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Evaluation for "economics and legislative factors influence the design team and contractor throughout a building project from inception to completion"

Lingling Chen, Hongchang Qu
Department of Civil Engineering and Architecture，Guangxi University of Technology, China
20482849@qq.com, qhc410603@126.com

Abstract: A building construction's lifecycle is a complex and integrated project; many factors influence its process. In order to put forward building construction's inception to completion to its success, these factors used properly at the project's stage become more important. This paper evaluates economics and legislative factors influence the design team and contractor throughout a building project's lifecycle and discusses using effective analyze system and assessment to ensure its successful completion.

Keywords: Evaluation, Economics and Legislative Factors, Project lifecycle

1. Introduction

Latham report (1994), Egan report (1998) and DETR (2000) all stressed the importance of improving economic efficiency within the construction industry-with the ultimate aim of it becoming a sector that supports the sustainable development agenda. The recurrent messages were that the industry is dependent upon the wider economy; that resources need to be used more efficiently - to become more cost effective; and that the construction industry should deliver its products in the same way as the best consumer led manufacturers.

No doubt, economics issues greatly influence construction both process and project. Construction economics aims to improve the efficiency of an industry which contributes over half of the capital formation of every country. (George,

1993) Construction economics consist of the application of the techniques and expertise of economics to the study of the construction firm, the construction process and the construction industry. (Hillebrandt, 2000) To understand the subject of construction economics as a sub-discipline of economics, some basic concepts in economics should be considered as disciplines in order to be utilized in construction.

The aims of this study are to apply, identify and analyze issues associated with legislative and economic factors in construction project and evaluate how economic and legislative factors influence the design team and contractor throughout a building project from inception to completion in contents.

2. Basic Construction Economics Concepts

As a general discipline, economics is concerned with the analysis of two interrelated problems: scarcity and choice, in other words, economics is concerned with resource allocation. Like all disciplines, economics is guided by a set of principles, in this way, construction economics as a sub-discipline should relate to the economic principles of scarcity and choice as well. The following basic economics concepts will provide an effective framework within which the construction industry can be analyzed.

2.1. Construction Markets

Hillebrandt (2000) described a market is any organization whereby the buyers and sellers of a particular commodity keep in touch with each other and determine the price of the commodity in the economist's sense. Markets in the construction industry should therefore be defined in terms of the total demand for particular identifiable service relevant parameters include degree of complexity and size, geographical area and type of contractual arrangement. The total number of firms interested in work of this defined type is referred to as being "in a particular market".

2.2. Construction Firms

The word "firm" in economics means any entrepreneurial unit. It can be a single person, a partnership, a small company, a public limited company or gigantic multinational organisation. A firm can be defined as an organisation that brings together different factors of production, such as labour, land and capital, to produce a product or service which it is hoped can be sold for a profit.

2.3. Demand and Supply

The determination of demands on the construction industry is complex as well. This is partly due to the characteristics of the products of the industry: notably, their size, cost and long life; the fact that many of the products are investment goods; and the complexity of the process. The supply of construction is provided by consultancy practices, firms from many industries including contractors and material and plant manufacturers, and individuals.

From the objectives of government macroeconomic policy which involve controlling the level of unemployment, maintaining a low and stable level of inflation, preventing long-term balance of payments deficits, maintaining a satisfactory rate of economic growth etc, the demand and supply in construction market provide an opportunity to realize these objectives. For example, the demand of new building and repair/renovation/maintenance will increase the level of employment to some extents.

2.4. Types of Cost

How do business owners react to changing taxes, changing input prices, changing government regulations and changing market conditions? To answer these questions, we must understand to the nature of productivity and costs. These costs may relate to design, construction, maintenance, management, conservation, refurbishment, or whatever. The nature of productivity was mention in previous definition of construction firm; here some basic types of cost will be classified as follows.

2.4.1 Opportunity Cost

When you have a choice between two or more alternatives, you will choose the best alternative. However, choosing the best alternative means you can't choose the next-best alternative. Opportunity cost is the next-best alternative that must be sacrificed in order to get something else you want. Opportunity cost can be thought of as "the road not taken".

2.4.2 Long-Term Cost and Short-Term Cost

Long and short term is not fixed periods of time but vary according to the matter under consideration. They are inextricably linked. For ease of understanding, short run can be defined as any time period when there is at least one factor of production that has a fixed cost; in the long run, therefore, all costs are variable, that is, all factors are variable.

2.4.3 Social Costs and Private Costs

Social costs are costs to the community; private costs are costs to the individual or group of individuals.

2.4.4 Other Types of Cost

Transaction costs, fixed costs, variable costs and so on.

2.5. Price

Price is the rate at which exchange may or does take place and it applies to all resources and factors of production. As a result of the interaction of supply and demand, price would come to equilibrium.

2.6. Profit

Profit is the revenue obtained by a firm in excess of its costs. Since costs in the economic sense include a normal return on capital and on entrepreneurial ability, that is, a return sufficient to keep the capital and entrepreneur in the industry, firms can stay in business making no profit in the economic sense, although not in the accounting sense.

2.7. Marginal Analysis

Marginal analysis is very important for economics; it deals with small changes in the total as a result of some other change.

3. Construction Life Cycle

The acquisition of a constructed facility usually represents a major capital investment, whether its owner happens to be an individual, a private corporation or a public agency. Since the commitment of resources for such an investment is motivated by market demands or perceived needs, the facility is expected to satisfy certain objectives within the constraints specified by the owner and relevant regulations.

The project life cycle may be viewed as a process through which a project is implemented from cradle to grave. The cycle begins with the initial conception of the project and continues though planning, design, procurement, construction, start-up, operation and maintenance. It ends with the disposal of a facility when it is no longer productive or useful. This process is often very complex; however, it can be decomposed into several stages as indicated by the general outline in Figure 1.

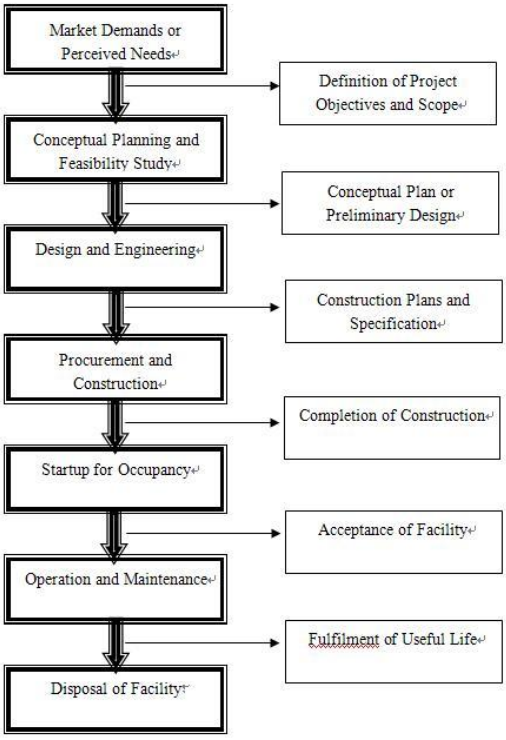

Figure1: The Project Life Cycle of a Constructed Facility

Essentially, a project is conceived to meet market demands or needs in a timely fashion. Various possibilities may be considered in the conceptual planning stage, and the technological and economic feasibility of each alternative will be assessed and compared in order to select the best possible project. The financing schemes for the proposed alternatives must also be examined, and the project will be programmed with respect to the timing for its completion and for available cash flows. After the scope of the project is clearly defined, detailed engineering design will provide the blueprint for construction, and the definitive cost estimate will serve as the baseline for cost control. In the procurement and construction stage, the delivery of materials and the erection of the project on site must be carefully planned and controlled. After the construction is completed, there is usually a brief period of start-up or shake-down of the constructed facility when it is first occupied. Finally, the management of the facility is turned over to the owner for full occupancy until the facility lives out its useful life and is designated for demolition or conversion.

4. Parties Involved in Construction Process

Since construction projects may be managed by a spectrum of participants in a variety of combinations, the organization for the management of such projects may vary from case to case. Although owners and contractors may have different perceptions on project management for construction, they have a common interest in creating an environment leading to successful projects in which performance quality, completion time and final costs are within prescribed limits and tolerances. The project manager, in the broadest sense of the term, is the most important person for the success or failure of a project. The project manager is responsible for planning, organizing and controlling the project. In turn, the project manager receives authority from the management of the organization to mobilize the necessary resources to complete a project.

A traditional management structure for executive project management is showed in Figure 2.

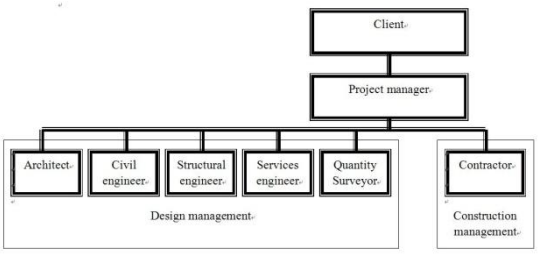

Figure2: Management structure for executive project management

It is worth to mention that the project manager must be able to exert interpersonal influence in order to lead the project team.

People are very much at the core of most project management processes. There are many different groups of people to be considered, not only the project managers themselves, but the client, the designer, the financial expert, the quality controller, the supervisors and the skilled operatives who actually carry out the physical work together, either in teams or on committees.

5. Construction Process Influenced by Economics and Legislative Factors

Facility investment decisions represent major commitments of corporate resources and have serious consequences on the profitability and financial stability of a corporation. In the public sector, such decisions also affect the viability of facility investment programs and the credibility of the agency in

charge of the programs. It is important to evaluate facilities rationally with regard to both the economic feasibility of individual projects and the relative net benefits of alternative and mutually exclusive projects.

5.1. Economic and Legislative Factors

In the construction project process, macro (dealing with the economy as a whole) and micro economic policies (dealing with parts of the economy such as markets and firms) affect the design team and contractor, these policies include:

- Rate of economic growth
- the level of employment
- price stability
- regional balance of economic activity
- the degree of equality of the distribution of incomes
- efficiency in the allocation of economic resources among others.

In nearly all countries, government, central or local, or acting through some public or semi-public organization, has an important influence on the construction industry. These policy instruments used by government include:

- Fiscal policy

Fiscal policy involves the use of monies raised through taxation in order to 'manage' the level of demand within an economy. The use of fiscal policy is recognition by government that it need not passively accept increase in unemployment brought about by short-falls in aggregate demand within an economy, but instead that imbalances can be corrected through the regulation of its own spending and a willingness to incur a budget deficit.

- Monetary policy

Monetary policy refers to government attempts to achieve its objectives by manipulating the rate of growth of the money supply, the level of interest rates and the ability of banks to lend money to their customers. Monetary policy as such, does not have any direct effect on public sector works, although it may lead to an increasing of costs for the financing of contracts, which may result in certain jobs being shelved.

- Exchange rate policy

Strictly speaking, the rate at which a currency is exchanged for the currencies of other countries of other countries can be used by governments as a policy

instrument or a defined policy objective, or indeed it can be viewed as a constraint on the use of other policy instruments and the achievement of other policy goals.

•Supply-side policy

In essence these measures are microeconomic in flavor and involve attempts to make markets function more effectively: the removal of impediments to entrepreneurial activity; curtailing restrictive labor practices; reducing excessively high welfare payments; the introduction of measures to promote individual liberty; and the introduction of reforms to reduce the size of the public sector, which was perceived to be unresponsive and bureaucratic.

5.2. Pre-Contract Stage

It is essential that a full economic evaluation and financial feasibility study is undertaken for any major construction work. Even if a client is not concerned with profit from the development, he will inevitably be working within general economic and planning constraints and within a tight financial budget.

In the early days of project management it was usual to undertake a review of the financial viability of a proposed project under the heading of 'investment appraisal'. While the economics of a project are still paramount it is now general practice to carry out a project appraisal which, while including financial viability, looks at a number of aspects, including:

•Financial viability

•Confidence in project performance

•Competitive strength vis-vis other projects

• "Cost/benefit" analysis

•Environmental impact analysis

•Social and economic impact analysis

The economic evaluation for construction will involve comparing different schemes and alternatives in order to identify the most appropriate scheme. Until recently, in the public sector, it was often the social and sometimes even the political benefits which justified expenditure. Now with the UK government's increased emphasis on privatization the justification for projects will be determined more by financial feasibility and cost-benefit analysis calculations.

Construction is a major capital expenditure which clients do not commence until they are certain that there is a benefit. This benefit may be for society in

the case of public projects or purely based on financial considerations in the case of private projects. So in order to provide effective pre-contract cost management, there are two essential components:

•The establishment of realistic budgets through cost estimating;

•Ensuring compliance with budgets as the design evolves through the process of cost control.

The arrangement of funds to finance the development and construction of a major project will vary from project to project depending on the type of project and the location. Experience indicates that serious problems are frequently encountered on major construction works. Typical risks to which the financiers might be exposed include:

•Completion on time and within cost.

•Operating risk: When complete the project may not perform as anticipated resulting in a higher operating cost or a lower productivity.

•Market risk: By the time the project comes on stream the demand for the product may be reduced, possibly due to the completion of competing products or reduced demand.

•Reserve risks: The cost of recovering the natural resources e.g. oil, gas, iron ore or coal, may prove too great or the amount of the reserves may have been overstated.

• Political risk: Changes in taxation, import duties and environmental legislation may have serious impact on the project.

• Technology risk: Technology used becomes obsolete or cost ineffective even before completion.

5.3. Procurement Stage

The contract strategy chosen will be governed by consideration of priorities, including speed, degree of complexity, quality, flexibility, competition, price certainty, incentive, responsibilities and risk sharing. The importance of choosing the appropriate strategy for the particular project should not be underestimated, and it is also equally true that at the end of the day the professional approach of client and the attitude of the designers, the project management team and the contractor can have equally important influence on the project success.

It is essential to consider those external matters which may affect the project in order to select an appropriate contract strategy; typical external factors are shown in Figure 3:

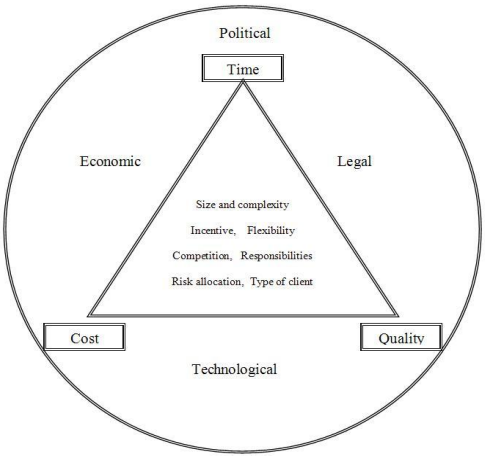

Figure3: Factors affecting the choice of contract strategy

• Political: government policy – expenditure on roads, defense, housing, education, hospitals; self – funded infrastructure projects – BOT contracts; import and export regulations – over 50 per cent of the materials on some of the large London Docklands projects were imported; national and local planning laws and policy; new legislation, e.g. on contaminated sites, deregulation of professions; grants for developments.

•Legal: Acts of Parliament – over 100 government regulations can affect construction projects, availability of standard conditions of contract, contract law, case law, conciliation procedures prior to arbitration/litigation, cost of dispute. Some acts are showed below:

Health and safety laws of Construction

Building performance standards

Energy management acts

Design and Management regulations (CDM regulations):

Environmental laws

Pollution control laws

Green building laws

Natural resource usage laws

Building contract laws

Insurance laws

•Technological: prefabrication, standardized buildings and products, innovative materials – limited suppliers, intelligent buildings, specialist's patent on design.

5.4. Post-Contract Stage

Cost control should be carried out throughout the life cycle of the project from inception until settlement of the final account. The implemented system should require that no one makes decisions to commit resources and expenditure without first considering the full consequences of their actions. Furthermore, it should not only record the past but should look forward to predict the anticipated final cost of the project.

The construction industry in the UK is currently in a period of recession. The recession emphasizes the need for efficient and effective cost control to enable the company to survive on greatly reduced tender margins until conditions improve. When conditions do improve an efficient and effective cost control system will enable the company to maximize profits.

If a contract is to be completed within budget the financial effect of all decisions must be forecast before the decision. Accurate forecasts based upon correct information should be made using cost records either form the project itself or from others.

A most important post-contract duty for the client's contract administrator or the contractor's commercial is the evaluation and subsequent agreement of variations. The valuation of variation requires that the parties have a detailed knowledge of methods of construction, estimating practice and costs; often it will involve consideration of the effect of the variations on the program of the works.

If the varied works are complex the parties need to be skilled negotiators satisfactory settlement. Compromise is often required for there is seldom one correct solution. Indeed both partied may consider several different approaches before selecting the appropriate strategy.

The great majority of contract provisions for additional payments for variations employ the concept of price, not of cost, when providing for their valuation. The intention will normally be to use prices which, in a fixed price contract, will be related to the estimated level of prices at the likely time of performance of the work. In a contract with a fluctuation of price provision care

should be taken to ensure that reimbursement for increased costs is taken only once.

6. Economic Evaluation of Construction Projects

Educated society of today insists that much more thought is given to all possible alternative schemes before arriving at the best solution obtainable. It is only by evaluating all alternatives that society in general can be best satisfied by choosing the proposal most suited to their needs.

6.1. Cost-Benefit Analysis

Why is cost benefit analysis needed? Certainly profit plays a large part of economics, but without safeguards of many sorts, how could society cope with the following:

- Noise, bust and atmospheric pollution generally
- Health
- Ecological conservation
- Parks and open spaces within urban areas

The basic principle in assessing the economic costs and benefits of new facility investments is to find the aggregate of individual changes in the welfare of all parties affected by the proposed projects. The changes in welfare are generally measured in monetary terms, but there are exceptions, since some effects cannot be measured directly by cash receipts and disbursements. Examples include the value of human lives saved through safety improvements or the cost of environmental degradation. The difficulties in estimating future costs and benefits lie not only in uncertainties and reliability of measurement, but also on the social costs and benefits generated as side effects. Furthermore, proceeds and expenditures related to financial transactions, such as interest and subsidies, must also be considered by private firms and by public agencies.

In order to carrying out cost benefit analysis, here is a method which is concluded as follows:

- Identification of the problem, and alternative solutions
- Identification of the sectors affected
- Identification of the costs and benefits
- Quantification of the costs and benefits

- Summary and conclusions

6.2. Cost-Effectiveness Analysis

This is a technique that can be used when decision makers have already accepted the need for a particular objective but remain uncertain as to the best way of achieving it.

6.3. Risk-Benefit Analysis

This is used when a project is associated with a 'risky' outcome. The framework differs from that of a CEA since the approach explicitly considers the costs and benefits of 'doing nothing'.

6.4. Environmental Impact Assessment

The aim of an EIA is to identify the environmental implications of a particular policy action or spending program, both desirable and undesirable.

6.5. A Systematic Approach for Economic Evaluation

A systematic approach for economic evaluation of facilities consists of the following major steps:

- Generate a set of projects or purchases for investment consideration.
- Establish the planning horizon for economic analysis.
- Estimate the cash flow profile for each project.
- Specify the minimum attractive rate of return (MARR).
- Establish the criterion for accepting or rejecting a proposal, or for selecting the best among a group of mutually exclusive proposals, on the basis of the objective of the investment.
- Perform sensitivity or uncertainty analysis.
- Accept or reject a proposal on the basis of the established criterion.

7. Conclusion

As construction economics concern that economics overlaps construction, whatever decisions are taken in the design of building or works, in their construction or in the management of the firms which are involved, they are nearly always taken after consideration of economics factors. Indeed, in any

decisions taken a construction firm, economic factors and management implications will nearly always be considered together.

In conclusion, Construction economics concerns a range of issues encountered in the construction process. On the macroeconomic level, it concerns the behavior of individual economic agents — clients, contractors, architects, engineers, surveyors — at various stages of development of a constructed facility. On the macroeconomic level, it concerns the interaction between the construction sector and all the other sectors comprising the national economy. On the macroeconomic level, it concerns broad economic aggregates such as construction output, employment, and construction cycles, as well as the role of construction activity at different stages of economic development.

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