



The management of construction company overhead costs

Sadi A. Assaf^a, Abdulaziz A. Bubshait^{a,*}, Sulaiman Atiyah^b, Mohammed Al-Shahri^c

^a*Department of Construction Engineering and Management, King Fahd University of Petroleum and Mineral, P.O. Box 960, Dhahran 31261, Saudi Arabia*

^b*Department of Accounting and Management Information System, King Fahd University of Petroleum and Mineral, Dhahran 31261, Saudi Arabia*

^c*Ministry of Defense and Civil Aviation, Riyadh, Saudi Arabia*

Received 11 January 1999; received in revised form 21 November 1999; accepted 10 January 2000

Abstract

This paper investigates the overhead cost practices of construction companies in Saudi Arabia. Although overhead costs are extremely important in construction estimation, they can be easily overlooked. Neglecting overhead has forced some contractors out of business, because these costs constitute a significant portion of the total construction cost. The practices of 61 large building construction contractors were investigated via questionnaire. The questionnaire has three parts covering the construction firms, overhead costs in general, and company overhead costs. Results show that average overhead cost is slightly higher than the ratio reported in the literature. The average percentage of company overhead costs to project direct cost is greater than 10%. Causes of increased company overhead costs include delayed payments, shortage of new projects, cost of inflation and governmental regulations. Factors affecting company overhead costs include the following: automobile and equipment costs, head office expenses, labor related costs and financing costs. The unstable construction market makes it difficult for contractors to decide on the optimum level of overhead costs that enables contractors to win and efficiently administer large projects. © 2001 Elsevier Science Ltd and IPMA. All rights reserved.

Keywords: Overhead cost; Construction costs; Saudi Arabia; Administrative costs

1. Introduction

Overhead (OH) costs are those charges that cannot be attributed exclusively to a single product or services [1], or the summary of expenses that benefit more than one cost objective [2]. A third definition is that OH costs are those costs that are not a component of the actual construction work but are incurred by the contractor to support the work [3]. Although overhead costs are extremely important in construction estimation, they can be easily overlooked. In fact, neglecting OH has forced some contractors out of business because these costs constitute a significant portion of total construction costs [4]. Total OH costs may vary from 8 to 30% of the sum of materials, labor, and equipment costs or from 12 to 50% of the labor costs, depending on the project characteristics [5].

High efficiency and total cost management are fundamental to success in any free market economy, which

has been the case in Saudi Arabia, since the start of the five-year development plans, 30 years ago. However, the issue becomes extremely important with the emergence of a global economy and the free trade agreements that are expected to be implemented in the near future. Under these conditions, contractors will be compelled to trim out the excess expenditures that has accumulated during better economical times and find ways of reducing OH burden non-billable costs. In an environment of intense competition, declining profit margins, and shrinking market shares, the only way to stay competitive is to control costs while maintaining quality products. OH costs constitute a good starting point for achieving cost reduction because they act as a silent harvester of retained earnings. Furthermore, OH costs rise continuously and never go down on their own, producing even higher production costs [6].

The objective of this paper is to investigate the overhead costs practices of construction companies in Saudi Arabia. Several aspects were examined that include contractor awareness, percentage of company OH costs to annual construction volume and methods of allocating company OH costs.

* Corresponding author. Tel.: +966-3-860-3709, fax: +966-3-860-4453.

E-mail address: bubshait@dpc.kfupm.edu.sa (A.A. Bubshait).

2. Overhead costs

There are two types of OH costs in construction: company OH costs and project OH costs. This research is limited to the company overhead. Company OH is also called general and administrative OH and includes all costs incurred by the construction firm in maintaining the firm in business and supporting the production process, but are not directly related to a specific project [7]. Company OH is perhaps one of the main reasons why so many contractors are unable to realize a profit, or even to stay in business [8]. Obviously, if the company does not know its true OH costs, then a failure in recovering these costs will result in financial collapse. Company OH costs vary considerably from time to time but range from 8 to 15% of the total construction volume [5].

The best approach in dealing with company OH costs is to directly charge each project the actual expenses that will be incurred, provided an accurate estimation is reachable [5]. The most commonly used allocation mechanism is to total all company OH costs for a given accounting period (fiscal year) and scale them against the total direct costs for the same period, which gives the percentage of company OH costs that can be applied to forthcoming projects [7,9]. After the OH rate is calculated, it is added to the total estimated direct costs of the project in hand. Although this method lacks accuracy, it is widely used among construction contractors because it is easily applicable to almost all types of construction projects. The reason accuracy is not obtained is that the amount of OH costs added to a given project does not take into account the efforts exerted by the company's main office to win and manage different projects, which differ considerably from one project to another. Accuracy is also negatively affected because the allocated costs depend on parameters that are determined only through estimation. It must be noted, however, that in deciding the final amount of company OH that has to be added to project direct costs, contractors may not exactly use figures emerging from the calculation. Instead they sense other factors such as the complexity of the project, the competition level, or the payment schedule. Major company OH costs include: head office expenses, head office staff wages, insurance, taxes and social security, warehouses, workshops and camps, fees, automobile expenses, uncollected receivables and miscellaneous.

An optimal OH level is one that allows the firm to accomplish its strategic goals at the lowest possible general expense. Reasons why it seems to be difficult to measure the effectiveness of OH costs and thus to reduce them are [10]:

- OH costs are generated by indirect activities which are not clearly defined.

- All indirect activities are considered vital for the survival of the company and thus any reduction in activity level or quality will effect the operation.
- The costs of indirect activities are never accurately known. In addition, the share of the individual product is only predicted using cost allocation which leads to distorted product cost. This situation makes any effort to reduce OH costs lack clarity.
- Cutting OH costs usually affects executives first, which sometimes generates a defensive mechanism among top management and may shift the blame for excess OH costs to misleading causes.
- Some companies lack clear long term plans regarding business orientation, which causes confusion regarding OH spending priorities.

There are, nevertheless, some signs that indicate that OH costs are reaching unacceptable levels. The first and foremost sign is when a contractor finds it is difficult to realize profit although estimated direct costs are close to actual costs according to cost control reports or when competitors's prices are unrealistically low [11].

3. Research methodology

Data needed for this research were collected via a questionnaire that was developed based on a thorough review of the related literature to reflect the existing level of OH costs and how local contractors deal with them. The questionnaire has three parts, covering the construction firm, OH costs in general, and companies OH costs. The first part contains 22 questions eliciting general information about the participating contractor. The second part contains eight questions about OH in general, which explores the contractors's background regarding OH in its broad aspects and how contractors feel about it. The third part has 17 questions asking specifically about company OH costs.

3.1. Population and sample

The population of this study is all building contractors classified by Ministry of Public Works and Housing (MPWH) in the first three grades for Saudi contractors and in the first five grades for foreign contractors who, according to MPWH, can bid for projects of SR50 million. The total number of those contractors is 230 [12]. Based on that population, sample was designed to reflect a confidence level of 95%.

Using Kish equation [13], the sample of 68 contractors can be calculated as follows:

$$n = n' / [1 + (n' / N)]$$

where

$$n' = S^2/V^2 = (0.5)^2/(0.051)^2 = 96.12$$

$$n = 96.12/[1 + (96.12/230)] = 67.79 \quad \text{say } 68$$

where n' is the sample size from an infinite population, n is the sample size from a finite population, N total population, V standard error of sampling population. Since $r = 0.1$, and $t = 1.961$ at confidence level = 95%, S is the standard deviation of the sample, S^2 the variance of population elements, $S^2 = P(1 - P)$; maximum at $P = 0.5$.

3.1.1. Interview sessions

In the initial stage of the research it was thought that the elements of the sample would be selected using tables of random numbers to ensure randomness, independence, and representativeness. However, it was very difficult to use tables of random numbers because the number of contractors who are available in the Eastern province and who satisfy the sample requirements were less than half the research population. Furthermore, some of those contractors were not willing to participate in the survey. This situation necessitated that the researchers contacted almost all the large building contractors in the area and asked them to participate in the survey so that 68 participants could be gathered.

In many interviews, the questionnaire was explained to the contractor and then left to be answered later according to the contractor's request. Some contractors needed sometimes to go back to their files to extract information. In such cases, an appointment was set to come back and go through the answers with the contractor to make sure that the answers were clear and complete. In other instances, contractor representatives just checked some files and gave immediate answers, thus giving reliability to them as they came from documented sources. The average time needed to complete one questionnaire was 2 h if information was ready. Total number of collected questionnaires was 61.

4. Results and analysis

4.1. What is an OH cost?

The purpose of this question is to measure the contractor's awareness regarding what overhead cost meant to them. Results reveal that 64% of the sample did not adequately define OH costs and directly crossed to examples of OH costs. Another 23% of the sample defined OH cost with a reasonably accurate definition by stating that OH cost is not part of the actual construction production cost but is an indirect cost. Only 13% of the sample have the proper definition of OH cost. Results indicate that even large contractors do not

have a unified or even proper understanding of the term OH costs.

4.2. Types of OH costs

About 87% differentiate company OH and project OH costs. The remaining percentage considers all OH costs together without segregation.

4.3. Percentage of OH costs

The percentage of total overhead cost to construction volume is shown in Table 1. The results show that only 48% of the contractors have 15% OH costs or less. The remaining 52% have a higher percentage, indicating that OH costs present a serious challenge. The calculated overall percentage is 16.83; higher than the ratio reported in the literature.

4.4. Contractors' perception regarding OH costs

The overall perception, the contractors have, regarding OH costs is investigated in this question as shown in Table 2. The majority of contractors believe that their current rate of overhead cost is not acceptable, and that uncontrolled overhead cost can badly affect the performance. Some of them also believe that the overhead cost was not important in the past, though it will be important in the future. However, it can be monitored and controlled.

5. Company OH costs

Company OH costs are by far the most important type of OH costs because they constitute a serious challenge to contractors as to how to recover them in a balanced manner and because they, unlike project OH costs, affect contractors' performance in all projects. The following results pertain to company OH costs.

5.1. Ratio of company OH cost to project direct cost

The percentage of company OH costs to project direct costs is an important measure that quantifies the cost

Table 1
Ratio of OH costs to annual construction volume^a

Ratio of OH ^b	Midpoint	Frequency	Percent
10 or less	10	4	6.6
11–15	13	25	41.0
16–20	18	16	26.2
21–25	23	13	21.3
Above 25	25	3	4.90

^a Ratio of OH to construction volume overall ratio of OH cost to annual construction volume = Σ Calculated midpoint $\times$ percent = 16.83.

^b Ratio of OH to construction volume.

Table 2
Contractors' perception regarding OH costs

Parameter under investigation	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Ave.
OH level is now acceptable	08 13%	09 15%	09 15%	23 38%	12 20%	61 100%	3.36
OH badly affects performance	14 23%	26 43%	13 21%	07 11%	01 02%	61 100%	2.26
OH was not an important issue in the past	05 09%	13 22%	13 22%	19 32%	09 15%	59 100%	3.24
OH will be of greater importance in the future	39 67%	14 24%	05 09%	00 00%	00 00%	58 100%	1.41
OH can be monitored and controlled	05 09%	03 05%	18 31%	23 40%	09 15%	58 100%	3.48

the project at hand has to carry in sharing company expenses. Results for this question are shown in Table 3. The results show that while 15.1% of contractors do not calculate the ratio, only 26.2% of the contractors have 10% (or less) of their project bid value as costs initiated by company expenses. The remaining 58.7% add more than 10% of the project direct costs as a company OH cost. In fact, 14.8% of the contractors surveyed reported that their ratio is 16–20% and 6.6% have 20 or above of their bid value as company OH costs, which is very high level. The overall percentage is 12.9 which is a higher than the figures reported in the literature of 6–10 (Means Estimating Handbook, 1990).

5.2. Ratio of company OH cost to annual construction volume

The ratio of company OH costs to annual construction volume differs greatly, but for large contractors ranges from 8 to 15% (Table 4). The table shows that 54.1% of the respondent have 15% (or less) of their annual construction volume as a company OH. The remaining contractors (45.9%) have more than 15% of their annual construction volume as company OH. The overall ratio is 14.3%.

5.3. Perceptions regarding company OH cost

5.3.1. Changes in company OH costs

Results on whether contractors believe that company OH has increased or decreased lately are shown in Table 5. It is clear that the majority of contractors think that company OH costs have increased during the past years.

5.3.2. Reasons for increased company OH costs

This question investigates the potential causes for increased company OH costs. Knowing the major sources of high company OH costs helps in concentrating efforts towards specific causes. Seven potential causes were identified from the literature and a pilot study, and evaluated as shown in Table 5. In evaluating these

results (and similar results) an important index was calculated to reflect the relative effectiveness of the criteria under investigation. The importance index was calculated using the following formula:

$$I = \frac{\sum_{i=1}^5 (a_i x_i)}{5} 100\%$$

where I is the importance index; a^i is the constant expressing the weight of the i th response, $a^i = 1, 2, 3, 4, 5$ for $i = 1, 2, 3, 4, 5$, respectively; x^i is the frequency of the i th response given as a percentage of total responses for each cause or factor; $i = 1, 2, 3, 4, 5$.

Table 3
Ratio of company OH to project direct costs

Ratio of company OH to direct cost	Frequency	Percentage
00–05	00	00
06–10	16	26.2
11–15	23	37.3
16–20	09	14.8
Above 20	04	06.6
Not calculated	09	15.1

Table 4
Ratio of company OH to annual construction volume

Ratio of company OH to construction volume	Frequency	Percentage
00–05	02	03.3
06–10	10	16.4
11–15	21	34.4
16–20	25	41.0
Above 20	03	04.9
Not calculated	00	00

Table 5
Changes in company OH costs

Trend	Frequency	Percentage
Increased	47	77.0
Decreased	08	13.2
Didn't change	06	09.8

It should be noted that some causes of increased company OH costs are inter-related, which makes it difficult to evaluate them individually. For example, a decision to expand the company, which stands as a cause of increased company OH costs by itself, involves also marketing costs and constitutes an inter-organization mistake if taken at the wrong time. The highest cause of increased company OH costs as shown in Table 6 is delayed payments.

5.3.3. Distribution of company OH cost

Company OH costs have many possible components that can be considered. The percentages of the most commonly included items were investigated. The importance of this analysis is that it gives a chance to know which company OH cost items consume most of the company expenses and as a result identifies where to

concentrate efforts to reduce company OH costs. Seven major cost categories were identified from the construction literature and an eighth open category was also added for a possible additional cost category. Results are shown in Table 7. The highest ranking is “automobile and equipment costs”.

5.4. Allocation of company OH cost

5.4.1. Company OH allocation base

In Table 8, the allocation base is investigated. There are at least seven possible bases that can be used to estimate the amount of company OH that has to be allocated to a project at hand. It was reported that total direct costs (excluding project OH, contingency and profit) are used too often as an allocation base, followed by labor costs as a second base in use, in the United

Table 6
Reasons for increased company OH costs

Reason for increased company OH costs	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Index%	Rank
Lack of new projects (recession)	27 44%	15 25%	06 10%	07 11%	06 10%	61 100%	76.4	2
Cost inflation	14 23%	19 32%	13 21%	10 16%	05 08%	61 100%	68.8	3
Delayed payments	24 39%	18 30%	11 18%	06 10%	02 03%	61 100%	78.4	1
Government regulation	10 16%	19 31%	20 34%	05 08%	07 11%	61 100%	67.2	4
Increased marketing cost	17 28%	06 10%	17 28%	11 18%	10 16%	61 100%	63.0	7
Client related reasons	19 31%	10 16%	12 20%	05 08%	15 25%	61 100%	64.2	6
Firm's growth	23 37%	04 07%	16 26%	03 05%	15 25%	61 100%	65.6	5
Other (internal mistakes)	00 00%	08 42%	06 32%	05 26%	00 00%	19 100%	N/ N/A	N/A

Table 7
Classification of company OH costs^a

Distribution of company OH costs	0–5%	6–10%	11–15%	16–20%	Over 20%	Total	Index%	Rank
Head office staff	08 13%	34 56%	03 05%	11 18%	05 08%	61 100%	50.4	5
Travel expenses	38 63%	15 24%	08 13%	00 00%	00 00%	61 100%	50.4	5
Auto. & Eq. Expenses	00 00%	10 16%	22 37%	13 21%	16 26%	61 100%	71.4	1
Head office expenses	01 02%	08 13%	23 38%	21 34%	08 13%	61 100%	68.8	2
Insurance & taxes	42 68%	14 23%	04 07%	01 02%	00 00%	61 100%	28.2	7
Labor health, travel, recruitment	00 00%	05 08%	37 61%	16 26%	03 05%	61 100%	65.6	3
Marketing	47 77%	14 23%	00 00%	00 00%	00 00%	61 100%	24.6	8
Financing cost	00 00%	05 18%	12 43%	11 39%	00 00%	28 00%	64.2	4

^a Ranges from very low (0–5%) = 1, to very high (over 20%) = 5.

States [6]. The study results reveal that total direct costs including project OH is the most frequently used base (38%). In second place comes the project duration (23%) and in the third are the direct costs for material, labor and equipment but excluding project OH (21%), followed by material and labor costs (16%).

5.4.2. Motivations behind using a particular allocation base

It is understood that using a particular base is greatly dependent on the nature of the company and its projects. This point was investigated and results are shown in

Table 8
Base Used to allocate company OH cost

Company OH allocation base	Frequency	Percentage
Project duration	14	23
Number of projects	01	02
Project bid value	00	00
Material cost	00	00
Material & labor cost	10	16
Material, labor & equipment. Cost	13	21
Direct cost including project. OH	23	38
Fixed amount is added	00	00
Company OH is not included	00	00

Table 9
Reasons for using a particular allocation method

Reason why a particular allocation method is used	Frequency	Percentage
Projects are similar in nature	09	15
Company OH is a time related spending	17	28
Company OH is related to direct costs	29	47
Ease in using this base	06	10

Table 10
Factors affecting the amount of company OH allocated to a particular project

Factors affecting company OH allocation	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Index%	Rank
Type of contract	22 37%	07 12%	11 18%	12 20%	08 13%	60 100%	67.6	2
Project complexity, location & size	01 02%	12 20%	19 32%	13 21%	15 25%	60 100%	50.4	6
Need for work	16 26%	22 36%	07 11%	11 20%	04 07%	60 100%	71.6	1
Payment schedule	00 00%	05 08%	16 27%	20 33%	19 32%	60 100%	42.4	7
Contractor's cash availability	05 08%	05 08%	23 38%	12 20%	15 26%	60 100%	51.0	5
Client's strictness in supervision	00 00%	03 05%	12 20%	21 35%	24 40%	60 100%	38.	8
Percentage of subcontracted work	07 11%	11 18%	19 32%	16 26%	07 13%	60 100%	58.4	4
Number of competitors	12 20%	19 32%	13 22%	09 15%	07 11%	60 100%	66.6	3

Table 9. The results show that 47% used direct costs as an allocation base because it is easier to be estimated. Estimation of the time needed to finish a project is costly and not accurate. Estimating direct costs can be achieved from contract documents, whereas estimating project duration needs expert planners who set activities, production rates, scheduling resources and other steps which are time consuming and costly, especially at the bidding stage. As a result, the majority of contractors use direct costs as a measure for company OH costs. However, 28% contractors consider company OH as a time related spending.

5.4.3. Factors affecting the magnitude of company OH allocated to projects

In many instances, decision-makers in contracting firms do not adhere to figures coming from project estimators but change company OH rates to higher or lower values. Contractors may choose to do so because of the nature of the contract, the size and complexity of the project, the contractor's need for work, financial causes, the contractor's experience with the client, the degree to which subcontractors services are needed, or the number of contractors competing to win the project, that may not be known at bidding time. These factors are investigated and results are listed in Table 10. The highest ranked factor affecting the amount of company OH loaded to a given project is contractor need for work.

5.4.4. Frequency of checking OH rate

Results shown in Table 11 indicate that 85% of the respondents indicate they check OH rate every year. The rest of the samples check OH rate arbitrarily when they feel it is needed.

5.4.5. Contractors' perception regarding OH cost allocation

Four points that reflect contractors' perceptions regarding company OH cost allocation are examined. Survey results in Table 12 cite that 80% of the contractors do appreciate the importance of using the right allocation approach. The remaining 20% gave a neutral response. The second statement investigates contractors' evaluation of their current allocation method. In this respect, 64% of the sample regards the currently in use methods adequate but 7% of the sample totally disagree with this idea. In the third question, only 48% of the contractors expressed their agreement with the idea that more cost pools, as bases for company OH allocation, yield a better cost tractability and thus result in a more accurate OH cost allocation. A neutral response, however, represents 35% of all answers, which is a high percentage.

Activity Based Costing (ABC) was investigated as a relatively new cost accounting method that relies on the concept of relating costs to the activities causing them. The idea was totally new to many contractors. Only 53 contractors made their judgment on the issue. Results show that while 47% of the contractors surveyed agree or strongly agree on the ABC approach, 11% strongly disagree but 42% of the sample have neutral response. In discussing the concept, many contractors had the impression that although the theory behind ABC is valid, it may be difficult to apply in the construction industry because company resources are continuously performing many activities in a manner that makes tractability very difficult.

Table 11
Intervals for checking company OH rate

Company OH rate is checked every	Frequency	Percentage
06 months	00	00
12 months	52	85
18 months	00	00
24 months	00	00
No fixed schedule	09	15

Table 12
Contractors' perception regarding company OH allocation

Factors related to allocation method	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Tot.
Using the right allocation method is vital for the contractors	00 00%	00 00%	12 20%	26 42%	23 38%	61 100%
Currently used method is effective	04 07%	00 00%	18 29%	25 41%	14 23%	61 100%
Accurate allocation can be achieved if more cost pools are used	00 00%	10 17%	21 35%	17 28%	12 20%	61 100%
Better allocation can be achieved if activity based costing (ABC) is used	06 11%	00 00%	22 42%	16 30%	09 17%	53 100%

5.5. Controlling company OH cost

This question asks contractors to specify efforts taken to reduce or control company OH costs. Results are summarized in Table 13. The results indicate that 77% of the contractors do apply a cost control plan for company OH costs. In the second part of this question, contractors were asked to explain their cost control plans. Answers can be divided into two groups. First, the majority of contractors (87%) explained their cost control plans as an instantaneous decision aimed at cutting company OH costs which came as a reaction to high OH rates. Many examples were mentioned by the contractors such as: reducing the size and staff of main office, renting facilities for offices and accommodation instead of building them, recruiting manpower with lower wages and who can handle a wider range of tasks, sharing head office resources with sister companies, reducing equipment and plant costs by selling surplus equipment, and reducing or canceling overtime and bonuses. On the other hand, 13% of contractors who reported having cost control plans for company OH costs described comprehensive plans which have a cost target to be met, a work plan to achieve a target, checking variances to evaluate progress and taking necessary corrective actions.

5.6. Additional comments

Participants were also asked if they have additional comments or suggestions regarding company OH costs. Only six contractors answered. Two points can be drawn from their answers. First, the unstable construction market makes it difficult for contractors to decide on the optimum level of OH costs that enables contractors to win and administer large projects and at the same time does not financially drain the company. This factor was also sensed as a major reason for increased company OH costs when lack of new projects was evaluated as second among causes of increased company OH costs. Second, there are new types of OH costs that were not previously known to Saudi contractors, such as insurance and financial costs that are project OH

Table 13
Rate of applying steps to reduce company OH costs

Efforts to reduce company OH costs	Freq.	Percent	Cum. Freq.	Cum. Percent
No efforts are exerted	14	23	14	23
Steps are taken to reduce company OH	47	77	61	100

costs in general but can be considered company OH costs in many instances. These costs are on the rise and local contractors have minimal control over them. Contractors who mentioned these costs suggested that government should be involved to help contractors find a middle way with banks and other surety groups.

6. Conclusion

Results of the survey show that average overhead cost in Saudi Arabia is slightly higher than the ratio reported in the literature. The ratio of company OH costs to project direct cost on the average is about 13%. The ratio of company OH costs to annual construction volume is 14.3%. Causes of increased company overhead costs include delayed payments, lack of new projects, cost of inflation and government regulations. Factors affecting company OH costs include the following: automobile and equipment costs, head-office expenses, labor related costs and financing costs. Factors affecting the amount of company OH loaded to a given project include: contractor need for work, type of contract, number of competitors, and percentage of subcontracted work. The majority of contractors apply a cost control plan for company OH costs. However, their cost control plans are instantaneous decision aimed at cutting company OH costs which came as a reaction to high OH rates. The unstable construction market makes it difficult for contractors to decide on the optimum level of OH costs that enables contractors to win and administer large projects and at the same time does not financially drain the company. There are new types of OH costs that were not previously known to Saudi contractors, such as insurance and financial costs that are project OH costs in general but can be considered company OH costs in many instances.

6.1. Recommendations

- Contractors need to be better informed about OH costs through short courses, seminars, professional and scientific societies. Contractors should be aware of the benefit of reduced company OH costs to their organization and to the construction industry. Less OH means more efficient organization.

- Contractors should, practically speaking, plan to maintain optimal levels of company OH costs, thus reaching two objectives at the same time: to eliminate unneeded spending and to be able to secure or increase the firm's market share in accordance with its strategic objectives.
- Contractors are recommended to establish cost control plans to help reduce company OH Costs. Such plan should contain cost objectives, implementation steps, monitoring and corrective actions.
- Contractors should not undermine the benefits of the following measures in reducing company OH costs:
 - Maintaining sound safety programs helps reduce insurance costs.
 - Applying a proper cost accounting system helps in allocating company OH costs in a balanced manner.
 - Customer satisfaction helps in maintaining good reputation, which helps in obtaining loans and other financial services at lower costs.
 - Applying the right combination of resources, which allows maximum utilization of company head office manpower.
- Contractors are recommended to coordinate their effort to urge the government to regulate rising financing costs.

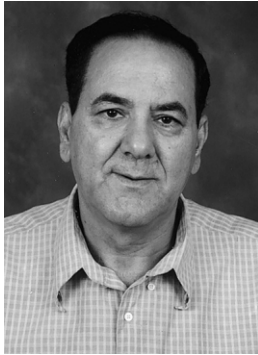
Acknowledgements

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.

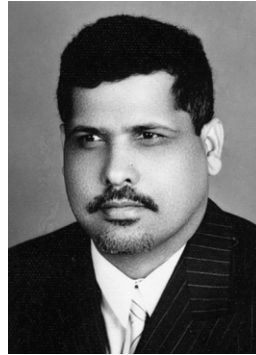
References

- [1] Tipper H. Controlling overhead. New York: American Management Association, 1966.
- [2] Fultz JF. Overhead, what it is and how it works. Cambridge, MA: Abt Association, 1980.
- [3] Cilensek R. Understanding contractor overhead. *Cost Engineering (AACE)* 1991;33(12):21–3.
- [4] Dagostino FR. Estimating in building construction. Englewood Cliffs, NJ: Prentice-Hall, 1989.
- [5] Pulver HE. Construction estimates and costs. New York, NY: McGraw-Hill, 1989.
- [6] Snodgrass T. Ideal overhead: lean and mean. *Credit Union Management* 1991;14(4):44–5.
- [7] Adrian JJ. Construction estimating. Reston, VA: Reston, 1982.
- [8] Lew AE. Means interior estimating. Kingston, MA: R.S. Means Company, 1987.
- [9] Franks J. Building sub-contract management: purpose, tasks, skills, and responsibilities. New York, NY: Construction Press, 1984.
- [10] Dale D. Controlling overheads without killing the business. *Australian Accountant* 1989;February:74–7.

- [11] Raffish N. How much does that product really cost? *Management Accounting* 1991;IXXII(9):36–9.
- [12] Ministry of Public Works and Housing (MPWH). Master list for Saudi contractors. MPWH Agency for Classification of Contractors, Riyadh 1989.
- [13] Kish L. Survey sampling. New York, NY: Wiley, 1965.



Dr. Sadi Assaf is a professor of construction engineering and management at King Fahd University of Petroleum & Minerals (KFUPM) in Dhahran, Saudi Arabia. He holds a B.Sc. and Ph.D in Civil engineering from the University of Illinois and an MBA from Northern Illinois University. His main areas of research are quantitative methods in construction management, risk management in construction and life cycle costing. Dr. Assaf has received distinguished and research awards from KFUPM.



Dr. Abdulaziz A. Bubshait is an associate professor of construction engineering and management at King Fahd University of Petroleum & Minerals (KFUPM) in Dhahran, Saudi Arabia. He holds a B.Sc. from UPM and M.sc. and Ph.D in Civil Construction contract and administration, quality management, construction methods and pavement management.

Dr. Solaiman Atiyah is an associate professor of accountancy at King Fahd University of Petroleum & Minerals (KFUPM) in Dhahran, Saudi Arabia.

Mohammed Al-Shahri is a captain engineer in the Ministry of Defense, General Directorate of Military Works, Khamis Mushayt, Saudi Arabia.