

A Review of the Research on the Impact of Air Pollution on Corporate Financial Performance

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Abstract: *Under the concept of sustainable development, the impact of air pollution on financial performance has attracted much attention. Taking the impact of air pollution on corporate financial performance as the research subject, on the basis of sorting out the current research status of air pollution and financial performance, a literature review and research prospect are conducted on the path and economic consequences of air pollution affecting corporate financial performance. First, the current research status of air pollution and financial performance at home and abroad is reviewed; secondly, the impact of air pollution on the individual financial performance of micro-enterprises is sorted out from the three aspects of corporate innovation, human resources and environmental regulation; finally, the existing research on the impact of air pollution on financial performance is summarized, and on this basis, research prospects are proposed in terms of research indicators, research object selection and the impact path between the two, so as to provide a reference for promoting corporate economic development and further conducting research on the impact of air pollution on micro-enterprises.*

Keywords: Air pollution, Enterprise innovation, Human resources, Environmental regulation, Financial performance.

1. Introduction

Since the reform and opening up, China's economy has been in a state of rapid development and has achieved remarkable achievements. However, the development of the economy with an emphasis on speed and less on quality is bound to be tied together with high energy consumption and high pollution emissions, which will have a severe impact on China's ecological environment to a large extent. As people pay more attention to air pollution, scholars have begun to study the impact of air quality on human behavior. Studies have shown that air pollution can cause respiratory diseases, damage lung function, and even cause a variety of diseases, ultimately causing serious harm to personal health [1-2]. In addition, air pollution can accelerate the decline of human health, damage mental health and reduce social adaptability [3]. In severe cases, it can also cause people to have negative emotions such as anxiety and uneasiness, further aggravating depression symptoms [4]. The purpose of economic development is to achieve the happiness of the people. Solving the problem of air pollution is a key way to improve people's happiness. For decades, China has always attached importance to environmental protection. President Xi Jinping put forward the scientific conclusion that green waters and green mountains are gold and silver mountains. It can be seen that environmental protection is not only beneficial to people's physical and mental health, but also very important to the long-term stable development of China's economy. As one of the components of China's overall economy, enterprises will also be affected by air pollution to a certain extent. Ju Hualei et al. pointed out that air pollution can cause the loss of technical talents in enterprises, which has a significant inhibitory effect on the innovation level of enterprises and is not conducive to the long-term development of enterprises [5]. Therefore, it can be seen that studying the impact of air pollution on enterprises and the path of its impact is crucial to China's economic development and the development of enterprises themselves.

2. Current Research Status

2.1 Research on Air Pollution

Air pollution, also known as atmospheric pollution, usually refers to the phenomenon that certain substances are produced by human production and life or natural precipitation and enter the atmosphere. After being absorbed by humans, they will eventually have a negative impact on human health and happiness. The earliest research on air pollution can be traced back to the Industrial Revolution. At the end of the 19th century, with the rise of coal burning and industrial production, many cities experienced deteriorating air quality. Some scholars began to pay attention to the health effects of particulate matter and smoke in the air, and found that air pollution will mainly affect people's cardiovascular, immune and respiratory systems, increase the mortality rate of cardiopulmonary diseases; it will also have a negative impact on the mental health of people who are exposed to pollution for a long time, and even cause a variety of diseases that damage the health of residents [1]. As the research deepened, many scholars turned their attention to the economic consequences of air pollution and found that air pollution will cause negative effects such as reduced employee productivity and increased labor costs [6-7], which in turn has a certain impact on enterprises.

2.2 Research on Financial Performance

Financial performance refers to the use of scientific evaluation systems and indicators to measure the contribution of the implementation and execution of corporate strategies to the final operating results, as well as the management and control of the work performance of accountants. Foreign scholars started research on corporate financial performance early. With the development of the capital market and the widespread separation of ownership and control, stakeholders are paying more and more attention to the evaluation of corporate operations and financial conditions. For example, new theories and evaluation methods such as the concept of credit capacity index, the idea of evaluating corporate department performance, and MM capital structure theory continue to emerge and become a research hotspot in the field of economics.

At present, domestic and foreign scholars have conducted a

wide range of research on corporate financial performance, mainly focusing on financial performance evaluation indicators and systems and their influencing factors. For the evaluation of financial performance, the DuPont analysis method can be used to analyze using financial indicators [8], or non-financial indicators such as communication effectiveness and customer satisfaction can be used to evaluate the profitability of the enterprise [9]. In addition, factor analysis [10] and methods such as the combination of BSC and EVA [11] can be used to evaluate the financial performance of the enterprise. As for the research on the factors affecting financial performance, it is mainly divided into two aspects: internal factors and external factors. The internal factors affecting corporate financial performance include but are not limited to internal control, corporate innovation, and senior management team. Xu Chaoyang et al. pointed out that companies with higher internal control quality can achieve the goal of improving financial performance by reducing cost stickiness [12]. Zhang Jing et al. pointed out that the stronger the dynamic ability of corporate technological innovation, the more obvious its financial performance improvement [13]. Lin Xinqi and Ding He empirically tested the view that the average salary of the senior management team, the average tenure and the equity concentration all have different degrees of positive impact on financial performance [14]. At the same time, external factors such as environmental regulation and corporate social responsibility will also have a certain impact on corporate financial performance. Zhang Chen et al. pointed out that the reform of environmental protection fees into taxes can stimulate environmental performance and improve financial performance by forcing green innovation [15]. Wang Qian and Chen Huiru pointed out that there is an inverted U-shaped relationship between corporate social responsibility and financial performance, that is, with the continuous investment in CSR, financial performance first increases to a maximum value and then decreases [16].

3. Study on the Impact Path of Air Pollution on Financial Performance

A good living environment, a sense of honor, and a superior social status are non-monetary benefits that people can obtain. At the same time, the satisfaction of material conditions makes people pay more attention to spiritual needs. As the external natural environment, the quality of air has a certain impact on people's production and life. The problem of air pollution is becoming more and more important, and the study of its impact on financial performance is also becoming more and more worthy of in-depth study.

3.1 Air Pollution Affects Corporate Financial Performance Through Corporate Innovation

3.1.1 Positive correlation

Ecological civilization construction is an aspect that China must pay attention to in order to achieve sustainable development. Enterprises' daily production and operation activities will inevitably have a certain impact on the environment. Since the word "smog" became the keyword of the year in 2013, scholars have conducted more in-depth research on air quality. Data show that pollution control will

cause corporate costs to rise and damage the level of regional scientific and technological innovation [17]. However, air pollution will, to a certain extent, create reverse pressure on enterprises and increase their willingness to innovate [18], thereby enabling enterprises to carry out process innovation and management innovation [19], especially green innovation technology to be continuously upgraded and transformed [20]. Innovation-driven is the core driving force of economic growth, and this is also true for enterprises. Feng and Ke's empirical research shows that increasing investment in technological innovation can positively affect corporate productivity [21]. Therefore, for enterprises, technological innovation can reduce corporate costs and increase corporate profits [22], and ultimately have a certain positive impact on financial performance.

3.1.2 Negative Correlation

Some scholars hold the opposite view, believing that air pollution can inhibit the level of individual innovation by affecting the health of innovative individuals, further reducing the innovation vitality of the city [23]. At the same time, air pollution will also affect the quality of management, and ultimately inhibit the improvement of future corporate financial performance. Li Weibing and Yao Yao used the breakpoint regression method to confirm that the worse the air quality, the worse the level of corporate innovation [24]. Xiao Zhenhong and others also pointed out in empirical research that as air quality gradually deteriorates, the rate of human resource loss will also increase, which will in turn affect the innovation capacity of the region [25]. Zhu Bangzhu and Deng Yawei and others pointed out that air pollution will increase corporate financing constraints, slow down or interrupt corporate R&D activities, thereby reducing corporate total factor productivity and ultimately having a negative impact on financial performance [26].

3.2 Air Pollution Affects Corporate Financial Performance Through Human Resources

3.2.1 Positive correlation

As an external natural environment, the air environment is one of people's non-monetary benefits, and its quality has a certain impact on human senses. When studying the macro-environment, that is, the impact of serious air pollution on micro-enterprises, some scholars believe that companies located in areas with poor air quality can retain talents and increase operating income through measures such as increasing executive salaries to improve corporate financial performance. Wu Chaopeng and others pointed out that air pollution will significantly reduce the role of management human capital quality in improving the company's future financial performance. However, when the salaries of directors, supervisors, and senior executives are higher, the negative impact of air pollution on the quality of management human capital is significantly weakened [27]. Through data research, Zhang Liguang and Peng Liao found that companies are willing to pay higher salaries to executives working in areas with significantly serious air pollution, and to alleviate the negative impact of air pollution on the accumulation of executive talent by increasing salaries, in order to improve Company performance [28].

3.2.2 Negative correlation

Employees are one of the necessary factors to ensure that enterprises can carry out their daily business activities normally. Long-term exposure to severe air pollution will not only affect human health, but also increase the probability of cognitive impairment, reduce the information processing ability of enterprise staff [29], and ultimately have a negative impact on the financial performance of the enterprise. Huang et al. pointed out that air pollution can reduce the information processing ability of investors [30]. Air pollution has a long-term impact on people. When people notice it, they usually have adverse physiological conditions. These physiological changes directly affect the work efficiency of these staff [31]. For example, it harms human mental health, undermines the completion of tasks, causes mismatch between labor resources and human capital, and reduces labor supply, which reduces the labor productivity of enterprises [32], hinders the effectiveness of human capital, and ultimately has a certain negative impact on the financial performance of enterprises [33].

3.3 Air Pollution Affects Corporate Financial Performance Through Environmental Regulation

3.3.1 Positive correlation

Air pollution has caused the national government to pay attention to environmental issues, which has led to the introduction and improvement of laws, regulations and action plans such as the Environmental Protection Law of the People's Republic of China and the "Ten Atmospheric Measures", realizing the transformation of environmental regulations from "soft constraints" to "hard constraints" transformation. On the one hand, the more serious the air pollution is, the more people pay attention to the implementation of environmental policies, which leads to an increase in the environmental governance costs of enterprises. However, it also forces enterprises to innovate, making up for the environmental governance costs, which ultimately helps to improve environmental performance and financial performance [34]. On the other hand, for their own benefit, enterprises will actively fulfill social responsibilities and other methods to create a people-friendly and green image to achieve the purpose of gaining the trust of the public and the government, thereby enhancing corporate competitiveness and improving corporate financial performance [35]. Based on institutional theory and the mortality salience effect, Yang Ping's empirical analysis pointed out that there is a significant negative impact between air pollution and corporate operating income. In areas with more severe air pollution, corporate operating income will be greater [36].

3.3.2 Negative Correlation

Many scholars hold the opposite view, believing that the worse the air quality, the more the government pays attention to environmental issues, and the stricter the implementation and enforcement of environmental laws and regulations. The allocation of limited resources by enterprises will inevitably be affected, resulting in a reduction in resources that should be used for production or investment, which will ultimately

continue to inhibit the growth of productivity and corporate operating performance. Chulwoo Baek et al.'s empirical research shows that environmental regulatory policies will continue to inhibit the growth of productivity and corporate operating performance [37]. Marlene Plumlee et al. pointed out that the more serious the environmental problems are, the stronger the environmental policy constraints will be. Under the constraints of environmental regulations, enterprises need to disclose carbon information, but the improvement of the quality of this information will have an adverse impact on corporate financial performance [38]. Geng Yunjiang et al. empirically tested the view that environmental regulations have a negative impact on corporate financial performance [39].

4. Conclusion and Outlook

This paper combs through the literature related to air pollution and corporate financial performance and finds that domestic and foreign scholars have relatively mature research on these two aspects. The content and results of air pollution research are relatively rich, including research on the impact of air pollution on people's physical and mental health, economic activities, and corporate innovation. In terms of corporate financial performance, the existing research system is relatively comprehensive, involving the selection of financial performance evaluation systems and indicators, and research on internal and external influencing factors, and the research results are rich. However, few scholars have linked the two and explored the relationship between the two, and the existing research conclusions on the impact relationship between the two have not yet been unified. Most scholars believe that air pollution will inhibit the improvement of financial performance, while a small number of scholars hold the opposite view. At this stage, further research and exploration is needed on the impact relationship and action path between air pollution and financial performance at home and abroad.

First, under the concept of sustainable development, the economic consequences of air pollution have received widespread attention. In terms of research results, the conclusions have not yet been unified. From the perspective of indicator measurement, the indicators for measuring air pollution and financial performance have not yet been unified. At present, the widely used indicators for measuring air pollution are PM2.5 and AQI, and their data are difficult to obtain. In comparison, the indicators for measuring financial performance are easy to obtain, but there are too many options. Overall, this has a certain impact on the study of the impact relationship between air pollution and financial performance. Based on this, when exploring the relationship between the two in the future, the indicators can be unified as much as possible to prevent the phenomenon of result deviation caused by different indicator selection.

Second, at this stage, when domestic and foreign scholars study the relationship between the two, although different scholars have different research data and years, the research objects they choose are mainly listed companies. The impact of air pollution on different industries and companies of different natures is different. Based on this, in the future, when studying the impact relationship between the two, the

industry can be subdivided to further explore the financial performance of companies of different industries and natures under air pollution.

Third, the existing research on the relationship between air pollution and financial performance is generally small, and there are few studies on the factors that have a moderating or mediating effect between the two, and the conclusions have not yet been unified. For example, some scholars believe that executive compensation only has a moderating effect on the relationship between the two, but some scholars use it as a study of the path of air pollution's impact on financial performance. As air pollution issues are gaining more and more attention, exploring the impact of air pollution on financial performance is crucial to the development of enterprises. Future follow-up research can continue to deepen the impact of air pollution on financial performance and find multiple impact paths to help companies develop in a long-term and stable manner.

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