Factors that Influence the Megaprojects in Iraq

Hassan Issa Abdul-kareem
Department of Civil Engineering/ Faculty of Engineering/ Mustansiriyah University

hassan.issa78@uomustansiriyah.edu.iq

Abstract. Megaprojects are classified within large investment projects which have a long term impact on the economy, the environment, and the society. Megaprojects are huge development projects such as railways, motorways, dams, power plants, airports and processing projects.

Numbers of megaprojects have been constructed and some of them are in the construction process or in the planning level, therefore, this research focused on these megaprojects to investigate the factors that could influence them in Iraq. Accordingly, the practical study consisted of quality data collections through interviews and quantitative data collections through questionnaire. The interviews have been done with six (6) experts in privat companies. The questionnaire survey has been conducted in government institutes. 85 questionnaire forms have been distributed; only 81 forms are collected.

The results of this research project revealed that less than half of the Megaprojects in Iraq are unsuccessful. However, there are numbers of reasons which may causing the failure in projects, such as insufficient and weaknesses in financial, quality and management abilities. Accordingly, there are some factors that influence the success of the megaproject in Iraq, such as increasing the confidence in local government, clarity of project vision and goal and compatibility with the long-term government plan.

1. Introduction
Megaprojects are classified within large investment projects which have a direct effect to economy and environment [1]. The megaprojects illustrate in the railways, dams, oil plants etc. [2] [3] [4]. Also, urban megaprojects have main role in formatting urban landscapes [3] [5].

Megaprojects are increasingly used as the preferable method to satisfy the development in countries [4]. The previous literatures such as [1] focused on the success of projects by measuring it according to success criteria. The software of project management is using as a tool for managing and organizing work, and it is growing at a rapid pace in all industries [6]. The success indicators of a project are the measures used to assess successful outcome, while the success factors can be managed to increase the possibility of success [7].

However, [8], [9] and [10] argued a number of points of view for this issue from different stakeholders in different time frames. [11] found that the academics project management has recognized that the success of project is multidimensional and only some of them are measurable. [12] analyzed the performance of construction and compared between project management problems with the success factors to illustrate how to assess projects’ efficiency. Also, [13] reviewed the correlation between
project success factors and project success indicators. [14] used statistical analysis to study the relationship between the risk factors and concluded the influence of some factors in the preliminary phase on the occurrence of additional risk factors during the latest phases [15].

Recently, large number of megaprojects has been constructed and some of them are in construction project or in the planning level, therefore, this research project focused on these mega projects to investigate the factors that could influence them in Iraq.

2. The Construction Project

The construction project is defined as: a set of interrelated and coordinated activities and activities that achieve a specific service or product objective [16]. It can also be defined as: a set of processes or activities with defined and specific relationships carried out in a specific time to achieve a set of objectives [17].

The global development satisfied by fulfilling the growing needs which achieved by implemented construction projects. Also, the construction sector has an interesting impact on economic, social life and local culture [18].

The complexity of the construction industry belongs to the demand challenges of business.

As long as the project laborers are the people who carry out building activities, they are considered as significant members in the implementation level of any project [18].

Any construction project passes through multiple phases from being an idea to a real that leads to the purpose for which it was created. These stages can be summarized as follows [16]:
1. Engineering, social and economic feasibility study.
2. Exploration, investigation and collection of basic information for the project.
3. Design and study of the project.
4. Preparation of tender documents.
5. Introducing the project.
6. Submission by tender.
7. Award the project.
8. Implementation of the project.

3. Types of Construction Projects

Types of construction projects can be classified according to the nature of the project where there are residential projects and commercial projects and industrial projects and mega projects such as roads and dams and large reservoirs, the classification may be based on the size of the project there are small and medium-sized enterprises and large projects, or projects are categorized on the basis of their cost or on the basis of the time required to accomplish them, and another classification on the basis of the employer sector is private or public sector. By exploring the status of construction projects in Iraq, the researcher found that most of the large projects are implemented for the public sector and have two or more types, which are either service projects or investment projects and may be projects of a special nature. The construction process enters all areas of life and this is reflected in various construction projects, and because of this it is difficult to determine a single classification of projects, but the traditional classification is as follows [19]:-

1. Housing and Residential Projects
2. Building, Institutional and Commercial Projects
3. Industrial Construction
4. Heavy Engineering Construction

3.1. Residential Projects

Residential projects include residential buildings, multi-story levels and residential complexes [16]. This type of projects constitutes a large proportion of the size of the executed projects and in which dealing with a large segment with different wishes. The construction of this type and the demand for it depends
on the material financial abilities of individuals and on the activity of the construction market, legal systems and the government financial policy [17].

3.2. Buildings and Commercial Projects
This type of project includes a wide range of buildings stretching from small market to Central big market, and from small schools to large universities and health clinics to large multi-story hospitals in addition to many other buildings, such as big hotels buildings and sports clubs. However, most of the businesses are created and financed by the private sector [19].

3.3. Industrial Enterprise Projects
This type includes a wide range of industrial sector projects. This type of project requires that both the design and the implementation of a high level of engineering expertise not only in the field of construction but also in other disciplines such as the specialization of electrical and mechanical engineering and others depending on the nature of the project and its size and the specialized need in the project, as most Complex industrial projects preferably implemented by turnkey mode (Turnkey method) or design and construction method (Built) [17].

3.4. Mega Engineering Projects
"Mega" belongs to a Greek word "megas" which refers to great, important, and so on. Megaproject has an economical meaning which is million-monetary unit (Dollar, euro, pound, etc.) projects [13].

This type of project includes various construction sectors for large engineering works such as dams and tunnels, highways, various channels and facilities and parts of large industrial projects [16]. These projects often require significant potential that is not available in any of the executive companies, so the most of this kind of projects use partnership between two or more companies (Joint Venture J.V) to minimize the risk of weak capabilities or skills. In the implementation of projects, the efforts of number of companies are grouped by temporary union in large projects that no company can do. This union is linked to the time of the end of the project where it dissolves [17].

4. Megaproject
Megaproject is the much costed project reach to a billion dollars (or more) and required very long time to be realized comparing with the normal projects. Therefore, this project consists of numerous stakeholders [4] [5]. The uniqueness and complexity of megaproject are belongs to the characteristics of the involved stakeholders [20] [4].

The Realization of megaprojects exceeds the objective of satisfying modern citizens to attract international investments. [3] The process of attracting foreign investment starts with presenting to investors the fundamentals that make it possible to earn attractive returns to investment [21]. Studying the characteristics of megaprojects (which is related to contracting, financing and technical issues) enable the management to determine the drivers of successful megaprojects [1] [15].

5. Factors affecting on megaproject
According to latest researches papers that discussed the factors that affected on the success of megaproject, such as [15]. The following are the suggested factors to be tested in Iraqi sectors of megaprojects:

1. In design, construction and delivery contracts the delay in project planning is due to the blurred purpose of the project
2. Exceeding the cost of implementation is linked to the absence of a clear definition and perception of the project.
3. The delay in implementation is related to the concern and interesting of environmental institutions and associations
4. The involvement of environmental institutions and associations before starting the project reduces the likelihood of exceeding the estimated cost of implementation
5. Cost overruns and delays in implementation are based on the lack of local and national acceptance of the project
6. The existence of strict regulations and laws increases the duration of the planning and the cost and duration of implementation
7. If the project is not in line with the long-term plan of the state, the cost may exceed its limits
8. Government subsidies for the project prevent the estimated cost of the project from being exceeded
9. The time needed to plan the project decreases with increasing confidence in the national authority
10. The existence of problems and litigation between the employer and the contractor affects the project in terms of cost and delay
11. The large number of complex units in the giant project increases the time needed to plan the project
12. The fact that the giant project consists of multiple modules, each of which is linked or depends on the other, this increases the duration of implementation

6. Qualitative Study (Interviews)

There is no previous study has been founded by the literature review conducted in Iraq, there is a need for qualitative study represented by interviews in addition to questionnaire survey.

Qualitative study is an investigation method used in many knowledge disciplines in practice [22]. The qualitative study performed through takes conducting interviews. The interviews have given flexibility in modifying the questions according with the interviews proceeding requirements [23]. The structured interviews are the adopted methods of interviewing. The structured questions of the interviews are as the following: -

1- Do you think that the Megaprojects in Iraq are successful or not?
2- In your opinion, what are the reasons of failure or unsuccessful projects?
3- In your opinion, what are the factors that influence the success of Megaprojects?

For the current study, eight experts have been involved in the interviews as interviewees. The interviewees’ background information is explained in table 1.

| No. | Company Name | Project | Education Level | Work Experience (Year) | Engineering Specialization | Work Position |
|-----|--------------|---------|-----------------|------------------------|---------------------------|---------------|
| 1   | THIMAR ALJOOD | Al-Rusafa Water Treatment | B Sc | More than 20 years | Mechanical and Electrical Engineering | CEO |
| 2   | ALAA ALIRAQ   | Al-Qasim Bridge in Al-Ramadi | B Sc | More than 15 years | Civil Engineering | Engineer |
| 3   | ALDANOOB      | Al-UM Bridging in Babilon | B Sc | More than 20 years | Civil Engineering | Consultant Engineer |
| 4   | ALSHAQ ALADNA |                       | B Sc | More than 15 years | Mechanical Engineering | Engineer |
| 5   | NABTH ALRAFIDAIN |               | B Sc | More than 20 years | Civil Engineering | Consultant Engineer |
| 6   | ALASHIQAA     |                       | B Sc | More than 10 years | Civil Engineering | Engineer |

6.1. Interview – Analyzing the Answers and Finding the results

The results of the interviews are as the following: -

1. About sixty-four (64) of Megaprojects in Iraq are successful.
2. The reasons that causing the failure in projects are as the following: -
• Rewarding the projects to the companies which have not enough financial abilities and quality of construction and awareness of their responsibilities.
• Weakness in management and lack of experience.
• Insufficient engineering vision and absence of technical equipment good plants.

3. The factors that can influence the success of megaprojects are as the following:
• Financial support and correct supervision and providing the right person who is an expert in the field of work and expert in analyzing problems and solutions.
• The existence of supervision to reduce the problems and the presence of work monitoring team and recording in the form of reports.
• Big finance abilities, good project management, excellent work staff and accuracy in execution with good quality.
• The success of the project depends on the cooperation between engineers and employees of the company.
• The success of any project is customer service.
• One of the success factors of the project is good project planning before it starts.

7. Quantitative Study (Questionnaire)

The quantitative method is a common methodology to collect data and covering a large sample of study population [23]. The quantitative study performed through a questionnaire survey. Based on the literature review and the conducted interviews, the questionnaire form and questions have been designed. The questionnaire has been built on a closed-ended question. The questionnaire designed to has two constructs. First construct is the background information of the respondents. The second is related to the factors that affecting on the success of megaproject. Each construct contains numbers of items which represented in questions and choices. For the second construct, the choices depend on five Likert scale ranged from (“Strongly Disagree” to “Strongly Agree”). Eighty-five (85) questionnaire forms have been distributed in different institutes of the ministry of construction and housing and municipalities and public works. Only eight-one (81) questionnaire form are completed and collected. The mean intervals of the Likert scale results are shown in table 2.

| Likert Scale | Agree Level |
|--------------|-------------|
| 1.00 - 1.50  | Strongly Disagree |
| 1.51 - 2.50  | Disagree |
| 2.51 - 3.50  | Neither Agree nor Disagree |
| 3.51 - 4.50  | Agree |
| 4.51 - 5.00  | Strongly Agree |

7.1. Questionnaire results and discussion

The method that has been used to analyze the data and find the results was basically depended on the SPSS program with assistance of SPSS Survival Manual of [25]. Table 3 shows the demography information of the respondents. About 85% (66.7% Plus 18.5%) of the respondents are project managers or members of project team, and this give more strengthen for the results because they are the most related people with megaprojects. Also this table shows that 71 respondents (87.7%) have B Sc. Degree, this result is representative for the most of project population. About half of the respondents (45.7%) have more than 10 years of work experience, and this give a good indication for the validity of their information. However, about half of the respondents (48.1%) working and have experience in residential project while these projects represented the most megaproject in Iraq.
For the factors that could affect on the success of the megaproject, factor analysis (FA) revealed that there are, basically, two main groups of these components (factors) which are: Duration Delay Factors and Cost Overrun Factors, as shown in table 4 and table 5.

Table 3. Frequencies and percentages of Respondents’ Specifications

| Respondent’s Specifications | Frequency (n=81) | Percentage (total=100%) |
|-----------------------------|-----------------|-------------------------|
| **Position**                |                 |                         |
| CEO                         | 4               | 4.9                     |
| Director Manager            | 8               | 9.9                     |
| Project Manager             | 15              | 18.5                    |
| project member              | 54              | 66.7                    |
| **Education**               |                 |                         |
| PhD                         | 1               | 1.2                     |
| Master                      | 9               | 11.1                    |
| B Sc.                       | 71              | 87.7                    |
| **Experience**              |                 |                         |
| ≤5                          | 13              | 16.0                    |
| 5-10                        | 31              | 38.3                    |
| >10                         | 37              | 45.7                    |
| **Category**                |                 |                         |
| residential buildings       | 39              | 48.1                    |
| commercial buildings        | 16              | 19.8                    |
| roads & bridges             | 6               | 7.4                     |
| dams                        | 1               | 1.2                     |
| industrial building         | 19              | 23.5                    |

Table 4. Factor Analysis for Megaproject Factors by Extraction Method: Component Analysis.

| Megaproject Factors’ Items | Component Groups |
|---------------------------|------------------|
|                           | 1    | 2    | 3    | 4    | 5    |
| Unclear project goal      | .608 | -.362|      |      | -.327|
| Related project units     | .605 |      | .535 |      |
| Project planning time     | .562 |      |      |      |
| Environment awareness     | .522 | -.385| .453 | .335 |
| Project complexity        | .454 | -.448|      | .430 |
| Project local acceptance  | .578 | -.628|      |      |
| Owner contractor causes   | .492 | .614 |      |      |
| Government finance        | .353 | .613 | .420 |      |
| Environment institutes involvement | .325 | .320 | .502 | .490 |
| Long term Project compatibility  | .442 | -.461 | .353 |      |
| Rigid laws                |      |      | .314 | -.744|
| Unclear Project vision    | .469 | -.353|      | -.629|
Descriptive statistics has been made for the Megaproject Factors to find the means values. Table 6 revealed that the respondents agree that following factors could influence on the success of the megaprojects where their means values are between (3.51 – 4.50) which fall in the (Agree) level (according to table 2): -

1. The delay in the planning level of megaproject belongs to the lack of clarity of project vision and goal.
2. The rigid laws, regulations and systems increases the duration of planning and increases the construction cost.
3. The incompatibility of megaproject with government long term plan leads to overrun cost.
4. Government financial support for the megaproject protects the estimated project cost to be overrun.
5. Owner-contractor problems and lawsuits cause cost overrun and delay.
6. The complexity of megaproject and existence of separated units involved in it increase the duration of planning process.

The respondents were neutral and didn’t give any indication of agreement or disagreement for the rest suggested factors in the questionnaire, maybe because they are not so familiar with these factors, but, however, this gives an indication that these factors are not influential to be recognized by the respondents. However, the respondent didn’t disagree with any of the suggested factors. Based on the above results mentioned, So far, the results of questionnaire survey are compatible with the results of interview according to the factors which may influence the success of Megaproject.
Also, one way ANOVA test has been made, the significance level has been tested discover if there is any different in the mean of megaproject factors according to respondents’ characteristics, table 7. The signification result is more than 0.05, so the variances are homogeneous [25]. Also, the results showed that there is no any significant difference for the respondents answers with regards to their specifications.

8. CONCLUSIONS
Compatible with the aim of this research project and the results of the literature review and practical study (interviews and questionnaire), briefly, it is possible to conclude the following:-
1. Less than half of the Megaprojects in Iraq are unsuccessful.
2. The reasons that may causing the failure in projects are as the following: -
   • Insufficient financial and quality abilities for the construction company which constructing the project.
   • Weakness in management and lack of experience.
   • Insufficiency in engineering vision and absence of technical equipment good plants.
3. The factors that influence the success of the megaproject in Iraq are as following: -
   • Increasing the confidence in local government and simplifying the megaproject design can minimize the duration of planning.
   • Clarity of project vision and goal can reduce the time required for planning megaproject and its construction cost.
   • The compatibility of megaproject with the long-term government plan can prevent the cost to be overrun. Also, the government financial support for the megaproject protects the estimated project cost to be overrun.
References
[1] Brookes N and Locatelli G 2015 Power Plants as Megaprojects: Using Empirics to Shape Policy Planning and Construction Management Utilities Policy vol 36 pp 57 - 66
[2] Van Wee B 2007 Large infrastructure projects: A review of the quality of demand forecasts and cost estimations. Environment and Planning B: Planning and Design vol 34(4).
[3] Aoun, O and Teller J 2016 Planning urban megaprojects in the Gulf: The international consultancy firms in urban planning between global and contingent Frontiers of Architectural Research vol 5 pp 254–264.
[4] Flyvbjerg B 2014 What You Should Know about Megaprojects and Why: An Overview Project Management Journal vol 45(2) April-May DOI 10.1002/pmj.21409 pp. 6-19.
[5] Abdul Rahman I 2008 Globalization and urban development: a case study of Dubai’s Jumeirah palm island Mega Project thesis for the degree of philosophy university of SOUTHAMPTON.
[6] Matthew J, Bruce P, and Colleen A 2014 Project Management in Construction: Software use and Research Directions Journal of Construction Engineering and Management vol 127 pp 101-107.
[7] Müller R and Turner R 2007 The influence of project managers on project success criteria and project success by type of project European Management Journal vol 25(4) pp 298–309.
[8] Davis K 2014 Different stakeholder groups and their perceptions of project success International Journal of Project Management vol 32(2) pp189–201.
[9] Dimitriou H, T Ward, E J and Wright P G 2013 Mega transport projects, beyond the iron triangle Findings from the OMEGA research programme. Progress in Planning vol 86 pp 1–43.
[10] Turner R and Zolin R 2012 Forecasting success on large projects: Developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames Project Management Journal vol 43(5), 87–99.
[11] Williams T 2016 Identifying success factors in construction projects: A case study. Project Management Journal vol 47(1) pp 97–112.
[12] Zavadskas E K, Vilutien T, Turskis Z and Saparauskas J 2013 Multi-criteria analysis of projects’ performance in construction Archives of Civil and Mechanical Engineering vol 14(1) pp 114–121.
[13] Gunathilaka S, Tuuli M M and Dainty A 2013 Critical analysis of research on project success in construction management journals Proceedings 29th Annual ARCOM Conference (2–4) pp 979–988.
[14] Bassam H A 2013 Factors influencing project success criteria Proceedings of the 2013 IEEE 7th International Conference on Intelligent Data Acquisition and Advanced Computing Systems, IDAACS 2 pp 566–571.
[15] Locatelli G, Kovacevic M, Brookes N, and Ivanisevic N 2017 The Successful Delivery of Megaprojects: A Novel Research Method Project Management Journal Vol 48( 5) pp 78–94.
[16] Donald S B 1980 Direction in Managing construction, John Wiely & sons Inc., U.S.A.
[17] Sidney M I 2000 Project Management in Construction 3 rd edition, Mc Graw-Hill, Inc., U.S.A.
[18] Gerges M 2015 Investigation Into the labour factors affecting project performance within the Egyptian Construction Industry, thesis submitted in partial fulfillment of the university’s requirements for the degree of Masters.
[19] Donald S B and Boyd C P 1984 Professional Construction management, Mc Graw-Hill, Inc., U.S.A.
[20] Ahmed A 2013 Challenges of mega construction projects in developing countries organization, technology and management in construction · an international journal vol 5(1).
[21] Nathan 2011 Investment Map for Iraq Project BF/IRQ/08/007 book published by Private Sector Development Programme for Iraq (PSDP-I), Associates London Ltd.
[22] Denzin N K and Lincoln Y S 2005 The Sage Handbook of Qualitative Research (3rd edition) London, Thousand Oaks, CA: Sage.
[23] Sekaran U 2003 Research methods for business 4th edition. USA: John wiley & Sons, Inc.
Acknowledgments
Author wishing to acknowledge assistance and encouragement from colleagues, special work by technical staff and financial support from the Faculty of Engineering in the Mustansiriyah University, and introduce my thanks to every person who supported me to do this research.