Research Article

Cost Control Analysis of Construction Projects Based on Wireless Communication and Artificial Intelligence Decisions

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In decades of development, the country has been vigorously developing infrastructure projects and providing a steady stream of help, so our infrastructure strength has always been world’s top part. But now, because of the vigorous development of environmental protection enterprises, a variety of raw materials and environmental treatment costs are getting higher and higher, in order to maintain the profitability of enterprises, so we need to carry out cost control of construction projects to ensure a certain profit. In recent years, various emerging terms such as artificial intelligence and big data have become more and more popular, so in order to ensure the stability of the industry, it is imperative for the construction industry to introduce new technologies for the technological revolution. Wireless communication is also widely used with artificial intelligence to build systems because of the fast speed of interaction. In order to ensure the steady development of the construction industry in the future, we need to control the cost of the project and the introduction of high-tech. The purpose of this paper is to control the cost of construction projects by means of wireless communication and artificial intelligence decision-making. After reviewing the history of the construction industry in recent decades, as well as the price fluctuations of building materials and the relevant laws and regulations on environmental protection and construction in recent years, this paper uses the emerging artificial intelligence and traditional wireless communication methods to carry out the traditional project cost control experiments. After a period of experiments, people found that the use of wireless communication with artificial intelligence decision-making ability can be very good control of construction project costs in a certain range, to ensure the profitability of the project and the maximum use of materials.

1. Introduction

When the country was established decades ago, all kinds of waste flourished. At that time, the best way to change a country was to build roads and bridges and open traffic, that is, if you want to get rich, build roads first [1, 2]. In the area near the lake, pier ferry is used for urban improvement. Under the guidance of the government and the support of policies, China’s construction industry has been expanding continuously [3]. Moreover, after so many years of development, the construction industry has passed the stage of savage growth and entered the stage of vigorous national control [4]. However, the current construction industry is supervised by enterprises and departments of various countries such as CSCEC, the Environmental Protection Bureau, and the Railway Bureau, and countless construction enterprises compete. As a result, only qualified and compliant enterprises can establish a position and develop steadily in the construction industry [5, 6]. However, due to the stricter control on environmental protection and the impact of international trade war and other factors, the price of building materials has risen sharply. Now, the construction industry needs a new round of revolution to survive. This is both a challenge and an opportunity [7, 8]. We should make good use of the high-tech and emerging technologies at this time. As long as we make good use of them, this opportunity can be grasped and further developed [9]. We decided to take the most effective way to use artificial intelligence for decision-making to control the cost of construction projects, so as to make steady progress and development [10].
Artificial intelligence and wireless communication are two concepts that have been mentioned for a long time, but the difference is that the development history of artificial intelligence is only a few decades, while the development history of wireless communication is very close to a hundred years. Moreover, because of its confidentiality and concealment, it was often used in war, and great progress has been made during this period [11–13]. However, we find that although artificial intelligence has a short development time, it has great potential, because it has intelligence and learning ability, can become stronger automatically, and is equivalent to an analysis system that can learn by itself; due to its own technical reasons and hardware barriers, wireless communication has also fallen into a stalemate at present. In terms of technical reasons and hardware barriers, wireless communication can become stronger automatically, and is equivalent to having great potential, because it has intelligence and learning ability.

2. KFLP Algorithm

Nuclear method is an effective method to find nonlinear relationship hidden in unknown nonlinear system. The input signal of nuclear adaptive filter is a filter method to track nonlinear system linearly based on this nonlinear mapping [32–34]. The essence of the nuclear method is an internal product operation, so when the algorithm is represented as an internal product form, the internal product calculation can be replaced directly by the nuclear function. The Mercer theorem states that any regenerative core can be extended as follows:

$$\hat{\varphi} (\rho, \rho') = \sum_{i=1}^{\infty} y_i \varphi_i (\rho) \varphi_i (\rho').$$  \hspace{1cm} (1)$$

Given the input sequence and the desired sequence, the document-based nuclear split low power cost function:

$$W(\theta) = F \left( \left\{ d(\mu) - \theta^T (\mu) \varphi (\mu) \right\} \right)_i, 0 < i < 1.$$  \hspace{1cm} (2)$$

The weight update formula of the KFLP algorithm s:

$$\theta (\mu + 1) = \theta (\mu) + \delta \frac{1}{|e(\mu)||1-\eta|} \text{sgn} (e(\mu)) \varphi (\mu).$$  \hspace{1cm} (3)$$

3. Experiment

3.1. Experimental Purposes. Current reforms in the construction industry are inevitable, so we need to update and upgrade all technologies and systems. At the same time, we should also pay attention to the basic principles of the construction industry, that is, do not steal materials and do not deliberately produce products that do not meet the standards and specifications, so we need to carry out real-time control to ensure that the completion of the target standards of the system.

3.2. Experimental Process. We started with using the KFLP algorithm to work with artificial intelligence to make a holistic analysis of the construction industry and to list all the materials and information required before the construction project was carried out. The wireless communication equipment is then reasonably arranged in the plan according to the functions of the various buildings and then will be buildings according to party A requirements and database cases according to its unique functions to divide the control site; the whole building is divided into small objectives, so that it will be completed in the construction process of safety and reasonable and can contact other small goals at any time, so that all independent buildings will be not only independent individuals but also connected to each other, forming an organic whole, to achieve the goal of interconnecting but not interfering with each other. Finally, the results of the simulation experiment are analyzed, the machine simulation evaluation analysis is carried out, and the next repeated experiment is carried out, and a result suitable for the needs of party A is obtained through many experiments.
3.3. Survey. After the experiment, in order to observe the success of the experiment, we usually invite the relevant construction industry, especially the collection and construction personnel of various materials, and negotiate with the construction personnel and security personnel on the planning and layout and then collect their information. Valuable opinions achieve results, formulate follow-up pilot programs, and continuously improve. This time, 500 material collectors, 300 construction layout personnel, 150 construction project managers, and 90 security personnel in the construction industry who used this wireless communication and artificial intelligence method to innovate costs were invited to conduct a questionnaire survey. The survey contents mainly include knowledge of new technologies, current construction process cost control issues, cost changes after using wireless communication, and artificial intelligence methods.

4. Experimental Results

4.1. Artificial Intelligence and Wireless Communication Work Together to Make Decisions about Estimates of the Cost of Housing Projects. After testing the collaboration between artificial intelligence and wireless communications, we found that we could experiment with this, so we went to the next experiment, which was to test the difference between intelligent and manual procurement.

After the data is counted, the data are tabled and charted, such as Table 1 and Table 2, which are made from Table 1. After the calculation, it is found that the labor measurement price is 46 80,000 yuan, while the intelligent estimate price is 4472 million yuan, and intelligent measurement for material waste is very small; manual measurement of more wood, steel, and stone, and less part of the tile and concrete need to repurchase to increase the cost budget and human resources. So, we think artificial intelligence measurements are still good for housing cost projections (Figures 1 and 2).

### Table 1: About manually measuring the material cost of a house.

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity/t</th>
<th>Price/10,000 yuan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>2.3</td>
<td>4.5</td>
</tr>
<tr>
<td>Steel</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Stone</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Concrete</td>
<td>13</td>
<td>2.5</td>
</tr>
<tr>
<td>Tile</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>The rest of the equipment</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>

### Table 2: About intelligently measuring the material cost of a house.

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity/t</th>
<th>Price/10,000 yuan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>1.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Steel</td>
<td>13.3</td>
<td>13.3</td>
</tr>
<tr>
<td>Stone</td>
<td>2.8</td>
<td>5.5</td>
</tr>
<tr>
<td>Concrete</td>
<td>12.7</td>
<td>2.53</td>
</tr>
<tr>
<td>Tile</td>
<td>4.3</td>
<td>8.5</td>
</tr>
<tr>
<td>The rest of the equipment</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>

4.2. On Using Wireless Communication and Artificial Intelligence Decision Support Technology to Control Labor Cost Results. When we use wireless communication and artificial intelligence decision support technology to control labor cost data and with labor planning for labor cost control data collection and made an analysis and comparison, list 3, mapping the data results reasonably in the graph to make the data comparison more obvious. Finally, we found that the labor cost of the intelligent forecast plan was $156.8 million, while the labor cost of the labor plan was $192,000, and that the intelligent forecast plan only required 14 people to work 32 days, while a manual plan requires 16 people to work for 40 days. And after two rounds of prediction, the final total cost of the two sets of experiments was 604,000 yuan and 66,000 yuan, of which the former was intelligent prediction results, and the latter was manual prediction results. Experiments show that intelligent forecasting plan in the duration, materials, and amount is lower than manual plan, so intelligent prediction plan can reduce costs within a certain limit and is effective (Table 3; Figure 3).

4.3. Results of the Questionnaire. By looking at the data in Table 4 and Figure 4, it is possible to carry out a planned analysis of this questionnaire’s acceptance of intelligent prediction. Among the 100 samples in this questionnaire, 88 samples have a positive attitude, and the evaluation attitude close to 90% is considered to be very good and negotiable, which is equivalent to a huge improvement. And another 12 people have a skeptical attitude, that is, more than 10% of the people think that they should continue to work hard, indicating that what they have not done fully meets everyone’s expectations, so we still need to continue to work hard and combine various smart new features in wireless communication technology, provide more channels for the collection of project cost analysis data, and combine artificial intelligence technology to create a better analysis system and implement a better project cost control plan.

4.4. Project Cost Control. Controlling project cost plays an important role in the profitability of an enterprise, and it is a research direction that every enterprise should focus on. The costs and expenses in the project are redundant and complex, including office management fees, material fees, service fees, and external consulting fees. If the cost is not reasonably controlled, it is likely to cause the situation to make ends meet or even break the capital chain. The project manager must plan and arrange the cost reasonably, summarize and analyze the cost every month, find out the cost expenditure that can be reasonably simplified, and summarize and report it on a regular basis. From the start of bidding to the completion of the construction project, cost control should always be prioritized. Under the condition of ensuring the construction period and quality, a series of measures should be taken to control the cost within a reasonable range and save the cost to the greatest extent.
Figure 1: About manually measuring the material cost of a house.

Figure 2: About intelligently measuring the material cost of a house.

Table 3: About using wireless communications and artificial intelligence decision support technology to control labor cost results.

<table>
<thead>
<tr>
<th></th>
<th>Number of people/persons</th>
<th>Daily wage/(100 yuan/day)</th>
<th>Working hours/days</th>
<th>Salary/10,000 yuan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual plan</td>
<td>17</td>
<td>3.2</td>
<td>40</td>
<td>19.18</td>
</tr>
<tr>
<td>Smart predictive plan</td>
<td>15</td>
<td>3.6</td>
<td>32</td>
<td>15.72</td>
</tr>
</tbody>
</table>
5. Conclusion

Artificial intelligence and wireless communication jointly create an engineering cost control system for the construction projects we need, and due to the calculation speed of the artificial intelligence system and the existence of the database, the engineering cost of the construction project can be effectively controlled. We should always pay attention to and keep the database updated, especially the data collection of building materials on the market, and store it in the artificial intelligence database in time, so that the database can analyze the price of the relevant data in time. It should

![Figure 3: About using wireless communications and artificial intelligence decision support technology to control labor cost results.](image-url)

![Table 4: Evaluation results of the questionnaire.](table-url)

<table>
<thead>
<tr>
<th>Evaluation attitude</th>
<th>Smart forecasting plan</th>
<th>Manual planning</th>
<th>The total number of copies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>71</td>
<td>47</td>
<td>117</td>
</tr>
<tr>
<td>It is OK</td>
<td>17</td>
<td>29</td>
<td>49</td>
</tr>
<tr>
<td>Continue to refuel</td>
<td>12</td>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td>Total number of copies/shares</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
</tbody>
</table>

![Figure 4: Evaluation results of the questionnaire.](image-url)
also be kept up-to-date on commodity price reviews of individual companies and preferential prices for prime material contractors. When we prepared all the information and tested it, we found an interesting result: that the system controlled the house far more than the bridge. Because of the single bridge construction, so as the system and people after a certain analysis, the results are not very different, and housing because of the construction costs will be due to individual decision-making and form a different program, so as our experiment to housing-based, that is, shown above. Based on the experimental results and subsequent evaluation results, we know that the system has some advantages for cost control, but people think it can go further and need to be updated, so our next goal is to speed up the update and upgrade of the system, adding other different algorithm-assisted use.

**Data Availability**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Conflicts of Interest**

It is declared by the authors that this article is free of conflict of interest.

**References**


