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Review Article

Research on Prevention and Control of Environmental Pollution in Building Construction

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Abstract: The quality of human life has been greatly improved with the rapid development of the market economy. However, at the same time, people are paying more attention to the problems caused by environmental pollution. As a result, there is an increase in environmental awareness. At the present stage, people are concerned about the negative impact that building construction has on the environment. Building construction enterprises must have preventive measures and deal with environmental pollution during construction. This is to minimize pollution caused by construction and to satisfy the implementation of green civilization construction. This is important as it can enhance the development of socialist spiritual civilization and thus promote the expansion of enterprises in the long run. The author explores and analyzes the main types of environmental pollution generated in building construction. Besides, the author provides effective measures for the prevention and control of environmental pollution caused by building construction to reduce its adverse impact on the environment.

Keywords: *Building construction; Environmental pollution; Prevention and control; Effective measures*

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1 Introduction

At present, the construction industry has been perceived as one of the pillar industries in China's economic revitalization. Nonetheless, due to the swift expansion of the construction industry, there is an overall increase in the negative impact brought by construction, especially on the environment, which seriously affects people's quality of life. In recent years, the process of urbanization has been accelerating, and construction can be seen everywhere. The typical period for building construction is long and there are various kinds of construction wastes being produced, which will cause irreversible pollution to the surrounding environment. Therefore, there is an urgent need to solve the problems of environmental pollution in building construction through some prevention and control methods. Also, the implementation of green construction should be intensified to achieve sustainable development in the construction industry.

2 Main types of environmental pollution in building construction

2.1 Noise pollution generated during construction

Noise pollution is a major contributor to environmental pollution in building construction at the current stage. The main source of noise pollution comes from the sound of mechanical operation and machines in building construction, such as mixers, pile drivers, excavators, road rollers, bulldozers, etc.[1] At the construction site, the installation, movement, disassembly of the scaffolding and framework, the cutting of the construction materials, etc., will generate noise. In the actual site, multiple mechanical types of equipment are often assembling together, and therefore the decibel of noise is noticeably increased. To catch up with the construction dateline, some construction sites often need to work round the clock continuously, and the noise generated will seriously affect people's normal life, study and work.

2.2 Exhaust gas pollution generated during construction

There is serious exhaust pollution at the construction site, mainly represented by dust pollution. The main source of the dust pollution can be due to the dust generated during the construction demolition process, the dust carried by the construction vehicles entering and leaving the construction site, the dust formed on the construction materials after a long time, as well as the dust produced during excavation operation by an excavator. When the climate is relatively dry or there is strong wind, this dust will be stirred up and fly around, which will bring more serious environmental pollution to the construction site. If the pollution gets worse, people might suffer from breathing difficulty and their travelling will be affected[2].

2.3 Wastewater pollution produced during construction

Usually, lots of wastewater is produced in the construction site because water is used in many places during the construction process. Table 1 shows the main source of this wastewater.

Table 1. The main source of this wastewater

Source of wastewater	Specific situation
Drain	Cement slurry produced when excavating drain
Pipeline	Wastewater generated when flushing the building pipelines
Others	1. Wastewater discharged during construction 2. Alkaline wastewater penetrates from the lime pit into underground 3. Domestic wastewater discharged by construction site workers

Many negative problems will arise even a slight oversight during the construction or insufficient attention is pay to the treatment of these wastewaters. For instances, sewer pipes around the construction site might get blocked, the rivers around the construction site is polluted, and these are causing a serious impact on the daily life of the residents.

2.4 Solid waste pollution

The waste generated during the construction process is usually a solid construction waste. Generally, it comprises of gravel, glass, cement and wood produced during the construction demolition process, including some of the domestic garbage created by the staff at the construction site. Under normal circumstances, the proportion of garbage generated by construction accounts for about 30% of the total urban waste, which seriously pollutes the environment[3].

3 The importance of preventing and solving environmental pollution in building construction

With reference to the actual condition and the contemporary construction site in China, the construction project is regarded as an engineering project that can promote social development and economic growth. Hence, the prevention and control work on environmental pollution has become an urgent need and an important key element in the protection of China's environment. Indeed, both prevention and control work have played important roles in governing and protect the current environment in China[4].

A comprehensive analysis of the construction conditions shows that some environmental pollution problems will inevitably occur during the construction process. It is more likely to cause environmental pollution especially when the quality of the technology and construction materials is limited. However, when environmental pollution problems occur, appropriate measures must be taken to prevent them from causing greater damage or threat particularly to the surrounding environment and the life of residents. In the current construction process, the prevention and control of environmental pollution should be assigned as a key task in the construction process. Also, the prevention and control of environmental pollution should be done in a timely manner[5].

The concept of sustainable development has been deeply rooted in people's hearts by judging the priority of current social development in China. People's understanding of the concept of sustainable development has become more in-depth with the continuous implementation and advancement of related work. People are not only concern about the economic profit and social benefits brought by the construction, but they also concern the issues on environmental pollution due to the construction process. Thus, the construction company must able to recognize the importance of preventing and coping with the

environmental pollution caused by construction to achieve sustainable development. They can strengthen the analysis of the actual situation of the construction site and the surrounding natural environment. By combining all these situations, corresponding measures are to be taken to prevent and deal with environmental pollution problems, reduce waste of resources while preventing and controlling environmental pollution[6].

4 Effective measures for prevention and control of environmental pollution in building construction

4.1 Prevention and control of noise pollution at the construction site

Noise pollution is inevitable in the process of building construction. Thus, construction companies should take certain measures to minimize the noise regarding the issue of noise pollution at the construction site. The detailed solution in minimizing noise pollution is shown in Table 2.

Table 2. The specific methods to minimize noise pollution

Prevention and control measures	Specific methods
Reasonable arrangement of construction time	Try to choose construction during the daytime to avoid high-decibel of noise generated by construction at night.
Reduce the noise generated from mechanical equipment	Apply isolation, shock absorption etc. to eliminate the noise sources that are produced by mechanical equipment
Install the appropriate equipment to reduce noise	1. Install a muffler at the construction site to reduce the noise pollution caused by the vibration of the air column, which can reduce the noise of about 20 decibels. 2. Sound insulation and sound absorption around the construction site to reduce the impact of noise on the normal life of the surrounding residents.

4.2 Prevention and control of exhaust gas pollution at the construction site

It is necessary to strengthen the understanding of relevant laws and regulations in the process of building construction in China. The construction company might not strictly follow the relevant requirement of exhaust gas discharge but at least to reduce the amount of smoke and dust emissions through corresponding measures, and to strictly control the sources of exhaust gas from the construction sites. The specific measures for controlling and preventing exhaust gas pollutions are shown in Table 3.

Table 3. The specific measures for preventing and treating the exhaust gas pollutions

Prevention and control action	Specific methods
Isolation	Isolate the construction site by coloured steel plate
Water sprinkling	The surrounding streets and residential areas of the construction site are required to sprinkle with water when excavation work is carried out at the construction site. This procedure is important to maintain the humidity of the road surface, thereby reducing the dust flying around the area.
Reasonable selection of construction materials	1. When selecting the concrete used for construction, commercial concrete should be selected as much as possible to reduce the occurrence of dust during the mixing of concrete. 2. It should be wind-shielded when stacking construction materials such as sand and cement.
Reasonable choice of transport vehicles	1. In the process of transporting construction materials, environmentally-friendly and reasonable vehicles should be selected. The vehicle should able to reduce the dust formation whenever they are entering or leaving the construction site. 2. The vehicle should be flushed with water after construction materials are unloaded and before the vehicle leaves the construction site. This is to avoid the leftover from the vehicle that possibly leaves behind on the street which will cause pollution to that area. 3. Water sprinkling should be carried out at a distance from the vehicle entering the construction site and when the concrete carriage is about to enter the construction site. The vehicle should be driven to a fixed location at the construction site for vehicle cleaning after the completion of the concrete unloading. The unused concrete should be placed in the concrete pit.

4.3 Prevention and control of wastewater pollution in building construction

The root cause of wastewater pollution must be identified and strengthen the prevention and control of wastewater pollution from the source to effectively solve the problem of wastewater pollution caused by construction[7]. Firstly, a strong awareness of water conservation must be created among the construction

workers at the construction site to reduce wastewater discharge. Secondly, the conservation of water resources during the construction process must be strengthened and strictly adhered to the relevant laws and regulations of China. This is to ensure that the total discharge and concentration of sewage and wastewater meet the relevant requirements. The wastewater especially generated from construction's pipe flushing, cement slurry and concrete curing needs to be treated first before discharged[8]. For example, the wastewater generated by flushing building pipes during construction should be treated with oil separation and sedimentation before being used for road cleaning or water spraying at the construction site. Additionally, construction companies should also construct wastewater and sewage sedimentation tanks at the construction site as prevention and control of wastewater pollution at construction sites. The sedimentation tank aids to concentrate the sediments and thus effectively avoid secondary pollution to the environment[9].

4.4 Prevention and control of solid pollution in building construction

Special purpose staff should be set up to collect the domestic garbage produced by the construction workers at the construction site. Then, the collected garbage is transported out by the sanitation department to further process it[10]. Moreover, solid waste is more often generated during the construction process. These solid wastes should be stacked in a centralized location and processed in a timely manner. It should be noted that they cannot be stacked in the open air. The dangerous waste gas produced during repairing machinery and equipment should be classified and stored in closed storage. It needs to be handed over to the local sanitation department for treatment when the accumulated amount reaches a certain amount to effectively reduce the environmental pollution of solid waste on the construction site.

5 Conclusions

In summary, the process of urbanization construction has been accelerating with the rapid development of the social economy, which also greatly promoted the development of construction enterprises. Construction sites can be seen everywhere, and people are paying more and more attention to the pollution caused by construction. Construction enterprises must strengthen the prevention and control of environmental pollution during construction in order to minimize the pollution caused by the construction of the natural environment.

References

[1] Wu Xiaowen. Study on the Effect of Surrounding Environment Pollution Caused by Stacking of Construction Wastes on Slope Land[J]. Journal of Environmental Science and Management, 2019, 44(01):35-40.

[2] Li Ming, Wang Qiming, Chen Jingying. Analysis and Research on the Role of Environmental Pollution Prevention and Control in Construction Engineering Management[J]. Journal of Environmental Science and Management, 2018, 43(06):14-18.

[3] Li Xiaoyue, Zhang Hui, Duan Huabo, Lei Guoyuan, Huo Peishu, Yu Danfeng, Wei Huiqiang. Environmental Pollution Characteristics of Building Decoration Process[J]. Research Journal of Environmental Sciences, 2018, 31(10):1811-1818.

[4] Chen Lifen. Analysis of the Cost of Prevention and Control of Ecological Environment Pollution in Building Construction[J]. Journal of Environmental Science and Management, 2018, 43(03):61-65.

[5] Cao Jie.Identification and Evaluation of Environmental Pollution at Construction Site[J]. Science & Technology Economic Market, 2015(10):112-113.

[6] Wang Qiming, Li Ming, Chen Jingying. Dynamic Control Analysis of Pollution Prevention Targets in Construction Environment[J]. Journal of Environmental Science and Management, 2018, 43(248):81-84.

[7] Chen Zaixing. Research on Environmental Protection and Control Measures for Energy Saving and Consumption Reduction of Building Construction Engineering[J]. Journal of Environmental Science and Management, 2018(4):28-30.

[8] Sun Haiping. Problems and Countermeasures Analysis and Treatment Methods of Building Construction Management[J]. Sichuan Cement, 2017(1):148-148.

[9] Lin Zheyu, Zhang Baoquan. Analysis of Construction Environmental Pollution Problems and Prevention Strategies in Building Construction[J]. Economics of Innovation and New Technology, 2017(9).

[10] Xie Jie. Analysis of the Application of Green Energy-saving Construction Technology in Modern Building Construction[J]. Urban Construction Theory Research (electronic version), 2018, 265 (19):123.