

Research on the Life Cycle Cost of Construction and Building

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Keywords: Real estate project, Construction phase, Life cycle cost.

Abstract. Real estate companies should strictly control the cost of real estate projects in order to remain invincible in the fierce competition. Most of the real estate companies only pay close attention on the construction phase while ignoring the other stages, in fact, we should not limit to the cost of the construction phase and should control the entire life-cycle cost control and it is called Life Cycle Cost Control.

Introduction

With the real estate industry management mode promotes step by step, cost control has become the focus of attention of the real estate industry. To reduce the risk of real estate project development costs and improve real estate project management level, we should strictly control the real estate project life cycle costs. From the perspective of society, the real estate should takes the best way to achieve the lowest cost.

The relationship between different stages of life cycle and life cycle cost

Real estate project mainly includes the investment decision-making stage, design stage, bidding stage, construction stage, use and maintenance stage, recovery stage and so on. At each stage it will produce cost, the relationship between different stages of life cycle and life cycle cost ^[1] is shown in figure 1.

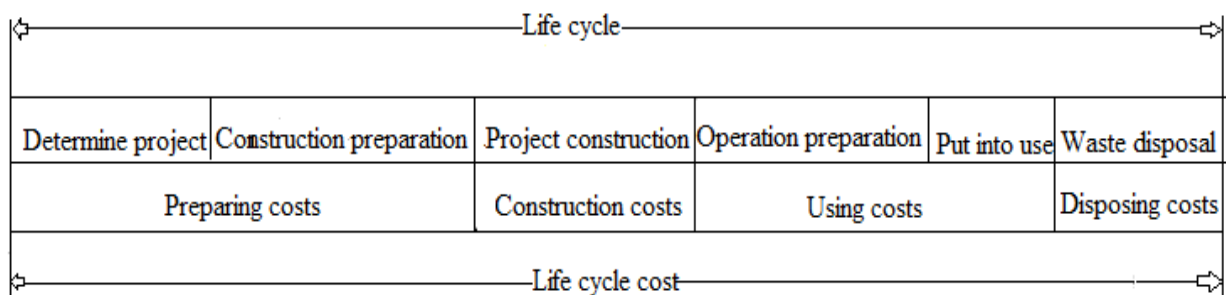


Fig. 1 Relationship between life cycle and life cycle cost

The characteristics in different stages of the real estate project: investment decision-making stage is the critical stage that project cost is planned and controlled; design stage: project design directly affects construction cost and overhead cost; bidding stage: it is the stage that the owner decides bidding control price and determining the final contract price with the contractor; construction stage: It determines the construction cost; use and maintenance phase: At this stage it will generate a lot of management fees.

The life cycle cost of the real estate project: the life cycle cost of real estate projects refers to the total cost in above stages of the real estate project, mainly including land costs, early construction costs, construction cost, use and maintenance costs, financial and selling costs.

Cost control measures in different stages

The different characteristics and relations with the cost control in various stages decide that each stage has its own cost control measures, life cycle cost curve of the building is shown in figure 2.

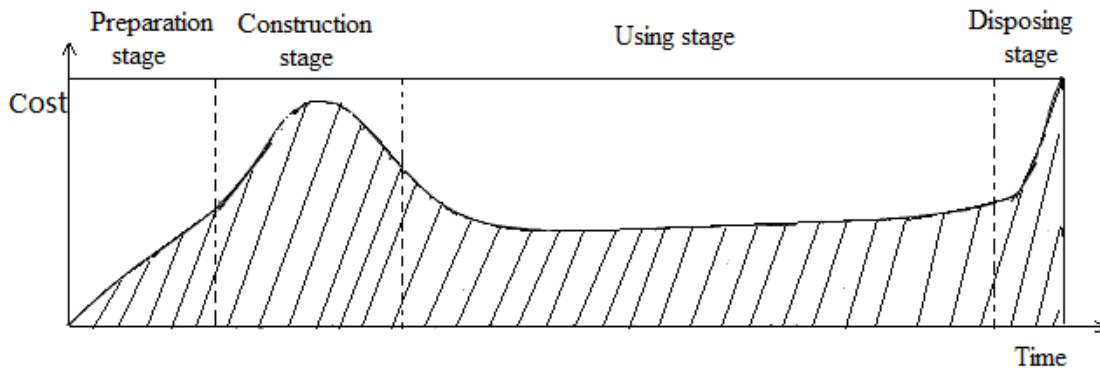


Fig. 2 Life cycle cost curve of the building

Land cost control measures: the land cost largely influences the cost of real estate, and land price continues to grow higher at present, so it is necessary to control the land cost reasonably. Because the different ways to get the land will generate different prices, we need to choose the most favorable way for developers.

Location affects land cost, the better, the higher the land cost, the higher the selling prices. And the shape of the land affects the entire project planning and designing cost, we can see land cost management is an integrated management content. In addition, land cost and the market environment also have a close relationship, so we need to do market research.

Pre-construction cost control: cost control is a close-linked entirety, therefore we have to do the pre-construction project cost control. Investment decision-making stages include project recommendation, feasibility study, and project evaluation stages.

The project recommendation mainly prepares from two aspects: the project site must be reasonable and make adequate market research. Feasibility studies and project evaluation stage should select the best program and evaluate the program to reduce investment blindness.

Design Phase: according to the data analysis, design costs in the design stage account for only 1.5% to 2% of the project costs, but the cost impact on the entire project can reach 75%, the relationship of life cycle cost and function are shown in figure 3. In the stage we can control cost through several aspects:

- (1) Introducing competition mechanism, carrying out the design tender, implementing comprehensive appraisal, and selecting the best design;
- (2) Carrying out limiting design so that control cost design;
- (3) Using value engineering to optimal design [2];
- (4) Strengthening the design change management, implementing dynamic control;

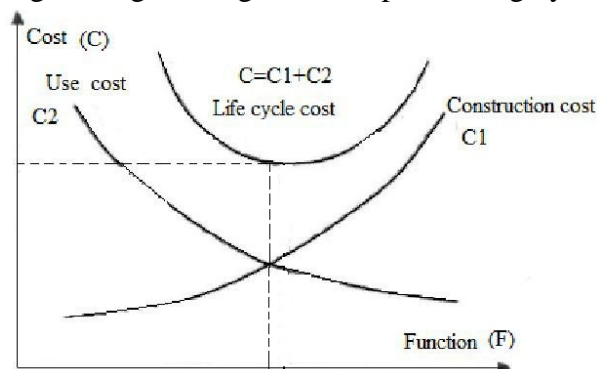


Fig. 3 Life cycle cost-function of the construction

Bidding stage: owners mainly apply public tender and invitation tender in this stage, public tender have more possible than invitation tender to select low quoted price, but the public tender will produce more fee, so the owner should select the most favorable mode according to the project complexity, size and bidding cost. When owners are working out base price, they must consider various factors such as market information and so on, in order to draw up the most reasonable base price, at the end they can choose the best contractor.

Construction Cost Control: construction cost is the largest part, and the investment mainly occur in this stage, therefore the owner must make reasonable management at this stage. The Composition of the residential life cycle cost^[4] are shown in table 1.

Table 1 Composition of the residential life cycle cost

Number	Cost category	NPV (¥)	Percentage of life cycle cost (%)
1	One-time construction costs	2266800	65.83
2	Use and maintenance costs	774650	34.17
3	Life cycle costs	3041450	100

Material costs accounted for about 60% of the total construction cost, so in order to effectively control the construction cost, the owner should strengthen the management and use of materials so that reduce unnecessary loss of materials in the construction process; according to the construction progress in the construction site, the owner should make scientific and rational material procurement plan so that avoid the accumulation and shortages of materials.

During the construction phase the supervision staff should enhance on-site visa supervision management and eliminate unreasonable prodigal phenomena. When contractors complete each construction stage, the supervision staff must strictly check construction quality and quantity to ensure completed work are in accordance with the construction design^[5], after the supervision staff confirm it, the owner will pay appropriate payment given for projects.

Control finance costs: at the present stage, the real estate business will have a lot of bank loan because develop project need a lot of money , plus long construction time will generate the high bank interest, therefore the real estate business would reduce the cost capital and reduce financial costs. Reduce the cost capital primarily through raising funds reasonably and reduce development period. The real estate business can raise funds through bank loan, social finance and other; at the same time, they can speed up development and construction process to the reduce construction period; scheduled funding to contractors, thus reducing the loan interest.

Control use and maintenance costs: the building in the long-term use process will generate a lot of use and maintenance expenses, the costs are potential and easily ignored. The distribution of life-cycle cost are shown in figure 4, below the horizontal line represents the potential costs. The construction has good construction quality, it will generate low fee in the late stage, but the construction cost will be high, we can see the construction quality have a large influence on use cost. At the same time, when householders decorate the house, we should forbid them arbitrarily change the house structure. And we should publicize treasure infrastructure and public facilities in order to reduce maintenance costs when householders move into these buildings.

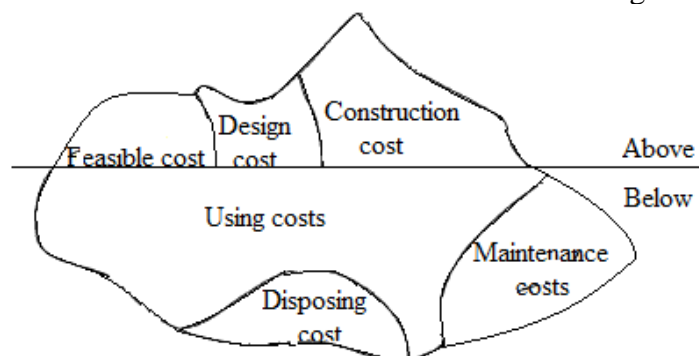


Fig. 4 Distribution of life cycle cost

Cost control in the demolition stage: building will be demolished after reaching the useful life, different architectural materials and structures in the late recovery is different, so we should select the building structure which has higher recovery while meeting using function when we are designing the building. In the same time, the designer should reduce structure cumbersome so that reduce demolition cost; when the building is demolished, the same architectural trash can be stacked together in order to handle, the material which can be reused should be recovered.

Summary

The cost directly affect the profits of the real estate business, in a very large extent it not only determines the house prices, but also has a certain extent effect on other industries such as the construction industry, the installation industry, so the cost controlling on the real estate project life is very important, we should attach great importance to the problem.

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