases, cough, heart attack, premature death
NO2	Fuel burning	Asthma, decreased lung function, risk of respiratory infections
CO	Power plants, car exhausts	Nausea, dizziness, headache, loss of consciousness
SO2	Power plants, industry, transport	Cough, respiratory diseases
C6H6	Car exhaust, industrial emissions	Headache, loss of consciousness, confusion, eye and skin irritation
NO	Industrial emissions, transport	Respiratory diseases, greenhouse effect

Figure 1: Elements of air pollution used in measuring the resulting values

4. RESULTS

The following figures show the maximum and minimum levels of air pollution during the period March-April 2020 in Slovakia, Wuhan and in Italy. During the defined period, the maximum value (72) was measured in Slovakia on 15 April and the lowest value (60) on 24 March (Figure 2). The average value of air quality in Slovakia was 67.5. The highest measured value (73) in Italy was on 15 April and the lowest value (46) was recorded on 28 March (Figure 3). The average value of air quality in Italy was 67.22. The highest value (74) during the period was measured in Wuhan Province on 28 March, the lowest value (13) was recorded on 6 April (Figure 4). The average value of air quality in Wu-chan Province was 39.75.
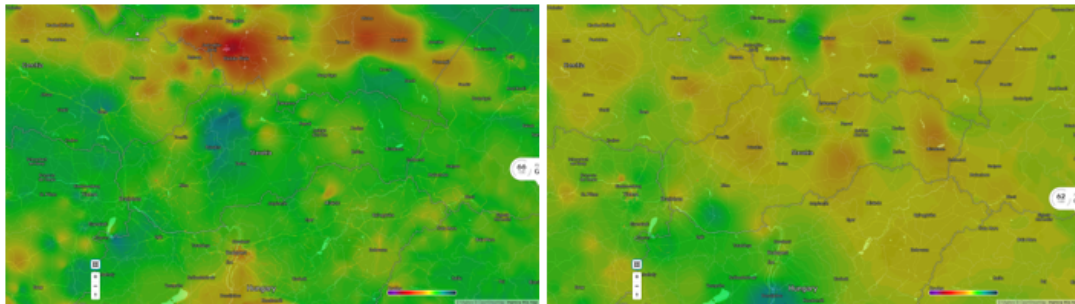

Figure 2: Maps of the lowest and highest values of air pollution in Slovakia during the observed period
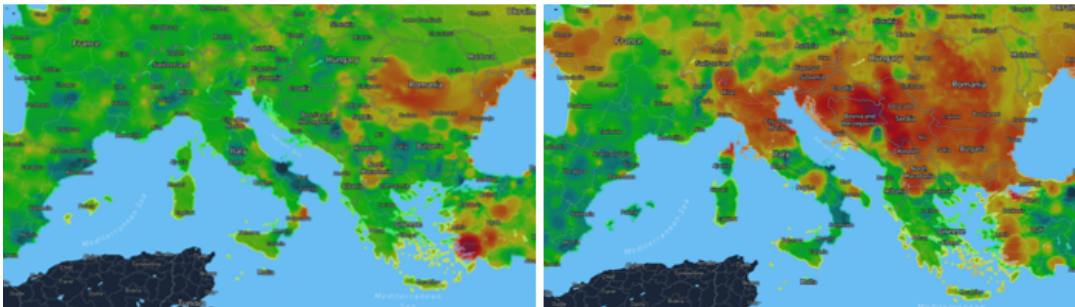

Figure 3: Maps of the lowest and highest values of air pollution in Italy during the observed period
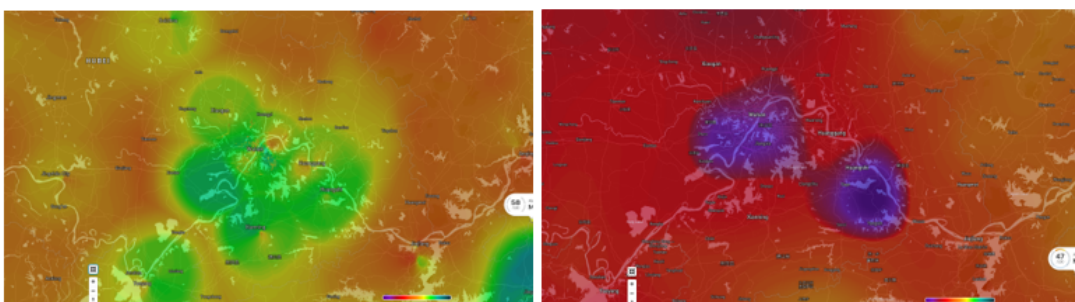

Figure 4: Maps of the lowest and highest values of air pollution in Wu-chan Province during the observed period

Graphical representation (Figure 5) of air quality values has a significantly more dynamic character in the case of Wu-chan. The reduction in transport and production was significantly demonstrated at the end of March 2020, when there was a significant improvement in air quality. The peak occurred on March 28, when the value was 74. Paradoxically, it was the highest value, which represents the cleanest level of air quality among all recorded values of Slovak Republic, Italy and Wu-chan Province. In April 2020, restrictions began to ease, with air quality rapidly deteriorating. At present, air quality in China has have similar values as air quality in pre-pandemic period. Slovakia and Italy are European countries whose air quality values are at a similar level.
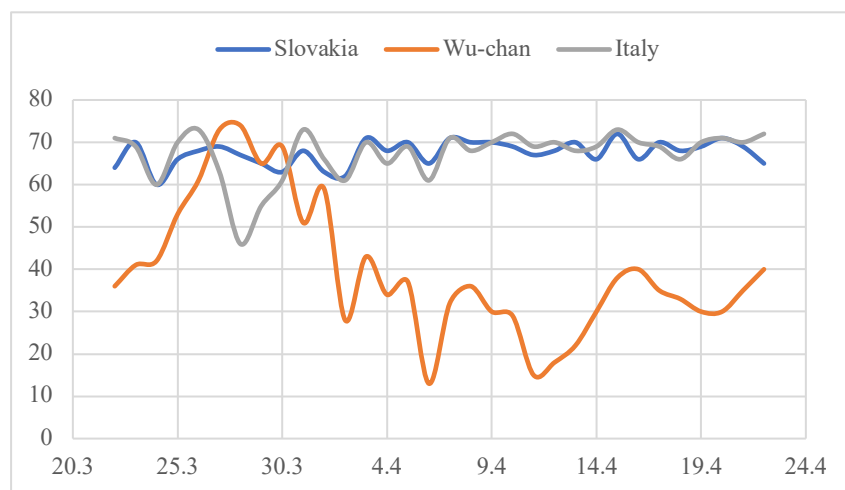

Figure 5: Air quality measurement in Slovakia, Italy, and Wu-chan province

Based on expert articles and monitoring the situation in the world, I suggested 3 options that may occur after the COVID-19 pandemic (Figure 6). Each of these options assumes a significant impact on the economy in the form of a financial crisis, which will have an impact on all spheres of life for an indefinite period. The first "expected option" presupposes a return to the situation before the pandemic. Another option is the "negative option". At this stage, the air would be much more polluted than before the pandemic. The reason is a much larger increase in the production of companies that will want to additionally produce all products that were not produced during the pandemic. Another reason is the fact that people may be afraid of COVID-19 in urban transport, so many more individuals will travel by own car. The last option I propose, the "positive option", is the case where companies start producing less than before the pandemic, due to low demand, lack of capital and financial problems. Another reason is the restriction of traffic on the grounds that people who have lost their jobs will stop

coming to work by means of transport. The last situation, i.e. the "positive option", is the best possible solution from an environmental point of view. On the other hand, this situation represents the worst impact on the economy. The problems of the pandemic have an impact not only on human health and the quality of the environment, but have affected the economy at both the micro and macro levels.

In this case, I see the potential in the decision-making of company managers who can help the right direction in the corporate area. Managers should focus primarily on "kick-starting" the economy by producing products and offering services, but not at the cost of environmental pollution. We can see that the suspension of production plants (apart from the quarantine impacts of people in homes) has led to a significant improvement in the environment. It is up to all managers to promote types of production that are as environmentally friendly as possible, so that we can see declines in air pollution in the world even after the end of the pandemic.
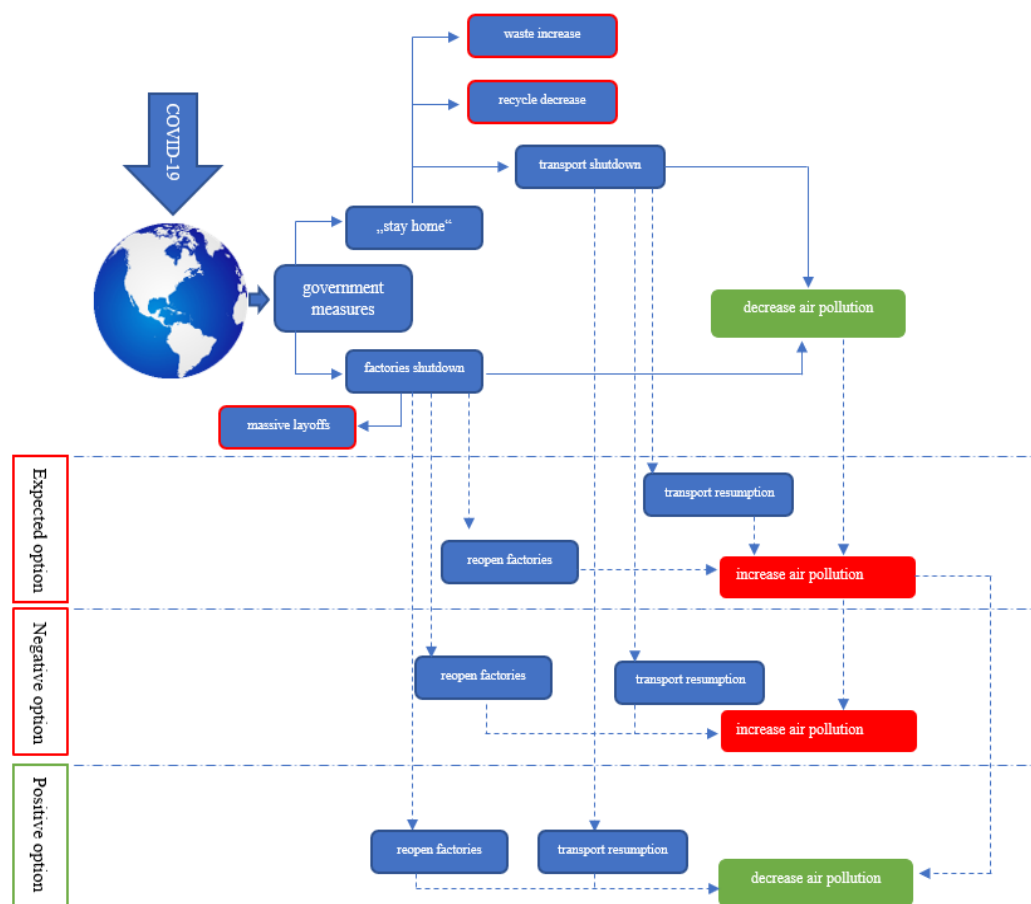

Figure 5: The current situation and three possible situations after the end of the COVID-19 pandemic

5. DISCUSSION

This article focuses on examining the impact of COVID-19 on the environment. The current situation has brought many positive and negative effects on the environment. The positives certainly include an air purifier and a water purifier around the mainland. On the contrary, the big negative is the increased volume of waste and the reduction of waste recycling. The direction of this article is on air quality caused by the suspension of human activity. After the closure of production plants and the suspension of transport, air quality has changed in many parts of the world. This state of clean air is only short-lived. I think that it is precisely due to the COVID-19 pandemic that we can realize how quickly people can change air quality through their activities. In my opinion, it is necessary to be aware of the consequences of factory and transport activities for the future. Managers (mostly in factories) have the opportunity to re-evaluate their actions and direct the volume, quality, material used, etc. in a sustainable direction. This change in managers' decision-making will create a suitable precondition for a successful sustainable trend towards a cleaner and better life on earth. These considerations create an area for the assessment of the impacts of the COVID-19 pandemic on the economic as well as the social area, which are connected with the mentioned environmental area.

I think that every area of sustainable development has been affected by the pandemic. It is up to all entitled people to promote views and decisions based on fair synergies between all areas of sustainable development without focusing exclusively on one area of sustainable development. In recent months, several documents have been created for managers, which form the pillars of the strategy in this challenging period. These are, for example:"COVID-19 and the world of work: Impact and policy responses" (ILO, 2020) or "Workforce Principles for the COVID-19 Pandemic Stakeholder Capitalism in a Time of Crisis" (WEF, 2020) which regulate standards and proactive measures for relaunch companies in practice. The documents primarily focus on strengthening the socio - economic situation in the company, which should lead to the solve problems caused by the COVID-19 pandemic. The environment is only minimally taken into account during the end of the COVID-19 pandemic. Most of the measures that are being developed are mainly of an economic character in order to save the economy and eliminate the consequences of the financial crisis. In connection with this issue, the need for further research focused on creation of documents defining standards and

measures for the environmental field is called for.

6. CONCLUSION

The COVID-19 pandemic has brought several significant changes in the lives of people around the world. After the end of the pandemic, there will not be many things as before. The pandemic significantly affected the environment. The reason is to limit the production of companies, transportation limit and to suspend social life for a certain period. The cleaner air we encountered during the pandemic can be considered a short-term situation. After the end of government measures, the production plants will resume their production, aircraft, buses, cars and other modes of transport will start operating again. It is very likely that air pollution levels will be much higher than in the past after the end of the COVID-19 pandemic. It depends on whether the production plants will want to "catch up with missed production" or not. An increase in the number of cars on roads is also expected if people are afraid to use public transport. How the situation after the pandemic will actually develop is still uncertain. It is very important for people to ensure that the quality of the air and the cleanliness of the environment even after the end of the pandemic. Defining appropriate measures can contribute to maintaining a better environment in the world and meeting the goals of the 2030 Agenda.

DISCLOSURE OF CONFLICT

The author(s) declare that they have no conflicts of interest.

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REFERENCES

Alvarado, M. et al. (2017). A methodology to monitor airborne PM10 dust particles using a small unmanned aerial vehicle. *Sensors, 17*(2), 25.

Burke, M. (2020). *COVID-19 reduces economic activity, which reduces pollution, which saves lives.* Global Food, Environment and Economic Dynamics, GFEED.

Detels, R. et al. (2003). Air pollution and case fatality of SARS in the People's Republic of China: an ecologic study. *Environmental Health, 2*(15).

European Environment Agency (EEA) (2018*). Air Quality in Europe – 2018 Report Technical Report n. 978-92-9213-989-6.*

Gardiner, B. (2020). *Pollution made COVID-19 worse: Now, lockdowns are clearing the air.* National Geographic.

Health Effects Institute (HEI). (2018).*The annual state of Global Air Report.*

ILO. (18 March, 2020). *COVID-19 and the world of work: Impact and policy responses.* ILO Monitor 1st Edition.

Institute for Health Metrics and Evaluation (IHME). (2018). *Global Burden of Disease country file*. China.

Štefánik, D. et al. (2020). Comparison of two methods of calculating NO2 and PM10 transboundary pollution by CMAQ chemical transport model and the assessment of the non-linearity effect. *Atmospheric Pollution Research,* 12.

Tanaka, S. (2015). Environmental regulations on air pollution in China and their impact on infant mortality. *Journal of Health Economics, 42*, 90-103.

Wang, Q. et al. (2017). A smart MCDM framework to evaluate the impact of air pollution on city sustainability: A case study from China. *Sustainability, 9*, 17.

WEF. (2020). *Workforce principles for the COVID-19 pandemic stakeholder capitalism in a time of crisis.* Committed to improving the state of the world.

Xia, X. H. et al. (2017). Coal use for world economy: provision and transfer network by multi-region input-output analysis. *Journal of Cleaner Production, 143*, 125-144.

Zhang, W. et al. (2014). Comparison of energy and environmental regulations for thermal power plants in China. *Environmental Engineering and Management Journal, 13*(5), 1221-1227.

Zhang, D. et al. (2019). Orchestrating big data analytics capability for sustainability: A study of air pollution management in China. *Information and Management.*

Zhu, A. et al. (2020). Interaction between residential greenness and air pollution mortality: analysis of the Chinese longitudinal healthy longevity survey. *The Lancet Planetary Health, 4*(3), 107- 115.