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Management Method of Safe Civil Construction in Ecological Agricultural Environment

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Abstract: At present, my country's eco-agricultural environmental problems have dual externalities and historical lags, which makes the construction of a modern agricultural eco-environment governance system and the realization of rural revitalization a prominent issue. Therefore, reasonable development in an ecological agricultural environment is particularly important. This paper mainly studies the management methods of safe civil construction in ecological agricultural environment. This article first introduces the current commonly used civil construction technologies, such as deep foundation pit excavation and support construction technology, formwork construction technology, steel bar construction technology, concrete construction technology; then introduces the current status of ecological agriculture and ecological agriculture combined with the purpose of rural revitalization The key to development is sustainable development; then the LEC evaluation method is optimized, safety management factors are introduced, and then the danger level of various operations in the construction is evaluated according to the optimized LEC evaluation method, of which the length of time in restricted space operations And the hazard level are 34% and A respectively; finally, the relevant safety management method is formulated based on the results of the optimized LEC evaluation method.

1. Introduction

After the Industrial Revolution, many countries have transformed from agricultural society to industrial society. While industrial civilization promotes the development of social production, it also poses a threat to human living environment. After the Second World War, some Western developed countries led the development, mechanization and industrialization of agriculture. Extensive use of chemical fertilizers, insecticides and herbicides to obtain high-yield food has severely polluted the human living environment, and the contaminated food directly threatens life

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safety. Sustainable agricultural development and the pursuit of food safety and pollution-free are the common aspirations of mankind. Therefore, advocating and actively developing ecological agriculture is the development trend of today's world agriculture.

In order to effectively solve the safety management of civil construction during the development of ecological agriculture, it is necessary to comprehensively consider the various specific construction conditions of the proposed project during civil construction management, formulate a reasonable construction plan, determine the construction sequence, construction method, labor organization, and adjust the construction Schedule to adjust the construction schedule reasonably. The engineering design plan needs to be economically reasonable and technically profitable. The project implementation is feasible and provides relevant evidence for the demonstration; the construction unit prepares the basic construction plan and the construction enterprise carries out the construction. Prepare work plan and provide basis for carrying out construction preparation work plan. The proposed project design and construction, technology and economy, all pre-construction and post-construction arrangements, and the construction company can be more closely integrated with the construction organization of a particular project. Construction units directly involved can better coordinate the relationship between the units. It can enable construction enterprises to complete high-quality, high-speed, low-cost and low-consumption engineering construction. This is also an important way to strengthen management and improve economic efficiency.

In terms of ecological agriculture and safe civil construction management, many researchers have conducted various analyses and studies on it. For the development of eco-agriculture, it is recommended that in the management of rural ecological environment based on social capital, the management space between the government and the community should be appropriately divided so that institutional capital can promote and regulate social capital and enhance the value of social capital. Jianguo establishes rural cooperative organizations, increases rural human capital investment, and promotes the coupling of administrative boundaries and ecological boundaries [1]. In order to improve the safety level of civil construction, Antoniou conducted a comparative analysis of the application of "ideal order preference technology under ideal conditions" and the multi-attribute utility theory in the selection of appropriate contract types in two different pilot projects, which is helpful for research functions. And AA requirements. For each project, two experts weighted nine selection criteria (SC) using the analytical hierarchy process, revised Simos method, and goal plan. On this basis, a decision support system for construction contractors to choose the type of contract is proposed [2]. Armaghani conducted 232 blasting operations in five granite quarries in Malaysia. Using empirical and intelligent methods, blasting parameters including each delayed maximum charge and powder coefficient were prepared to predict flying stones, and an empirical map was proposed to predict the distance of flying stones with different powder coefficient values. In addition, using the same data set, two intelligent systems, namely Artificial Neural Network (ANN) and Adaptive Neuro-Fuzzy Inference System (ANFIS), are used to predict flying stones. Taking into account the model performance indicators such as the determination coefficient (R~2), value share and root mean square error, and using a simple ranking procedure, the best flying stone prediction model is selected [3].

Therefore, the study of safe civil construction management in an ecological agricultural environment has a strong reference role and reference value for the development of ecological agriculture and civil engineering development with a view to accelerating and perfecting my country's ecological development and rural revitalization strategy. The main purpose of this article is to propose a set of management methods for safe civil construction in an ecological agricultural environment. This management method is integrated with the LEC evaluation method to evaluate the safety of various civil construction operations, and then proposes suitable management methods.. The management method is detailed and reliable, and has strong guiding significance.

2. Civil Construction Technology and Ecological Agricultural Environment

2.1. Civil Engineering Technology

(1) Construction technology of deep foundation pit excavation and support

During the excavation of deep foundation pits and supporting construction, the construction personnel are required to carry out construction according to the following principles: excavation is carried out in sections, layers, and blocks, first excavating the central part, and then excavating the parts on both sides. To dig and support at any time, so that it can be completed within the specified time. The construction unit must dynamically manage the excavation of the deep foundation pit according to the changing law of soil displacement during the excavation of the deep foundation pit [4].

At the same time, the use of advanced monitoring equipment to achieve the purpose of information management during the construction process, to ensure that the deformation of deep foundation pits meet the requirements of construction design. Generally, when excavating from the horizontal direction, cross-section excavation is the most commonly used method. When drilling from the vertical direction, most of them use the layered drilling method from top to bottom. In the excavation work, the support work needs to be closely coordinated with the progress of the excavation to achieve the effect of excavation and support. In most cases, excavation of foundation pits is carried out in layers along the longitudinal direction.

During the excavation process, the construction personnel must ensure that the excavation length of each layer is shorter than the adjacent support spacing. Generally, the excavation length of the first layer is about 7.5m, and the excavation length of the second layer and subsequent soil layers is mainly 4m. The height of the excavation surface of each layer should be calculated relative to the supporting bottom of the layer. After the excavation is completed, the construction personnel should install the steel support as soon as possible. In order to prevent the unstable factors of the slope, the construction personnel must thoroughly clean up the mound at the end of the foundation pit, take waterproof drainage measures and pipeline protection measures around the foundation pit, and then carry out the actual construction. Nowadays, the layer-by-layer drilling method peculiar to the underground drilling process is becoming more and more common, which can effectively guarantee the effect of the final construction quality. Construction at this level must be reasonably set in combination with various construction conditions, and it is best to provide ideal construction safety conditions for the application of mechanical drilling methods.

(2) Formwork construction technology

In the process of assembling the formwork, the construction personnel must strictly abide by the construction process codes and promptly solve various problems that occur during the installation process. At the same time, the construction staff considers the formwork from the perspective of the overall structure, attaches great importance to all links and details of the formwork installation process, and effectively handles the gaps and joints of the formwork. Therefore, it is necessary to avoid slurry leakage due to the presence of gaps and affect the template safety [5].

In addition, the construction personnel must reasonably select steel pipes with appropriate specifications to ensure the safety of the formwork and prevent drift. The assembly process of the top formwork requires the construction personnel to lean the roof formwork against the wall panel and take appropriate sealing measures. In addition, the construction personnel will reasonably determine the specific size of the top arch slab according to the actual construction needs, and then make reasonable adjustments according to the construction requirements during the assembly process to avoid the problem of improper assembly.

In the process of assembling the pillar formwork, the construction personnel will pay close

attention to the stability of the assembly and effectively combine the dimensions of the cylinder to create a reasonable horizontal, vertical, peripheral control line and other edges. Under normal circumstances, the formwork needs to exceed 20 cm in width, and the vertical change of the formwork during the assembly process exceeds 5 mm. In actual assembly, the column formwork is easy to deform, so the construction personnel must strengthen the formwork and correctly design the process of assembly of the column formwork.

(3) Reinforcement engineering construction technology

Reinforcing steel is an indispensable material in civil engineering construction, so the construction personnel must strictly control the processing quality of the steel, straighten it before use, and cut it appropriately according to the length of the steel required for structural design. Special attention should be paid to the bending of steel and calculation of its bending length. The process of rebar bending requires construction personnel to handle the bending points and alignment positions of each rebar. The construction personnel must reasonably determine the thickness of the concrete protective layer according to the construction design requirements. All protective layer pads can be used to effectively control the thickness of the concrete protective layer [6]. At the same time, when the reinforcement bar is to be bound, the head of the reinforcement bar must be rotated inward so that it does not appear in the protective layer. In addition, according to the construction drawing data, the height of the rebar and its specific embedding position are reasonably determined. In the construction of steel bars, the construction personnel must take appropriate operating methods so that the deformation of the steel bars does not affect the construction quality.

(4) Concrete construction technology

Concrete mixing usually includes mechanical mixing and manual mixing, in which manual mixing is usually used in civil engineering that does not require a large number of concrete structures. This mixing method can effectively reduce the cost of civil engineering structures, and can be used for large structures to ensure the construction quality to a certain extent. When the plug-in mixing method is used, the relevant operator must fill the gap that occurs during the mixing process. At the same time, the concrete mixing work cannot be stopped on the way, and after solving problems such as subsidence and water immersion on the concrete surface, the construction personnel can perform leveling work. When the plane stirring method is adopted, the vibration time must be properly controlled and completely cover the whole stirring.

When curing and pouring concrete, there is usually a problem of hardening, the main reason is the hydration of cement. During the hydration process, cement must have certain humidity and temperature conditions. Therefore, once the concrete pouring work is completed, the construction personnel need to strengthen the concrete maintenance work [7]. There are two main methods for curing concrete, steam curing and natural curing. Natural curing is the most commonly used construction method for civil engineering structures. During the maintenance process, the construction personnel need to reasonably control and set the temperature and humidity of the concrete. Usually, the curing time of concrete is about 14 days, during this period, the construction personnel need to prevent the deformation of the concrete caused by high pressure.

2.2. Ecological Agriculture

(1) Ecological environmental protection and industrial development

The eco-environmental protection and industrial development are unified in dialectics. The ecological environment is the natural foundation to support industrial development, and industrial development is an important way to regulate the ecological environment. A good ecological environment provides a solid material foundation and an excellent living environment for industrial

structure adjustment and industrial economic development, promotes the continuous optimization and upgrading of the industrial structure, and promotes the continued profitability of the industry. The loss of the ecological environment and the disorderly utilization of resources will gradually cause the basic industrial structure to lose its comparative advantage, and eventually lead to a double crisis of industrial decline and environmental damage [8]. The central issue of ecological environmental protection and industrial development is the issue of sustainability, including environmental resources as internal factors of industrial development, and the use of "green" and "ecology" as the content and means of industrial development. Sustained development is particularly important.

(2) Rural revitalization

According to the requirements of industrial prosperity, ecological livability, rural civilization, effective governance, and affluent life, the focus of insisting on agricultural and rural development is to establish a sound and coordinated urban and rural integrated development system mechanism and policy system to promote the construction of rural economic and political culture, Social construction, ecological civilization construction, party construction, accelerate the modernization of rural governance systems and capabilities, accelerate agriculture and rural modernization, the road to socialist rural revitalization with Chinese characteristics, agriculture as the main industry makes farmers an attractive occupation Beautiful home with rich pay and healthy life.

2.3. LEC Assessment Method

The LEC assessment method is used to assess the danger of the operator and the danger of working in a potentially hazardous environment. This method uses the product of the index values of three factors related to system risk to assess the risk of operator casualties. The three elements are: L-likelihood represents the possibility of an accident, E-exposure represents the frequency of occurrence in a hazardous environment, and C-criticality represents the possible consequences of an accident. Different scores are determined for different levels of these three factors, and then the product of the three scores of D (danger) representing risk (danger) is used to evaluate the size of the operating conditions [9].

2.4. Safety Construction Management

Construction engineering safety management is a systematic and comprehensive management covering all aspects of construction production. Therefore, in safety management, construction companies should follow the principle of "safety first, prevention first, comprehensive management", formulate corresponding safety policies, plans and measures, improve safety production organization management systems and inspection systems, and establish safety production organizations to Strengthen safety management.

The special plan must be reviewed by experts from other departments such as the construction unit's construction technology, safety, quality and engineering departments. If the test passes, it will be signed by the person in charge of construction technology. For general construction contracts, the general technical person in charge of the contractor and the relevant technical personnel of the relevant contractor must sign the plan. For the special plan that does not require expert verification, it will be approved by the construction department, reported to the supervision department, and signed by the person in charge of the project supervision department[10].

The construction department shall organize construction strictly in accordance with the special plan, and shall not modify or adjust the special plan without authorization. If changes are required due to design changes, structural changes, external environment changes, etc., they are deemed to require review of the revised special plan and should be reviewed in accordance with the relevant

regulations. For a special project with a certain scale and great risk, the construction unit will organize experts to demonstrate. The construction department shall supervise the implementation of the special plan on site and appoint a special person to supervise in accordance with regulations.

3. Risk Assessment Based on LEC Evaluation Method

3.1. LEC Evaluation Method Design Optimization

All hazards in civil construction are derived from its own hazards, which depend on environmental hazards, the hazards of the substances used and the hazards of the methods used. This is a unique attribute of the hazards of civil construction. However, it is possible to offset the actual hazards through control measures such as safety training for workers at hazard sources and the establishment of a strict and effective safety management system. Therefore, the safety management factor M- was proposed based on the initial LEC evaluation method. Manage, which makes the LEC evaluation method more accurate in evaluating hazards.

3.2. Optimized LEC Assessment Process Design

Among them, the value setting of the probability of accident occurrence represented by L factor is shown in Table 1; the value setting of E factor represents the frequency of exposure to dangerous environment as shown in Table 2; and the value setting of C factor represents the value of the consequences of the accident as shown in the Table 3 shown.

$$D = L \times E \times C \times M \tag{1}$$

Among them, the factor L and the value of the possibility of accidents are shown in Table 1; the factor E and the value of the frequency of exposure to dangerous environments are shown in Table 2; and the factor C and the value of the consequences of accidents are shown in Table 3.

For the management factor M introduced due to optimization, its numerical setting weights the safety management system according to equation (2) according to the emergency plan and drill situation.

$$M = Ep\_value \times S\_value \tag{2}$$

Table 1. Accident probability value

Accident probability	value
Extremely unlikely	0.1
Very unlikely	0.2
Unlikely	0.5
Less likely	1
Average probability	3
High probability	6
Must happen	10

Table 2. Frequent exposure to dangerous environment

Exposure to dangerous environment	Frequency value
Very rare exposure	0.5
Several exposures per year	1
Monthly exposure	2
Weekly or accidental exposure	3
Exposure during working hours every day	6
Continuous exposure	10

Table 3. The severity of the consequences of an accident

Consequences	value
Draw attention	1
Minor injuries	3
One or more people are severely disabled	10
1~3 people died	20
4~9 people died	50
More than 10 people died	100

Where Ep_value represents the weight of the emergency plan, as shown in Table 4; S_value represents the safety management system's suppression value for danger, as shown in Table 5:

Table 4. Emergency plan to suppress dangerous value

Emergency plan	Drills	Ep_value
Yes	Regular	0.1
Yes	Less	0.5
Yes	No	0.8
No	No	1

Table 5. Emergency plan to suppress dangerous value

Safety management	Operability	S value
Yes	High	0.1
Yes	Middle	0.5
Yes	Low	0.8
No	No	1

The evaluation criteria of the calculated result D hazard value are shown in Table 6:

Table 6. Risk assessment level

Risk level	Degree of danger	Advice	D value
A	Slightly dangerous	Work carefully	<30
B	General danger	Need attention	30~80
C	Significantly dangerous	Requiring rectification	80~160
D	Highly dangerous	Must be corrected immediately	160~320
E	Extremely dangerous,	Work prohibited	>320

4. Discussion and Management Plan

4.1. Optimizing the Analysis of the LEC Evaluation Method

Table 7. Node and job correspondence

Node number	Job
Section 1	Laying temporary cables
Section 2	Working at heights
Section 3	Use reverse chain operation
Section 4	Welding work
Section 5	Working with gas
Section 6	Store flammable and explosive items
Section 7	Welding operation
Section 8	Multiple people working on the same part
Section 9	Homework
Section 10	Restricted space operation

According to the optimized LEC evaluation method, calculate the hazard value of each node of civil construction in the ecological agricultural environment. The construction operations corresponding to the nodes are shown in Table 7. The relationship between the construction operations corresponding to the nodes is shown in Figure 1. The nodes correspond to the construction operations. The risk exposure relationship is shown in Figure 2, the evaluation result is shown in Figure 3, and the duration of each node is shown in Figure 4.

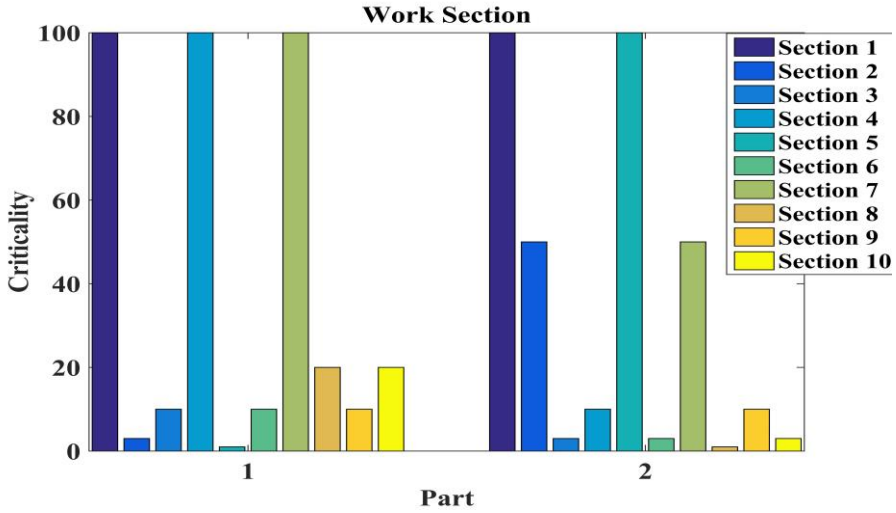

Figure 1. The consequences

It can be seen from Figure 1 that the severity of the consequences for each construction node in different areas, of which node 3 and node 4 of area 1, that is, the use of chain link operations and welding work, the severity after the accident is the highest, according to LEC the standard of the assessment method, its severity value reaches the highest 100; followed by node 5 and node 9, namely the operation with gas and the operation of this part, the severity after the accident is also in a higher position, reaching a value of 50; and the node 2 and node 10, that is, multiple people working on the same part, its value is 20, there is also a certain danger. For node 5 and node 8 in area 2, ie the operation with gas and multiple people working in the same location, the severity after the accident is the highest. According to the standard of LEC assessment method, the severity value reaches 50; followed by node 1, node 3. Node 7 and node 9, that is, laying temporary cables, using reverse chain operations, welding operations and local operations with multiple people working in the same location, the severity after the accident is also at a higher position, reaching a value of 20.

It can be seen from Figure 2 that the exposure degree of each construction node in different areas, where node 1 and node 3 of area 1, that is, laying temporary cables and using reverse chain operations, the highest degree of exposure to danger, according to LEC The standard of the assessment method, the exposure risk value reaches the highest 10; the second is node 6, which stores flammable and explosive materials, and the degree of exposure to danger is also at a higher position, reaching a value of 6; and node 8, which is more When working on the same part of a person, its value is 3, and there is also a certain danger. For node 2 of area 2, ie high-altitude operations, the degree of exposure to hazards is the highest. According to the LEC evaluation method, the exposure risk value reaches the highest 10; followed by node 7 and node 8, that is, welding operations and multiple When working in the same part of the same person, the exposure risk value reaches 6, and the degree of exposure is also at a high position, while node 1, node 4 and node 10, that is, laying temporary cables, welding work and limited space operations also have certain the risk is 3.

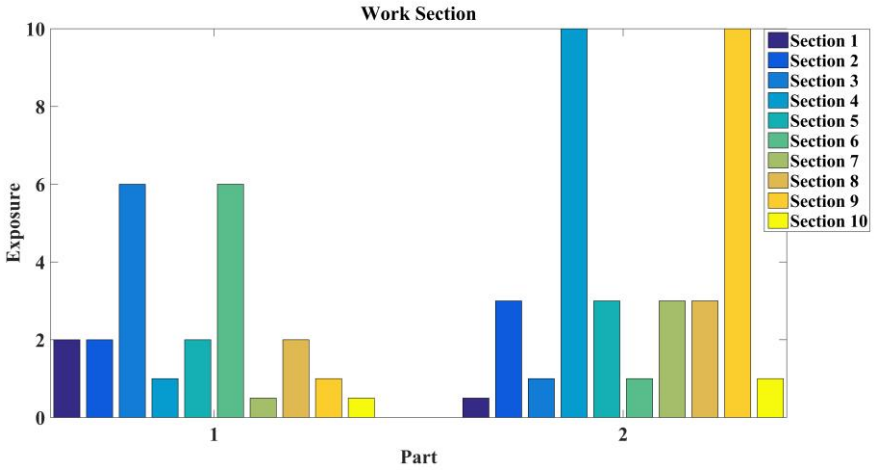

Figure 2. Work Section

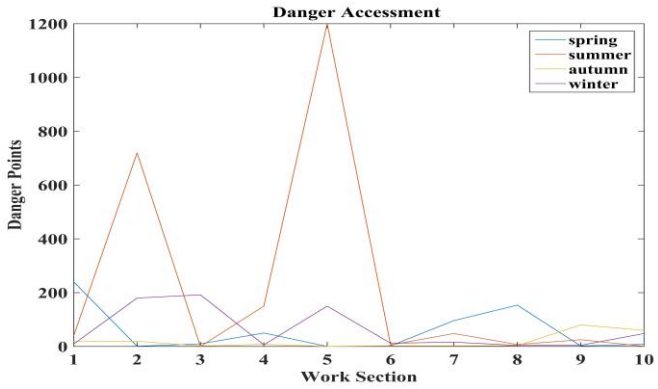

Figure 3. Danger Accessment

As can be seen from Figure 3, in terms of construction time, construction is not suitable in autumn and winter, and its risk is greater, especially at node 1 in winter. When laying temporary cables, the dangerous value is as high as 600, while node 2 is working at height The danger value also exceeds 320 and reaches 500, both of which are forbidden to operate; the node 6 during autumn construction stores flammable and explosive items, which is the most dangerous during the entire construction process, reaching 700, and the operation is also prohibited; Pay attention to node 2 and node 5 during spring construction, that is, carry out aerial work and operation with gas, the dangerous values are 140 and 250 respectively, and need to be rectified immediately; the dangerous value of each node during the summer construction process does not exceed 50, when the operation is carried out need to be careful.

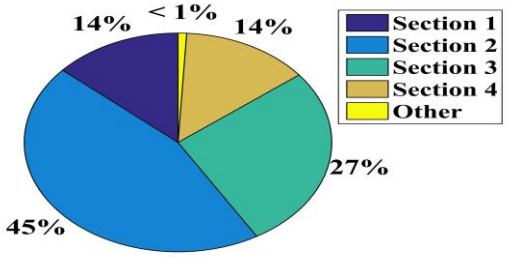

Figure 4. Proportion of working hours

It can be seen from Figure 4 that in terms of construction time, node 1 and node 10, that is, the temporary working hours for laying temporary cables and confined spaces account for the largest proportion, with 31%, followed by the welding operation of node 7, whose working hours Accounted for 16%; Node 4, Node 6 and Node 8, which are welding operations, store flammable and explosive items and work with multiple people at the same location, their working hours accounted for 5%; Node 2 working at heights accounted for 3%; The node 3, node 5 and node 9 represent the use of reverse chain operations, gas operations and local operations, and their working hours account for the smallest proportion, only 1%. According to the length of its operation, you can set a detailed operation schedule. For example, in the summer, a large amount of temporary cable and limited space operation, in winter, a small proportion of the use of reverse chain operation, with gas operation and this part In the spring and autumn, some medium-length operations such as welding work, storage of flammable and explosive items, and multiple people in the same part are performed.

4.2. Safety Civil Engineering Construction Management Scheme

Construction workers must wear complete protective equipment and hard hats. Must have received safety education, violation and discipline education, and have passed the exam before they can start work. On-site materials need to be arranged in a safe and orderly manner to keep them organized, and to continuously remove construction waste so that there is no sewage or oil pollution on site. The construction department needs strict construction organization and personnel responsible for construction safety.

The temporary cable must be free from rolling, friction, collision and high temperature damage. The position of the power distribution cabinet must be correct. The switch cannot be damaged, and the insurance must meet the requirements. There are no exposed wire ends and no wrong wiring. It is strictly prohibited to connect multiple switches to the load line. The electrical equipment must be managed by a dedicated person. The power distribution room and the operation office will execute and record the "blackout list" and "prohibition list". Non-electricians are prohibited from handling wiring, replacing insurance, and handling electrical equipment failures.

To prevent injury to people caused by falling objects, it is strictly forbidden to drop objects, and dangerous operations are prohibited to set warning signs or personal supervision on the ground. When cross operations are required, lower-level operations must take the lead in coordinating with higher-level operations. In order to prevent falling objects from causing personal injury, lower-level operators should take protective measures and set up special personnel to supervise. If the lower-level operations are also high-altitude operations, the requirements for high-altitude operations are strictly implemented.

The construction shelf shall be firmly constructed and not deformed. The shelf must be intact, tied at both ends and cannot be moved. The temporary working platform should be equipped with safety fences. Use of seat belts: high suspension and low use; if there are no suspension points, temporary suspension points should be welded. If the suspension point cannot be set, a steel safety rope must be installed. The safety rope must be hung on the safety rope. Applicable to all levels of advanced operation statement form. High-altitude operators must participate in the development of safety measures for high-altitude operations. People who are not suitable for high-altitude work should not participate in high-altitude work.

The safety distance between the two bottles of oxygen and acetylene and the fire source is 5 meters and 10 meters, respectively. The length of the welding machine shall not exceed 2 meters at a time, and the ends of the wires shall not be exposed. The welding machine shell should be connected zero. The end of the secondary wire of the welding machine should be tied. It is strictly

forbidden to touch the power cord and the secondary line, touch the oxygen, touch the acetylene bottle, touch the steel wire rope, load-bearing steel wire rope and other flammable medium pipes. Secondary circuits are prohibited to use flammable medium pipes and supports and other fixed metal structures as circuits. The welding work of working at height must meet the requirements of working at height. Fire extinguishing requirements must be implemented during welding operations. Before working, make sure there is no fire hazard. Welding machine parts must not be defective.

After the gas equipment becomes hot and enters the gas equipment operation, it is necessary to release and replace the gas equipment according to the regulations. After passing the gas test, the construction unit will appoint a person in charge of holding the equipment to monitor the operation. The construction of the main part of the natural gas area requires special personnel to hold the equipment to monitor and prevent gas leakage and personnel poisoning. Confirm that the electrical facilities, gas, nitrogen, oxygen, and other facilities in the workplace are free of electrical leakage and leakage. When multiple people work on the same part or the work of this part affects others, they should actively inform and contact to confirm. Restricted space operation tickets should be handled for restricted space operations.

5. Conclusion

The safety of civil construction has always been the content that the project must pay attention to, because of the special nature of the ecological agricultural environment, the management method of safe civil construction is particularly important. This article establishes the risk assessment of construction operations in an ecological agricultural environment by optimizing the LEC assessment method. On this basis, a corresponding management plan is formulated, which mainly strengthens the safety awareness and self-prevention awareness of the construction personnel, and strictly abides by the civil construction management in the ecological agricultural environment. The system takes "safety first, prevention first" as the safety guidance for construction, and through joint efforts, effectively improves the safety level of the construction management system in the ecological agricultural environment.

By introducing management safety management factors, the LEC evaluation method is optimized to make it more in line with the actual construction process. Through the established safety scoring standard, the danger degree of construction operations in the ecological agricultural environment is digitized and visualized to make it appear concise and clear. Effective and reasonable control of the safety risks of construction projects can not only reduce the cost of safety risk management of civil engineering projects to a certain extent, but also have a certain positive significance for improving the development of ecological agriculture. It is conducive to ensuring the quality of construction projects in an ecological agricultural environment and reducing the frequency of unsafe accidents.

This article, under the guidance of the LEC assessment method, did some research on the current key problems of construction operations in the ecological agricultural environment, evaluated it, and put forward some countermeasures, but the management method of safe civil construction needs some aspects. Do further thinking and research.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this

study.

Conflict of Interest

The author states that this article has no conflict of interest.

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