Assessment of Critical Success Factors (CSFs) influencing the successful implementation of the construction projects in Libya

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Abstract. The Libyan construction industry enhances the overall Gross Domestic Product (GDP) of the country and the quality of life by providing necessary facilities such as hospitals, schools, roads, and other essential infrastructures. In addition, the industry mobilises and uses local, human, and material resources in development endeavours to promote community job opportunities and improve economic competitiveness. However, Libya's construction industry faces severe challenges and difficulties due to fast developments and dependence on foreign experts. Hence, the primary focus of this study is to assess the critical success factors that critically influence the successful execution and performance of the contraction projects in Libya. Consequently, this paper determines nine critical success factors that are significant and can positively influence construction projects. A questionnaire survey had been distributed, with 64.47% response rate in Libya based on different demographic parameters. From the Relative Important Index (RII) analysis, the study's findings suggest that Factors Related to Materials (FRM) are the most critical category in Libya. This finding might indicate that the instability in the city's economic, political, and financial sectors highly influence the successful execution of the construction projects in Tripoli, Libya.

1 Introduction

Since last five decades, Libyan construction industry and its development have been confronted [1] with widespread complicated issues and challenges. Some of these issues include projects’ fund misappropriation, mismanagement of project resources, incompetence of project leaders and managers, as well as other surrounding inconsistencies such as lack of appropriate measurements and performance analysis regarding the success or failure of the projects [2], [3]. These disputes and challenges of Libyan construction industry [4], [5] could be recovered by implicating a project management system with requisite expertise [6], skilful [7], attributed [8] and experienced [9] project managers and leaders. However, critical success factors [10] and their proper applications always play a vital role in successful project management of the construction industry. Nevertheless, it is matter of great regret that there

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are no academic and educational scopes [11] and strategies dedicated to the training and development of professional project management for prospective and contemporary practitioners of construction project management in Libya [12].

Therefore, the proper distribution and allocation of the limited resources as well as the improvements in the efficiency of the construction projects are greatly influenced by the assessment of the factors that have been categorized as critical to measure the risks and failures in the public and private construction projects. However, the researchers and practitioners of construction project management discipline concur, to a certain degree, that the performance objectives of the construction projects play a significant role in the assessment of the associated critical success factors [13]–[15]. Though, some practitioners and researchers argued that factors related to the cost, quality and time should be considered as the most significant critical success factors in construction industry. The critical review of the contemporary literature, collected from different countries and types of construction projects, suggest that the assessment and influence of the CSFs highly vary according to the demographic, geographic, socio-political, socio-economic, financial as well as types of the construction projects [16], [17]. Despite, the widespread analysis of the assessment of critical success factors in the construction industries of developed countries, there have been very little to no significant study regarding the CSFs of construction industry in Libya. Moreover, the differences between the ranking variations and the mutually inclusive or exclusive relationship of one specific CSF to other as well their overall performance need to be studied extensively.

In this study, a survey study was conducted from the respondents of different demographic, professions, and experts in Libya. The survey questionnaire was prepared from the recent articles of the CSFs in construction projects and explicitly identified nine groups of success factors with specific several related factors to each of the groups. The respondents were asked to consider the nine most referred to CSFs as well as the associated factors to each group. The relative importance index (RII) ranking method was then adopted in order to determine the relative importance of these CSFs and used to identify the CSFs. The identified CSFs were prioritized by the construction professionals and consumers in Libya, who are all working in different areas of the construction industry.

2 Literature review

Many studies have considered the critical success factors (CSFs) as the crucial impetus for the enhancement of the projects’ effectiveness and efficacy as well as for achieving the project goals [12]. Though there is no universally accepted definition of CSFs, due to the content variant and ever-changing nature of CSFs. However, for the construction project management system, CSFs can be defined as the factors within construction project that could increase performance, improve success likelihood, and prevent necessary delays during construction as well as taking the proactive measures for the success of the construction projects [18]. Ahmadabadi et al. (2019) highlighted that the most important critical success factors within the project life cycle are project mission, client consultation, technical tasks, client acceptance, supervision and feedback, problem-solving, project manager's interpersonal competence and leadership skills [19]. Additionally, in a recent study, the authors considered the CSFs as the central element for organization activities as their intended success. CSFs are not fixed rated or valued parameters, rather they may change over time and may include product quality, manufacturing flexibility, employee attitudes, brand awareness and other evolving factors or aspects of the project execution and success. Various aspects of the implementation of CSFs implication play vital role for successful achievement and maintenance of the project’s goals. Moreover, CSFs are also associated with the success in production processes, employee and organisational skills, techniques, as well as
technologies. Therefore, the identification and assessment of the CSFs associated with construction projects is an essential requirement for modern and successful project management analysis.

Labour productivity has also been identified as a significant CSF which is associated with the management of the project materials [20]. For instance, the lack of materials and tools at the right time and/or in the right place could be an incentive of unproductive working hour. In addition, double handling due to the remote and delayed transportation of storage can affect the availability of materials. Therefore, the availability of quality project materials has critical impact on the successful achievement of project goals. Furthermore, organizational continuity and execution continuity were indicated by a United Nations report (1995). These two factors were reported to affect the site labour productivity requirements, especially in case of ordinary situations. In general, many aspects of the labour productivity requirements, such as details of the project design protocols, physical components of the projects and specification of the requirements, are associated with the organizational continuity. On the other hand, execution continuity factor encompasses various management aspects including the availability of equipment and materials, sequence of the project execution, congestion and weather of the labour productivity sites. The external factors usually include the nature of the industry, knowledge of construction procedure among clients and contactors or managers, weather, as well as financial availability and economic development. In general, failure of any success factors caused by project participants is characterised as external causes or external CSFs.

A detailed and rigorous study of construction project related CSFs in Malaysia was conducted. The authors adopted a qualitative research approach in their study, and data were collected using semi-structured interviews with experts in Malaysian construction companies [21]. Data were analysed and then, used to classify the identified success factors. The researchers then proceeded to rank the top ten critical success factors. Among the forty factors classified into seven groups are procurement related factors, project manager related factors, client-related factors, design team-related factors, project management factors, contractor-related factors, and work environment-related factors. Ten critical success factors were identified: contractor experience, actual cash flow by the contractor, project manager’s competence and experience, effective decision-making, practical overall-managerial actions, project team skills and experience, effective control by the project manager, effective management and site supervision, the effectiveness of the project delivery system, and the ability to make and perform decisions.

Yusof et al. (2013) conducted a quantitative study on the identification and assessment of the CSFs for construction projects in Malaysia [22]. The authors collected the data by using a questionnaire from seventy-six construction professionals in Malaysia. The findings of the study suggested 7 CSFs, such as proper distribution of project resources, adequate supervision and control by project managers, correct definition and understanding of project objectives, appropriate allocation of project resources, scopes of trade-off, project managers’ competence to solve specific project problems, and realistic schedule planning. Another study also identified and investigated the CSFs associated with the construction projects in Malaysia [23]. This study primarily focused on the analytical method—based on relative importance of the identified CSFs. The results of this quantitative analysis suggest that the participants consider human-related factors, such as efficiency, communication, commitment, and collaboration as the predominant and essential CSFs for construction projects. Although, better financial capability was rated and identified as the most critical factor. Furthermore, Enshassi et al. (2016) identified the critical success factors for construction projects in Palestinian. The study used relative importance index (RII) and exploratory factor analysis (EFA) for the data analysis and the study concluded that teamwork, generating a new knowledgeable environment, resourceful sharing, worker's
participation, effective project planning, and controlling were the most significant critical success factors in successful construction project management [24].

In fact, most of the studies suggest that a range of factors are explicitly and/or implicitly responsible for the failures and delays in the construction projects in both developing and developed nations alike. To overturn project failures, these key areas ought to be well considered and understood. Hence, there is an urging need to assess the critical success factors that have significant impact on the successful implementation of construction projects. The assessment of critical success factors (CSFs) might help project managers to develop the capacity in managing construction projects and also develop the repertoire of skills required to mitigate project failures and other associated challenges.

3 Methodology

The survey study was carried out in three central regions Libya: the west (Tripoli), Sabha in the southwest and Benghazi in the east. The research was focused on public and private Libyan construction industry in west and southwest regions only. The prioritised region was the city of Tripoli for the primary research site due to the higher and denser amount of construction activities in the region. Therefore, a questionnaire survey was adapted and used to collect the data. The distribution of the survey instrument commenced on 15th of June 2020 in Libya, and the survey was completed on 25th of March 2021. The questionnaires were prepared in the English language. Then the researchers translated them into the Arabic language to ensure the maximum feedback from the Arabic speaking local project manager, construction business owners and consumers.

Moreover, the distributed survey questionnaires were close ends and primary objectives of the survey was to evaluate the perceptions of the respondents towards the effects of the specific success factors in Libya. As a result, out of the 380 distributed survey questions, only 245 useable questionnaires were returned, producing a comparatively higher response rate of 64.47%. The collected data were statistically analysed using Statistical Package for Social Science (SPSS) version 17.0. The data were analysed in the following order. First, firms and respondents' demographic profiles were analysed using descriptive statistics, followed by indices like the Relative Importance Index (RII).

\[
RII = \frac{5N_5 + 4N_4 + 3N_3 + 2N_2 + 1N_1}{5N}
\]  

(1)

In the equation (1), \(N_1, N_2, N_3, N_4\) and \(N_5\) represent the total number of respondents who have chosen to select strongly disagree, disagree, neutral, agree and strongly agree, respectively. \(N\) represents the total number of successful responses.

Finally, extracted data from literature review and survey responses were categorized, coded and entered into SPSS software for data analysis. The data analysis of this study used Relative Importance Index (RII) approach based on the distribution of the frequency of CSFs. The relative importance values for each category of CSFs were obtained from relative dominance and relative frequency for each group of CSFs. Finally, the ranking of each CSFs Group was determined from the relative importance factors. Therefore, the study used an exploratory data analysis that is often used to interpret data.

4 Results and discussion

Based on the distribution of the survey, the Relative Importance Index Analysis was conducted in identifying the significant CSFs in Libya Construction Project. There are 9 groups of CSFs found from the literature. However, on the analysis of respondents’ data, we found that Factors Related to Materials (FRM) is the leading group of CSFs (Fig. 1), while
FRPMr maintains its rank in the second position. On the other hand, Factors Related to Contractors (FRCo) is ranked as 3rd. These significant differences in the ranking label of the CSFs groups indicates that demographic, geographic and socio-cultural factors have substantial impacts on determining the CSFs in a certain region or country [23, 25]. In case of Libya, due to the political imbalance and civil wars, the construction projects facing difficulties in succession and execution are due to the difficulties in availability, supply and distribution of the construction project materials.

![The Most Important Factors That Influence the Construction Projects in Libya](image)

**Fig. 1** The histogram of relative importance index vs 9 groups of CSFs.

The analysis of each CSFs category also was conducted according to their associative CSFs in each group. The category Factors Related to Projects Managements (FRPM) has four associative success factors and Effective Decision-Making (FRPM4) is the most critical success factor, followed by Planning, Monitoring and Control Mechanism (FRPM2). The Relative Importance Index of all CSFs in Factors Related to Projects Managements (FRPM) is stated in Fig. 2(a). Meanwhile, Factors Related to Client (FRCl) has a total of six critical factors with Information for Teamwork (FRCl3) being the leading critical success factor followed by Client’s Experience in Construction (FRCl2) and Client's Knowledge of Construction Project Organization (FRCl4) as the second and third important CSFs, respectively. Fig. 2(b) demonstrates the RII values for the CSFs of FRCl category. From the Fig. 2(c) and Fig. 2(d) it is clear that the Factors Related to Contractor (FRCo) and Factors Related to Design Team (FRDT) have the most critical factor as FRCo1 (Contractor Experience) and FRDT2 (Speed and Accuracy in Preparing Design Documents), respectively. Contractor experience and Speed & Accuracy in Preparing Design Documents are often common issues affecting the successful execution of the construction projects in Libya [25]. The main reasons could be the lack of proper training, work ethics and other organizational characterises.
Moreover, we identified eight success factors (Fig. 3) regarding the Factors Related to Project Manager (FRPMr). FRPMr1 (Project Manager’s Experience), FRPMr3 (Commitment to Meet Quality, Cost, and Time Objectives) and FRPMr6 (Leadership Skills of Project Manager) being the most critical success factors. There are six and two success factors related to Factors Related to Work Environment (FRWE) and Factors Related to Materials (FRM), respectively. FRWE2 (Technology and Skills Availability) and FRM1 (Availability of Materials) are the most critical success factors for FRWE and FRM, respectively. There are also Factors Related to External Factors (FREF) and Factors Related to labour and productivity (FRLP). However, FREF and FRLP contain three and eleven success factors to the respective category, respectively. In FREF, the most critical success factors are FREF1 (Public Acceptance toward Project) and FREF2 (Unexpected Changes in Material Availability and Prices). On the other hand, Factors Related to Labour and Productivity (FRLP) has the leading success factor as FRLP11 (Troubleshooting) followed by FRLP1 (Appropriate Organizational Structure). The RII values of the CSFs of FRWE, FRM, FREF and FRLP are stated in the Fig. 4 (a)—(d).
In both existing literature review and survey analysis, these significant differences in the ranking label of the CSFs groups indicate that demographic, geographic and socio-cultural factors have substantial impacts on determining the CSFs in a certain region or country [25, 26]. In case of Libya, due to the political imbalance and civil wars, the construction projects are facing difficulties in succession and execution due to the lack of abundance of the project materials at the right place and time. While the existing literature review indicates that, due to the majority of the studies from economically balanced and developed countries, the leading critical success factor is the group Factors Related to Labour and Productivity (FRLP), indicating an ongoing demand thrive in construction project industries.

![Fig. 4 RII values of the CSFs](image)

<table>
<thead>
<tr>
<th>CSFs Group</th>
<th>RI Values</th>
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<tbody>
<tr>
<td>Factors Related to Work Environment (FRWE)</td>
<td>FRWE1: 0.77, FRWE2: 0.79, FRWE3: 0.77, FRWE4: 0.79, FRWE5: 0.77, FRWE6: 0.79</td>
</tr>
<tr>
<td>Factors Related to Materials (FRM)</td>
<td>FRM1: 0.67, FRM2: 0.86</td>
</tr>
<tr>
<td>Factors Related to External Factors (FREF)</td>
<td>FREF1: 0.78, FREF2: 0.78, FREF3: 0.77</td>
</tr>
<tr>
<td>Factors Related to Labour and Productivity (FRLP)</td>
<td>FRLP1: 0.78, FRLP2: 0.78, FRLP3: 0.77, FRLP4: 0.77, FRLP5: 0.77, FRLP6: 0.77, FRLP7: 0.77, FRLP8: 0.77, FRLP9: 0.77, FRLP10: 0.77, FRLP11: 0.77</td>
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5 Conclusion

The findings of the study and existing literature explicitly suggest that the successful execution and project evaluation criteria largely depend on various perspectives of the construction industry. It was observed that the higher frequency and repetition of some CSFs in multiple studies suggest the critical roles of those repeated CSFs in construction projects. The three most critical success factor categories—factors related to materials (FRM), factors related to the project managers (FRMr) and factors related to the contractors (FRCo)—are to be taken seriously for the assessment and implication of CSFs in construction industry in Libya. Finally, most of the identified factors in this study focus on different aspects and disciplines ranging from organisational disciplines to human resource management and various factors of labour and productivity. There may be other CSFs crucial to the successful construction project assessment, depending on the particular aspects of the construction projects’ goals. Similarly, there are factors which could have influenced certain aspects of the projects differently than the CSFs would have under certain condition. For instance, effective cost control system could have different effects on the assessment of CSFs and successful project management if it were considered with FRDT group. Therefore, considering the organisational process with the assessment of CSFs and a deeper understanding of their relationship could also be a crucial input for strategic formulation and implementation of CSFs to the construction projects in Libya.
References