Kufa Journal of Engineering
Vol. 9, No. 1, January 2018, PP. 60-76
Received 21 February 2017, accepted 20 April 2017

IMPROVING THE BIDS EVALUATION CRITERIA AND REDUCING TIME AND EFFORT OF THE ASSESSMENT BY DEVELOPING A SOFTWARE PROGRAM

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http://dx.doi.org/10.30572/2018/kje/090104

ABSTRACT

A number of studies have been conducted to specify the most effecting factors on the success of projects. Those studies titled the most influencing factor, which is the bid selection criterion. By this criterion, the most qualified bidder/contractor could be chosen where the contractor has a considerable impact upon projects successes. Moreover, the published studies helped a lot in correcting the improper adopted criterion in selecting the best bid, which is the lowest price bid. Awarding the bid depending on the lowest price bid ended many projects in failure. Therefore, this study aimed to revise the popular mistaken selection criterion, recommend an evaluation criterion, and develop a computer program that works on finding the best bid according to the recommended criterion. The suggested criterion was followed in selecting one of the contractors to construct some projects in Iraq. That projects were felicitously finished; the projects were completed on time and budget.

KEYWORDS: Bids types; Bids assessment stages; Bids assessment standards; Criteria weighting; Bids assessment program

تحسين معيار تقييم العطاءات وتقليل وقت وجهد التقييم من خلال تطوير برنامج حاسوبي

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الخلاصة

تم أجراء عدد من الدراسات لغرض تحديد أكثر العوامل تأثيرا على نجاح المشاريع, تناولت تلك الدراسات العوامل الأكثر تأثيرا والتي تمثلت بمعيار اختيار العطاء, يتضمن العمل اختيار أفضل مقدم عطاء أو مقاول والذي يكون له الدور المؤثر في إنجاح المشاريع. ساعدت تلك الدراسات وبشكل فاعل على تصحيح المعايير الخاطئة والتي تعتبر الأكثر شيوعا والمتمثلة باختيار اقل العطاءات تسعيرا والذي أدى إلى فشل عدد ليس بالقليل من المشاريع. تهدف هذه الدراسة الى تفسير المعيار الأكثر خطا في أحالة المقاولات وذلك بوضع معيار تقييم جديد فضلا عن تطوير برنامج حاسوبي والذي يحدد أفضل عطاء على ضوء المعيار المدخل للبرنامج. تم استخدام المقترح الجديد والخاص باختيار أفضل المقاولين لغرض تنفيذ بعض المشاريع في العراق والتي تم إنجازها بنجاح حيث أكملت وفق الوقت والميزانية المحددة للمشاريع.

1. INTRODUCTION

Many parameters could recognize between valid and invalid management, such as completing projects on or under budget, closing projects on or ahead of time, executing projects according to drawings and specifications, learning from the past lessons, and satisfying the owners with the quality of the completed projects. Mantel et al. (2011) grouped all of those differences into three main sets and titled them as performance targets, which are cost, schedule, and scope .Therefore, the quality of any completed project is measured based on those targets. Unfortunately, most recent statistics published that only 1 to 5 of projects succeed since there is a conflict between what we are really aware of the projects and what we want to be aware of (Shenhar and Dvir, 2004). Due to common failures in projects, many researchers had inspired to seek for the most critical affecting factors on success or failure of projects. Belassi and Tukel (1996) published a number of critical factors leading to succeed or fail projects depending on theoretical studies. Some of those factors are concerned with the project manager, project's organization, weather conditions, and time and cost of the project. Pakseresht and Asgari (2012) classified the most impacting factors on projects success into seven categories, which are project management, logistics, employer, design team, contractor, project manager, and environment and business environment.

As it can be noticed from the results in the previous paragraph, the most shared factor among the specified factors is the best quality selection criterion. Regrettably, the most causing problem in defeating in finishing the projects according to the contract requirements is awarding the contract to the lowest bid price (Robertsen and Hannas, 2011). Considering this criterion leads to exclude the qualified bidders and increase time and cost of projects as a result. Nevertheless, in this limited study, the authors intended to clarify the importance of other factors when evaluating the received bids likeexperience, obligations, personnel capabilities, equipment fleet, manufacturing capacity, financial situation, litigation history, conditional prequalification, etc. (EBRD, 2012). Next, after long time of studying and analyzing, they could specify and reach to the best weighting scores for the most influencing factors on the project's success. The recommended weighting scores were applied when contracting for a construction project in Iraq. In addition, a new computer program, which is called bids assessment program, was developed for this study to save time and reduce the effort of evaluation of the most qualified bids as there will be more available information about it in the next sections of this paper.

BIDS

In this section, there will be a quick review for all of bids types, bids assessment standards, and bids assessments stages.

Bids types

In general, two types of bids are known by which a project gets constructed or executed by a contractor for owners, which are competitive and negotiated biddings. Each type has its own traits and conditions to be adopted and applied to get the best contractor according to the contract requirements and project environment. Dagostino and Peterson (2011) summarized the two types of bidding strategies as follow. On the basis of competitive bidding strategy, bidders should turn in a tender or proposal with priced units of work. In this situation, the project would be either awarded to the bidder with the most competitive tendered price or to the bidder with the best value. In case, the project is awarded depending on the price then the bidder with the lowest price would be the winner, but if it is awarded depending on the best value, then the submitted proposals would be competed based upon specific criteria. The criteria may inspect the price of bidders in addition to other qualifications of the bidders like their experience, fleet of equipment, financial stability, company size, time, number of completed projects, and others based upon the size and type of the project.

Based upon negotiated bidding strategy, clients could negotiate with a number of bidders. With who and how many bidders should be negotiated, it is decided by the clients themselves. Therefore, this type of bidding would be considered when clients know that which bidder should construct or execute the project, consequently in this case considering the competitive bidding type would be wasting for time. The negotiations between the clients and desired bidders could be about any aspect that may affect the final project's price, for example, experience of builders and workers, materials, finishes, types and sizes of the available equipment, etc. As it can be noticed from what is mentioned previously, when negotiated bedding type is used, bidders may not be enough encouraged to do their best in getting the lowest bidding price as when the other type, competitive bidding type, is used Dagostino and Peterson (2011).

Bids assessment stages

In general, two procedures of tendering are known: open tendering and closed tendering procedures. Open tendering procedure is usually used for the public projects where the time and location of the bids opening are provided in the project manual. In contrast, closed tendering procedure is used for the private projects where only the qualified bidders are allowed to submit

their bidders; those bidders will receive an invitation by the clients to submit their proposals. Moreover, the two procedures could be categorized one more time into four procedures as follow (ADB, 2010):

1. Single-stage, one-envelope bidding method: In this type of the bidding procedures, the bidders submit both of price and technical proposals in one envelope. Then, the received envelopes will be opened where the bidders are attended at the same time and location announced in the section of instructions to bidders of the project manual. After that, the bids will be evaluated, and the contract will be awarded to the bidder with the lowest price.
2. Single-stage, two-envelope bidding method: Based on this type of procedures, bidders turn in two envelopes at the same time; one envelope contains the technical proposal while the other includes the price proposal. At first, just the received technical proposals will be reviewed and evaluated at the same mentioned time and location in the project manual. The received technical proposals are not allowed to be changed or updated. The technical proposal that don't satisfy the contract requirements will be rejected. Succeeding that, the remaining bidders get their price proposals evaluated at in an announced time and location, and the bidder with the least price will be the winner.
3. Two-stage, two-envelope bidding method: This procedure is similar to the second procedure, Single-stage, two-envelope bidding procedure, in submitting two envelopes one for the technical proposal and one for the price proposal and in reviewing the technical proposals first, but here the technical proposals could be changed. Clients may ask bidders to change their technical proposals with submitting an extra price proposal for the changes. Afterwards, all of the modified technical proposals, primary price proposal, and extra price proposal will be reviewed, and the contract will be awarded to bidder with the lowest price (summation of the primary and extra price proposals) and with a technical proposal (modified technical proposal) meeting the contract requirements.
4. Two-stage bidding method: Initially, bidders should submit only the technical proposals. Those proposals are reviewed and discussed with the bidders by the client's contracting team. The bidders are permitted to change or modify their proposals. Next, the bidders will get invitations to turn in their modified technical proposals and price proposals for the modified proposals. The proposals will be reviewed, and the bidder with the best competitive price and technical proposal is the winner.

Single-stage procedures are used for most contracts with normal requirements and sizes, but two-stage procedures are considered when there are exceptional contract requirements and large contracts therefore the proposals need to be professionally technically reviewed.

Bids assessment standards

Owners may have the right to reject any received bid/s, and they are not obliged to contract with the bidder with the lowest price, why? It is obvious that it may cause weird feelings when the lowest price bid is rejected, yet the owners seek for the best bid. The best bid could not be specified only by considering the lowest price; the best bid could be obtained when it is based upon a number of criteria (Dagostino and Peterson, 2011). Therefore, each proposal will be graded for each set criterion, and a decisive score can be calculated by adding all of the results of multiplying the criterion's score by its weighting. By the way, this stage of evaluation could be reached only by bidders whose proposals and bidding documents have met all the requirements!! What does that mean? Bidders should make sure of submitting the bid form, submitting the required number of proposals, filling out all blanks, turning in the bid security, delivering the package to the right place and at the right time, etc. Unfortunately, there is no enough space to explain those in details. However, setting the criteria relies on many factors, such as size and type of the contract, requirements of the contract, location of the project, and others. Basing on experience in contracting, realizing the problems of projects failure in Iraq, and reviewing many resources for setting the assessment criteria, the suggested criteria were set and summarized in Fig. 1.

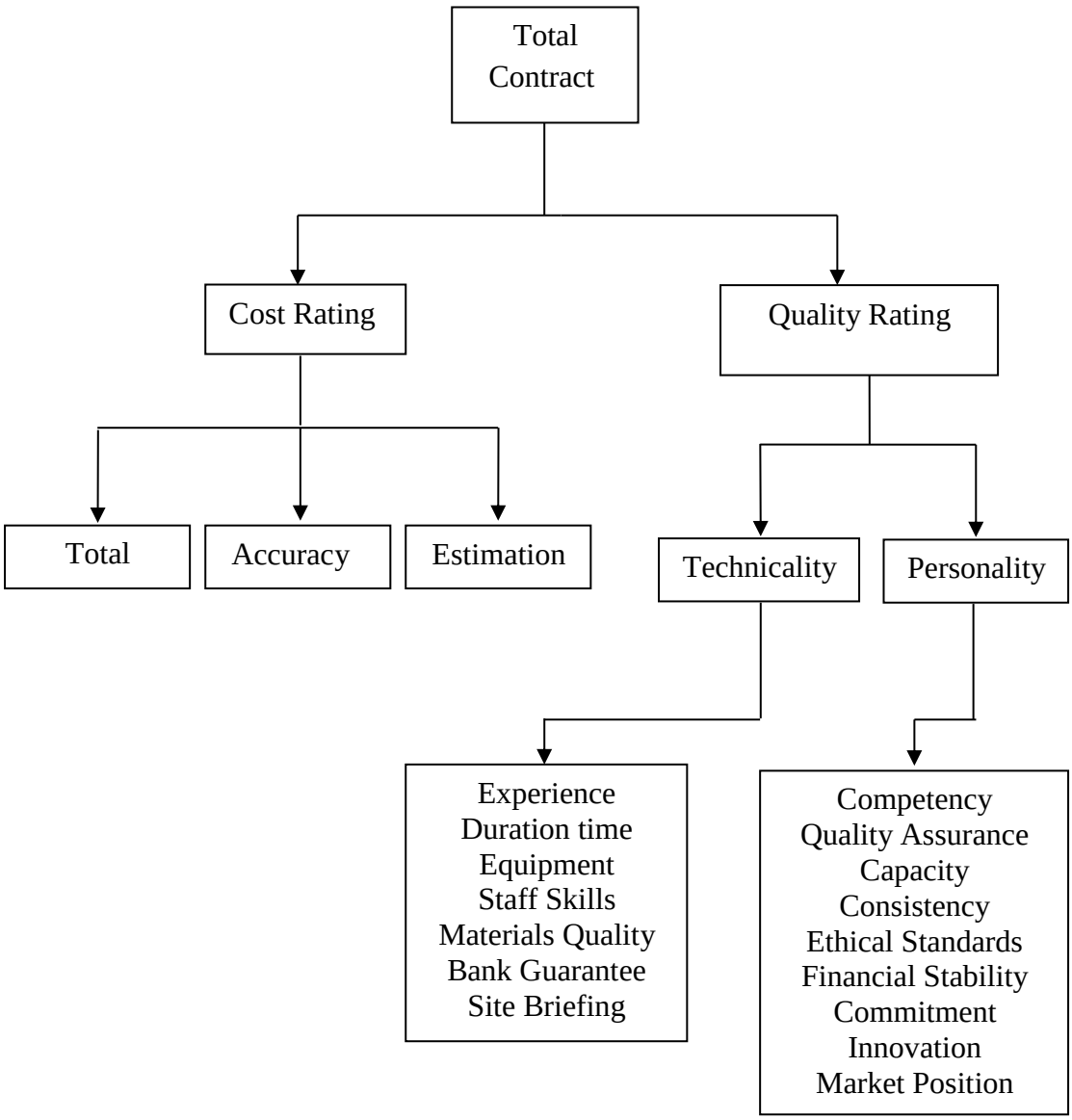

Fig. 1. The recommended criteria for bids evaluation.

As it can be seen from the Fig. 1, the criteria are divided mainly into two main categories: cost and quality categories, and each category is divided one more time into sub-categories. Each category is given a short summary as follow:

- Cost Rating: Weighting of this category is distributed among three categories, which are total bid price, accuracy of bidding, and estimation. The aim of this category is to make sure that the selected bid price will be neither too high compared with the prepared price by the owner's team to save money nor too low to not affect the quality of the built project.

- The total price of each bidder is compared with the prices of the other competitors. The bidder with the lowest price among his competitors price gets the whole score for this sub-category. Otherwise, the bidder gets a percentage of that score.
- One of the bidder's responsibilities is studying carefully all of specifications, drawings, and the other documents of the project manual to estimate accurately each activity of the project activities. The price of each activity in the bidder proposal should be within an acceptable range of the corresponding activity price in the owner proposal. The more exact activity price, the higher score for the accuracy sub-category.
- The total bid price of each bidder is compared with the total price of the owner, and it should be within an enough closeness of the owner's price. Of course, the accuracy of the prepared takeoffs relies on the experience of the estimator and the used technique, such as Excel, or a software like WinEst Pro. The proposal with the closet price to the owner's price gets the highest score for this sub-category.

- Quality Rating: Weighting of this category is distributed between two categories, which are technicality and personality. This category is set to take in consideration the qualifications of bidders from different perspectives, for example, their experience, financial ability and stability, their equipment fleet, their ability in completing projects on or ahead of time, their staff experience, etc. This category is classified into a number of sub-categories, and each subcategory is briefly explained.
  - Experience: The criteria were recommended to construct hospitals as it would be explained in the next sections. So, the bidder gets one point for each completed similar project, and half point for each completed project other hospitals. As, it can be drawn, the most experienced bidder in constructing identical projects to the bidden project gets the highest score for this sub-category.
  - Duration time: Bidders should mention the number of the project completion calendar days in the submitted bidding package. Some bidders underestimate while others overestimate. In the both cases the owners are concerned. Owners want their projects to be completed on time or ahead of time, but at the same time they don't want them to be expedited, bringing worries about the quality of the project. On the other hand, owners don't prefer their projects to be delayed since that affects the investments time and refunds. As a result, the bidder with the most realistic completion time get the highest score for the time sub-category.

- Equipment: Bidders should submit enough information about their machines fleets, such as machines identifications, utilization data, availability time, and their sizes and numbers. The purpose is to make sure that the selected bidder has the required equipment to perform the work with the least possible rate of exhaust emissions; construction process causes a high rate of pollutions. However, the highest score is given to the bidder who provides as many needed machines as possible with the least possible utilization time.
- Staff skills: Bidders are committed to prove that they have enough experienced personnel. Personnel comprises project manager, engineers, drivers, workers, etc. Besides, personnel is not enough to be big and experienced, but also personnel should be well practiced in the same type of work to be performed. The bidder with the biggest and most experienced staff obtains the highest score.
- Materials quality: Contractors may supply materials with properties better than the specified properties in tenders while others supply the exact materials in tenders for the same price. Hence, contractors who provide better materials without raising their prices get higher score than contractors whom raise the price or don't bring better materials.
- Bank guarantee: or as it is known as bid security. It is usually stipulated in the proposal form. The main purpose of it is to ensure that when a bidder is selected then he shall sign the agreement and enter into. Otherwise, this amount will be kept by the owner as a liquidated damage. Depending on the type, amount of the guarantee, and granted institute, the bidder will be scored for this sub-category.
- Site briefing: One of the requirements in the contract documents is the contractors inspect the site and present a held conference before bidding. Usually, a number of items are provided and should be checked by contractors. Some of those items are site access, available accesses to the site, transportation means, the conditions of soil, etc. The evaluation is based upon the contractor questions, observations, and how much information they got.
- Competency: This sub-category is to ensure the qualifications of contractors in constructing the bidden project.
- Quality assurance: What is the obligation of contractors to complete the projects with the best quality? This sub-category can evaluated for contractors based upon their history.

- Capacity: Are the contractors able to build the bidden project? Their ability in general and from different perspectives, such as financially, technically, and humanly.
- Consistency: This sub-category is set to evaluate the activities schedule that is prepared by contractors. Which technique is used to prepare it? Is the duration of any activity realistic or not? How is the project duration consistently distributed on the whole project activities?
- Ethical standards: This category could be checked by reviewing the history of contractors and enquiring people who have had business with them. The purpose is to ensure that the contractors don't have any tendency for defrauding.
- Financial stability: Contractors are obligated to submit documents that illustrate their annual financial situation for the last five years. Also, they need to submit information about the banks that they deal with to let owners confident about their financial ability.
- Commitment: Contractors may have ongoing large projects and/or pending contracting awards. Those obligations should be considered by the owner's contracting team where those obligations may exhaust the contractor resources, consequently affecting the project.
- Innovation: This category measures the ability of contractor's company in figuring out solutions to the encountered problems at any life cycle of the project. Besides, it measures the executing company capability in finding out alternative ways that lead to saving construction time and cost.
- Market position: It is about the reputation of a company in the construction markets.

2. CRITERIA WEIGHTING

An international nongovernmental French Organization known as Premier Urgency (PU) for rehabilitation hospitals from North up to South of Iraq. This organization rejected to award the contracts to the lowest bidders to construct hospitals in all of Al-Rumaitha and Suq Al-Shuyukh Districts in addition to constructing all of Al-Aziziyah Hospital, Al-Kut Hospital, Al-Chibayish Hospital, Tuberculosis Center of Nasiriyah, Tuberculosis Center of Amarah, and Al-Hawija Hospital. Therefore, it asked a number of experienced PU engineers to suggest criteria that ensure getting the most qualified contractor. Needless to say, hospitals contract requires special conditions and terms to be mentioned since there will be special insulations for the X-ray rooms, medical supplies, and medical equipment to be executed, provided, and installed, respectively.

The authors of this paper suggested the detailed criteria in section 2.3., which were the only selected by the organization among numerous suggested criteria by others because they were found to almost comprise everything about contractors (financially, technically, and manly). Furthermore, the authors suggested the criteria weighting as well as summarized in Table 1.

Table 1. Criteria weighting.

<table>
<tr><td colspan="5">Total Contract 100%</td></tr>
<tr><td colspan="3">Cost Rating 70%</td><td colspan="2">Quality Rating 30%</td></tr>
<tr><td rowspan="9">Total Price 55%</td><td rowspan="9">Accuracy 10%</td><td rowspan="9">Estimation 5%</td><td>Technical 20%</td><td>Personality 10%</td></tr>
<tr><td>Experiences 3.0%</td><td>Competency 2.0%</td></tr>
<tr><td>Duration Time 3.5%</td><td>Quality Assurance 2.0%</td></tr>
<tr><td>Equipment 2.0%</td><td>Capacity 0.5%</td></tr>
<tr><td>Skill Staff 3.0%</td><td>Consistency 0.5%</td></tr>
<tr><td>Materials Quality 5.0%</td><td>Ethical Standards 1.0%</td></tr>
<tr><td>Bank Guarantee 2.0%</td><td>Financial Stability 2.0%</td></tr>
<tr><td rowspan="3">Site Briefing 1.5%</td><td>Commitment 0.5%</td></tr>
<tr><td>Innovation 0.5%</td></tr>
<tr><td>Market Position 1.0%</td></tr>
</table>

Hence, the total criteria weighting 100% is divided into 70% for the cost rating and 30% for the quality rating. Then, the cost rating 70% is divided one more time into 55% for the total price, 10% for the accuracy, and 5% for the estimation. Furthermore, the quality rating 30% is divided again into 20% for the technical rating and 10% for personality rating. And the 20% of the technical rating is divided into3% experiences, 3.5% time, 2% equipment, 3% staff skills, 5% material quality, 2% bank guarantee, 1.5% and site briefing for. Besides, the 10% of personality rating is divided into 2% competency, 2% quality assurance, 0.5% capacity, 0.5% consistency, 1% ethical standards, 2% financial stability, 0.5% commitment, 0.5% innovation, and 1% market position.

3. BIDS ASSESSMENT PROGRAM

This program was developed in Visual Basic. When all the received bids are reviewed, and the bids that don't satisfy the contract requirements are separated and rejected, the program could be used by the owner contracting team to select the best contractor of the remaining ones. The program may be started by double clicking on it then the window in Fig. 2 will show up:

Fig. 2. The starting window of the developed assessment program.

Three buttons are available on this window. The first button is "Help" button to give some information about the program, the second button is "Next" button to move to the next window, and the third button is "Turn off" button to close it.

The second window of the program is shown in Fig. 3, which includes the weighting criteria as summarized previously in section 2.3. Also, the second window includes a small rectangular corresponding or below each criterion to put in their rates out of 100%. Those rates are added by the owner's team, or they could be adjusted as default values by clicking the default button on the bottom of the second window. Here, the default values are the same values in Table 1. In addition, this window comprises other buttons on its bottom, such as *Clear* to delete the inserted rates of the criteria, *Back* to move back to the previous window, *Next* to move on the next window, and *End* to close the window and program simultaneously.

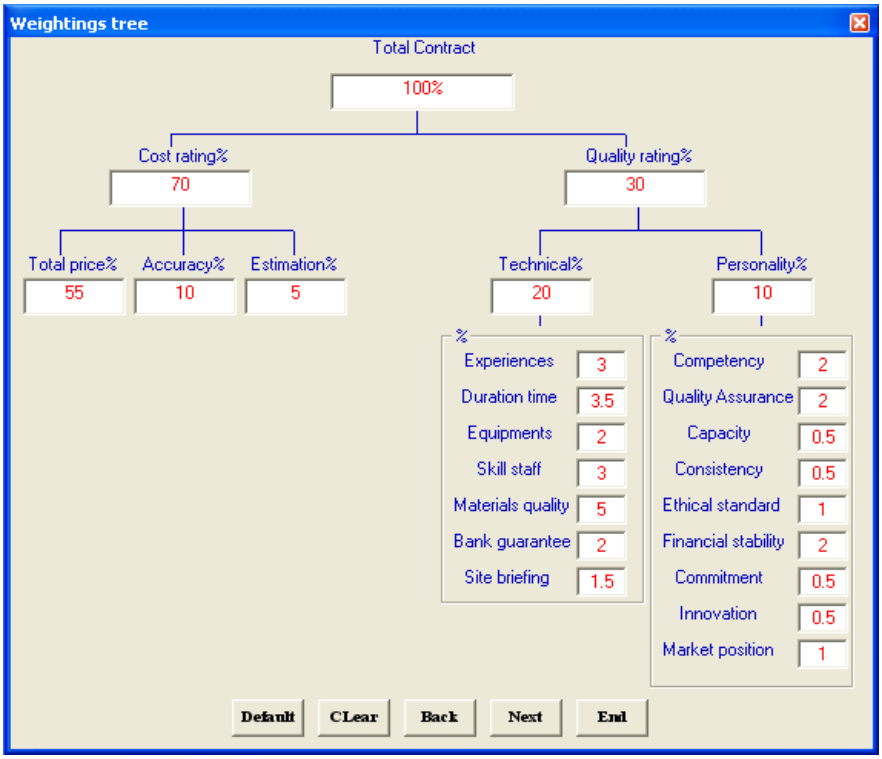

Fig. 3. The weighting window of the developed assessment program.

The third window contains four questions on it to be answered as shown in Fig. 4.

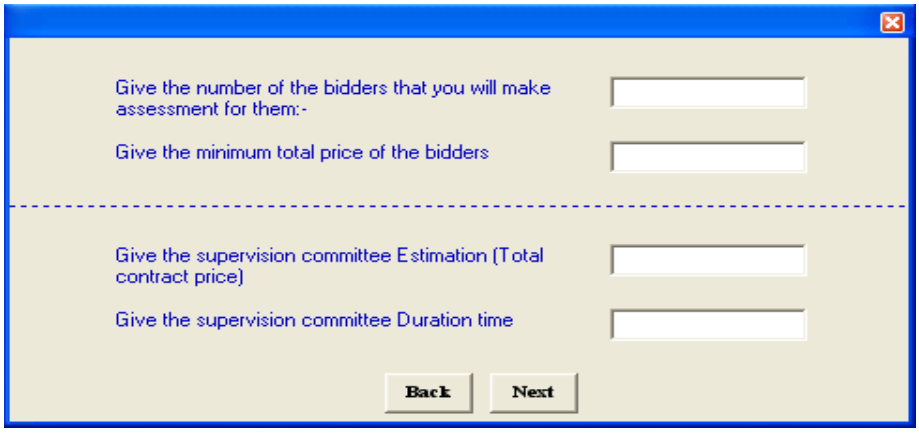

Fig.4. The questionary window of the developed assessment program.

The questions are about: the number of bidders to be competed, the total minimum price of those competed bidders, the owner's estimated price, and the owner's estimated project time.

The fourth window is the contractor's information window as illustrated in Fig. 5. This window will show up depending on the number of competed contractors. For example, if the number of the competed contractors is three then the window shows up three times to enter the information of each contractor.

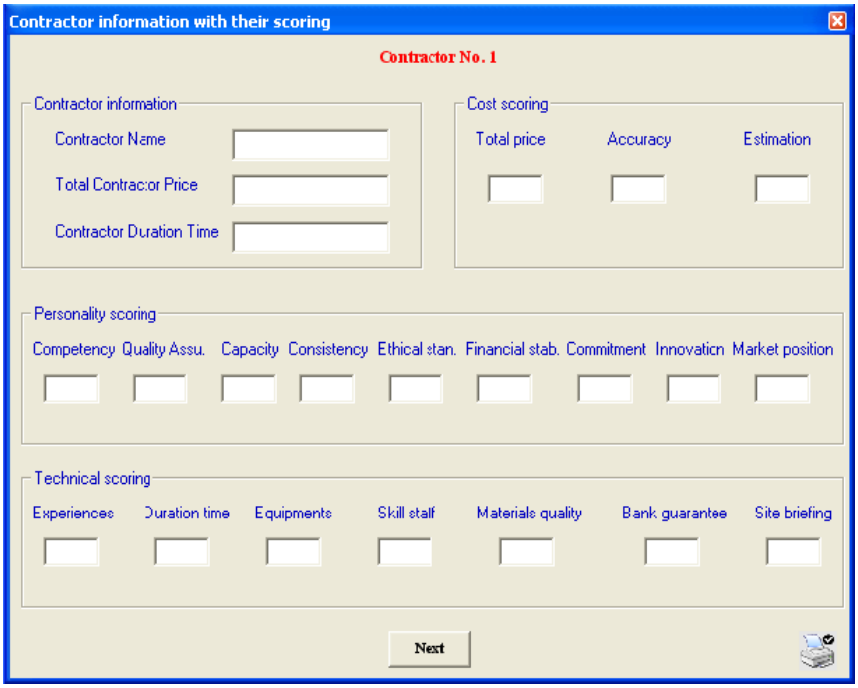

Fig. 5. The contractor's information window of the developed assessment program.

When the total contractor price is entered, its score ranged from zero to ten pops up immediately in the total price and estimation fields where the program compares it with the owner estimated price then gives its score based on that. Next, when the contractor duration time is put in, its score shows up immediately in the duration time field of the technical scoring. Finally, for this window, other fields should be scored by the owner's contracting team based on bids assessment standards in section 2.3 out of 10 and so on for the other contractors.

The last window is the results window as in Fig. 6. Also, it offers the name of contractor who gets the higher score. Besides, it offers a report about the results as shown in Fig. 7, and it offers a button to print out the results sheet.

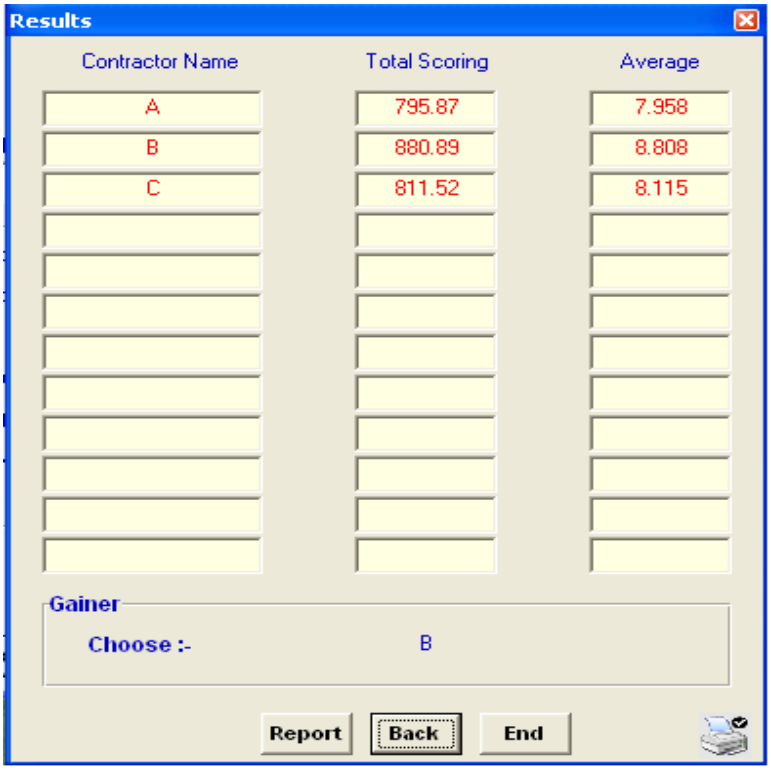

Fig. 6. The results window of the developed assessment program.

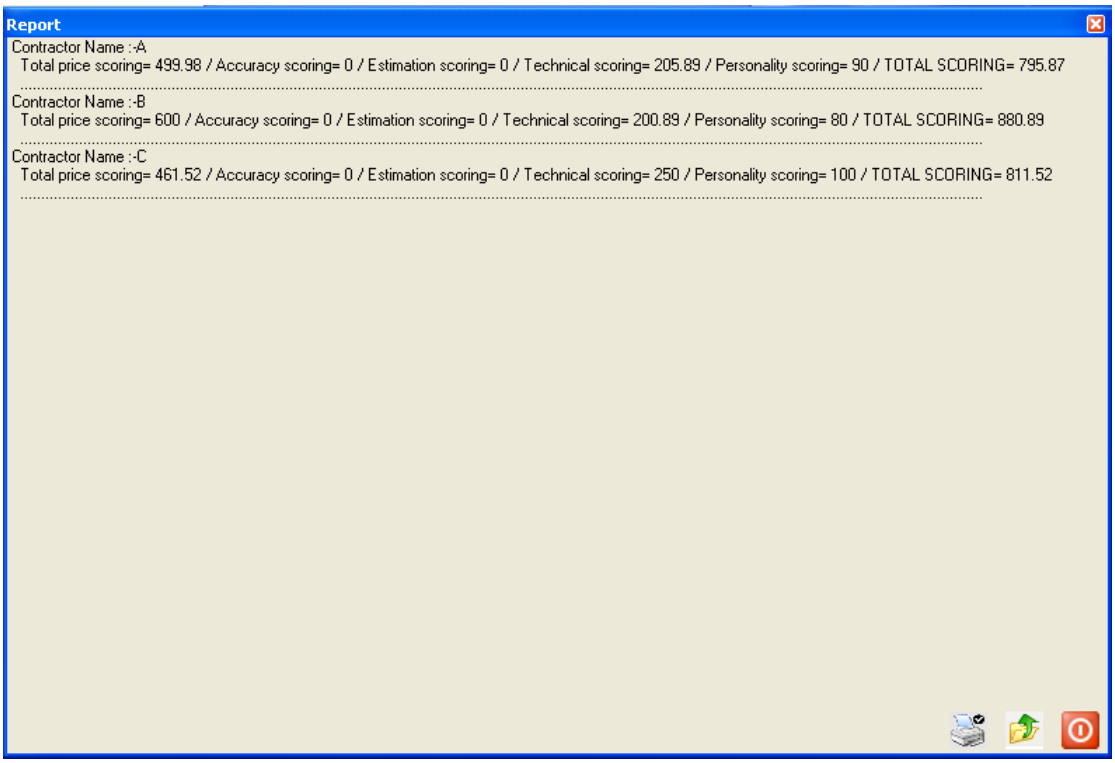

Fig. 7. The report window of the developed assessment program.

4. RESULTS

For the hospitals projects, a competitive bidding (section 2.1), two-stage bidding method (section 2.2), and criteria weighting (section 3) were used that ended up the projects with more than what was expected. The project quality was as desired by the owner, the project was

finished within the calendar days as specified in the contract, and the project cost was approximately the same what is budgeted for it.

5. CONCLUSION

In Iraq, projects suffer from the common failures, which are over budget, behind time, and projects quality failures. The main reason for that is awarding contracts based on the lowest price. So, to defeat these problems, other assessment standards should be taken in consideration, such as experience, innovation, etc. as explained above in the previous sections, and as it is followed in the construction media all over the world. Therefore, the authors of this paper were motivated to set evaluation criteria depending on their expertise in constructing projects, frequently documented faced problems in projects, and other sources as serviceable tool in improving the construction production level in Iraq. As a practical verification for the importance of not considering the lowest price only, criteria assessment and weighting were applied to construct hospitals in all of Al-Rumaitha and Suq Al-Shuyukh Districts in addition to constructing all of Al-Aziziyah Hospital, Al-Kut Hospital, Al-Chibayish Hospital, Tuberculosis Center of Nasiriyah, Tuberculosis Center of Amarah, and Al-Hawija Hospital with high requirements, resulting in projects with the best performance targets: time, cost, and scope.

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