An Exploratory Study on Key Risk Factors Affecting Reconstruction Projects in Syria

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Abstract

Uncertainties and risks are inherent in construction projects. Constructing projects during reconstruction stage will be subject to more uncertainties and challenges that obstruct achieving the objectives of project and its stakeholders. This paper aims to identify key risk factors in reconstruction projects in order to assist decision makers and stakeholders to produce appropriate risk management strategies to reduce their negative impacts. A list of challenges and risk factors that may exist in reconstruction projects were identified through intensive literature review and pilot study with various stakeholders involved in reconstruction stage. A questionnaire survey is employed to obtain different stakeholders' opinions toward the significance of risk factors. Data were analyzed by utilizing SPSS software. The findings reveal that most challenges and risky factors facing reconstruction projects are related to resources and finance issues. Risk factors related to resources involve, shortage of materials, an increase of resources prices, quality of resources and delay of delivery because of high demand on them. Risk factors related to financial and economical issues include shortage of finance, stoppage of finance during construction and fluctuation of exchange rates.

Keywords*:* Risks, Uncertainty, Reconstruction Projects, Risk identification stage, Syria.

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1. INTRODUCTION

The term '*Reconstruction'* is defined, according to Longman Dictionary (2000), as "*the work that is done after a war to repair the damage that was caused to a country's buildings, industry, etc*". The current situation in Syria has been affecting all aspects of life including residential and non-residential buildings, infrastructures and all other economic sectors. It can be clearly observed that thousands of houses were destroyed and damaged almost in all cities and villages. A large number of industrial and commercial buildings and organizations have disappeared from the market as a result of the war actions. Infrastructures were greatly damaged and a wide range of vital infrastructures stopped working, such as oil and gas field, electricity stations and airports. This situation makes day-to-day life difficult and complex. The society is facing everyday more challenges and obstacles to carry out its own activities and obtain its needs. Therefore, post-war situation and its development immediately after the conflict are essentials for the future of Syria. This puts a great pressure on the government to prepare plans and strategies, and identify national priorities to deal with post-conflict stage.

The construction industry is the dominant provider of houses, infrastructure and buildings to all economic sectors and the society. Therefore, for the purpose of successful development of post-conflict stage it is necessary to identify all possible obstacles and challenges that potentially face the construction industry tasks. This is an important step to start with in order to prepare the appropriate strategies to avoid threatening the development.

In general, construction projects are complex, and uncertainties are inherent in them (Thevendran, 2003), because they are carried out in an open environment, with a large number of participants involved, associated with a wide range of skills starting with non-skilled workers to a high professional managers. Construction projects also take considerably long period to be ready for operation and utilization. If this is the situation with construction projects at normal circumstances, then it will be necessary to think about the situation in which reconstruction projects will be carried out within non-ordinary circumstances (Mesurier et al., 2006).

2. DEFINITION OF RESEARCH PROBLEM

Unlike most ordinary construction projects, reconstruction projects during post-disaster reconstruction and rehabilitation stage are diverse in nature, and are built within more uncertain and dynamic circumstances (Mesurier et al., 2006). These circumstance, for example, may involve shortage of resources, damage to infrastructure and transportation facilities, unfamiliarity of different stakeholders with such a situation like reconstruction stage, etc. Altogether, these will affect the development and resilience of post-disaster construction projects, and in turn will affect population activities and unlimited needs. Despite of the considerable recognition among governmental bodies, media, interested groups and other stakeholders about the requirements and the challenges that facing construction projects during post-disaster reconstruction, there is a lack of comprehensive studies towards the reconstruction stage and this area remains poorly investigated especially in the situation of Syria. Therefore, there is a real need to identify factors that threaten and negatively affect the objectives of construction projects during post-disaster reconstruction stage. Because ignoring these factors may lead to disastrous results in terms of loss of project resources, delay of housing and infrastructure provision and negative impacts on the country economy at large.

3. RESEARCH AIM:

This paper aims to identify key risk factors and challenges that may face reconstruction projects at post-conflict stage. In order to accomplish this aim, it will be necessary to understand the characteristics of reconstruction projects, the unique nature of Syria and the conflict. Furthermore, it is essential to identify risk factors and obstacles that may exist in reconstruction projects and classify them in appropriate way to facilitate managing them and reduce their negative impacts.

4. CHARACTERISTICS OF RECONSTRUCTION PROJECTS:

Every conflict at any country is unique and has its own characteristics and therefore must be treated individually. Reconstruction projects

also differ from ordinary construction projects in many terms, such as shortage of financial resources and required speed to construct them (Mesurier et al., 2006; SIG IR, 2007). Therefore, it is necessary to understand the characteristics of reconstruction projects and in particular in the Syrian environment. In the following, some characteristics are mentioned:

- Shortage of needed resources (finance, materials, equipment and labor)
- Shortage of services and facilities required to serve these projects
- A large number of projects to be executed
- Lack of sufficient time to plan and study these project properly
- Lack of security and thefts actions
- Partial damage for some existing building and facilities where as others need to be fully replaced
- Lack of urban and regional plans
- Difficulty of coordination between a large number of projects in the region
- Unfamiliarity of these projects to different stakeholders involved within these projects (policy makers, governmental bodies, contractors, suppliers, management professionals and local financial providers).
- Implementation of these projects in a complex environment with interconnections with society and activities from other economic sectors.
- Lack of consistency between the studies and the actual conditions of projects.

Working within this type of projects, which are fully extraordinary to all stakeholders involved in reconstruction process, will be risky and full of uncertainty sources. Almost every stakeholder in reconstruction process will face some risks and uncertainties. Thus, it will be necessary to determine these risk factors and classify them in a proper way to ease managing them and possibly reduce their negative impacts on projects objectives.

5. RISK IDENTIFICATION IN RECONSTRUCTION PROJECTS:

Since the circumstances associated with reconstruction projects significantly vary from those related to ordinary construction projects, there is a need to identify potential factors exist in these circumstances and may affect objectives of reconstruction projects. However, before proceeding further, it will be necessary to illustrate what is meant by 'risk' in this study? The term 'risk' have been defined and understood in many ways depending on the sector and the person who uses this term (Thevendran, 2003). Most of the definitions involve words (e.g. possibility, probability, likelihood, loss, misfortune and adverse effects). It can be recognized that the meaning of risk is often associated with an occurrence of an event and its negative outputs. Therefore, the notion 'risk', in this study, is adopted from Dawson (1997) to mean: "*An uncertain event whose outcome can be detrimental to the attainment of the objectives*". In order to handle risks and mitigate their effects, it is always important to start with 'risk identification' which is the first step at risk management process (i.e. Identification, Analysis, Response, Monitoring and Control), because only risks which are identified will be managed or assessed.

The obstacles and challenges that facing the development during reconstruction or post-disaster stage have been investigated by several researchers (Malalgoda et al., 2014; Hoeffler, 1999; Palliyaguru et al., 2007; Freeman, 2004; Hayat and Amaratunga, 2011; Hayles, 2010; Sadiqi et al., 2012; Baradan, 2008; Stringfellow, 2014; Chang et al., 2012; MacDonald, 2005; Brown, 2005). A list of challenges and risk factors are presented in the 2nd column in Table 2 after ranking them according to their severity impact. These challenges and risk factors are not exclusive to construction projects during reconstruction stage, but most of them exist within ordinary construction projects, such as errors in design documents, change order and fluctuation of resources prices. However, the circumstances and the environment related to reconstruction stage will have significant effects on the importance and the priorities of these challenges.

In addition to the literature review, a pilot study was conducted with professionals, contractors, consultant engineers and representatives from governmental bodies in order to explore their expectation and opinion about the potential risks that may exist within reconstruction

projects. Five initial interviews were carried out. A list of risk factors that were identified from the literature were introduced to interviewees and they were asked to add any risk factor that they think it may affect the objectives of reconstruction projects in Syria. The final list of risk factors that were obtained from the relevant literature and the pilot study is presented in Table 2. Following to this stage, data are collected by utilizing a questionnaire survey.

6. DATA COLLECTION:

A questionnaire survey was conducted between December 2014 and April 2015 to collect information on the challenges and risk factors affecting reconstruction projects. The questionnaire consists of three parts:

1. A cover letter presents an introduction to the research study and its aim
2. General information about the respondent, such as his/her position, experience and the type of organisation he/she works for.
3. A table presents 75 risk factors. Respondents were asked to give their opinions based on a scale (Very Low, Low, Medium, High and Very High) towards the impact severity of each risk factor on the success of reconstruction projects. Also, respondents were asked to add factors which may have effects on reconstruction projects and are not mentioned in the table.

Questionnaires were distributed in person to 60 different stakeholders that are expected to be involved in reconstruction projects. 36 responses were received and 3 of them were excluded because of incompleteness. Thus, only 33 responses were considered for analysis.

7. DATA ANALYSIS AND RESULTS DISCUSSION

7.1. Organisations and Respondents' details

Table 1 shows general information about the respondents, namely their positions, experience and the type of organisations they work for and its size in term of number of employees.

It can be seen that the majority of organisations work in building and infrastructure, and about 63% of them have more than 50 employees. The results also show that about 55% of respondents work at top management positions and the majority has more than 10 years experience in construction.

Table 1: Details about respondents and organizations

Organisation Type	%
Public Sector	42.42
Private Sector	57.58
Area of work	%
Property development and building	33.33
Infrastructure	45.45
Legislation and law organisation	12.12
Higher Education	9.10
Size of organisation *(Employees)*	%
1 – 10	9.10
11- 50	27.27
50 – 250	24.24
More than 250	39.39
Job position	%
Organisation manager	36.36
Project Manager	18.18
Consultant	12.12
Site Engineer	21.21
Architect / Civil Design Engineer	12.12
The Party the you represent	%
Client	33.33
Design Team	12.12
Contractor	30.30
Consultancy and Supervision team	12.12
Governmental authority	12.12
Years of Experience	%
0 – 5	9.10
6 – 10	9.10
11 – 20	39.39
More than 20	42.42

7.2. Challenges and Risk factors

Table 2 shows 75 challenges and risk factors. They are presented in the table after ranking them according to their impact severity on reconstruction projects. Following the data collection, the mean were computed for each risk factor based on values given by the Likert scale (1-Very Low, 2-Low, 3-Medium, 4-High and 5-Very High). The factors ranked were based on their mean; a factor with high score means that it has a significant impact on the success of reconstruction projects. In order to classify these factors into various classes according to their impact severity, it was decided to determine ranges for each class. Based on the Likert scale, 1 represents very low impact factor and 5 represents very high impact factor. The range between the maximum and minimum values is 4. This range is divided by 5 to represent the five classes shown in Likert scale. The calculated interval for each class is 0.8 as follows:

- Very low: 1 + 0.80 = 1.80 (Range from 1 to 1.80)
- Low: (Range from 1.81 to 2.60)
- Medium: (Range from 2.61 to 3.40)
- High: (Range from 3.41 to 4.20)
- Very high: (Range from 4.21 to 5.00)

It can be seen from Table 2 that the highest factor has a score (4.79) and the lowest has a score (2.03). According to the above class ranges, it can be seen that 12 factors fall within the very high impact class (*Shaded in Red*), 23 factors are in high class (*Orange*), 25 factors are in medium class (*Yellow*) and 15 factors fall within low class, and there is no factor falls within very low class.

In the following sections, only very high and high factors will be discussed since they are recognised by respondents as more important and risky to reconstruction projects than others. However, this does not mean that medium and other factors are not important for investigation, but these risk factors can be investigated in depth when they are categorised, for instance, with respect to the source of risk or the party who is responsible for them.

Table 2: Identified risk factors from the literature and the pilot study

#	Risk Factor Description	Mean / Rank	Factor Class
1	Increase of material prices	4.79	Very High Impact Factors
2	Shortage of finance	4.70	
3	Shortage of fuel required for transportation	4.70	
4	Ignorance of contractors involvement at early stages	4.70	
5	Shortage of resources (materials and equipment)	4.67	
6	Finance stoppage	4.45	
7	Poor Security circumstances	4.42	
8	Unfamiliarity of construction companies with this type of projects	4.42	
9	Low production of local materials	4.39	
10	Fluctuation of exchange rate because of imported elements	4.36	
11	Shortage of energy availability	4.30	
12	Methods of damage and compensation evaluation	4.21	
13	Poor quality of material	4.18	High Impact Factors
14	Delay of material delivery	4.15	
15	Lack of required experience about this stage from different [illegible]	4.12	
16	Difficulty to get approvals required because of incomplete updated [illegible]	4.09	
17	Poor conditions of roads	4.09	
18	Lack of sufficient legislation related to reconstruction projects	4.06	
19	Shortage of skilled labor	4.03	
20	Poor planning and scheduling	4.00	
21	Increase of labor wages because of demand increase	3.91	
22	Lack of knowledge about construction technologies during reconstruction stage	3.85	
23	Interconnection between damaged building removal and rehabilitation works	3.85	
24	Difficulty of fair compensation between different damaged buildings owners	3.85	
25	Corruption and unlawful activities	3.82	
26	Difficulty of obtaining permission to start work on site and especially in unorganized areas	3.76	
27	Rapid completion needed	3.76	

#	Risk Factor Description	Mean / Rank	Factor Class
28	Poor quality material caused by recycling	3.73	
29	Lack of service facilities near project site	3.73	
30	Explosion caused by war remains	3.70	
31	Unexpected broken down of equipment because of unexpected accidents	3.70	
32	Using traditional contract methods	3.67	
33	Difficulty to get access to project site	3.55	
34	Lack of experience and studies about the situation of damages building/projects (Rehabilitation or new build)	3.52	
35	Utilizing traditional design approaches rather than new design tools	3.42	
36	Thefts actions	3.39	
37	Unqualified design team	3.36	
38	Unqualified decision makers (consultants and clients)	3.33	
39	Unqualified project management team	3.33	
40	Lack of monitoring and control by supervision team	3.33	
41	Difficulty of logistics process	3.30	
42	Lack of sufficient information from client	3.21	
43	Inefficient construction methods	3.18	
44	Cost reduction over quality consideration	3.06	
45	Lack of quality assurance and management	3.03	
46	Ambiguity of claims, dispute resolution and arbitration between parties	2.97	
47	Short study period	2.94	
48	Incomplete documents of project and design	2.94	
49	Difficulty of site visit prior to design	2.91	
50	Conflicts between subcontractors	2.88	
51	Centralization of decision making and lack of delegation by governmental bodies	2.82	
52	Economic sanctions	2.79	
53	Short negotiation period before contract award	2.73	
54	Working in residential areas	2.73	
55	Difficulty of work in cities	2.73	
56	Difficulty of coordination between projects because of a large number of project execution at the same time and same region	2.73	
57	Delay of response toward contractor requirements from client and consultant	2.67	
58	Resistance to follow health and safety regulations and procedures	2.67	
59	Resistance to work as teamwork	2.64	
60	Low productivity	2.61	Medium Impact Factors
61	Poor work conditions and environment	2.58	
62	Overloaded companies	2.52	
63	Disagreement of clients about design teams	2.52	
64	Social conflicts between labor	2.48	
65	Difficulty of coordination between many clients at the region	2.48	
66	Difficulty of coordination between many clients about contracting methods utilization	2.45	Low Impact Factors

#	Risk Factor Description	Mean / Rank	Factor Class
67	Disagreement of clients about quality required	2.42	
68	Difficulty of communication between various project stakeholders	2.33	
69	Change orders by clients	2.24	
70	Fraudulence of supervision team with contractor	2.24	
71	Shortage of sufficient space for work because of many participants working at the same time	2.24	
72	High competition	2.15	
73	Expensive insurance premiums on labor and machines	2.12	
74	Weather and environmental circumstances	2.03	
75	Accidents	2.03	

Table 2: Identified risk factors from the literature and the pilot study *(Continue..)*

7.3. Very High Impact Factors:

The results in Table 2 show that there are 8 risks factors are related to resources, energy and finance availability. This clearly demonstrates that there is a significant concern with the possible shortage of materials, finance and fluctuation of resources prices. The results highly reflect the possible situation and environment associated with reconstruction stage. For example, the high demand on materials leads to an increase of material prices and most likely will affect their delivery on time. Also, the large demand on infrastructure and buildings will put pressure on the government and other stakeholders to invest a huge amount of money which can be out of government and stakeholders' capacity. Thus, it is very likely to witness during reconstruction stage many challenges, such as finance stoppage, finance shortage and energy and fuel shortage. These findings are similar to other studies in various countries (Malalgoda et al., 2014; Hoeffler, 1999). Altogether, these factors have significant impact on the success of reconstruction projects as they form the major elements of project completion.

It can also be seen that using traditional contracting methods which ignores early involvement of contractors in projects is a very high impact factor and has considerable influence on reconstruction projects success. This factor highlights the importance of employing new procurement methods that encourage open communication and knowledge sharing between project stakeholders. This in turn can help in dealing with 'Unfamiliarity of construction companies with this type of projects' though sharing knowledge and experience. The factors 'Poor Security circumstances' and 'Methods of damage and compensation evaluation' are very realistic during reconstruction stage.

7.4. High Impact Factors

Table 2 shows that there are 23 high impact factors facing reconstruction projects. It can be recognised that these factors fall for some extension under similar themes of very high impact factors. Some of these factors are related to resources availability and affordability in terms of skilled labour, labour wages, resources delivery and material quality. This is realistic in such a situation like reconstruction stage, whereas the high demand largely affects these resources availability and quality.

The results also reveal the importance of legislation and regulations that facilitate the commencement of projects work through providing permissions to start work and approvals of update plans of projects regions. Furthermore, utilising traditional design methods also can lead to a considerable amount of errors in project documents especially when the situation associated with short period study of projects and the rapid completion needed for reconstruction projects. In order to deal with these factors, advanced innovative design methods, such as Building Information Modelling, should be adopted to overcome limitations of traditional design methods.

The results also point to the importance of access to project site, the situation of roads, services and facilities availability and the difficulty of works between damaged building

removal and rehabilitation works, and possible explosion caused by war remains. All these factors refer to the necessity of logistics issues that support the process of reconstruction and rehabilitation work in damaged and destroyed areas.

The factor 'poor planning and scheduling' is considered as high impact factor on reconstruction projects. This is true since there is a serious difficulty to prepare a realistic plan and schedule to reconstruction projects because they are associated with a large amount of uncertainties, which in turn makes planning and scheduling is very complex task. Additionally, the factor 'corruption and unlawful activities' also affect reconstruction projects and can result in delay of project completion and cost overruns.

Other factors which are classified as having medium impact are related to lack of qualification by various stakeholders, such as management team, client, decision makers and design and supervision team. Despite of the importance of these factors, they fall as medium factors comparing to shortage of resources and finance factors.

8. CONCLUSIONS AND RECOMMENDATIONS

In general, the results shed light on many important areas that all stakeholders involved in reconstruction stage, especially the government, must consider and prepare strategies to deal with these negative factors. The results mainly revealed that the key risk factors and challenges that will face and influence construction projects during reconstruction stage can be categorised into major themes as follows:

- Risk factors related to resources required for reconstruction in terms of availability, quality, affordability, delivery and fluctuation of prices. Therefore, it will be very important for the government and other stakeholders to prepare procedures and produce strategies to deal with these risks.
- Risk factors related to financial and economical issues, such as finance shortage, finance stoppage, fluctuation of exchange rate, economic sanction and the increase of resources (material, equipment and labour) prices. Thus, it is an essential task for the government to prepare the environment that encourage investment and finance availability during reconstruction stage.
- Risk factors related to regulation and legislation that face facilitation of reconstruction process and work.
- Risk factors related to logistics issues associated with projects areas, such as road conditions, lack of services facilities, access to project site and interconnection between projects in damaged areas. For these factors, the governmental bodies should hardly work to enhance and improve logistics issues that support reconstruction process in terms of facilities, site access, urban plans and regulation and legislation.
- Risk factors related to management functions, such as poor planning, lack of appropriate supervision, unqualified decision makers and lack of coordination and communication between stakeholders involved in reconstruction. Therefore, this put pressure on various stakeholders involved in reconstruction stage to maintain their management capacities and enhance their competences in order to deal with uncertainties and complexities associated with reconstruction projects.
- Risk factors related to traditional contracting methods and traditional design methods. This is also important to employ innovate procurement and contracting methods such as FIDIC contracts and Integrated Project Delivery method and advanced design methods such as BIM.

This study also recommends investigating deeply risks and uncertainties associated with reconstruction and rehabilitation projects from various points of view with respect to the project stage and suitable party who can manage these risks.

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