Developing a Computer Program to Solve the Implementation Problems of Public Investment Projects in Iraq

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Abstract. The implementation of public investment projects in Iraq in terms of cost and time specified within the general investment budget and in terms of quality; requires analysis the obstacles facing the implementation of these projects and propose appropriate solutions to them through developing a proposed program to analyze and address the problems through project phases. The aim of research for developing a computer program comprises the identified problems as input to the program and the proposed treatments as output for it; to facilitate the work of the departments involved in projects in making decisions and to avoid repeat the previous mistakes. The researcher conducted personal interviews to identify (55) problems facing the public investment projects in Iraq grouped in (5) groups; legal and administrative, financial, technical, problems with documentary credits and other problems, conducting questionnaire survey to clarify the impact of these problems on the implementation process, using a statistical program (SPSS) to compute relative important index (RII) for them to identify the group that most impact on the implementation of public investment projects. A visual basic program with database (SQL) was utilized to analyze and treat the problems related to the subject of research. This program is equipped with the ability to withdraw reports on projects as (word, pdf, or excel). The results from research showed that there is (absences coordination between different service departments, delays in land acquisition procedures for projects, weakness of the possibility of most consultancy offices designed for projects, weakness of personals specialized in the preparation of technical and economic feasibility studies and inaccuracy of signed contracts with contractors…etc.).

Keywords: Investment projects, implementation, investment project, successful investment project, public investment project.

1. Introduction
The investment project can be well-defined as the optimum set of activities of investment based on sector and logical planning. It represented by a grouping of humans, material, and resources that lead to economic and social development [1]. Characteristic investment projects comprise the construction of new buildings, hospitals, roads, power plants, water tanks, and other infrastructure elements. Also it may include replacing the old facilities, rebuilding of existing facilities, acquirement of new facilities, or buying of equipment. Investment projects generally are large, non-repetitive expenses that comprise multi-year funding, have a useful life for more than five years, are based on a comprehensive requirements assessment, meet an important public purpose, and require public answerability for funding [2-5].

The expenses of the investment include: expenses to acquire the land, infrastructure expenditures, design and technical help expenditures (permits, approvals, designing, project review, technical support, and construction site supervisor), expenditures through the basic investment comprises (constructions
and works of interference), costs with independent acquisitions, other expenditures such as the association of the construction site, comities, taxes, legal issues, financing expenses, others unexpected expenditures, operating expenditures and training the workers for utilization, recent technologies, court case, getting expertise [3-6]. Most of the public investment projects do not meet the anticipations of many clients. Some are delivered too late, at a greater cost, and do not meet approved quality standards. They might not be able to achieve the expected goals.

The government needs to do something because public resources are wasted [4]. For successful investment project, it is required a common concept to the problem and its explanation together with the clients, this concept include: Any investment project to be a success, it should be accurate, clear, and exact understanding of the constructing way, a complete analysis of the options in the problem to be addressed to solve or to meet the need [2].

2. Preliminary Interviews
To gather information about the problems of implementation weakness in the public investment projects of Iraq, personal interviews were conducted with a group of experts (eleven engineers), who have more than fifteen years, experience in investment projects. They are working in the field of design, planning, management, and execution of the investment projects. The results from these interviews identified (55) causative factors, which represent the origins of implementation weakness problems in the public investment projects under (five) groups as shown in table (1). The cause and effect diagram was helped the researcher in design the form of the questionnaire survey as shown in Fig. 1.

![Figure 1. Cause and effect diagram for problems in Iraqi public investment projects.](image)

3. Closed Questionnaire
The closed questionnaire is an important source of obtaining field information about weakness implementation problems in the public investment projects of Iraq. Sixty questionnaires were distributed to a group of experts in those departments and only Fifty-four were answered. The results of the questionnaire were analyzed using the statistical program SPSS and the following Tables 1 and 2 show the results.

| Table 1. Relative important index (RII) for the implementation weakness causative factors. |
|-----------------|---------|---------|---------|--------|--------|--------|
| Key Causative Factors | N  | AM     | S.D    | α      | Effect | RII    |
|-----------------|----|--------|--------|--------|--------|--------|
| 1- Administrative and legal problems |    |        |        |        |        |        |
| 1- Delaying ratification of the state budget | 54 | 4.0377 | 0.9600 | 0.851  | High   | 4.243  |
| 2- Lack of allocations allocated to projects | 54 | 3.9811 | 0.7203 | 0.848  | High   | 4.183  |
| 3- Lack of a specific mechanism for carrying out research projects | 54 | 3.7358 | 0.7377 | 0.844  | High   | 3.925  |
| 4- Exceeding the plots of land allocated to investment projects | 54 | 3.8868 | 1.1546 | 0.873  | Very high | 4.084 |
| 5- Delays in land acquisition procedures for projects | 54 | 3.8491 | 1.1162 | 0.845  | High   | 4.044  |
Table 1. Continued.

| Key Causative Factors                                                                 | N   | AM   | S.D    | α    | Effect Level | RII |
|--------------------------------------------------------------------------------------|-----|------|--------|------|--------------|-----|
| **1-Administrative and legal problems**                                               |     |      |        |      |              |     |
| 6-The existence of disputes over the ownership of buildings and land between ministries and state departments | 54  | 3.8679 | 1.07485 | 0.845 | High         | 4.064 |
| 7-The difficulty of administrative procedures between the Ministries                  | 54  | 3.9057 | 0.92537 | 0.843 | High         | 4.104 |
| 8-Limited administrative powers granted to project managers.                         | 54  | 3.7547 | 0.78215 | 0.843 | High         | 3.945 |
| 9-Weak coordination between ministries when allocating or buying land plots           | 54  | 3.7358 | 0.76337 | 0.843 | High         | 3.925 |
| 10 The lack of accuracy in the evaluation of companies executed                       | 54  | 4.1509 | 0.74411 | 0.845 | High         | 4.362 |
| 11-Delay in resolving disputes between the contractor and the employer               | 54  | 3.9434 | 0.74460 | 0.843 | High         | 4.144 |
| 12-Inaccuracy of signed contracts with contractors                                     | 54  | 3.7170 | 0.94822 | 0.843 | High         | 3.906 |
| 13-The large number of cases of forgery                                               | 54  | 3.4717 | 0.89386 | 0.845 | Medium       | 3.489 |
| 14- The reluctance of some contractors to perform maintenance work                   | 54  | 3.4717 | 0.89386 | 0.845 | Medium       | 3.489 |
| 15 Lack of technical and financial efficiency of most companies                      | 54  | 4.1698 | 0.75284 | 0.846 | High         | 4.381 |
| 16- Re - announcement of tenders for more than one time                                | 54  | 3.5660 | 0.84374 | 0.841 | High         | 3.747 |
| 17- Weak knowledge of the people working on the implementation of projects with their laws and instructions | 54  | 3.6415 | 0.68203 | 0.843 | High         | 3.826 |
| 18- Lack of classified contractors in many governorates                                | 54  | 3.3208 | 0.89386 | 0.841 | Medium       | 3.489 |
| 19- The length of time in the tenders                                                 | 54  | 3.6792 | 0.77889 | 0.843 | Medium       | 3.866 |
| 20- Inadequate r project management in governorates                                    | 54  | 3.9623 | 0.64933 | 0.842 | High         | 4.163 |
| 21- Poor implementation capacity of some implementing agencies                       | 54  | 4.0566 | 0.84159 | 0.841 | High         | 4.262 |
| 22- There is not existence coordination between different service departments.        | 54  | 3.9245 | 0.97762 | 0.840 | High         | 4.124 |
| 23- Some contractors contracted with subcontractors.                                  | 54  | 4.0189 | 0.90915 | 0.840 | High         | 4.223 |
| 24- Transfer more than one contract to one company                                    | 54  | 3.6792 | 0.99564 | 0.842 | Medium       | 3.866 |
| 25- Executing companies ignore the period of delay penalties.                         | 54  | 3.7925 | 0.84030 | 0.842 | High         | 3.985 |
| **2- Financial problems**                                                             |     |      |        |      |              |     |
| 26-The length of the procedures for the payment and receipt of payments by the ministries. | 54  | 3.2075 | 0.71679 | 0.846 | Medium       | 18.398 |
| 27-The inadequacy of the financial ceilings contained in the direct implementation instructions | 54  | 3.3019 | 0.84546 | 0.845 | Medium       | 18.939 |
| 28-The multiplicity of regulatory bodies (Financial Control, Integrity, Inspector General). | 54  | 3.7170 | 0.71730 | 0.843 | High         | 21.321 |
| 29-Lack of funds financed for executed projects.                                      | 54  | 3.5660 | 0.90955 | 0.845 | High         | 20.454 |
| 30- Lack of proportion of the amounts allocated to the investment platform and the development program of regions of the state budget. | 54  | 3.6415 | 0.87912 | 0.845 | High         | 20.888 |
| 31-The failure of specialized agencies to open documentary credits                    | 54  | 3.6038 | 0.81664 | 0.842 | High         | 32.263 |
Table 1. Continued.

| Key Causative Factors                                                                 | N  | AM          | S.D  | α         | Effect Level | RII   |
|--------------------------------------------------------------------------------------|----|-------------|------|-----------|--------------|-------|
| 3- Problems with documentary credits                                                  |    |             |      |           |              |       |
| 32-The length of procedures followed in opening documentary credits for the importation of materials, machinery, and equipment. | 54 | 3.7925      | 0.81709 | 0.839     | High         | 33.953 |
| 33-Slow shipping procedures, customs clearance, cargo insurance.                     | 54 | 3.7736      | 0.84675 | 0.840     | High         | 33.784 |
| 4- Technical problems                                                                |    |             |      |           |              |       |
| 34-The inability of some departments to prepare designs for their projects.          | 54 | 3.9811      | 0.77187 | 0.842     | High         | 6.222 |
| 35-Lack of engineering staff with high experience in the implementation of projects. | 54 | 4.1509      | 0.92811 | 0.839     | High         | 6.488 |
| 36-The weakness of the possibility of most consultancy offices                       | 54 | 3.8868      | 0.95395 | 0.842     | High         | 6.075 |
| 37-Non-conformity of the structural materials to the specifications.                 | 54 | 3.4717      | 0.97278 | 0.841     | Very high    | 5.426 |
| 38- Old means of work and technology used by the local contractor.                   | 54 | 3.9057      | 0.94593 | 0.840     | High         | 6.104 |
| 39-Lack of number of modern construction laboratories.                               | 54 | 3.1132      | 0.93357 | 0.844     | Medium       | 4.866 |
| 40-The length of time required to examine the construction materials in laboratories. | 54 | 4.000       | 5.53312 | 0.895     | High         | 6.252 |
| 41-Lack of highly qualified companies (financial and technical)                      | 54 | 4.0377      | 0.83118 | 0.845     | High         | 6.311 |
| 42-Most of the projects lack technical and economic feasibility studies              | 54 | 4.2075      | 0.76858 | 0.842     | Very high    | 6.576 |
| 43-Weakness of personals specialized in the preparation of technical and economic feasibility studies | 54 | 4.0566      | 0.86414 | 0.843     | High         | 6.34  |
| 44-Weak technical capabilities and practical experience of the personals working in the provinces. | 54 | 3.9057      | 0.86077 | 0.840     | High         | 6.105 |
| 45-The difficulty of guessing the prices of imported materials.                      | 54 | 3.3962      | 1.02544 | 0.839     | Medium       | 5.308 |
| 46-The majority of the materials involved in the work are not subject to the soil examination particulars, which leads to make an examination of the materials through experience, which leads to an error rate. | 54 | 3.3774      | 0.92459 | 0.841     | Medium       | 5.279 |
| 47-The delay in obtaining the results of the laboratory tests of the construction materials. | 54 | 3.3019      | 0.86791 | 0.843     | Medium       | 5.161 |
| 48-The lack of machines and specialized equipment                                     | 54 | 3.2264      | 0.93318 | 0.841     | Medium       | 5.043 |
| 49-Weakness of procedures of the supervision committees on the projects.            | 54 | 3.8491      | 0.92811 | 0.840     | High         | 6.016 |
| 50-Lack of accuracy in the preparation of statements and plans for projects          | 54 | 4.1132      | 0.77609 | 0.841     | High         | 6.429 |
| 5- Other problems                                                                    |    |             |      |           |              |       |
| 51-Tribal problems, especially in remote areas.                                      | 54 | 3.8302      | 0.82592 | 0.842     | High         | 21.573 |
| 52-The difficulty of lifting the excesses on the plots of land allocated for the projects | 54 | 3.9057      | 0.86077 | 0.844     | High         | 21.998 |
Table 1. Continued.

| Key Causative Factors | N  | AM   | S.D  | α    | Effect Level | RII  |
|-----------------------|----|------|------|------|--------------|------|
| 5- Other problems     |    |      |      |      |              |      |
| 53-The proliferation of security control points. | 54 | 3.4906 | 0.93279 | 0.840 | High         | 19.659 |
| 54-Water scarcity in general, so sometimes requires exceptional measures such as canceling projects or changing priorities of other projects | 54 | 3.2075 | 1.00687 | 0.843 | Medium       | 18.065 |
| 55-Security reasons.  | 54 | 3.3208 | 0.95623 | 0.843 | Medium       | 18.703 |

Table 2. (RII) for the groups of causative factors.

| Group of Factors                | AM   | RII  |
|--------------------------------|------|------|
| Administrative problems         | 95.1697 | 46.309 |
| Technical problems              | 63.9811 | 31.133 |
| Other problems                  | 17.755  | 8.639  |
| Financial problems              | 17.4339 | 8.483  |
| Problems with documentary credits | 11.1699 | 5.435  |

4. Building the Proposed System
In building the proposed system for improving implementation efficiency in the public investment projects, the three main phases were adopted, namely: the planning and design phase, the contracting phase, and the construction phase. For building the proposed system, the factors causing implementing weakness in public investment projects have been distributed to the main project phases and proposed appropriate procedures for these problems in each phase as shown in Fig. 2.

5. Developing the computer Program
The following are the most important specifications of the program: Visual basic (vb.net) program version 2012 was used, the database designed by (SQL) server 2012, this facilitates the preservation of project data and accessibility at a later date for audit purposes, the program is equipped with the ability to withdraw reports on projects, which facilitates the work of the departments involved in projects as (word, pdf or excel), the program's English language was used similar to the research language, and the program can be used by all parties to the project such as (client, contractor). When the user runs the program, the main window which represents the main page of the program will appear as shown in Fig. 3.
Figure 2. Flow chart of the proposed system.
And when press log in appears the screen shown in Fig. 4.

When the brief option is pressed, the window appears as shown in Fig. 5.
When press on Back, return to previous figure and press on Start appears as shown in Fig. 6.

![Figure 6](image)

Figure 6. Input the name and Information of the current project.

When press on Next, the program asks about the requirements of any project as shown in Fig. 7.

![Figure 7](image)

Figure 7. Check to achieve all requirements of any investment project.

When press (√) on (all these requirements achieved) option a list of project phases appears as shown in Fig. 8.
Figure 8. Choose the project phase.

When the project phases window appears, the program asks for the stage selection and when you click on a (back) option, you are returned to the previous page. When press on planning phase for example appears most important problems that may occur within this phase as shown in Fig. 9.

Figure 9. The problems in the planning phase.

When you press the option (absence coordination between departments) for example a window appears the impact of identified problem as shown in Fig. 10.
In the case of high and very high impact choose (improve) action which shows the suggested treatments for the identified problem as shown in Fig. 11.

In case of moderate impact choose (required action) option as shown in Fig. 12.
Then, back to Fig. 11 and press on (return to problems of this phase) option to check all problems in Fig. 9. When press on (end of check) option in Fig. 11 and press (back) for returning to Fig. 8 and select another phase and When (end of check) for all phases of project return back to Fig. 2 and then press on (Report) option an interface appears that contains a report was discussed as shown in Fig. 13.

![Image](image_url)

**Figure 13.** The final report.

### 6. Conclusion

The public investment projects in Iraq influenced by many factors. The results from research showed that (44) causative factors with high and very high impact on the implementation process, and the results from computing (RII) to all problems showed that the administrative problems in the first level and were (46.309%), the technical problems in the second level and were (31.133%), other problems in third level and were (8.639%), the financial problems in the fourth level and were (8.483%), finally the problems with documentary credits were (5.435%). The program will present a written report and presentation about definitions with the problems through the project phases and the ways to achieve the improvement process. It aims to satisfy the decision-makers to proceed with the project and to gain their consensus about the best way to proceed.

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