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### The goals of creating rural industries with the view of environmental protection

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#### ABSTRACT

The relationship between industrialization and rural development in the texts of developing countries has different views, so that Rajesh Chandar has emphasized the role of industrialization in the development process by expressing these views and believes that the following views have made the role of industry in development more sensitive. Industrialization in developing countries is known as a historical necessity. In this regard, due to the lack of another provable model for development, historically this claim that development requires industrialization has been accepted.

Due to the minimization of the competitiveness of the agricultural sector compared to the industrial sector and the significant reduction in the price of agricultural products compared to industrial products, the trade conditions in the agricultural sector are significantly limited and the tendency towards industrialization as it is an economic fact.

#### Introduction

Even if the manufacturing and production of goods in the process of industrialization is not considered as a desirable option for the development of the agricultural sector, the trend towards industrial activities can be a source of encouragement for the economic development process as a complement to the agricultural sector [1].

The development of the industry sector can provide significant assistance to the agricultural sector in various dimensions, and through the processing of agricultural products, it leads to more income. In the United Nations trade and development conference, it has been estimated that the processing of agricultural products of developing countries has been able to increase their income by at least 50%. Also, due to the vast capabilities of the industry, the efficiency of the forms of production and marketing in the agricultural sector has been strengthened, and a suitable field is created to attract surplus forces in the agricultural sector [2].

**The point of view of the demand pattern and the elasticity of goods:** with the increase in income, there is no logical proportion in the direction of consumption of industrial goods and agricultural

products, so that the elasticity of demand for agricultural products is very low. This problem reduces the potential of agricultural sector development in the long term. In other words, industrial goods have higher demand elasticity and more favorable potential for development. Also, many agricultural products are facing the problem of reducing consumption due to changes in the way of life and increase in production, which also requires the trend towards industrialization [3].

**Employment perspective:** The population of most developing countries increases rapidly, but the creation of new job opportunities does not keep pace with the increase in population growth. Thus, unemployment as a social problem is a concrete phenomenon of developing countries by creating new job opportunities, industrialization can attract an acceptable proportion of the labor force and reduce the growth rate of unemployment [4].

**Free market view or business strategy:** industrialization is considered as an important source of earning income through international exchanges. This is important through the creation of skills in entrepreneurs, which starts with meeting the

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domestic demand and continues with the export in international dimensions [5].

**The point of view of import substitution:** Many developing countries consider industrialization to be the cause of breaking the dependence of technology on developed countries and consider it the main basis of production and especially increasing productivity [6].

#### **Monte Carlo algorithm and neural networks for predicting air pollution**

Air pollution is not a new phenomenon that has become a problem today and has worried people's minds to predict it. Unfortunately, the increasing activities of humans, especially after the industrial revolution, have caused air pollution on a large scale. It is clear that the knowledge of biological behaviors in the production of air pollutants can help in managing and controlling air quality, and as a result, raising the level of social health and reducing the harmful effects of air pollution, because with this knowledge, the necessary planning can be done to reduce production resources. Think about air pollution and then having a healthy environment.

The US Environmental Protection Agency (EPA) has chosen six main pollutants as criteria to check the level of air pollution and has divided them into two primary and secondary categories. Primary pollutants are substances that enter the ambient air directly from sources and include five pollutants: carbon monoxide CO, nitrogen dioxide NO<sub>2</sub>, sulfur dioxide SO<sub>2</sub>, suspended particles with a diameter of less than 10 microns PM10 and volatile hydrocarbons VOCs [7].

Secondary pollutants refer to substances that arise as a result of interactions in the air around the earth, and ozone O<sub>3</sub> can be mentioned in this group. In this research, among the mentioned pollutants, the prediction of two pollutants, CO and O<sub>3</sub>, is the basis of the work. We know the necessity of ozone prediction because of its negative effects on human, animal and plant health and that with ozone modeling, it is possible to issue a quick warning in places where its concentration increases.

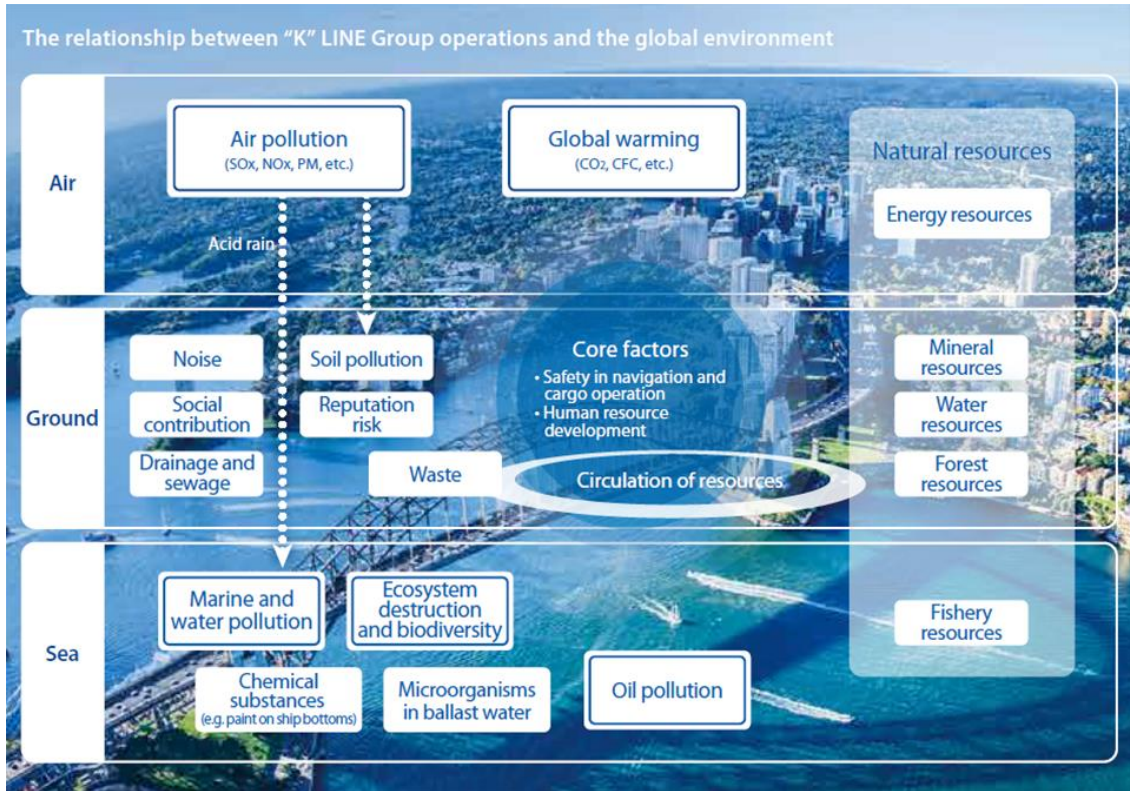
Also, since cars are the main source of carbon monoxide production. Therefore, due to the heavy traffic volume caused by transportation in Tehran city, the use of non-standard cars and the problem of incomplete combustion of the fuels used in cars, we have paid attention to the prediction of CO.

#### **Small industries are considered the most important tools in this direction due to the following characteristics:**

- ✓ These industries attract a significant workforce due to the use of user technologies.
- ✓ Small and medium-scale industries are an important source for the formation of domestic capital, the creation of capital goods or the capital that is created as a result of savings, through the mobilization and direction of private savings for production activities.
- ✓ Small and medium-scale industries play a constructive role in the distribution of income, especially in regional exchanges.
- ✓ The dynamic growth of small and medium-scale industries can be used as a tool to accelerate rural development and prevent migration to the city [7].
- ✓ These industries are able to create a suitable platform for the link between the agricultural sector and the industry through the processing of agricultural products and also spending the income from agriculture to buy manufactured goods.
- ✓ Small and medium-scale industries can easily create a suitable training ground for entrepreneurs by creating technical management and marketing skills.
- ✓ These industries have flexibility and variety of production and they easily adapt to changing market conditions.
- ✓ Due to the existence of specialized areas and low production costs, these industries can be considered as a by-product producer for large-scale investments [8].

#### **Olaf Fass considered the role of small industries in creating job opportunities in rural areas important for the following reasons:**

- ✓ Small-scale investments have long-term effects.
- ✓ Small industries are more competitive than large ones, so the increase in market performance and international competition leads to the favorable growth of small-scale investments.
- ✓ Small-scale investments work better than large-scale investments in rural areas.
- ✓ Sectoral changes in small-scale industries are far less than large-scale industries [9].



**Figure 1.** Environmental Regulations

Considering the deadly effects that carbon monoxide can have on human health, it seems necessary to make the necessary decisions for proper planning in dealing with this problem. As it is necessary, to have a suitable decision in the future, we should get proper information about the behavior of our system so that we can check how it works in other times by modeling the behavior of the system. In such a way, after proper modeling of the system, we can make a proper prediction of its behavior in the future and, as a result, make more optimal decisions to prevent unwanted incidents. In the way of systems modeling, knowing the influencing parameters in the system, the relationship of these parameters and the type of influence of each one in the system is one of the main discussions in the analysis and identification of the system [10].

**An overview of the research done**

The researchers conducted in the field of forecasting air pollutants have been expanded in various ways. In this research, the prediction of meteorological pollutants is mainly from the aspect of the data used to predict each pollutant, the pre-processing performed on the input data to the forecasting system, the structure of the model used for prediction and the accuracy of these models. has been challenged. In the path of predicting air pollutants, it is suggested to use different data to enter the neural network. In some of the conducted researches, according to the relationship between the desired pollutants and meteorological parameters,

the use of meteorological parameters to predict the desired pollutants has been suggested [11].

As an example, the use of meteorological data including wind speed, relative humidity, wind direction, temperature, rainfall, air pressure, radiation amount and evaporation amount has been suggested for hourly forecasting of O<sub>3</sub> concentration. The prediction of 3 pollutants PM<sub>10</sub>, SO<sub>2</sub> and CO in the next 24, 48 and 72 hours using meteorological parameters including wind direction, air pressure, day temperature, night temperature, relative humidity and wind speed is also suggested. In another research, the prediction of ozone concentration using the meteorological parameters of temperature, humidity, wind speed and solar radiation has been proposed [12].

In some other researches, the use of information related to the pollutant itself, in addition to the information of the meteorological parameters affecting the pollutant, has been suggested as input to the neural network. As an example, to predict the maximum amount of ozone in the 8-hour range for days t, t+1 and t+2, use the maximum amount of ozone concentration in the 8-hour intervals of day t-1, the maximum ozone concentration in the first half of the day-on-day t and the average predicted temperature of days t, t+1 and t+2 is suggested. Also, using neural networks, the maximum amount of ozone in the 8-hour range for days t, t+1 and t+2 has been predicted for 23 stations, and using the Co-Kriging spatial interpolation method, the maximum amount of ozone in the 8-hour range for the days t,

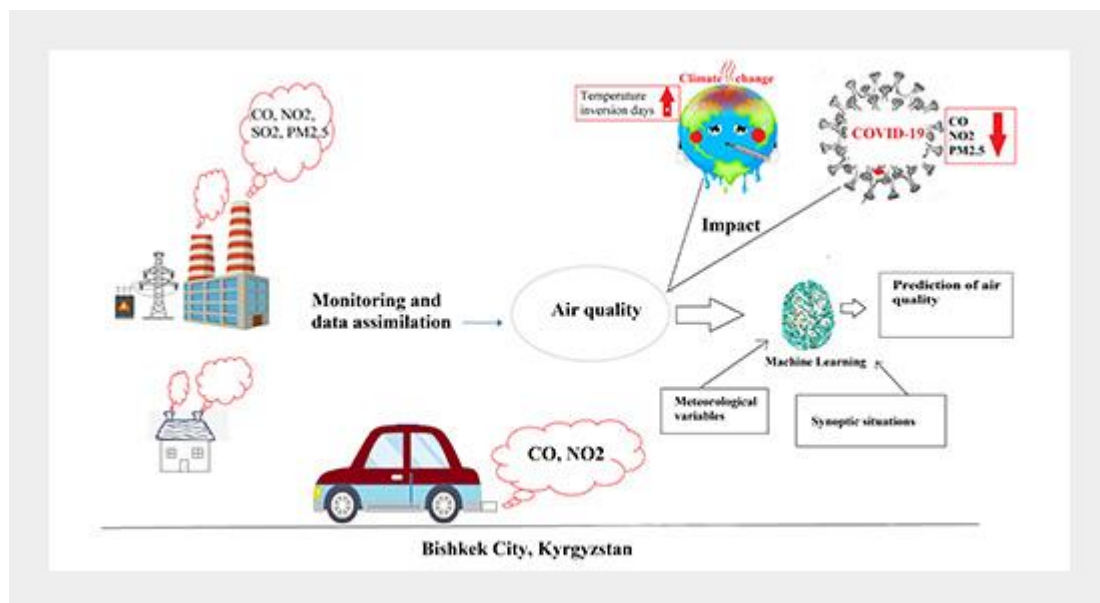
t+1, and t+2 was calculated for the desired range and finally resulted in the production of the scatter map of the maximum ozone concentration distribution for the next three days [13].

Forecasting the daily average PM<sub>10</sub> using the average PM<sub>10</sub> in the first 9 hours of the previous day as well as the forecasted meteorological parameters including wind speed, wind direction and temperature of the same day are other ideas proposed for the input of the forecasting system. In order to predict the values of SO<sub>2</sub> and PM<sub>10</sub> at the desired time, using the hourly values of these two pollutants in 24 hours before the forecast time and using meteorological parameters including air temperature, wind direction and speed, air pressure, rainfall and relative humidity in the previous 24 hours [14].

The time of forecasting as well as the predicted values of these parameters on the same day have been suggested. Sometimes, in some researches, without considering the meteorological parameters, only the information of the pollutant itself and sometimes of the pollutants that have a significant relationship with each other have been used. As an example, in research to predict each of the air pollutants, it is suggested to use the time series of the pollutant itself in order to predict and analyze a time step ahead of the pollutant. In another study, the use of hourly data of five pollutants NO<sub>2</sub>, O<sub>3</sub>, CO, NO and SO<sub>2</sub> from eleven stations is described in order to predict the maximum daily concentration of NO<sub>2</sub> and O<sub>3</sub> [15].

The use of diverse daily CO data between 2002 and 2005 and from different stations for daily CO prediction is a proposal that only uses past information of the pollutant itself to predict the same pollutant. The use of daily CO and NO data for the daily prediction of PM<sub>10</sub> is a suggestion that uses the past information of other pollutants to predict the desired pollutant and does not involve the past information of the pollutant itself in the input of the prediction system [16-18].

After studying the inputs used as required information in pollutant forecasting, how to use information in the forecasting system is one of the fields that have been mentioned in various researches [19-21]. In other words, pre-processing on the input data to the predictive system with the approach of making it easier to visualize and understand the data, reducing the volume of data storage, reducing the modeling time and increasing the efficiency of data classification is a field that has been proposed in the studies conducted for forecasting systems. In line with the pre-processing of data before entering the neural network, the research done is mostly aimed at extracting suitable features to optimize the model [22-24]. Among the methods used to extract features, we can mention the use of genetic algorithm. For example, in research, the genetic algorithm was used as a means to reduce the classification error of features, as well as a means to find out the hidden temporal and spatial relationships between features [25].



**Figure 2.** Impact of Climate Change and Air Pollution Forecasting Using Machine Learning Techniques

### Conclusion

In another study, the genetic algorithm was used to select the appropriate weights of the network. The combination of the error back propagation algorithm with the genetic algorithm to achieve more

robustness in the prediction is a proposal that has been described. Among other methods for feature extraction, we can mention the use of PCA method. In research in order to optimize the efficiency of the network, the combination of PCA and RBF has been

used to predict NO and NO<sub>x</sub>. In this research, the PCA method was first used to find the parameters that are effective in predicting NO and NO<sub>x</sub>. Then by selecting the effective parameters using the components obtained from the PCA method as input to the network, it has made the training of the network easier. In another research, the PCA method is used as a method to extract the characteristics of input data to the MLP network. In another research, the PCA method was applied on the data of the previous day's temperature, wind speed, NO, NO<sub>2</sub> and O<sub>3</sub>, and using the three components obtained from this method, O<sub>3</sub> was predicted the next day. Using different neural network structures to model the process of air pollutants and choosing the appropriate structure are other activities carried out in order to predict air pollutants. In the research comparing multilayer perceptron neural networks with regression methods, the superiority of neural networks has been reported.

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#### Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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