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## Research on cost control management system of investor's landscaping project based on analytic hierarchy process

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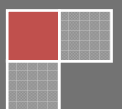
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### ABSTRACT

With economic development, now the project is growing, and consumptions of both the financial and human resources are enormous. As the project is so big that little mistake can cause a waste of resources, so project management is very important, especially cost control management in project management is essential. In this study, cost control management in the implementation process of the project is studied taking landscaping project as an example. Because the key to the success of a project lies in scientific and standardized management, such as the control of project costs, the control of the progress of the project, project quality control and so on, all belonging to important procedures in the construction process of the project. This study also focuses on analysis of the current problems in China's landscaping project, makes profound study of the root of these problems, and proposes solutions to address the problems. At last, this study establishes a cost control management system based on Analytic Hierarchy Process taking a landscaping project as an example. And the fact proves the management system is a scientific, standardized and rational management system, a system that can address the serious problems existing in the current major projects in a practical manner, in particular problems in landscaping projects. Landscaping project is not just related with the national economy, but also affects the livelihood, so each country has paid great attention to it. Especially in developing China, more attention has been paid, for the rapid economic development in recent years has led to the deterioration of the environment, so the Chinese Government is working to optimize the environment. In this sense, this study has practical significance.

### KEYWORDS

Landscaping project; Project cost control; Project management system; Analytic hierarchy process.



## INTRODUCTION

After decades of development, at present, China's landscape project is in a situation of more people and less materials, the competition among landscape corporations has increasingly grown fierce, especially after China's accession to WTO, some foreign landscape contracting business began to enter China, and this intensifies the competition in the landscape industry<sup>[1]</sup>. In order to change the passive situation into an active one, control of marketing management process should be strengthened so as to achieve the efficiency of marketing management. Marketing system should be aimed at the building of a mechanism of customer demand data mining, analysis, and coping, and to deal with the responsibilities of all levels in a scientific and reasonable manner. Such kind of marketing and management structure can coordinate marketing and services, and makes the two into organic integration. The large banks should give full play to their advantages and vigorously promote the marketing system, create an "able and victorious" marketing team, and make a good security mechanism, as well as improve the marketing resource allocation mechanism. Besides, personal marketing resource allocation needs to improve too. Based on the research and analysis on the current status of China's large landscape projects, this study finds that while building and improving cost control mechanism with high efficiency, there are two aspects cannot be ignored<sup>[2]</sup>. One is to encourage and support individual exploration of resource allocation in grassroots large landscape projects, and to encourage individuals who having made significant contributions. The other is to highlight the speciality and competitiveness of individual encouragement, to maximize the individual initiative. All in all, the ultimate goal in building a high efficient management system is to maximize the excitement of the enthusiasm and initiative of marketers, thus to improve the competitiveness of large landscape projects in world financial market.

In the implementation of landscaping projects, the understanding towards project cost management knowledge of Chinese construction enterprise is basically stuck in determination of cost of engineering projects, and Chinese large banks are all from specialized banks from the traditional planned economic system. Credit industry originated in the 1770s, marked by the appearance of Irish Loan Fund system; to the 1880s, Germany established credit cooperatives; after a long period of development, when in the 1970s, there had been small credit services platform. Microfinance credit usually is small in amount, its objects are mostly small and medium enterprises or low-income families, with a purpose to help the production of enterprises with financial difficulties or support for public projects. It is worth noting that microfinance credit is used for production or development of public welfare, rather than consumption. Chinese microfinance sector is currently in the early stages, yet it gropes forward<sup>[3]</sup>. This study points out a variety of problems in the current Chinese landscape project and analyzes and researches each of the issues separately.

## THEORETICAL BASIS OF PROJECT COST MANAGEMENT

Project cost management, although very practical, also must follow a scientific theory<sup>[4]</sup>. Credit industry originated in the 1770s, marked by the emergence of the Irish Loan Fund system, and the system was mainly to provide small loans to poor farmers without collateral; until the 1880s, the real sense of the credit cooperatives began to emerge, which was established in Germany; after a long period of development, in the 1960s, credit industry began to focus on providing low-interest loans for low-income hard households, small-scale farming or small-scale industries at first<sup>[4]</sup>, and made no prescription on the repayment date and loan, so most of the research ended in failure. Till 1970s, microfinance services platform appeared, which was to help the poor in capital formation through microfinance, thereby improving the welfare of the poor<sup>[5]</sup>. With the development of the credit industry, based on the targets, microfinance gradually was divided into two camps, namely welfarism and institutionalism. The former focuses on production and living of the poor; while the latter lays more emphasis on sustainable development of credit industry. Now with the development of credit technology and the diversification of credit financial products, welfarism and institutionalism have started integration to pursue a win-win goal. Large banks should pay attention to ownership structure in the changing process from passive marketing to active marketing. All levels of management of the banks should make the construction of marketing system the heart of corporate governance. As already mentioned above, the objectives of microfinance are different based on different targets, similarly, understandings towards microfinance are different in different countries or different institutions. In the definition of CGAP, microfinance provides many financial services, including loans, savings, insurance and remittances, primarily for low-income families. Providing loans services is to bring productive capital for these low-income families, so that they can generate profit on their own human capital to get rid of poverty; savings services are to store a large amount of money and ready for future use; insurance services can reduce investment risk and provide security for future unexpected expenses. The followings are two cost estimate classifications. One is cost estimate classification by Association for Advancement of Cost Engineering (AACE), as shown in TABLE 1, the other is cost estimate classification by CII, as shown in TABLE 2.

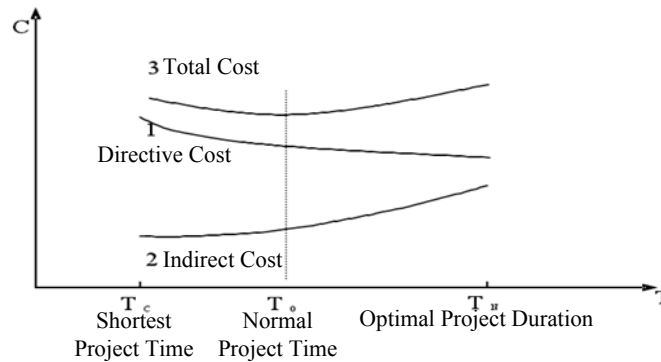
**TABLE 1 : Cost estimate classification by AACE (18R-97)**

Estimated Grade	Project Definition Degree	Ultimate Use(Estimated Special Aim)	Range of Expected Accuracy
Level 5	0%~2%	Concept Selection	-50%~100%
Level 4	1%~5%	Study or Feasibility	-30%~+50%
Level 3	10%~40%	Budget, Approve or Control	-20%~+30%
Level 2	30%~70%	Control or Tendering and Bidding	-15%~+20%
Level 1	50%~100%	Check the Estimation or Tendering and Bidding	-10%~+15%

**TABLE 2 : Cost estimate classification by CII (CII SD-6)**

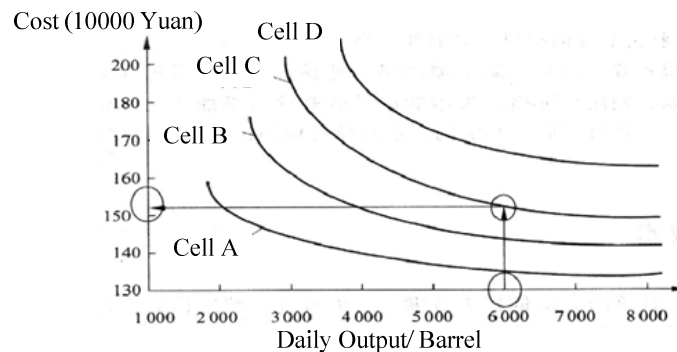
Estimated Grade	Range of Percentage	Explanation/ Methods
Order of Magnitude	+/-30% ~ 50%	Feasibility Study—Cost/Yield Curve
Coefficient Estimating	+/-25% ~ 30%	Main Equipments—for Cost Factor
Control Estimate	+/-10% ~ 15%	Calculated amount based on mechanical, electrical and constructional drawings
Detail or Final	+/- < 10%	Based on detail drawings

Time-cost optimization is the process to find the shortest period arrangements with the lowest cost, or seek the lowest-cost plan as required duration<sup>[6]</sup>. Microcredit is not only with the intention of poverty reduction, it is also a mode of operation with cost-effective development in line with the economic situation, and can be sustainably developed. The current credit is not used for consumption purposes, but in order to promote the production. Microcredit offers a possibility of improving income distribution, thereby changing the distribution of wealth and income. Through a long period of development, it has been basically confirmed that microfinance does have the effect of increasing the income of the poor. Therefore, the aggregate of time and cost are shown in Figure 1. In the curve of total cost, there must be a point with duration of the minimum total cost, which is the objective sought by cost optimization, and the corresponding duration is called the optimal period.



**Figure 1 : Time-cost curve**

Seeking the lowest cost and optimal project duration is generally performed by a computer. Marketing strategy is necessary as well as its planning and implementation mechanisms. Prerequisite for long-term sustainable development of microfinance is to integrate the funds from the social sectors, and then put them into the commercial area of investment. But in China, the integration of private capital is difficult, because people generally more believe in government financial organizations<sup>[7]</sup>. Therefore, the development of microfinance in China needs a positive atmosphere for private finance. In China, the target group of microfinance is poor and low-income populations, and this is easily mixed up with subsidized poverty alleviation programs, but the two are significantly different, although the former has a feature of welfare, its essence remains a loan, and principal and interest need to be returned on time, while poverty alleviation programs have greater significance is the nature of social assistance. So in different regions, different credit models are adjusted according to the local economic situation. For example, Figure 2 is the cost-yield curve of some cells in a chemical factory. A project of Cell C has a production of 6000 barrels every day, so what is the estimated cost?

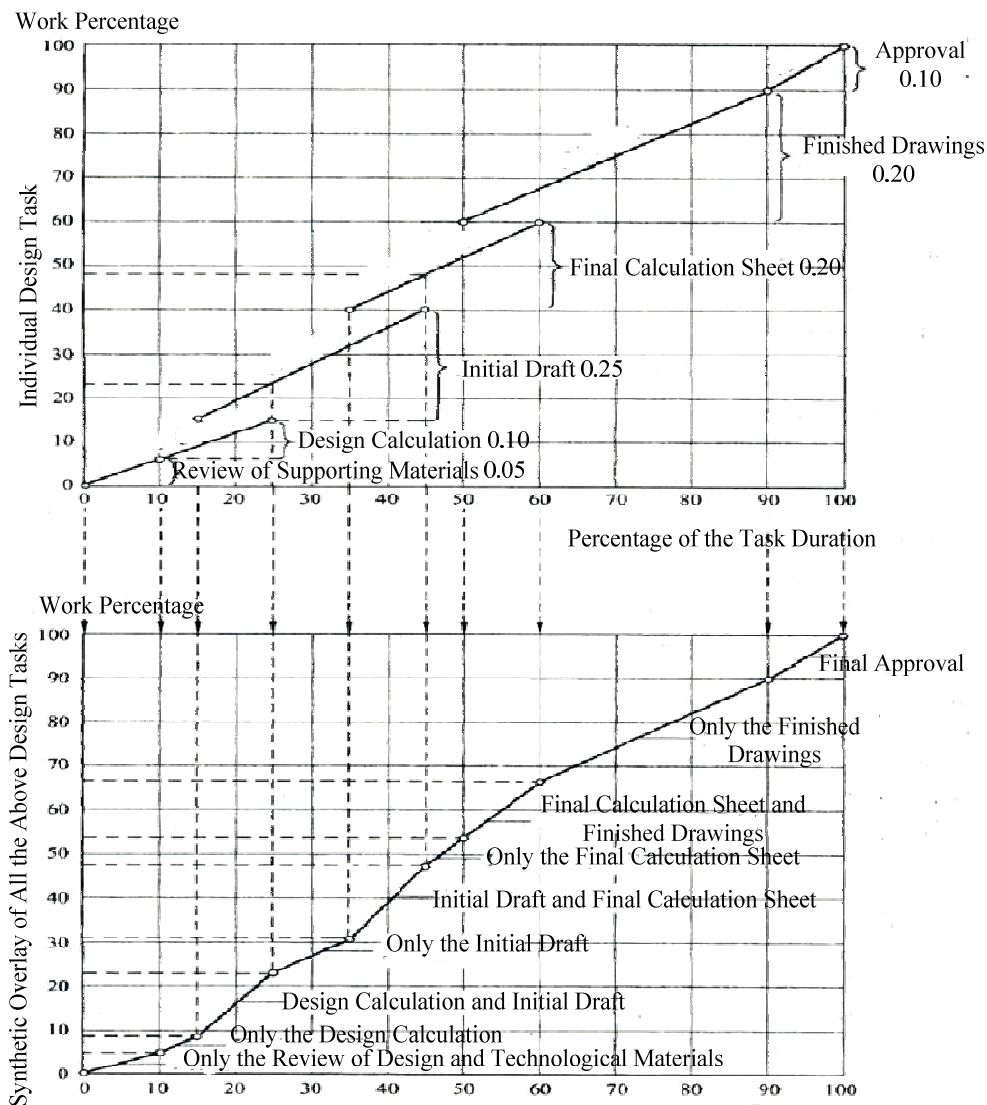


**Figure 2 : Cost-yield curves**

Along the horizontal axis to find the yield of 6,000 barrels per day, draw a vertical line up intersecting with the production unit C curve, then draw a horizontal line to the left of the intersection, the corresponding number is the estimated cost of 1.53 million yuan.

**MANAGEMENT SYSTEM OF PROJECT COST CONTROL**

To manage all the design work, a work-time curve is drawn based on data, as shown in Figure 3. The top half of Figure 3 is a series of independent line segments representative of each design work, arranged in order of occurrence, the slope of each line segment is the ratio of weight coefficient and the time required to complete the work. The bottom half of Figure 3 is work-time curve of the entire design work. As mentioned earlier, some of China's current funding of microfinance comes from foreign institutions, so there is great uncertainty, once the funds are recovered, the project cannot be continue. And such kind of distrust also restrains the development of microfinance to a certain degree. Now China has begun to its own sources of funding on the government agencies, it is believed that in the future there will be a boost for the development of microfinance. By integrating the private capital, and then making use of the capital for the development of the credit industry has become a model for the development of the credit industry, and now there already has been a pilot microfinance for private capital, which in a sense guiding the private capital into the credit industry, also as a strong impetus for the development of small and medium enterprises with the background of economic crisis. How to make use of private capital in the credit industry, thus to mitigate the impact of the economic crisis is an issue that should be considered in the next step.



**Figure 3 : Work-time curve of the entire design work**

Figure 4 shows the synthesis of the results of the planned work, and the upper half of the figure shows the overlap and sequence of three major facilities construction tasks with diagrams. In the context of the current economic crisis, due to

the continuous growth of gross domestic product, China's macro-economic performance is in accelerated recovery, which can be seen from the emerging government fiscal policy effectiveness, but the development of China's economy is still mainly driven by government support. The acceleration of macro-economic development is disproportionate with the current Chinese social consumption growth, which arouses anxiety about the economic structure of China. Because this disproportionate development will easily lead to economic inflation pressure, while the country's macroeconomic policy is more focused on monetary contraction, so there have been conflicts between national policies and the development of SMEs. This contradiction is reflected in the form of although economic recovery has already realized, the development of enterprises lags slightly, and therefore, more investment is needed to support the accelerated development of enterprises. In this way the funds invested mainly are credit funds injection. However, with the current background of economic crisis, in the formation of economic recovery trend, the country's macroeconomic policy prefers a moderately tight monetary policy, so the loan amount in state-level banks is reduced, thus there forms a relatively large contradiction between loan amount and the high demand for funds. With the economic crisis, the majority of SMEs are in trouble, if without the support of government funds to get rid of the plight of development, it is necessary to look for other ways to promote the normal operation of business, at this time, the injection of integrated private capital becomes an urgent, for it can provide funds to enable normal operation of SMEs on certain extent, thus help them survive the economic crisis. In the figure, the sum of all the weights should be equal with 1.0 as discussed previously to represent 100% of the work.

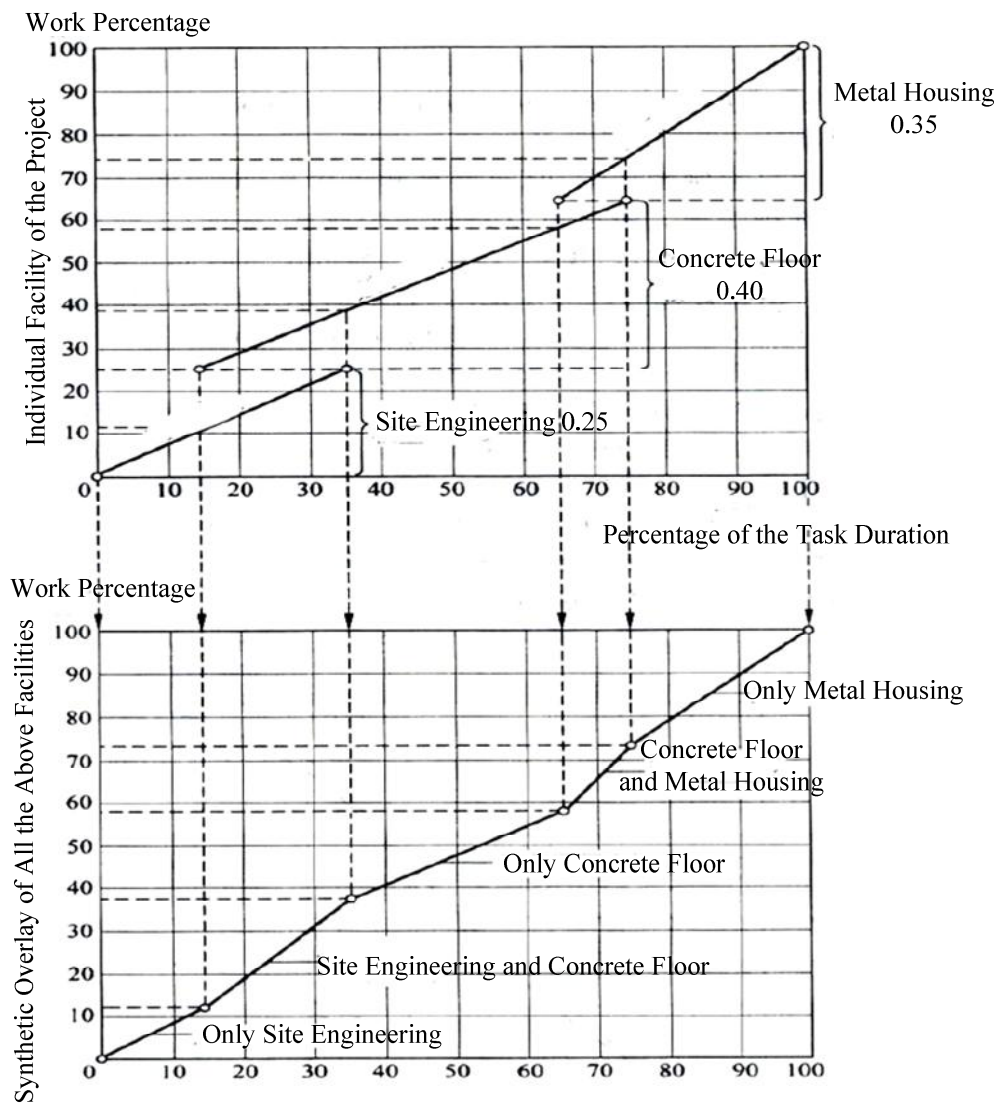
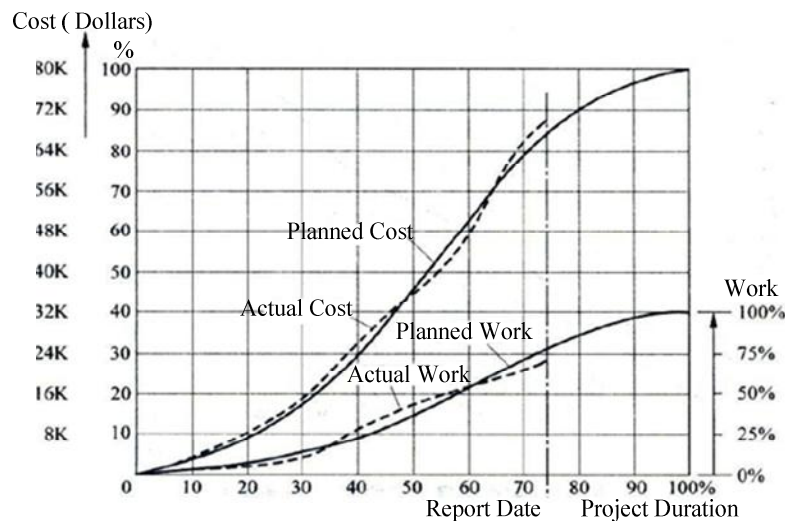


Figure 4 : Work-time curve of the entire construction work

Experienced project managers know that only by using local information, such as cost or time, it is able to track the existing problems of project status. For now, to attract private capital into the credit industry can ease the contradiction between the national policies and the development of SMEs. As has mentioned above the contradiction between the national policies and the business development can be resolved through capital investment, but the source of funds is a major problem. In general, the funds should come from loans of the banking sector, but under the control of national policy, the

loan amount is limited now, so now in some enterprises' development, part of the funds is from the international capital, whose inflow brings life to the development of enterprises. But since it is a short-term investment, and accesses to financial markets through non-formal channels. Once they gains profits and achieves the purpose of short-term returns, funds will be quickly withdrawn, which puts the development of enterprises into an awkward position, leaving a very negative impact on the development of enterprise. Due to lack of funds, there will be the introduction of international hot money again, and then repeat the withdrawal of funds, the introduction of capital, thus leading the development of enterprises to a vicious cycle. This will interfere China's monetary policy seriously, and leads to malicious impact on the national economy. This is undoubtedly worsening the economic development under the background of economic crisis. Comparing with such funds, the integration of private capital can promote the development business in a stable way. And in terms of the current situation in China, the amount of private capital is relatively large, which can effectively solve the financing problems of SMEs, and can bring some prospects to private credit development on the basis of solving business development financing problem, and also avoids the vicious circle international hot money brings. In Figure 5, the ordinate on the left is the cost, the abscissa is the time (duration), and the right ordinate is work. The upper curve is the Cost-Time curve which has been discussed above, and the lower curve is Work-Time curve showing the relationship between the work and time in the entire project period. So this picture is just a synthetic overlay of the information previously introduced.



**Figure 5 : Comprehensive graphs of cost/ duration/ work**

These are the promotion bringing by absorbing private capital into the credit industry under the background of economic crisis analyzed from two aspects of national macroeconomic policy and stability of private funds. Apart from these, the injection of private capital can also be an effective use of private idle funds, which are usually idle before being invested in the credit industry, and usually with a large amount if integrated. Effective use of this part of the idle funds can promote the local economy to rebound, help the local economy out of the negative impact of the economic crisis. And this practice now has saw significant effect in some places. In this case, this part of the funds after integration, on the basis of resolving the financial difficulties of SMEs in the economic crisis, not only promotes the development of these small and medium enterprises making them rapidly seize the opportunity to grow, and get rid of the problems caused by the economic crisis, but also activates these funds benefitting more people. Although the development of enterprises can rely on the credit industry injection of private capital, most companies still prefer bank loans because of the lower cost of bank loans than private credit. There are statistics showing that loan interest rate of private credit is generally 3%, and even some private credit lending rate is as high as 10%. Multiple figures like this can be drawn based on complexity of the project and control level required by project managers.

## CONCLUSION

In this study, cost control management in the implementation process of the project is studied taking landscaping project as an example. Because the key to the success of a project lies in scientific and standardized management, such as the control of project costs, the control of the progress of the project, project quality control and so on, all belonging to important procedures in the construction process of the project. This study also focuses on analysis of the current problems in China's landscaping project, makes profound study of the root of these problems, and proposes solutions to address the problems. At last, this study establishes a cost control management system based on Analytic Hierarchy Process taking a landscaping project as an example. And the fact proves the management system is a scientific, standardized and rational management system, a system that can address the serious problems existing in the current major projects in a practical manner, in particular problems in landscaping projects.

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