

# UNDERSTANDING DELAYS IN CONSTRUCTION IN CONFLICT ZONES

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**Abstract:** Delay-related issues have been identified as one of the key inhibiting factors in the construction sector due to its significant impact on project performance and completion. As the construction industry faces these problems, the understanding of delays in construction needs to be improved in order to successfully meet project goals. This study focuses on understanding delays in construction projects in conflict zones, especially in Palestine. The situation in conflict zones is affected by several parties, external to the project. How project managers identify and respond to these delays varies immensely, probably based largely on their perception of risk. This situation in conflict zones introduces a different set of delays that needs to be considered carefully. Construction projects in Palestine face a high degree of problems, especially delays, due to the ongoing and prolonged Palestinian-Israeli conflict. This research aims to identify and understand delays caused by external factors arising from the situation in conflict zones in Palestine. Because of this conflict there is a lack of large-scale construction projects such as universities, airports, shopping centres or highways. Thus this research focuses on residential projects, for which there is a high demand. Most of these delays and problems affect time, cost and quality of constructing residential projects. Initially ten targeted expert interviews were carried out in order to identify types of external delays arising from the conflict situation. Then a wider survey was conducted to understand the scale, nature and impact of each delay on construction project performance. The research identifies factors that are specific to conflict zones that cause construction delays. It concludes that limited building areas, limited water resources, segmentation of land, lack of use of technology and fluctuation in material cost are the most critical factors that lead to construction delays in this conflict zones.

**Keywords:** risk perception, conflict zones, delays, construction.

## 1. INTRODUCTION

Construction projects are complex, dynamic, and characterised by risks. Projects differ in duration, size or objectives (Smith, 2014). The problems and risks that lead to delays in the construction industry, such as implementation risks, financial risks, disputes, project abandonment, litigations, late completion, waste or cost have been widely illustrated (Doloi et al., 2012; Enshassi et al., 2009 and Ramanathan et al., 2012). Moreover, construction projects usually suffer from unique causes leading to delays, such as lack of information, design problems, changes in scope and lack of management (Shehu et al., 2014). Delays occur in all stages of construction projects, leading to time and cost overrun (Yang et al., 2010).

Vyas (2013) claimed that construction delays make project participants stressed and unfocused, because they try to avoid the effect of any potential delay by extending the project time or accelerating the project work. This leads to consequences such as cost overrun, litigations or disputes (Salunkhe and Patil, 2014).

The demand of construction stakeholders in conflict zones for delivering projects on time has required more research to identify the cause of delays. Conflict zones suffer from different kind of risks and disputes. Implementing construction projects in those zones are challenging and

risky. The risks of working in conflict zones could be posed by war, financial issues or increased operational cost (Locaria, 2013). International and some local organisations are able to perform projects in conflicts with a lack of identifying and assessing potential delays. Understanding and identifying stakeholder's perspectives about delays help construction companies to deliver projects without delays.

Previous studies found that stakeholders including contractors, clients, consultants and workers perceive and deal with construction delays differently (Sweis, 2008; Akinsiku et al., 2012). All of those studies have been conducted in normal situations. This study in contrast was conducted in a zone of prolonged conflict. Therefore, this study aimed to explore how project participants perceive and deal with construction delays in conflict zones. This is useful to help project stakeholders to understand and deal with different perceptions of project delays, and to provide useful information for international organisations who are intending to work in conflict areas.

## **2. LITERATURE REVIEW**

Construction projects greatly suffer from risks, delays and uncertainties. One of the indicators of measuring the efficiency of delivering a project is time. According to Alaghbari et al. (2007), construction project delay is one of the most complex, costly and risky problems affecting construction projects. Assaf and Al-Hejji (2006) claimed that it is very rare to deliver construction project on time. Delivering the project according to planned schedule is considered a major dimension of project success (Rwelamilla and Hall, 1995). Gandhak and Sabihuddin (2014) defined delay as the completion later than the time agreed by stakeholders. According to Megha and Rajiv (2013), delays were defined as time overrun after planned project schedule. Client may face loss in project revenue and contractors may be exposed to cost overheads due to project delays or time extension. Yang and Ou (2008) illustrated that reducing project time and cost is important to manage construction projects and deliver them successfully. They also stated that delays can increase the project duration and occur in all phases of the project.

Ali et al. (2012) claimed that factors of delays are related to four classifications, contractor, client, consultant and external. Moreover, Assaf and Al-Hejji (2006); Theodore (2009); Motaleb and Kishk (2010); Gandhak and Sabihuddin (2014) determined the causes on project delays and classified them into three classifications; consultant, owner and contractor.

First classification, factors related to the project owner, the previous authors identified the main causes of delay as; late progress payment, variation orders, late approvals for shop drawings, lack of communication among project parties, poor coordination, late design approval, delay in decision making, conflict among project stakeholders, delay in furnishing stage and suspension of work. Second classification, factors related to project contractor, the scholars also identified the causes of construction delays as; conflict among subcontractors, rework because of errors throughout construction phase, conflict between project parties and contractor, poor coordination, insufficient plans, ineffective project schedule, inadequate construction methods, incompetent contractor, lack in technical workers experience, frequent change of subcontractor, communication problems, late site mobilization, insufficient capital and other financial difficulties. Third classification, factors related to consultant, causes of delays identified by previous scholar as; late approvals, problems in communications and coordination, inadequate experience, errors in design approvals, late in producing shop drawing, unclear information in drawing, insufficient methods for data collection and shortage

in available resources (Assaf and Al-Hejji, 2006); Theodore (2009); Motaleb and Kishk, 2010); Gandhak and Sabihuddin, 2014).

Pourrostan and Ismail (2011) claimed that delays in construction projects cause time overrun and cost overrun, conflict, litigation and abandonment of projects. Based on those results, other scholar have conducted a study in delays in construction and identified the same results (Motaleb and Kishk, 2010).

Table 1: Causes of delays in construction projects

Author \ Cause	Akintoye and MacLeod (1997)	Mezher and Tawil (1998)	Sweis et al. (2008)	Love et al. (2005)	Alaghari et al. (2007)	Shehu et al. (2014)	Jennings (2012)	Lo et al. (2006)	Ahiaga-Dagbui and Smith (2014)	Odeyinka and Yusuf (1997)	Koushki et al. (2005)	Kaliba et al. (2009)	Walker and Vines (2000)	El-Razek et al. (2008)	Hwang et al. (2013)	Mahamid et al. (2011)	Marzouk and El-Rasas (2014)
Poor performance	✓					✓							✓				
Lack of information							✓	✓	✓								
Variation orders										✓							
Lack of experience			✓								✓		✓				
Lack of coordination among various stakeholders	✓													✓	✓		
Lack of commitment and inefficient site management	✓			✓	✓												
Poor planning and scheduling			✓				✓										✓
Equipment unavailability								✓					✓				
Labour disputes and strikes				✓									✓				
Political issues																✓	
Late of approvals		✓															✓

Managing risks in construction projects depends on the consensus and collaboration of all stakeholders involved in the project. Toole (2002) acknowledged that various agreements and opinions among stakeholders in construction affect a project's success. Also, Thekdi and Lambert (2014) established that consensus of dealing with risk is difficult to accomplish among people within construction due to discrepancies in understanding, perspective and expertise. Arezes and Miguel (2008) claimed that most risks in construction projects are objective and can be recognized and observed. However, Flin et al. (1996) explored that risk perceptions are subjective and varied between individuals. Hallowell (2010) also addressed an important differences in perceiving risk in construction between workers, managers and contractors. Ouedraogo et al. (2011) added that people in construction react differently to the same consequences from various risk, and accomplished that perception of risks depends on experience, culture, society, and knowledge.

Conflict means widespread violence, war crimes, armed aggression or human rights abuses (OECE, 2012). Conflict zones are defined as an area where conflict is widespread. The area

might be country, region or an area locates within more than one country. Conflict is sometimes presented as a separate ‘issue’ that can be showed in isolation from other ‘issues’ such as the environment, human rights, or sustainable development. But conflict is a cross-cutting context or theme that is related with a violent manifestation of tensions that may have produced as a results of various reasons such; unjust governance, human rights abuses, environmental scarcity or economic insecurity. Therefore, Conflict sensitivity includes consideration of the range of problems that may cause trigger or violence in the future. There is a strong relation between doing business or investment in conflict zones and conflict. There are various relations that are related to a geographical scales and a level complicity. The interactions between investment and conflict happen at all geographical scales including the closest areas to the project (investment) up to the national scale (OECD, 2016).

Perceptions of risk are partly based on actual risk which is different across various locations (Huddy et al., 2002). But, risk perception is also affected by daily difficulties and changing in behaviours. Jonas et al., (2003) found that people who live in conflict areas feel less safe and this affect their behaviours in perceiving and dealing with risks. The purpose of studying risk perception is arisen from the observation that lay people and experts often have different views and disagreed about how identifying the risks in natural hazards and technologies. Research shows that risk perceptions are greatly affected by the emotional state of individuals (Bodenhausen, 1993). According to valence theory, there is a difference between negatives emotions such as anger and fear, and positive emotions such as optimism and happiness. Positive emotions lead individuals to perceive risks positively (optimism way), however negative emotions lead individuals to perceive risks negatively (pessimistic way) (Lerner and Keltner, 2000). Scholars also found that benefit and risks are negatively related with how people think and make decision, and they are positively related with risky activities (Slovic, 2006).

Numerous researchers studied delays in construction in different areas and countries. However, there is a lack in identifying causes of delays in construction in conflict zones. Due to that, this study aims to identify causes of delays and how individuals perceive them in construction in conflict zones.

### **3. RESEARCH METHODOLOGY**

This study was carried out in Palestine. The country suffers from prolonged armed aggression, human right abuse, difficulties in travelling, weak infrastructure, restricted boundaries and lack of financial resources resulting from the prolonged conflict (Obeidi, 2008). This study is based on qualitative and quantitative approaches in order to identify different delays in conflict zones and find their level of occurrence. Hence, qualitative approach was carried out in order to identify different kind of causes of delays and how they perceive risks. 10 experts of construction industry in Palestine have been interviewed. Prior to the interviews, experts in construction projects were chosen depending on their contribution to the project. The experts were included consultants, contractors and clients who are involved in construction. The chosen participants were contacted via e-mails and telephone in order to attain their acceptance to participate in this the interview. The participants were informed about the aim of the interview and the research aim before conducting the interview. Also, the participants were assured about the confidentiality of their answers.

A questionnaire survey was also conducted in this study. The interviews were considered as a guideline for the interview. The questionnaire were distributed among 45 construction project participants. 15 were distributed to participant associated with owner, 15 with participant associated with consultant and 15 with participants associated with contractors. 31 were returned representing a response rate of 69 percent.

The causes of delays in construction residential projects were ranked and analysed by the measurement of severity index. Moreover, the following formula was used in order to rank them according to the views of the participants.

Severity Index (S.I.) % =  $\sum A (F/N) \% *100/5$ , where:

A is the constant expressing weighting given to each response (ranges from 1 for very low up to 5 for very high),

F is the frequency of the responses and,

N is total number of responses.

*Table 2: Severity index scale*

Percentage %	Severity level
0-20	Very low
20-40	Low
40-60	Moderate
60-80	High
80-100	Very high

#### **4. DATA ANALYSIS**

The interviewees claimed that there are three different types of categories for delays which are geographic, political and generic. Also, they presented causes of delays related geographic category such as inaccessibility to the projects, poor soil suitability, natural disaster, man-made disaster, limited building areas and limited water resources.

Furthermore, causes of delays related political such as restricted construction areas, restrictions in building design, limited electricity resources, investment risks, lack of transportations and market demand problems. The problems of market demand results pf in the lack of demanding on projects in some restricted areas, because customers do not prefer to live or invest in areas which are close to problems or conflicts. So, owners find difficulties to promote their business and sell it. According to Palestinian regulations, external investors or customers are not allowed to invest, sell or buy anything in Palestine. In term of investment risks, most investors worry to investing in areas in Palestine, as these areas are exposed to high risks due to Palestinian-Israeli conflict. So, they are unsure about achieving successful project completion and benefits.

In addition, there is a lack in transportation to reach some residential hoses using public or private transportations, as some roads are unsafe to be used in conflict areas. Quantitative approach was also carried out in order to identify delays with high severity and low severity index. These causes of delays were ranked on a scale from 1 (very low) to 5 (very high).

This study shows the current views of owners, consultants and contractors in construction project in the West Bank. 19 causes of delays in construction residential projects were identified and ranked. Based on interviews results, the causes of delays were classified into three different categories which are: geographical, political and generic categories (table: 3).

*Table 3: List of delays and related category*

Category	Cause of delay
Geographic	Inaccessibility to the projects, poor soil suitability, natural disaster, man-made disaster, limited building areas and limited water resources
Political	Restriction in construction areas, limited electricity, restriction in movements, restrictions in construction, design, investment risks, market demand problems and limited construction areas.
Generic	Shortage in labours, shortage in experts, lack of engineers, fluctuation in materials costs, monopoly and lack of using high-technology equipment.

## 5. RESEARCH RESULTS AND DISCUSSIONS

Table 4 presents the severity index and ranking for each cause of delay in the geographic category. Three different types of perspectives have been considered in order to rank these causes. Contractors and consultants identified that the limited building areas cause leads to highest amount of delay. However, the owner's perspective shows the highest amount of delay is the limited water resources cause. On the other hand, the perspectives of consultants and contractors claimed that the lowest amount of delays is related to the natural disaster cause. In contrast, the owner's indicated that the lowest ranked delay is in man-made disaster cause. Also, all perspectives were identified the same ranking for the inaccessibility to the projects cause.

*Table 4: Ranking cause under geographic category*

Cause of delay	Contractor's perceptive		Owner's perspective		Consultant's perspective	
	Severity index	Rank	Severity index	Rank	Severity index	Rank
Difficulties in travelling	84.98	1	81.56	2	78.18	1
Limited water resources	76.61	2	80.76	1	77.15	2
Poor soil suitability	40.57	4	38.72	4	36.43	5
Natural disaster	26.12	6	29.11	5	31.91	6
Man-made disaster	31.89	5	28.64	6	37.79	4
Inaccessibility to the projects	66.78	3	51.22	3	69.55	3

Table 5 shows the severity index and ranking for each cause of delay in the political category. 7 causes causing delay were identified under this category. According to the contractor, the highest amount of delay is the difficulties in travelling. However, owners claimed that the highest amount of delay is the restricted construction areas cause. According to consultants,

restrictions in construction design is considered one of the most important factor that leads to delay in construction projects.

On the other hand, all participants suggested that the lowest amount of delays is the lack of transportation factor. Also, there are more than one factor with severity index more than 50% such as: segmentation of the land, restricted construction areas, market demands problems, investment risks and lack of transportation. This means that the political situation has a high impact on construction project completion. Thus these causes are most likely leading to delay in construction residential projects.

*Table 5: Ranking cause under political category*

Cause of delay	Contractor's perceptive		Owner's perspective		Consultant's perspective	
	Severity index	Rank	Severity index	Rank	Severity index	Rank
Restriction in construction areas	73.85	3	83.44	1	69.43	3
Limited electricity	48.33	6	41.31	6	51.66	6
Restriction in movements	38.84	7	31.65	7	26.58	7
Restrictions in construction design	51.63	5	47.76	5	86.71	1
Investment risks	61.18	4	68.98	4	55.67	5
Market demand problems	74.61	2	71.79	3	69.55	3
Limited construction areas	88.34	1	82.18	2	76.32	2

Table 6 presents the severity index and ranking for different causes of delay which are related to generic category. Six causes were identified and ranked by participant's views. According to contractor, owner and consultant's perspectives, the highest amount of delay is the lack of using high-technology equipment cause. While the lowest amount of delay is the shortage in labour. All participants were claimed similar information about the amount of delays in each cause, therefore the delays were ranked similarly.

*Table 6: Ranking cause under generic category*

Cause of delay	Contractor's perceptive		Owner's perspective		Consultant's perspective	
	Severity index	Rank	Severity index	Rank	Severity index	Rank
Shortage in labours	27.76	6	23.71	6	19.57	6
Shortage in experts	53.52	4	59.81	4	56.52	4
Lack of engineers	41.62	5	37.29	5	46.52	5
Fluctuations in material costs	79.19	2	73.96	2	68.83	4
Monopoly	72.95	3	69.49	3	65.31	3
Lack of using high-technology equipment	83.48	1	79.39	1	85.82	1

## 6. CONCLUSIONS

This study concludes that delays greatly affect construction projects. This study aimed to identify and understand delays in construction project in conflict zones based on different perceptions. Three types of people perception have been used in this study; contractors, owners and consultants. Interviews and surveys were conducted to identify cause of delays and then rank them. Based on the three categorises of delays, the most critical causes that lead to delay

were: limited building areas, limited water recourses, difficulties in travelling and lack of using high technology.

Conflict zones people have different perceptions of causes of delays compared to non-conflict zones. Therefore, stakeholders in construction projects in conflict zones deal with delays differently. Researchers studied construction delays in non-conflict zones and found that the most significant causes of delay are lack of information and insufficient site management. However, this study was carried out in conflict zones and identified the most significant causes of delay as difficulty in travelling, limited construction areas and lack of using high-technology equipment.

Finally, the study showed that different people perceive delays differently depending on their knowledge and their relation with the project. Most delays in construction have been ranked and perceived differently by different individual's perception. However, there are some delays were perceived and ranked similarly. The results of this study may provide useful information for managing, perceiving and responding to risk in construction projects in conflict zones.

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