10^{th}

INTERNATIONAL SCL CONFERENCE

2023

www.sclturkey.org

DO ALL CONSTRUCTION PROJECTS THAT DELAY END UP IN DISPUTES? A REVIEW OF HOW DELAYS ARE ACCUMULATED IN PROJECTS

Haris Katostaras, MSc, MBA

Director at HKA Global Ltd, HarisKatostaras@hka.com

ABSTRACT

This article examines how delays accumulated in construction projects that experience significant delays and ended up in dispute resolution mechanisms. The study analysed 22 projects, categorised as High or Low Budget, and indicates that there may be a threshold of delays that trigger dispute resolution mechanisms, especially for High Budget projects, at around 20% of the planned duration, while the threshold for the Low Budget projects appears to be higher. Hence, based on this study, it is essential for parties to aim to stay below this threshold and to implement effective tracking mechanisms to monitor project delays throughout the course of the works. Further, the analysis suggests that High Budget projects tend to resort to dispute resolution mechanisms for smaller delays than Low Budget projects, and delay accumulation in both projects starts to occur early in the project. The study also concluded that delays leading to disputes are not the result of isolated incidents, but rather they occur throughout the course of the project. The findings of this analysis could be used by employers and contractors to conduct risk assessments.

Keywords: Delays, Dispute Resolution, Threshold of delays, Cumulative Delay Curve, Delay Ratio Curve

1. INTRODUCTION

The questions of how to complete a construction project on time and which projects do not end up in dispute resolution mechanisms despite experiencing delays are often viewed with cynicism by many delay analysts, and not without reason. Typically, delay analysts are called in after a project has been completed and has experienced significant delays or when communication has broken down between the parties involved. As a result, they are more familiar with project failures rather than successful projects completed on time.

The primary objective of this article is to identify common patterns in the way delays were accumulated through the analysis of construction projects that encountered significant delays, leading to disputes. While some analysed projects involved dispute resolution mechanisms, others required one or both parties to seek guidance from construction consulting firms. In either case, this led to additional expenses.

The article analyses the accumulation of critical delays in 22 projects. It is important to note that the analysed projects are drawn from the writer's personal records, and the information must remain confidential. Therefore, no further data regarding these particular projects can be disclosed.

The study examines two types of projects: "Low Budget" projects, which include 12 residential, care homes, and public buildings in the UK, and "High Budget" projects, which include 10 power plants, oil and gas projects, offshore wind farms, and manufacturing facilities constructed both in the UK and internationally. The research intends to determine how critical delays occurred throughout the construction period. For the purposes of this article, the term "delays" refers specifically to critical delays.[1]

Figure 1 below provides a typical example of how critical delays are accrued in a project. The blue curve represents the cumulative delay curve, which shows the percentage of overall delay at any given point in the project timeline. For instance, by 30 March 2020 the project had experienced around 15% of the overall project delay, by 31 July 2020 around 55%, and by 31 October 2020 around 80%.

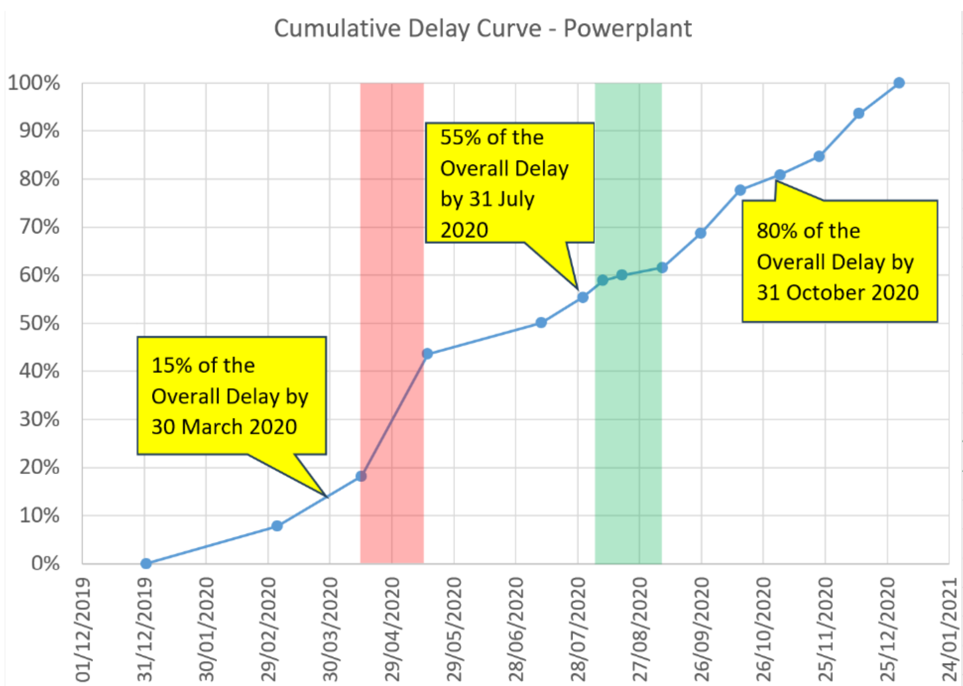

Figure 1. Cumulative Delay Curve.

[1] Critical delays refer to project delays that result in the completion date being pushed to a later date.

Cumulative delay curves are useful as they help draw various conclusions about a project. For instance, Figure 1 above represents the cumulative delay curve of a power plant project, indicating that, during the period highlighted in red, almost a day's delay accumulated each day. Conversely, only a few days of delay were accrued in the period highlighted in green. This curve is commonly used by delay analysts because it presents a clear overview of when delays occurred throughout the project.

Another curve that is equally important in understanding how delays were accumulated during the course of the works is shown in Figure 2 below.

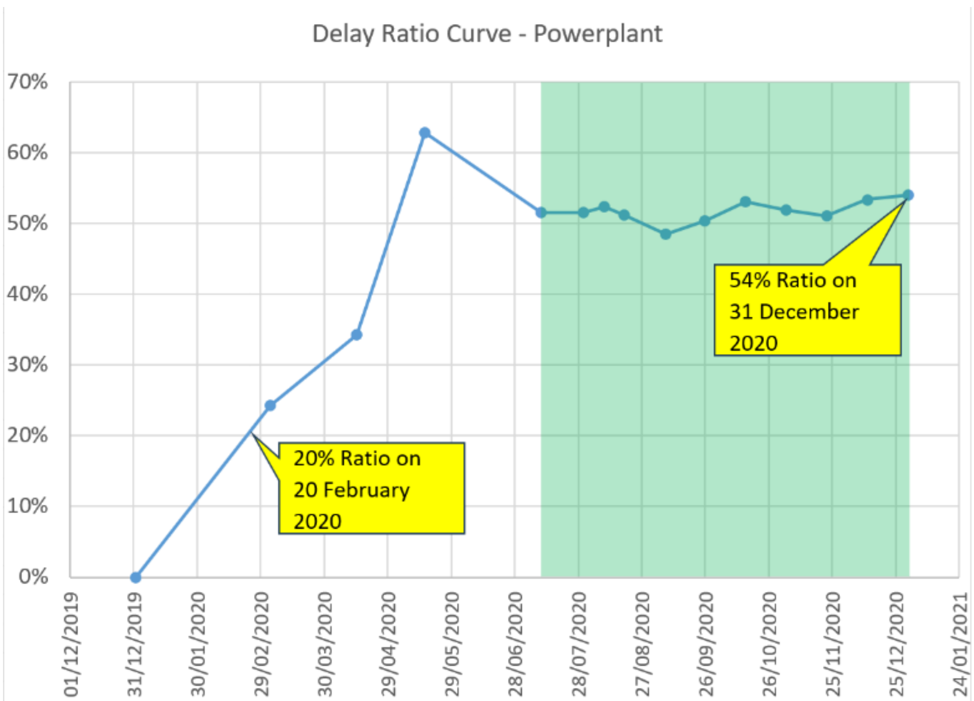

Figure 2. Delay Ratio Curve

The graph above depicts the ratio between actual delay and project duration up to a given point in time for the same power plant project as in Figure 1. For example, on 20 February 2020, the ratio between actual delay and duration up to that point was 20%. This means that within the 50-day period from 1 January 2020 (start of the project) to 20 February 2020, the project experienced a critical delay of 10 days.[2] Upon completion of the project on 31 December 2020, the ratio between actual delay and the overall project duration was 54%. This means that out of a total actual duration

[2] i.e. 20% of 50 days

of 365 days of the project, there were 197 days[3] of delay. In other words, this specific project delayed 197 days that caused the completion date to be pushed beyond the contractual deadline.

Unlike Figure 1, the segment of the curve in Figure 2 highlighted in green, where the curve remains flat in principle, does not indicate the absence of delays. On the contrary, it signifies the accumulation of delays in a consistent manner during that period.

In the following paragraphs an analysis of the cumulative delay and delay ratio curves of the 22 projects will be presented.

2. Cumulative Delay Curves Analysis

The cumulative delay curves for each of the 22 projects that were analysed are presented in Figure 3. Because each project had a different duration, the duration of each project was normalised to one year to enable meaningful comparisons. The cumulative delay curves of the High Budget projects are depicted in blue, while those of the Low Budget projects are shown in red.

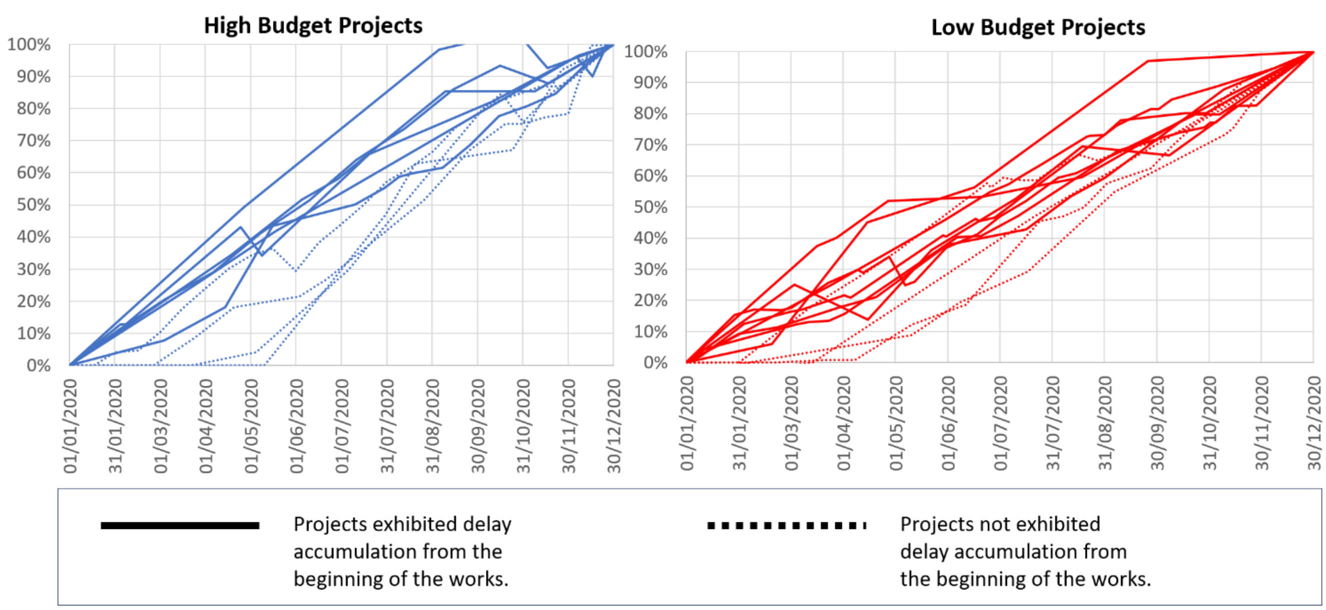

Figure 3. Cumulative Delay Curves

Upon an initial glance at the spaghetti graphs above, it may appear daunting or difficult to decipher, but upon closer examination, several observations can be made.

[3] i.e. 54% of 365 days

Initially, the cumulative delay curves for both High Budget and Low Budget projects are quite similar indicating that there are no material differences in the way that these types of projects accumulate delays.

A majority of High Budget (60%) and Low Budget (66%) projects exhibited a delay accumulation from the beginning of the works as shown in the figure above. From the review of the projects, the analysis reveals that delays related to the late handover of the site, late Contractor's mobilisation, design issues and underground obstructions were the main contributors to these delays.

Further, Figure 4 presents a histogram that shows the proportion of total critical delay incurred by each project until its planned end date. Stated differently, the histogram illustrates the fraction of the overall critical delay experienced by each project by the time it was scheduled to finish, as specified in its contract. As shown in Figure 4, only three projects suffered delays that accounted for 70% to 100% of the total critical delay by the end of their planned period. In these cases, the remaining 0%-30% of the critical delay was incurred beyond the period specified in the project's contract.

Notably, the histogram demonstrates that a large percentage of the projects analysed, suffered from a relatively small proportion of the overall critical delay by the scheduled end date. Specifically, 16 out of 22 projects (72.7% of the sample) experienced only 25%-55% of the total critical delay by the end of their planned period. For these 16 projects, the remaining 45%-75% of the critical delay occurred after the contractual deadline, indicating that delays continued to accumulate even after a significant amount of time had passed beyond the original timeline.

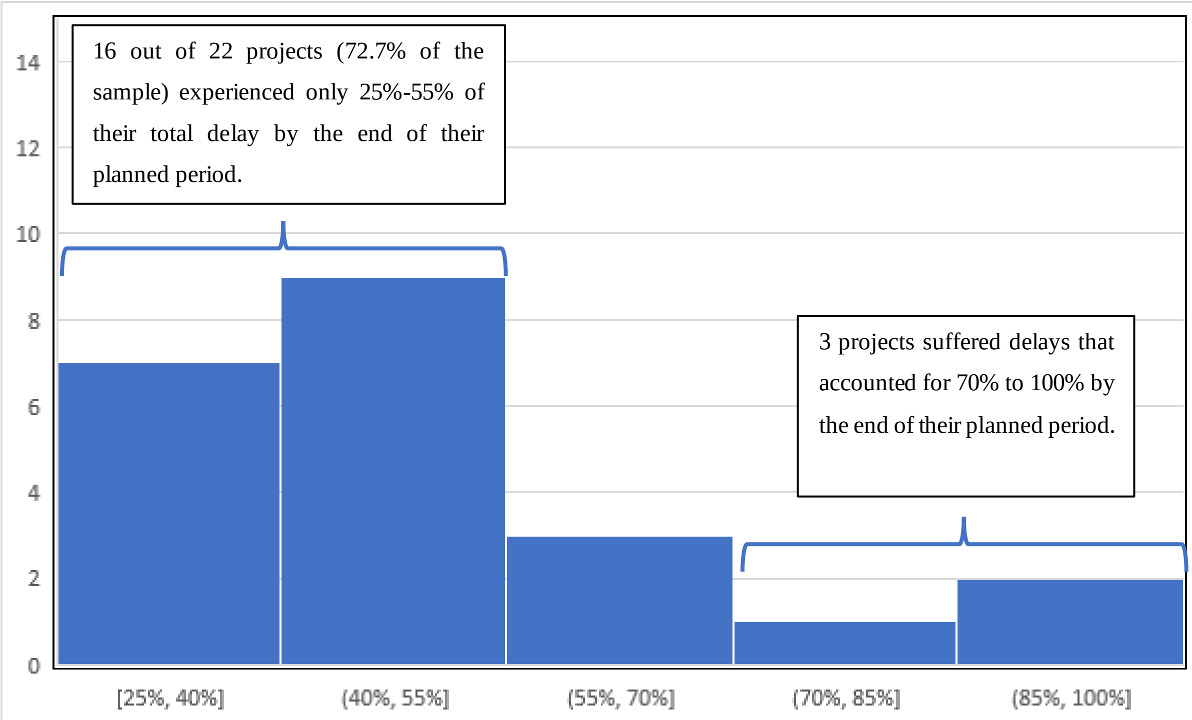

Figure 4. Percentage of Total Delay Suffered by Projects to the End of the Contractual Period.

Upon further analysis of individual projects, additional insights may be gained. However, the above figures confirm what delay analysts already know - that for projects that enter dispute resolution mechanisms, delays are often not the result of isolated incidents, but rather they occur throughout the course of the project. This could be due to a series of different delay events or limited delay events that have a continuous impact.

3. Delay Ratio Curves Analysis

The figure below shows the ratio between actual delay up to a given point in time and the duration from the start of the project up to that point in time for any of the 22 projects. The red curves represent the delay ratio of the Low Budget projects, while the blue curves represent the delay ratio of the High Budget projects.

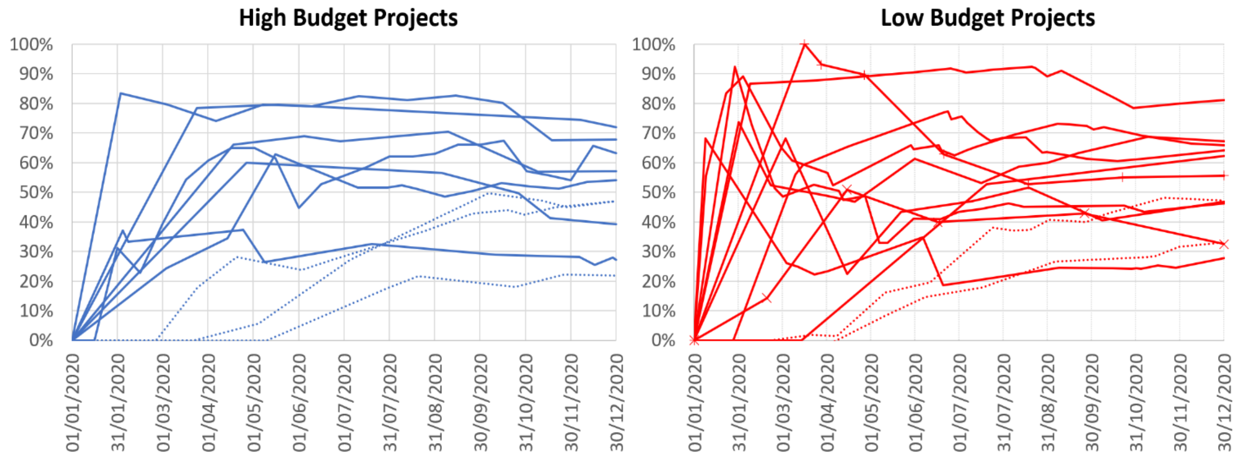

Figure 5. Delay Ratio Curves

From this graph, several observations can be made. Firstly, most of the Low and High Budget projects delay ratio curves follow the same pattern - increasing initially, reaching a peak, and then decreasing or remaining relatively stable. Furthermore, Low Budget projects tend to experience more delays at the beginning of the project compared to High Budget projects, as evidenced by the steep rise of the Low Budget delay ratio curves at the start of the projects. Additionally, projects that experience delays later generally tend to have a lower overall percentage of delays, as shown by the dotted-line delay ratio curves in the figure above. Lastly, for most curves, although there are fluctuations, the delay ratio remains relatively stable during the second half of the project, indicating that delays during this period accumulate at a steady pace.

Further, a histogram plotting the overall excess of planned construction time for the analysed sample of projects is displayed below. For instance, five out of the 22 projects (light blue bar below) exceeded the planned construction time by 42-51%, while six out of the 22 projects (dark blue bar below) exceeded the planned construction time by 61-71%.

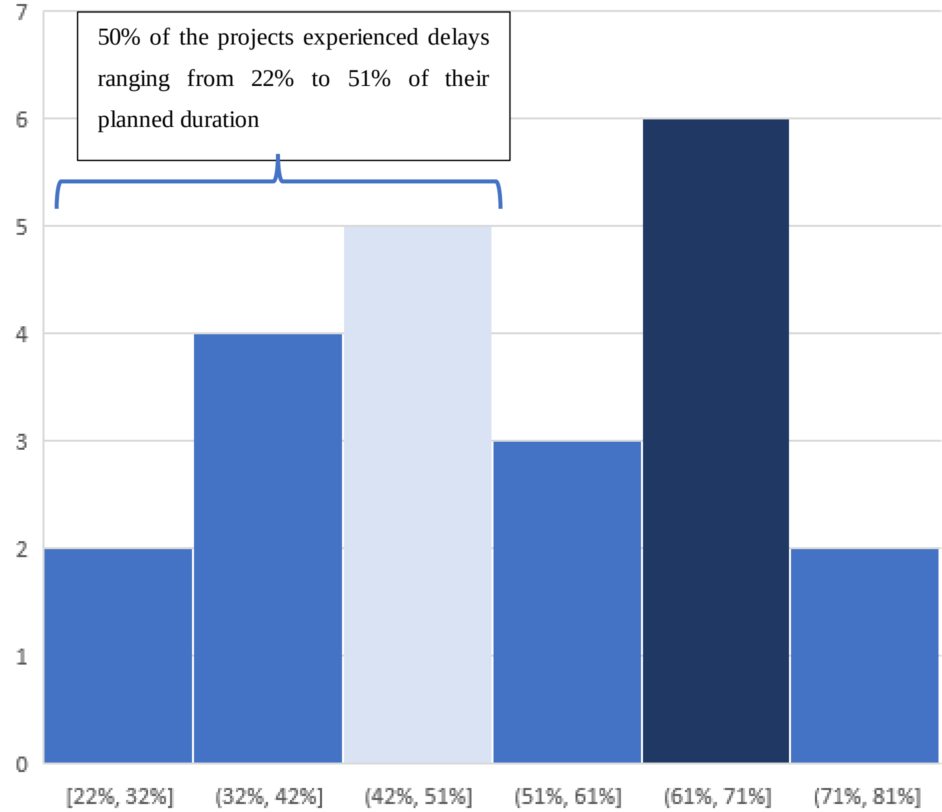

Figure 6: Excess of Planned Construction Time

The histogram above shows that in our sample, half of the projects experienced delays ranging from 22% to 51% of their planned duration, while the other half experienced delays ranging from 51% to 81%. Notably, none of the projects suffered delays less than 22% of their planned duration, suggesting that projects that experience relatively small delays do not typically end up in dispute resolution mechanisms. Parties would thus avoid time-consuming processes and additional costs.

Although our sample of projects is limited, the analysis suggests that there may be a threshold of delays at which a project is more likely to enter dispute resolution mechanisms. Further research should be conducted to accurately determine this threshold for different types of projects. However, as demonstrated above, preliminary findings of my analysis indicate that this threshold may be around 20% of the planned duration, at least for the High Budget projects. Hence, based on this analysis, it is essential for parties to aim to stay below this threshold and to implement effective tracking mechanisms to monitor project delays throughout the course of the works.

However, it is important to note that projects with delays less than 20% of their planned duration are not necessarily immune to dispute resolution mechanisms, as many different factors can contribute to the decision to pursue such mechanisms. However, good management which maintains delay below 20% of the planned duration may help for the possible delay disputes to not escalate to dispute resolution mechanism. Similarly, projects with delays exceeding 20% of their planned duration will not necessarily end up to dispute resolution mechanisms as in many cases the disputes are managed effectively by the parties.

The figure below provides additional insights into the extent of delays experienced by the Low Budget and High Budget projects in our sample. The x-axis shows the percentage of either Low Budget or High Budget projects, while the y-axis shows the delays as a percentage of their planned duration. For instance, 40% of the High Budget projects experienced overall delays of less than 47% of the planned duration. Similarly, 75% of the Low Budget projects suffered overall delays of less than 64%

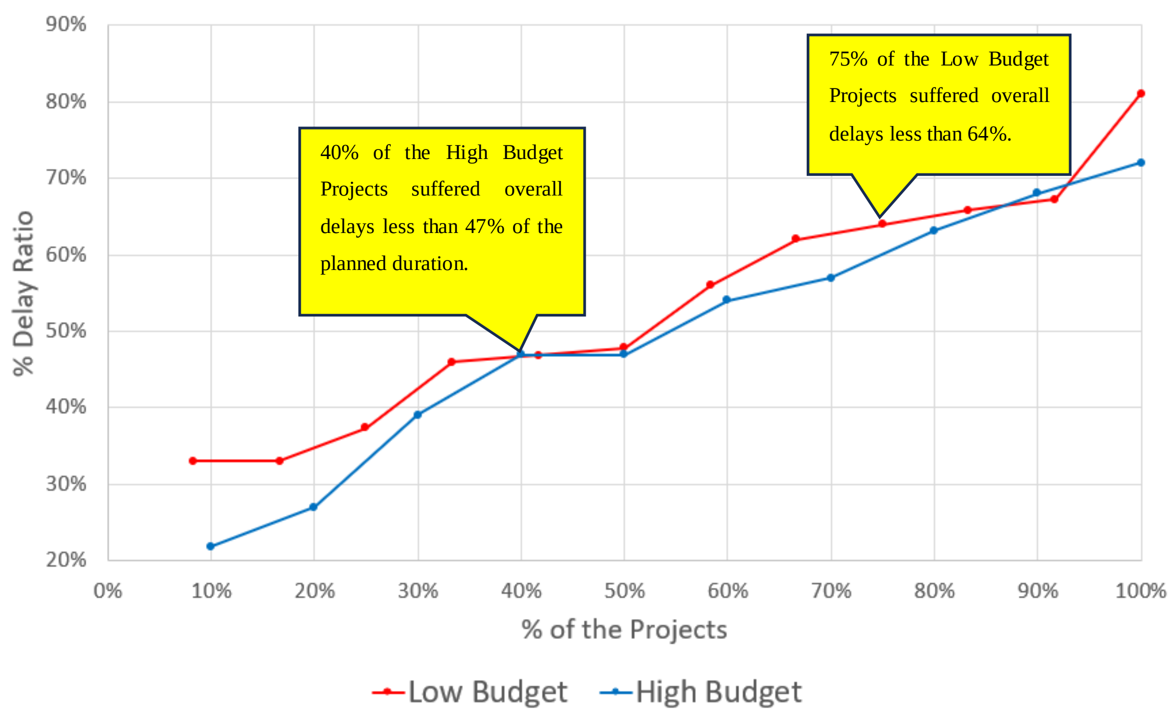

Figure 7. Delays as Percentage of Planned Duration

The figure above shows several observations. Firstly, the Low Budget and High Budget curves have a similar shape, the High Budget curve consistently staying below the Low Budget curve.

Moreover, in general the Low Budget projects in the sample experienced more delays than the High Budget projects, which aligns with our expectation that the less stringent environment that often appears in these projects may contribute to project delays. Interestingly, High Budget projects tend to resort to dispute resolution mechanisms for relatively smaller delays than those experienced by Low Budget projects. This most likely arising as the liquidated damages and corresponding costs are greater. This suggests that the threshold for delays, as discussed earlier in this article, is lower in High Budget projects than Low Budget projects. Finally, it is observed that 50% of the High Budget and Low Budget projects experienced overall delays of less than 47% and 48% of their planned duration, respectively. These figures may prove useful for both the employer and contractor when conducting risk assessments.

4. Conclusion

The study analysed 22 projects, split between High and Low Budget, to identify how delays were accumulated throughout the construction period. The analysis indicates that there may be a threshold of delays that trigger dispute resolution mechanisms, especially for High Budget projects, at around 20% of the planned duration, while the threshold for the Low Budget projects appears to be higher. The study also revealed several key insights. Firstly, delay accumulation often starts early in the project, with 60% of High Budget and 66% of Low Budget projects experiencing delays from the beginning of the works due to issues such as late site handover, contractor mobilisation, design problems, and underground obstructions. Additionally, delays usually continue even after the end of the planned period, with 72.7% of the analysed projects suffering from a significant amount of delay after their planned period ended. Further, projects that started to experience delays later generally tend to have a lower overall percentage of delays. Finally, the analysis confirms that for projects that enter dispute resolution mechanisms, delays are often not the result of isolated incidents, but rather they occur throughout the course of the project.