Factors Contributing to Construction Costs in Saudi Arabia

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ABSTRACT: This article discusses the main factors that affect construction costs in Saudi Arabia. Forty-two factors affecting construction costs and their degree of importance were evaluated. The severity of those factors is measured by their the level of importance and ranked according to the severity index for contractors, consultants/engineers, owners, and a combination of all respondents. It was concluded that material cost, incorrect planning, previous experience of the contract, contract management, and poor financial control on site are factors contributing to high construction costs.

KEY WORDS: Construction cost, Saudi Arabia, project finance, contract management, contractor experience, and cost of material.

The construction industry in Saudi Arabia has gone through very dramatic stages of fluctuation since the late 1980s because of the completion of huge infrastructure projects. Competition between contractors to win project bids increased significantly despite low profit margins. The demand for more construction of all types, coupled with a tight monetary supply, provided the construction industry with a big challenge to cut costs. The problem of high contract costs of in all aspects of construction is becoming obvious. Consequently, substantial increases are being observed in project costs. It is important to identify the dominating factors leading to high construction costs so that efforts can be concentrated on those factors in order to reduce them. Furthermore, with the implementation of the World Trade Organization agreement (WTO), international contractors are keen to know factors contributing to construction costs in the international market in order to consider them in making project bids.

S.U. Al-Dulaijan and J.D. Steven [1] explained the changes that have occurred in the construction industry in Saudi Arabia in recent years. These changes were caused by a switch in emphasis from new construction and building infrastructure, to operation and maintenance, and the planned privatization of many aspects of construction. Contractor financing has changed from interest-free loans in the form of large advance payments provided by the government, to short-term, fee-bearing loans provided by commercial banks.

This article reports the findings of a study that investigated possible factors affecting construction costs in Saudi Arabia. Questionnaires and interviews were used to collect information from the main construction parties.

Factors Affecting Buildings Construction Costs

There are several factors affecting construction costs for large building projects. Moreover, as the building project gets larger and more complex, the probability of having so many factors increases. D.C. Okpala [6] investigated the causes of high costs of construction in Nigeria. A preliminary survey involving all the professionals in the construction industry identified delays and direct cost overruns of projects as the principal factors leading to the high cost of construction. A total of 27 factors were identified as causing cost overruns and delays. Okpala [6] listed 20 variables that could cause delays and cost overruns and seven other variables that could result in the escalation of construction costs without necessarily causing delay. In another study, U. Elinwa [4] identified 31 factors causing high construction costs for large buildings. Z.S. AL-Khaldi [2] studied factors affecting the accuracy of construction costs estimating in Saudi Arabia. He reported 29 factors. All these factors mentioned in the literature were studied and compiled into one uniform list. A total of 42 factors were obtained, as shown in Table 1. The 42 factors are grouped into the following five major categories.

- environmental factors;
- construction factors;
- factors of construction items;
- cost-estimating factors; and
- financing factors.

Environmental Factors

There are 14 general environmental factors that contribute to the costs of building. Three important ones are highlighted in the following paragraphs.

Effect of Weather

Saudi Arabia has a long, hot summer, with a short, cool, winter season during which little rain falls. Some parts of Saudi Arabia have some of the extreme climatic conditions that are most unfavorable for contractors to work with. Operations conducted during such climatic conditions suffer a loss of productivity. Furthermore, an increase in the maintenance costs of the equipment will result from the climatic variables of humidity and temperature.

Construction Demand

During periods of high construction demand, basic construction materials, such as Portland cement and steel reinforcement, suffer a dramatic reduction in quantity on the market. The prices of such commodities will increase due to the supply-demand relationship, because suppliers take the opportunity to increase material prices. For example, it was observed that the cost of cement increased about 96 percent from its original price in the high demand period. Also, contractor competition increases during the time of high demand and that also affects the construction costs.

Table 1—Construction Cost Factors

I. Environment Factors	3. Additional work
1. Effects of weather	4. Duration of contract period
2. Number of construction going on at same time	5. Contractual procedure
3. Social and cultural impacts	6. Frequent design changes
4. Project location	7. Inadequate labor availability
5. Lack of productivity standard in Saudi Arabia	**IV. Cost Estimating Factors**
6. Level of competitors	1. Cost of materials.
7. Number of competitors	2. Fluctuation of prices of materials.
8. Supplier manipulation	3. High cost of labor.
9. Economic stability	4. High cost of machinery.
10. Inadequate production of raw materials by the country	5. High cost of machinery maintenance
11. Absence of construction-cost data	6. High transportation cost.
12. Domination of construction industry by foreign firms and aids	7. Insurance cost.
13. Government policies (law and regulations)	8. High interest rates charged by banks on loans received by contractors.
14. Labor nationality	
II. Construction Factors	9. Long period between design and time of tendering.
1. Incorrect planning	
2. Relationship between management and labor	10. Bureaucracy in tendering method.
3. Lack of coordination between designers and contractors	11. Waste on site.
4. Poor financial control on site	12. Wrong method of estimation.
5. Previous experience of contract	
6. Disputes on site	**V. Financing Factors**
III. Construction Item Factors	1. Mode of financing, bonds and payments.
1. Fraudulent practices and kickbacks.	2. Inflationary pressure.
2. Contract management.	3. Currency exchange.

Social and Cultural Impacts

Overseas laborers, because of their geographic isolation, are not exposed to Saudi culture and frequently lack the knowledge necessary to accommodate themselves to the ways and customs of the local people. These social and cultural barriers affect the overseas workers' productivity and length of stay due to feelings of loneliness.

During the month of Ramadan, Moslems are fasting from eating or drinking during the daylight hours. Fasting, coupled with hard work and harsh climatic conditions, causes a loss in job site production. In addition, the Islamic lunar calendar moves the start of Ramadan through the seasons at a rate of 10-11 days per year. When Ramadan falls during the hot months, production of work during Ramadan will be affected dramatically.

Construction Factors

There are six construction factors, (see Table 1). Four of these are highlighted in the following paragraphs.

Incorrect Planning

The planning stage is one of the most important factors that may affect the cost. Contractors must be aware of all resources that they might need for any project. The contractor, also, should use all resources in an efficient manner. Proper scheduling is the key to using project resources; if not, the project costs will increase.

Management-Labor Relationship

There is always a gap between the project management and labor. This gap should be kept as small as possible, so that the relationship between management and labor may be strengthened. Both should work as a team to build a project with minimum cost. If the relationship between management and labor deteriorates, the morale of the laborers will decrease, affecting the productivity and leading to increased project cost.

Lack of Coordination Between Designers and Contractors

Contractors construct the project according to the project design. Sometime, if the design has mistakes or deficiency, the contractor may not notice, or may not notify the designer or the client. Deficient designs obviously cost a lot of money.

Poor Financial Control

Controlling the project financially on-site is not an easy task. All resources need to be controlled: labor productivity, material availability, and material waste. Contractors should use effective tools and

equipment, and good project planning and scheduling. Project management should be aware of all these factors in order to achieve better financial control on-site.

Construction Factors

There are seven construction item factors (see Table 1) and five are discussed in the following paragraphs.

Additional Work

Generally, no contract has been completed without any change to the original contract. A unit price contract is relatively straightforward if there is a change because of additional work. However, a lump sum contract has some difficulty in approving any additional work because the contractor normally asks for expensive cost recovery, leading inevitably to dispute. Any additional work has to have clear procedures and clear explanations in the contract.

Contract Duration

Usually the longer the duration of the contract the more resources will be put into the project. Any delay to a project will lead to an increase in the project cost. If the delay comes from the contractors, the project owner will lose the opportunity to invest in the project earlier. Also, if the cause of the delay stems from the client, the contractor may lose the opportunity to win other projects or suffer from non-use of the full resources.

Contract Procedure

The contract procedure shows the type of contract, payment procedure constraints, and regulations within the contract. The type of contract affects the project cost because of the risk involved in some types of contracts (i.e. lump sum or cost reimbursable). Unclear contract procedures will lead to dispute, project delay, and cost overrun [5].

Frequent Design Changes

Frequent design changes happen mostly because of the client's requirements. These design changes may affect the contractor in terms of delay as well as cost. Not only do client requirements cause design changes but the design may also be wrong or difficult and expensive to construct. Also, several other reasons, like government requirements or building codes, may cause design changes.

Inadequate Labor Availability

Most of the task force of laborers working on construction sites in Saudi Arabia are from the Far East. There are several factors affecting labor availability. Government regulations from Saudi Arabia and the labor-exporting countries play a very important role on the availability of laborers. The cost of hiring overseas labor is continuously rising.

Recently, the cost for a work visa has been doubled. Also, charges for the residency permit "IQAMA" have been tripled. These increases in the cost of labor importation make it difficult for contractors to afford the required manpower. The process of importing labor from outside of the Kingdom is a very lengthy process. In addition, skilled workers are scarce, costly, and very difficulty to find.

Cost-Estimating Factors

There are 12 factors in this category listed in Table 1. The most important is discussed in the following paragraph.

A Long Period Between Design and Time of Project Estimation

Normally, it takes several months to complete the design for a large project. Furthermore, the reviewing, cost estimating, cost allocation, and final approval of the design requires several additional months. Moreover, the bidding stage takes several months in which the contractor submits his estimate. By that time material, labor, and other costs may have changed. Therefore, cost engineers should consider any variation in the project cost because of the escalation of material and labor prices.

Financing Factors

The tight monetary supply in the construction industry in Saudi Arabia is hard on contractors. Consequently, contractors must now look to the financial markets for construction funds, where in the past interest-free government loans in the form of large advance payments were available. Table 1 lists three financing factors with the issue of bonds and payments discussed in the following paragraph.

Bonds And Payments

Bonds in Saudi Arabia are issued mainly by commercial banks, but occasionally by insurance companies that have permission from the Ministry of Finance and National Economy. Most bonds are bank's letters of guarantee with maximum coverage only up to 30 percent of the contract price. These are also unconditional, meaning the beneficiary (owner) has the right to demand payment pursuant to the issued guarantee without any justification for the demand, forcing the contractor to immediately reimburse the bank for all amounts paid to the beneficiary, and without deduction for any claims pending against the beneficiary. This law makes the contractor, as well as the issuing bank, subject to the risk of an unfair calling of the bond.

The Saudi government requires bank guarantees even though the contractor may be willing and able to put up cash, because bonds issued by commercial banks are considered additional support, or extra opinions on the judgments made by the Ministries. In other words, the government is looking for third party opinions as to the credit worthiness [1].

The Survey

The populations of the study consisted of contractors, consultants/engineers, and owners in the Eastern Province of Saudi Arabia. A total of 280 questionnaires were distributed. Eighty-four completed questionnaires were received, giving a response rate of 30 percent. The responses are distributed as 19 consultants/engineers, 52 contractors, and 13 owners.

There were three main parts in the questionnaire. The first part was an introduction. The second part contained general information questions, including annual volume, specialization, experience, and nationality of the company. The third part listed the cost factors in building construction projects. For each question, the respondents chose one of five options, ranging from extremely severe to not severe. The severity index was calculated using the following equation:

$$I_s = \sum_{I-1}^{5} (Wi\ xi\ /\ 4)\ 100 \qquad \textit{(equation 1)}$$

Where I_s = severity index

wi. = value (weight) assigned for each response is as follows:

- w_1 = 0, for "Not severe effect"
- w_2 = 1, for "Somewhat severe effect"
- w_3 = 2, for "Severe effect"
- w_4 = 3, for "Very severe effect"
- w_5 = 4, for " Extremely severe effect"

Results

The result of the analysis is presented in three tables (Tables 2-4). The tables are arranged in five columns, the first column is the ranking by one party as indicated in the table heading, the second column contains the listing of the top five factors, the third column is the severity index, the fourth column is the ranking by all parties, and the last column is the combined severity index by all parties. For a complete presentation of the analysis and numerical ranking for all factors, refer to reference [3].

It was observed that none of the factors had an extremely high severity index, i.e. a severity index equal to or greater than 90 percent, which indicates that the parties believe that the construction cost is more sensitive to a combination of factors rather than a single factor. The cost of materials was ranked first by three parties, with a severity index of 84.2 percent. The wrong method of estimation was ranked second by the consultants/engineers. This is anticipated since the consultants/engineers are more aware of different methodologies and the accuracy and precision of estimating. The same factor was ranked fourth by the contractors; however, it was not in the top five factors in the owner rankings. Incorrect planning was ranked third by the consultants/engineers, and second by both the owners and contractors. The data was further analyzed to assess the level of agreement between all three parties. It was found that the agreement is higher between the owners and the contractors than the other agreement indices. For further discussion on this subject refer to reference [3].

Project financing was ranked fourth by the consultants/engineers, but it was not in the top five factors on either the owners or the contractors ranking list. Economic stability was ranked fifth by both consultants/engineers and the owners; however, it was not on the top five factors of the contractors list.

Depending on the type of contract, owners, and to lesser degrees contractors, are the most severely hit by poor financial control. The owners ranked poor financial control as third, while it was not in the top five factors of the consultants/engineers or the contractors. Previous experience with a contract can minimize the contingency in the project estimate. This factor was ranked forth by the owners and fifth by the contractors. Good contract administration is another factor that can reduce the cost and financial risk of the contractors. Contract management was ranked third by the contractors. It was not in the top five factors of the consultants/engineers or the owners. The engineers ranked the wrong method of estimating as the second factor.

Table 2—First Five Factors According to Consultants/Engineers Ranking of Construction Cost Factors

Rank	COST FACTORS	Sev. index	ALL parties	
			Rank	Sev.
1.	Cost of materials	84.2	1	81.6
2.	Wrong method of estimation	79.4	5	67.6
3.	Incorrect planning	77.6	2	75.0
4.	Project financing	76.4	9	61.3
5.	Economic stability	73.5	10	61.0

Table 3—First Five Factors According to Owners Ranking of Construction Cost Factors

Rank	COST FACTORS	Sev. index	ALL parties	
			Rank	Sev.
1.	Cost of materials	84.2	1	81.6
2.	Incorrect planning	75.0	2	75.0
3.	Poor financial control on site	75.0	7	65.7
4.	Previous experience of the contract	75.0	3	69.6
5.	Economic stability	75.0	10	61.0

Table 4—First Five Factors According to Contractors Ranking of Construction Cost Factors

Rank	COST FACTORS	Sev. index	ALL parties	
			Rank	Sev.
1.	Cost of materials	79.8	1	81.6
2.	Incorrect planning	74.0	2	75.0
3.	Contract management	70.0	4	69.2
4.	Wrong method of estimation	68.8	5	67.6
5.	Previous experience of the contract	67.3	3	69.6

In this article, factors contributing to the high cost of building construction were analyzed. Cost engineers are in the unique position of being able to examine these factors and take actions to estimate, include contingencies in the budget, plan for, and mitigate the adverse effects of these factors on the project cost.

The five most severe factors affecting construction cost in Saudi Arabia as agreed by owners, contractors, and designers are the following.

- cost of materials;
- incorrect planning;
- previous experience with the contract;
- contract management; and
- poor financial control on-site.

The study shows that the three parties generally agree in the ranking order of the factors affecting construction costs. However, there is a higher agreement between contractors and consultants than between the others.

Most of the problems faced in the construction industry in Saudi Arabia are within the parties-related factors category (management and control problems).

The construction parties category is the most influential category in construction cost that reflects human problems. The major factors in this category are incorrect planning, previous experience with the contract, and poor financial control on site.

The major factors in the general category that affects the construction costs construction are the government economic stability, level/number of competitors, and supplier manipulation.

The major factors in the cost-estimation category that affect the construction costs are material costs, wrong estimation methods, and labor costs.

Project financing is the major factor in the financing factors category. ◆

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ACKNOWLEDGMENTS

The authors appreciate the support of the King Fahd University of Petroleum and Minerals during the course of the study. Thanks are also extended to the construction companies who participated in the study.

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