Application and Research of Urban Building Construction Technology Based on the Concept of Environmental Protection

Zhengyan Lu
HENAN COLLEGE OF INDUSTRY & INFORMATION TECHNOLOGY, Henan Jiaozuo 454000, China
7749lzy@163.com

Abstract. The construction phase of a house building is the most important stage in building engineering, and it is also the concentrated stage of resource consumption and environmental pollution. The environmental pollution caused by building construction mainly comes from: solid waste, liquid waste, and gas waste during construction. At the construction site, relevant personnel have a weak awareness of energy saving and consumption reduction, and they often ignore the waste of resources during construction. The article focuses on the analysis and research of building construction technology related issues from the perspective of environmental protection. Firstly, the main characteristics of building construction technology under environmental protection are studied. Then, from the perspective of environmental protection, the technical points of building construction are discussed. Finally, with the sustainable development of building construction as the starting point, some suggestions and suggestions are given for the promotion and development of building construction technology.

1. Introduction
In vigorously accelerating the development of the economy and the construction of civil engineering in Daxing, it will inevitably produce construction waste, sewage, and noise to pollute the environment. The effect of environmental protection work on the site not only affects the interior of the construction site, but also affects environmental protection in urban areas. Therefore, the environmental protection work at the construction site is part of the environmental protection work in the entire city, and the construction site must meet the requirements of urban environmental protection work. The main content of its protection work involves preventing air pollution, water pollution, noise pollution, and environmental sanitation of on-site accommodation and living facilities. Generally speaking, in building construction, people only pay attention to the progress, quality, and investment of the project, but not enough attention to the management of the construction site. As a result, the construction site has become a construction site with "dirty, messy, and poor" as the main characteristics. Set up enclosures, litter and dump waste, and cross-flow of sewage. In accordance with the requirements of the International Labour Convention No. 167 "Construction Safety and Health Convention", the construction site should be safe in production, civilized construction, and the site layout is neat and orderly. Civilized construction embodies the principle of “people-oriented”. While providing material wealth to society and creating a beautiful environment for work and life for human beings, construction workers must pay attention to
their own safety, production conditions and environment, and pay attention to the construction site’s impact on the city and society. Therefore, environmental protection construction should be listed as one of the important contents in the modernization construction [1].

2. Types of pollution generated during construction

(1) Dust-borne pollution. Dust pollution is more common in construction projects. Dust pollution is mainly caused by powdery building materials such as lime, sandstone, and cement. Such materials are easy to spread with the air and are extremely threatening [2].

(2) "Three wastes" pollution of buildings. Buildings are prone to various types of pollution, of which the "three wastes" are the most common. The "three wastes" are waste gas, waste residue, and wastewater. These three types of building pollution will cause fundamental pollution to the human environment. First, exhaust gas. Exhaust gas mainly refers to air pollution. In construction engineering, it is easy to produce the exhaust gas of transportation vehicles and the volatilized gas of chemical industrial materials, which will greatly reduce the air quality. Second, waste residue. Waste slag is garbage generated by construction projects and the lives of construction workers. If it is not treated in time, it will be covered by garbage or the harmful substances in it will flow into the soil, causing a lot of pollution. Third, wastewater. Wastewater forms a certain level of discharge, which will affect the drinking water in the range and the water use of the building itself [3].

(3) Noise pollution. Noise pollution at construction sites is very common in life. The source of pollution is mainly in construction sites such as pile drivers, mixers or large machines.

(4) Glare pollution. In construction projects, strong light irradiation equipment is often used, and such pollution is amplified at night.

3. Environmental Problems and Energy Saving Status of Construction Sites

3.1. Environmental Problems Existing in Construction Sites of Buildings

![Figure 1. Possible construction pollution problems in urban buildings.](image-url)
suspended particles in gas, liquid and solid chemical substances, which will adversely affect human health. As shown in Figure 1, all possible environmental pollution problems in buildings are included.

3.2. Status Quo of Energy Efficiency in Building Construction
At the construction site, many managers do not have the awareness of energy saving and consumption reduction, and the waste of resources during construction is often ignored, making it difficult to implement green environmental protection construction. In addition, the quality of the management personnel at the construction site is not high enough to formulate an appropriate energy-saving and consumption-reduction plan, resulting in some very advanced technologies not being fully applied.

4. Construction energy saving control model based on punishment factor

4.1. Penalty Constraint Model in Building Construction
During the construction process, the environmental pollution and waste of resources are caused by many reasons. Therefore, the construction energy conservation and environmental protection control model based on the penalty factor, that is, the punishment restriction model of the construction process should also be carried out from the following aspects. Analysis. First, a hypothesis is put forward: treat construction engineering as a population in a biological society, and assume that the density of individuals in a population can be accurately measured. The increase in pollution and waste of resources is a continuous process. Secondly, the indicators involved in model construction include water pollution, solid waste pollution, water and electricity costs, and environmental protection control technologies. Finally, the penalty constraint model, as the name suggests, is the price that companies need to pay in order to punish the environmental pollution and waste of resources caused by the construction process, such as fluctuations in the growth rate of corporate profits and mortality (the number of companies withdrawn / the total number of companies). Establish a punishment constraint model for the construction process, as follows:

\[
dN(t)/dt = rmN(t)[K - N(t)]/K
\]  \( (1) \)

(1) K represents the maximum capacity of environmental pollution and resource waste; represents the actual growth rate of the construction business, \( N(t) \) represents the construction scale at time t, and \( rm \) represents the natural growth rate of the enterprise, that is, the number of newly registered construction companies and the cancellation of bankruptcy Difference in the number of construction companies. When the value of K reaches the maximum, \( r = 0 \), then \( t = 0 \), and the cluster density is \( NO \). The answer to formula (1) is:

\[
N(t) = K / \left[ (1 + K / NO - 1) - \exp(-rmt) \right]
\]  \( (2) \)

(2) From formulas (1) and (2), it can be known that when \( N = K \), pollution and punishment are in a balanced state, indicating that after punishing the amount of environmental pollution and waste of resources generated during the construction process, TR will be in a period of time. To maintain equilibrium. After the end of this period, the impact of TR constraints will continue to change, but the order of magnitude remains stable. Under the constraint of the penalty threshold of the model, the construction cost and resource constraints of the construction enterprise will increase, which will trigger the corresponding penalty response. When the punishment threshold infinitely approaches 0, the profit space that construction companies can obtain will expand and the construction progress will continue to advance smoothly.

4.2. Penalties for pollution and waste of resources during construction
The larger the scale of construction, the more serious the pollution and waste of resources are. The two are closely related. When \( N(t_0) \leq K \) in the formula (1), the pollution degree of the project construction
and the intensity of resource waste will reach the maximum or on the way to the maximum intensity. The degree of pollution and resource waste during the construction process will be punished when it breaks through the threshold of punishment. The formula of the net expected utility condition is as follows:

\[ u_f - (\gamma + \Delta \gamma) u_c > 0 \]  

\( u_f \) represents the normal income of the construction company; \( u_c \) represents the extra costs caused by pollution and resource waste; \( \gamma \) represents the penalty ratio, and \( \Delta \gamma \) represents the penalty compensation coefficient. According to formula (3), the utility generated when the constraint is broken should meet the specifications:

\[ u_f - \Delta \gamma u_c > \gamma u_c \]  

The net expected utility specification for the operation of a construction company trying to break the legal penalty is:

\[ FU = (u_f - \Delta u_c) - (\gamma + \Delta \gamma) u_c > 0 \]  

When the value of \( \gamma \) increases, the predicted utility decreases, and pollution or waste of resources during construction will be controlled.

5. Analysis of environmental protection measures for urban construction

5.1. On-site civilized construction and management measures

(1) Enhance environmental awareness. Construction personnel should have a strong sense of environmental protection, carefully study national laws and regulations on environmental protection, and improve environmental protection. (2) Carry out civilized construction and create civilized construction sites. The key contents of civilized construction include on-site enclosure, closed management, construction site hygiene, material stacking, on-site accommodation, on-site fire prevention, comprehensive public security management, construction signage, and management of living facilities. (3) Strengthen on-site management. The formation of various types of pollution sources is directly related to the management of the construction site. If the quality management fails to keep up, it will cause rework and generate a lot of rework waste. The chaotic management of materials will cause sand and stones to be piled up and scattered, and cement, white ash, and dust flying. Poor labour management will cause chaos on the site, uncontrollable waste and excreta, etc. We must attach great importance to it, make great efforts to grasp it, and rely on management for environmental protection and efficiency [4].

5.2. Measures to Prevent "Three Wastes" Pollution

5.2.1. Prevention of air pollution. (1) The garbage on the construction site should be cleared and transported in time, and a proper amount of water should be sprinkled. High-rise or multi-layer construction garbage must be constructed with closed temporary dedicated garbage channels or hoisted by containers. It is strictly forbidden to volley in the air. (2) Fine powder and bulk materials such as cement should be stored in the warehouse as far as possible. If it is stored in the open air, it should be tightly covered. Effective measures should be taken during unloading. (3) The construction site shall be constructed in accordance with the design of permanent roads. Road bases shall be implemented in accordance with the design requirements. The surface course may use reef slag, fine stone asphalt or concrete to reduce road dust. Pavement to prevent floating soil. (4) The transportation vehicle shall not be carried in excess, and the earthwork, building muck or other bulk materials of the transportation engineering shall not exceed the upper edge of the trough. Before the transportation vehicle appears on
the site, the trough and wheels of the vehicle shall be washed to prevent the transportation vehicle with dirt. Drive to the field and retreat slag on the way. (5) The mixing equipment at the construction site must be equipped with closed enclosures and spray dust removal devices. (6) The construction site shall formulate a sprinkler and dust reduction system, and a special person shall be provided with sprinkler equipment to take charge of the site to reduce dust and timely clean up the floating soil. (7) When dismantling the old building, it shall cooperate with sprinkler.

5.2.2. Prevention of water pollution. (1) A sedimentation tank must be set up at any site where concrete, mortar and other mixing operations are required. The discharged wastewater must be settled twice in the sedimentation tank before it can be discharged into the municipal sewage pipeline or recycled for water spraying and dust reduction without treatment. It is strictly forbidden to discharge mud water directly into urban drainage facilities and rivers. (2) For the sewage produced by the operation of the existing terrazzo operation, the direction of the sewage must be controlled to prevent its spread, and a sedimentation tank must be set up at a reasonable location. After the sedimentation, it can be discharged into the sewage pipeline. Construction sewage is strictly prohibited from flowing out of the construction site. (3) For the sewage discharge control of the temporary canteen at the construction site, a simple and effective oil trap should be set up, and the generated sewage should be discharged through the sewer to pass through the oil trap, strengthen management, and regularly pull out oil. (4) Dedicated paint and oil depots should be set up at the construction site. The floor and walls of the depot should be specially treated to prevent leakage. Special persons should be responsible for the use and storage to prevent oil from running, dripping, dripping, leaking, and contaminating water bodies. (5) It is prohibited to use toxic and hazardous waste for earthwork backfilling to prevent pollution of groundwater and environment [5].

5.2.3. Prevention of noise pollution. (1) The construction site shall follow the “Noise Limits at the Boundary of the Construction Site” to formulate corresponding systems and measures for noise reduction. (2) For noise operations in densely populated areas, the operation time must be strictly controlled, and measures must be taken to prevent disturbance to the people. If continuous operations are required under special circumstances, a night construction permit should be obtained in accordance with regulations. (3) Processing and production of finished and semi-finished products that generate strong noise should be completed in factories and workshops to reduce noise caused by processing and production at the construction site. (4) Closed machinery sheds such as mixers, chainsaws, electric planers, and grinders should be provided at the construction site to reduce the spread of strong noise. (5) Strengthen the management of the construction site, especially to prevent artificial knocking, screaming, barbaric loading and unloading noise, etc., and minimize noise disturbance to the people.

5.3. Introduction of advanced construction technology
The rapid development of the construction industry is inseparable from the support of new construction technologies. By applying new building technology to project construction, it has a positive significance for reducing construction pollution and enhancing the speed of construction project advancement. For example, in the concrete construction process, a centralized mixing station technology can be applied. This technology directly mixes the concrete in the target area, and directly conveys the cement slurry to the designated construction location by means of a transfer pump. This technology can greatly reduce the amount of sand and gravel on site, and reduce industrial water use during construction. In the production of steel cages, double steel bar technology can be used to make steel cages. This technology directly bundles instead of the welding process, which can effectively reduce the field. Light pollution during construction; In the process of wall construction, new materials can be used to replace traditional wall materials, thereby reducing the water consumption of construction operations and the discharge of construction wastewater [6].
5.4. Energy saving and consumption reduction measures

5.4.1. Energy saving and consumption reduction in building construction. Energy-saving and consumption-reduction of housing construction walls. As one of the most basic frameworks in house construction, the wall is of great significance for the sustainable development of the construction industry because of its energy saving and consumption reduction [0]. In the wall building process, it is usually adopted that the holes are arranged along the vertical direction. When hollow bricks are used, they must not be cut and cut, and when the wall is built, the total number of bricks is insufficient. Masonry is completed to achieve the purpose of energy saving and consumption reduction. At the same time, when masonry walls are built, new energy-saving and consumption-reducing building materials and technologies should be used as far as possible to achieve energy-saving purposes as much as possible. For the selection of new materials for building walls, as shown in Figure 2.

![Figure 2](image)

Figure 2. New type building energy-saving wall construction materials.

The new energy-saving wall building materials shown in Figure 2 can achieve energy conservation and consumption reduction of the architecture wall, reduce construction steps, increase construction speed, and reduce the amount of hazardous waste generated at the construction site, which is important for environmental protection.

5.4.2. Energy saving and consumption reduction of house wall insulation. During the construction of a house, it is often encountered that the wall of the building is cracked. The reason is that the wall temperature is too low. To solve this problem, the wall insulation work needs to be done well. Compared with the internal test construction of the thermal insulation layer, the external construction can save more area, and the thermal insulation effect is better than the internal test thermal insulation. However, in the process of external thermal insulation, improper construction will cause problems such as wall cracking, water seepage, etc., and may also cause environmental pollution. In order to ensure energy saving and consumption reduction in the thermal insulation of the house wall, the following measures should be taken for the general thermal insulation design of the house wall: (1) Before construction, the wall must be clean and flat; (2) During construction, skirting and skirting lines should be set according to the design standards of the house to ensure the thickness of the insulation layer [6]. According to the energy-saving and consumption-reduction analysis of the above-mentioned house wall insulation, the existing house wall insulation and energy-saving materials can solve the above problems. As shown in Figure 3, not only can prevent wall cracks, but also achieve energy saving and emission reduction.
In existing urban construction, this new type of wall insulation and energy saving material is called phenolic foam, and has a very high utilization rate in Europe and the United States and other countries, which can efficiently solve the problems existing in the current wall insulation materials of houses.

5.4.3. Energy saving and reduction in doors and windows of buildings. In the construction of houses, the windows and doors occupy a large area, and the most serious energy dissipation is the doors and windows, which is very detrimental to the energy-saving building of the house. In addition to the necessary ventilation and lighting, the doors and windows of the house should be opened as few times as possible, and low-radiation glass can be used. Such glass can obtain a large amount of sunlight to ensure the indoor temperature and achieve the purpose of energy conservation and consumption reduction [7].

6. Conclusion
Economic development has promoted China’s all-round construction. Under this megatrend, the real estate industry has risen and developed rapidly, and modern buildings have appeared in people's vision, improving the quality of the environment in which people live and work. However, in the process of modern buildings, environmental pollution and waste of resources have not been paid much attention, which has led to many energy-saving and environmental protection problems in building construction. Promoting environmental protection and energy saving at the construction site is in line with the concept of sustainable development in the construction industry and has great significance for the growth of the ecological environment. At present, the construction site of the domestic construction industry still has problems of unavoidable environmental pollution and waste of energy consumption. The joint efforts of relevant personnel and the people are required to carry out environmental protection and energy conservation to the end.

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