## Why should we care about disruption?

According to the Society of Construction Law, disruption is defined as follows:

> *"[Disruption is a] disturbance, hindrance or interruption to a Contractor's normal working methods, resulting in lower productivity or efficiency in the execution of particular work activities."*[1]

And why should we care about disruption? Because it is pervasive, it affects most large complex construction projects, and it causes huge cost overruns (Table 1) – and this situation tends to get worse as the size of the projects continues to grow.

| Project | Overrun (%) |
|---|---|
| Suez Canal | 1900% |
| Scottish Parliament | 1600% |
| Sydney Opera House | 1400% |
| Montreal Olympics | 1300% |
| Concorde | 1100% |
| Excalibur Projectile | 650% |
| Panama Canal | 200% |

*Table 1: Cost overruns on construction mega-projects (in %.)*

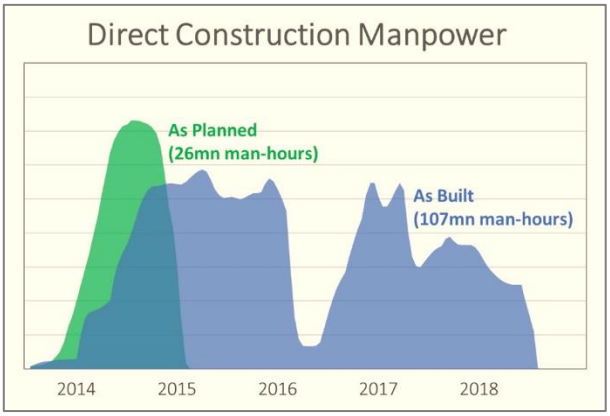


*Figure 1: As-built vs. as-planned direct construction manpower for a recent project in the MENA region.*

An example will further prove the relevance of disruption (see Figure 1): On a recent project that the authors of this article analysed, direct construction effort overran from a planned 26 million man-hours to an as-built figure of 107 million[2]. Some of the overrun was caused by an underestimation of the scope of the project, and

[1] Society of Construction Law, "Delay and Disruption Protocol" (Second Edition, 2017), p. 9.
[2] These figures, as well as the graph shown in Figure 1, have been amended for confidentiality reasons.

some more by variations and scope creep caused by preferential design changes; however, well over 80% of the overrun was caused by the indirect consequences of those changes (i.e.: disruption.) Note that "direct" resources (like direct construction manpower) depend only on the project's scope of work and on the productivity of these resources; thus, on any given project, the number of direct resources required to complete a certain scope of work will increase if their productivity is reduced (i.e., if they are disrupted.)

But disruption is not just pervasive and relevant, it is also insidious. Over two decades of experience working with large complex construction projects has shown us that disruption costs are usually as significant (if not more so) than delay costs – yet the term "disruption" still appears 'foreign' to many in the industry: Disruption is not well understood, it is often overlooked… and when it isn't, it is often conflated and confused with delay.

So, before we delve into why disruption is such a tricky animal, we should probably first make clear what disruption is not.

## Delay and disruption: Related, but not the same!

Again, the Society of Construction Law Protocol explains the nature of "delay" as follows:

> *"[Delay] is concerned with time – work activities taking longer than planned. In large part, the focus is on delay to the completion of the works – in other words, critical delay. Hence, 'delay' is concerned with an analysis of time."* [3]

Thus, delay is about prolongation of the project while disruption is about "efficiency", about the number of resources directly needed to complete the works.

However, as stated earlier (and again in the words of the SCL):

> *"The construction industry often associates or conflates delay and disruption."*[4]

"To conflate", by the way, means "to combine into one" – so why does the construction industry often believe that disruption and delay are the same thing? The fact that disruption and delay are often caused by the same events probably has something to do with it: events causing delay will normally cause the way that the project is executed to deviate from the plan, thus also giving rise to disruption; and, any disruptive events affecting activities on the project's critical path will also cause delay: after all, disruption is caused by losses in productivity (work being executed more slowly) and by rework (work having to be re-done.)

But there is at least one other major reason why people in construction and engineering often confuse disruption and delay: Disruption is often simply overlooked (or only noticed after the fact!)

The SCL's Delay and Disruption Protocol, for instance, contains 22 core principles of which only one deals specifically with disruption, and only two more even mention it – all of the remaining principles deal solely with different aspects of delay. And, this is just one example of an industry-wide pattern: Table 1 shows how both "standard contract forms" and reference books on construction contracts deal much more extensively with issues relating to delay than to disruption.

[3] Ibid.
[4] Ibid.

 

| Document | Mentions of "Delay" | Mentions of "Disruption" |
|---|---|---|
| FIDIC Red Book (2nd Ed., 2017) | 148 | 6 |
| NEC4 Engineering and Construction Contract (June 2017) | 50 | 0 |
| AIA Document A201 (2007), General Conditions of the Contract for Construction | 61 | 2 |
| FIDC Contracts: Law and Practice (Baker, Mellors, Chalmers and Lavers, 2009) | 535 | 9 |
| Delay and Disruption in Construction Contracts (Burr, 5th Ed. 2016) | 973 | 423 |
| Keating on Construction Contracts (10th Ed., 216) | 524 | 40 |
| Legal Aspects of Architecture, Engineering and the Construction Process (Sweet & Schneier, 8th Ed.) | 748 | 31 |

*Table 2: References to "delay" and "disruption" in key forms of contract and construction claim books.*

But, in spite of all this "neglect" and confusion, we should not forget what disruption is: it is a crucial and significant factor influencing the performance of construction and engineering projects. Therefore, in this world of reduced margins and high competition, the industry cannot afford to overlook disruption, it must be taken into account.

## Has your project been disrupted? Yes, it has!

When projects are planned to achieve delivery with minimum time and cost, any changes to sequence, method or scope imposed after they have started are very likely to impact their efficiency, and thus lead to disruption. For this reason, pretty much any unplanned change to a project is likely to be disruptive.

Some of the most common causes of disruption are:

- Deficient design / requirements.
- Design by comments
- Variations
- Late nominations
- Late drawing reviews
- Work interruptions
- Late inspections
- Late payments
- Site access restrictions
- Late award of EOTs
- Changed working conditions

Large construction and engineering projects involve so many stakeholders over such a long period of time that it is nearly impossible not be impacted by many of these types of events.

The disruptive nature of these events may not always be immediately obvious, but it will, almost invariably, exist: Take, for example, late design changes that are proposed by the client, but then never actually implemented: In this case, when the client proposes a change, the contractor will have to "rope off" the affected area of the works, keeping it on hold while the change is being discussed and agreed. Even though the change is not instructed, the proposal alone is likely to be disruptive, since it will probably force the contractor to change his work sequence while the affected area is on hold.

## Some key things about disruption to keep in mind

In our previous article in this series[5], we described the causal framework that explains how disruption ripples through complex construction and engineering projects (see Figure 2.)

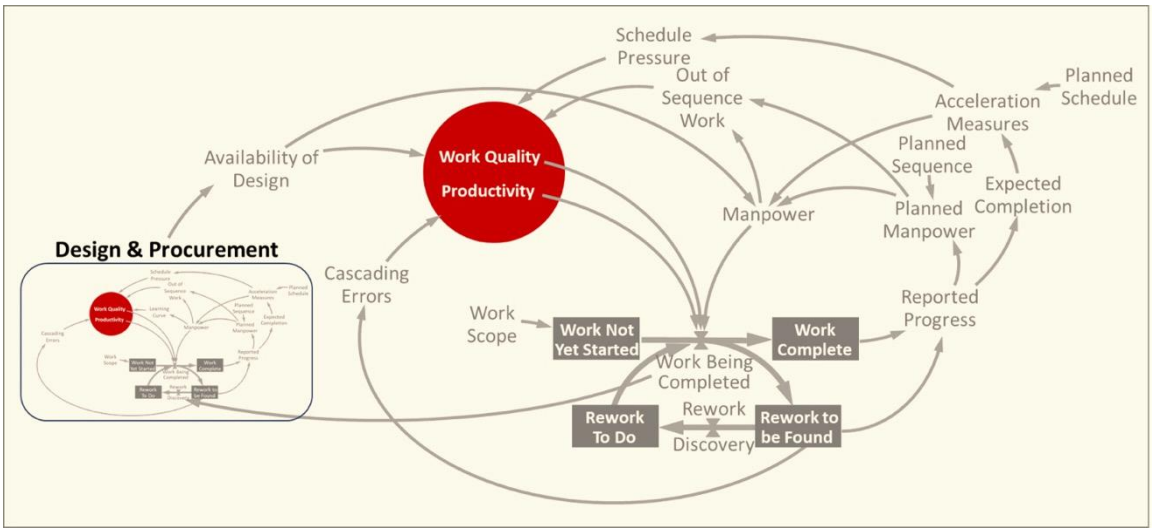


*Figure 2: The Project Dynamics framework explains how disruption starts, and why it keeps going.*

We will not go through the full workings of this framework again, but there are three key insights that have emerged from it, that are critical to remember at this point:

1. Disruption is intrinsic to projects: The mechanisms that allow disruption to start and to spread are always active; so much so, that, to some degree, there are always efficiency losses on all projects – from Day 1 onwards. Good contractors will suffer a little from minor inefficiencies, lesser ones will suffer more – but nobody is perfect, so there will always be some amount of inefficiency that will be caused by the contractors' own processes, equipment and personnel.

   When a project suffers from disruptive claimable events (i.e., for which the client is responsible), the disruption mechanisms kick into gear, adding "claimable" disruption to the "intrinsic", pre-existing ones. In dispute settings, the word "disruption" is often applied to mean only productivity losses and rework caused by *'client-risk'* events; but, strictly speaking, it applies to the result of all project inefficiencies – and this is how it is used in this article.

2. Disruption just keeps on going and going: Disruption is caused by a complex net of causal relationships, and many of its causal links end up forming closed loops. When disruptive events directly impact this "loopy" network, they set off ripple effects that keep going forever, never quite dying away.

3. Rework: It is often said that disruption come from losses in productivity… but this obscures the fact that it can also come from the need to perform additional rework. In our experience, contractors generally dislike having to recognise even the existence of rework on their projects, and rarely measure it explicitly. However, rework does happen: nobody is perfect, and when bombarded with

[5] "A Causal Framework for Delay and Disruption: Loopy, Not Straight" can be downloaded from our website at www.constructiondynamics.globa/publications.

changes and placed under intense schedule pressure… often corners are cut… and it may not be until weeks, months or even years have passed, that the errors or omissions are detected and resources are diverted to fix them. A good example of this is the punch-listing / 'snagging' activities at the end of a project when latent defects are discovered, leading to de-snagging (rework).

## How much were you disrupted? Good question!

To summarise the points just made: it is almost impossible for a project to suffer from no disruption at all, both the client and the contractor will contribute to it (albeit in different measure), and the consequences of disruptive events are often felt way after the occurrence of these events.

All of these factors explain why disruption is so difficult to assess. As an example, Figure 3 shows the disruptive impact of an event occurring at the start of a project: As can be seen, the impact is most severe shortly after the event, but its consequences linger long after that.

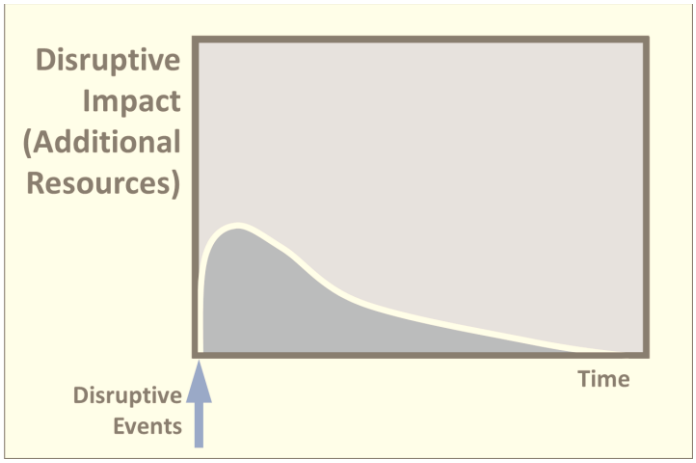


*Figure 3: Disruptive consequences linger on for a long time.*

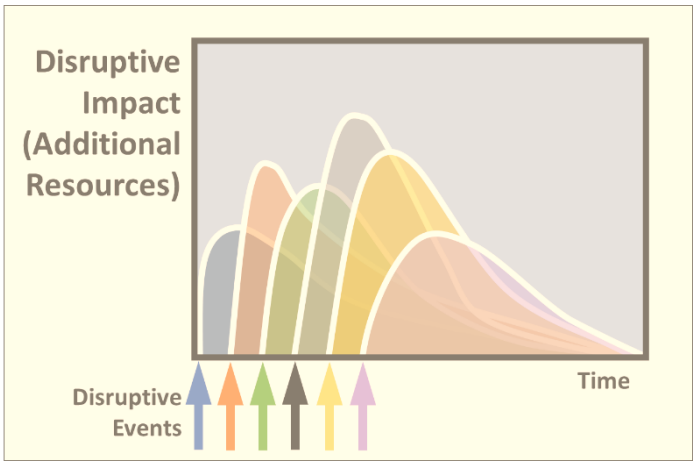


*Figure 4: The disruptive consequences of different events will overlap and compound each other.*

This problem would still be manageable – but, of course, reality is more complex: large construction and engineering projects are usually affected by dozens, sometimes hundreds (or even thousands) of disruptive events of all sorts invariably caused by different stakeholders – including the contractor's own (underbidding,

inefficiencies…) All of these events have a direct, varied impact on the project, and therefore all of them set off lingering ripple effects, which inevitably overlap and compound each other (see Figure 4.)

And this is the problem at the core of disruption analysis: There is no hard data that will tell us what the individual disruptive impact of each event is; the only information given to us by project reporting systems is the total resource overrun. In other words, project data will paint us the picture shown in Figure 5 – and, invariably, this information is generally available *only after the fact!*

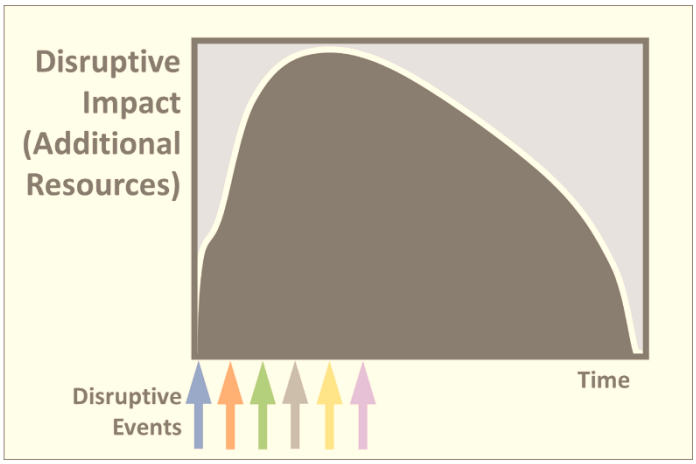


*Figure 5: Project data normally only tells us the total, cumulative impact of all events taken together.*

And why should this be problematic? Because it is essential, even critical, to be able to isolate the disruptive impact of different events (or groups of events):

a) In disputes: Not all events will have been caused by the same party – some will be the responsibility of the client, some will be contractor-risk, and some will be caused by third parties or be *'force majeure.'* If a contractor wants to recover the disruption costs caused by events for which he was not responsible, he will need to be able to separate the disruptive impact of these events from that for which he was responsible himself.

b) For lessons learned: Contractors who do not understand what disruption is and how different disruptive events impacted their projects will never be able to learn from the past… and, thus, improve their performance in the future.

## Assessing disruption

For these reasons, the industry has developed several ways in which to "bridge" this lack of data on disruption, and assess it indirectly. How to assess disruption in the face of this complexity, the requirements that one needs to fulfil, and the types of methods that are available to us – all these topics will be covered in the next article in this series.

Construction Dynamics Solutions

For more information, please contact us at:
info@constructiondynamics.global
or visit our website:
www.constructiondynamics.global

## Appendix: Disruption and delay are claimed differently

There are two types of manpower claims typically made under construction contracts: Delay (or Prolongation, or Extension of Time) and Disruption (Loss of Productivity and Rework, or Loss and Expenses). Generally, more attention is paid to cost claims associated with extension of time than to disruption, even though disruption claims can be substantial in comparison to prolongation ones.

The key difference between delay and disruption claims are the types of remedies that can be sought. In plain English: What costs/damages you can recover, or what penalties you can impose.

With the ample press given to delay matters in most contracts, it is common for contractors to attempt to recover as much of their overruns as possible via delay claims. However, there are limits to this: certain types of costs will be claimable under *"delay",* but certain others will need to be claimed under *"disruption".*

To be more specific: "direct" costs can only be claimed as disruption costs; and direct construction manpower is the main type of cost included in disruption claims. However, very often projects do not just involve construction, but also include design, procurement, fabrication, etc. – so other direct costs (like that of design manpower, for example) should be considered.

Also, there are some types of costs that are usually included in delay claims but which can also be included in disruption ones: for example, indirect labour and construction plant and equipment. This can be done when it can be proven that these types of costs were not incurred on a time-basis (e.g., as a fixed cost-per-day), but that they depended on the number of direct resources being spent (for example, support labour or tools or equipment units whose number fluctuated based on the size of the construction crew.)

In these cases, when certain types of costs can be claimed via both delay and disruption, two considerations will need to be made:

a) First, cost overruns can only be claimed once: the same cost cannot be claimed both under delay and under disruption. (However, the overrun may be split and each part may be claimed differently.)

b) Second, when a cost category can be claimed in more than one way, the best course of action will depend on the different methodologies that may be applied (which one can best prove how the damage was caused?).

Which brings us to contractual / legal considerations. Most contracts have extensive provisions aimed at achieving completion of the contract scope on time. Equally, most contracts include a comprehensive list of events which would entitle the contractor to make an application to the client or engineer to extend the specified completion date(s) – and there are often strict notice provisions, specifying strict deadlines for when contractors are required to notify their clients of any likely delay to their projects.

It should be noted that none of these restrictions normally apply to disruption. As we saw earlier, contracts hardly mention disruption, and then only in passing; it is usually not tied to a specified list of potential events, and there are generally no notice provisions (and, even when these do exist, they would very rarely be enforceable because disruption is "felt" long after the event(s) started if ever.) While this lack of specificity should (in principle) make it easier to put forth disruption claims, in practice, it appears to add to the contractors' uneasiness about doing so, because of the common misconception that "if it is not expressly mentioned in the contract, it is forbidden".

 