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**PREDICTING THE OUTCOME OF PROSPECTIVE CLAIMS IN
CONSTRUCTION**

**CLAIM STRENGTH CALCULATOR: AN INTERMEDIATE STEP
BETWEEN CLAIM AND DISPUTE**

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ABSTRACT

Construction projects commonly face challenges that lead to delays and cost overruns. While the majority of these projects encounter setbacks, not all of them escalate into official disputes. Studies highlight the significant time and financial costs associated with dispute resolution, which dissuade parties from pursuing such measures. By reframing delays, variations, and conflicts as official disputes, the parties involved take on substantial risks. The risks associated with official disputes in construction projects go beyond just time and financial costs. Legal proceedings can strain relationships between project stakeholders, leading to damaged partnerships and future collaboration prospects. Moreover, disputes can result in negative publicity for all parties involved, potentially harming their reputations in the industry. Therefore, the claimant seeks to gain insight before proceeding with legal action. Unfortunately, the current market lacks a comprehensive tool that can assist the complainant in assessing the probability of a favourable outcome in a dispute. This gap between conflict and dispute resolution profoundly impacts the construction industry. This paper aims to address the need for an effective solution to predict the outcome of prospective claims before they evolve into formal disputes. As per this need, the “Claim Strength Calculator” tool, designed to predict the outcome of claims, is to be introduced. The purpose of this system is to provide insights into a company's position within a particular dispute about construction-related issues. By using this tool, users can identify weaknesses within their claims, enabling them to strengthen and substantiate their data. It offers clarity on the strength of existing or potential claims, including factors such as time, cost, and their interplay. The generated insights assist in making informed decisions regarding further actions or claims. The primary intention of the tool was to ensure a comprehensive assessment of claim strength before engaging in any financial or temporal commitments.

Keywords: Construction claim, Delay, Construction dispute avoidance, Instant results

1. INTRODUCTION

Godwin (2013) defines a contract as an agreement that shares rights and obligations between parties according to governing law. Any breach in these contract clauses may cause the right to demand compensation. In construction, it's common for all projects to carry risks due to human factors. One of the contract's purposes is to share this risk between involved parties namely the contractor, designer, consultant, or client. With many different participants involved in the project, risks can become disputes between parties (Murdoch & Hughes, 2000).

To have a dispute between parties, a claim shall be raised in most cases. All construction contracts have time and cost claim clauses for both parties (Chappell, 2011). Gibson (2008) defines claims as “inevitable features of many projects” that are to be addressed with relevant contract clauses. Therefore, all standard form of contracts contains delay clauses. Duty for evaluation of these claims is given to either the contract administrator or engineer/architect by the many contracts.

Standard contract forms define the circumstances of delayed possession (Gibson, 2008). If the contractor has no control and impact on the delays, an extension of time claim can be raised by the contractor. If the extension of time claim is granted by the engineer or authorities, the claim duration is added to the contractor's baseline completion date without any liquated damage or penalty (Yusuwan and Adnan, 2013).

Disagreements in the construction industry often take a long time to resolve, are complicated, and can be costly to settle. They can also damage the long-term relationships between the parties involved (Gaitskell, 2011). The construction industry of today has evolved into a highly complicated and risky business involving multiple parties. As a result, it is not surprising that a significant amount of conflict exists within this industry. Unfortunately, despite being aware of the visible signs of conflict, there is a lack of understanding regarding the underlying causes and the actual expenses associated with it (Semple, Hartman, & Jergeas, 1994).

2. DISPUTE RESOLUTION IN CONSTRUCTION PROJECTS

The American Institute of Architects, a prominent publisher of widely utilized standard contract documents, provides a definition of a claim as follows: It signifies a formal request or assertion made by one of the involved parties, seeking rightful payment or alternative remedies in accordance with the contractual terms. A claim refers to a plea for reimbursement for any harm

suffered by any participant in the agreement. It outlines the reasons and consequences behind the claim, explains the contractual and legal grounds for payment (entitlement), and quantifies the resulting losses (Semple, Hartman, & Jergeas, 1994).

There are numerous ways in which the contract may stipulate how disputes are to be resolved. According to Gaitskell (2011), dispute resolution is divided into two major parts. Court litigation, arbitration, and expert determination are the three primary methods used for reaching a final resolution in legal matters. These methods hold the authority to make a binding decision, as depicted in Figure 1. In cases of construction disputes, when differences arise, the common approach to resolving them involves resorting to the court system. Occasionally, parties may opt for alternative avenues such as arbitration or seeking expert opinions. However, in the absence of such agreements, the typical course of action is to consult the court with the ultimate verdict. (Christie et al., 2021).

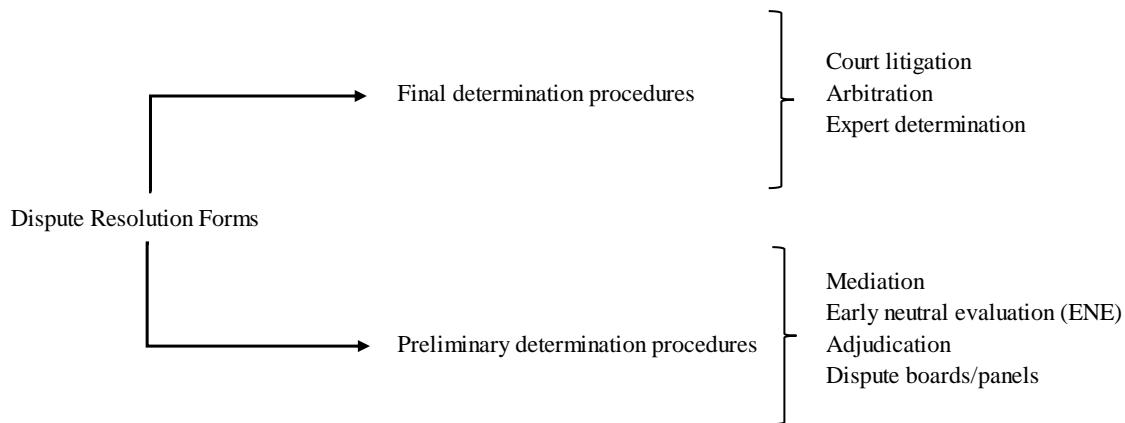


Figure 1. Forms of Dispute Resolution

Technology and Construction Court (“TCC”) deals primarily with litigation of disputes arising in the field of technology, construction, and procurement claims. As seen in Figure 2, the construction industry is one of the major case topics (Annual Report of the Technology and Construction Court, 2022).

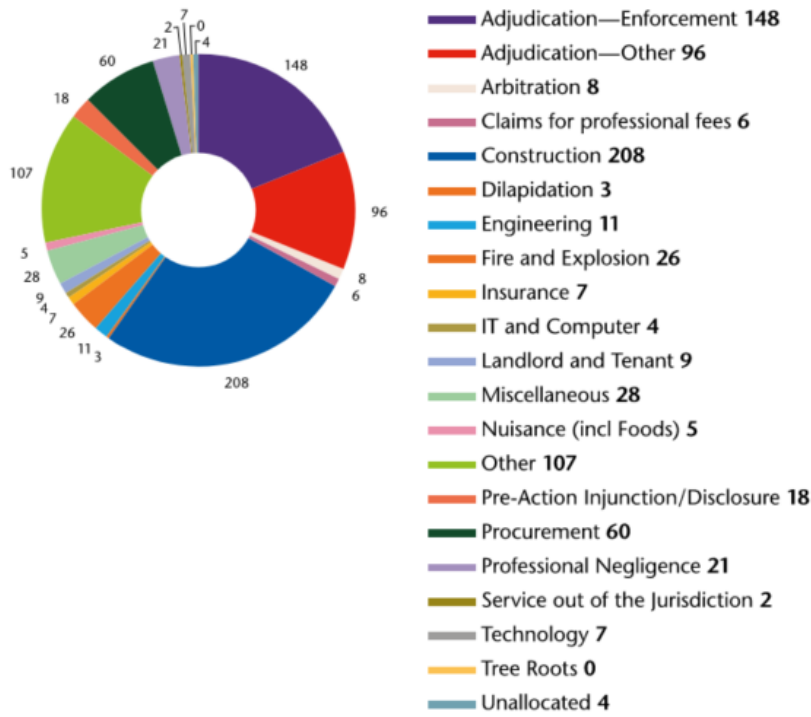


Figure 2. Overall Division Cases

When it comes to construction projects, conflicts or disputes typically go through three primary phases before reaching the point of litigation as shown in Figure 3. These phases include the initial stage of forming a claim (Stage 1), the subsequent stage of rejecting the claim (Stage 2), and finally, the stage where attempts at reaching a peaceful resolution are unsuccessful (Stage 3). The findings of this study suggest that it would be advantageous to redirect the research efforts in construction disputes and litigation. The focus should be on exploring strategies and methods to

mitigate such litigation-prone behavior among the parties involved (Jagannathan & Delhi, 2020).

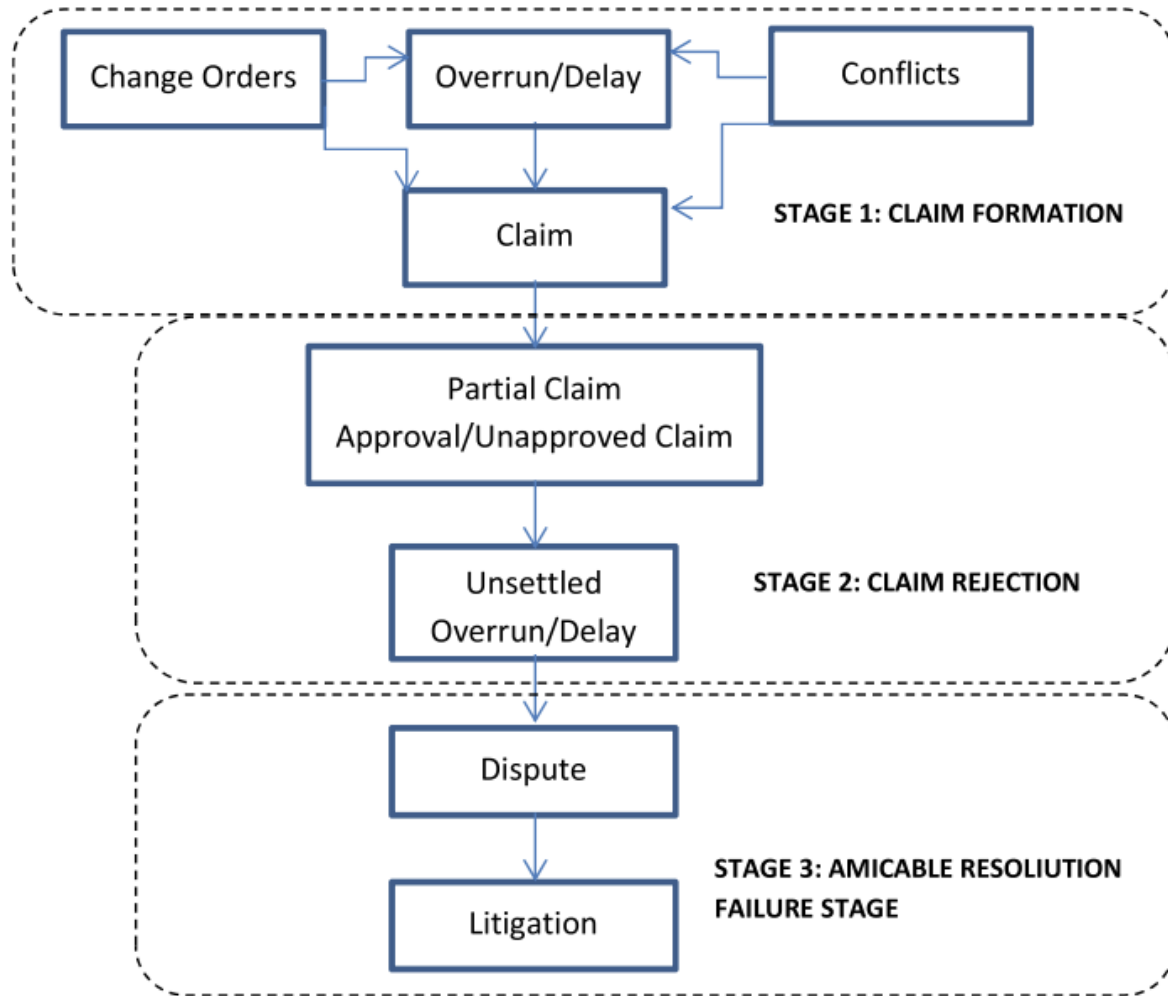


Figure 3. Representation of Phases Preceding Legal Action

Carnell (2005) described how claims can be used as a negotiating tool. When facing a difficult disagreement, consider the key elements required for success in court or arbitration. Effective settlements arise from a careful assessment of necessary proofs by both parties. Evaluate the availability of records, messages, witnesses, and documents to bolster the case. Initiation of a demanding legal process carries risk, potentially serving negotiation positioning. Employing this tactic involves strategic posturing, presenting a robust case to encourage settlement and avert risk.

3. NEED FOR INTERIM STEP BETWEEN CLAIM AND DISPUTE

A. The Significance of Negotiation and Pre-Action Resolution Techniques

When disputing parties engage in direct negotiations, it can result in significant savings in terms of both cost and time, especially if a settlement is reached. As a result, most dispute resolution methods commence with negotiation. Negotiation is considered the most economically efficient approach to resolving conflicts. To avoid or minimize the risk of unsuccessful negotiations, it is crucial to develop practical techniques that empower negotiators to effectively pinpoint the underlying cause (Yiu, Cheung, & Lok, 2015). In reality, negotiation proves to be the most cost-effective approach for parties involved in resolving their disagreements (Illankoon, Tam, Le, & Ranadewa, 2019). Construction professionals often must deal with disputes, whether with a contractor over certified sums, with an employer about unpaid fees, or with a supplier over sub-standard material (Gaitskell, 2011). Mediation, for example, has a success rate generally greater than 70%. Similarly, the vast majority of disputes dealt with adjudication never proceed to arbitration or litigation; the parties simply accept the adjudicator's decision.

In most construction contracts, when negotiations are unsuccessful, a disagreement will undergo a structured process involving alternative dispute resolution and arbitration. The aim is to prevent expensive legal procedures and damage to business reputations, making it crucial to have a compelling reason to resolve disputes through negotiation. To encourage a negotiated resolution, it is important to place significant value on the negotiators' personal perspectives, thereby increasing their motivation to settle (Cheung, Construction Dispute Research Expanded, 2022). Reducing biased decision-making is effective for better dispute resolution. Using resources wisely based on fair judgments improves efficiency. Giving negotiation more priority significantly boosts conflict resolution, reducing the need for complex processes (Cheung, Construction Dispute Research Expanded, 2022).

Based on previous occurrences, it has been demonstrated that a minimum of 80 percent of conflicts that undergo a non-binding dispute resolution process with the assistance of a neutral facilitator are resolved without the need for traditional legal proceedings or arbitration. By employing consensual dispute resolution, the involved parties are allowed to create their resolutions, thereby

fostering an environment that promotes continued business relations between them (Groton & Wilson, 1991).

TCC introduced the pre-action protocol for construction and engineering disputes that applies to all types of construction and engineering disputes, including claims related to professional negligence involving architects, engineers, or quantity surveyors. Its main objectives are to promote open and early communication regarding the potential claim and any defense against it, to facilitate the resolution of disputes through settlement agreements before initiating formal legal proceedings, and to facilitate the effective management of cases in situations where litigation is unavoidable (The Technology and Construction Court, 2022).

Effective utilization of various dispute resolution methods necessitates adequate preparation to maximize the potential for resolving conflicts. Nevertheless, parties frequently engage in these processes without a well-defined strategy to navigate their way through (Martin & Thompson, 2011). Based on the Arcadis 2022 Global Construction Dispute Report, the predominant method for alternative dispute resolution is through direct party-to-party negotiations. The pivotal element in promptly resolving disputes is the willingness of the owner and the contractor to find a middle ground. When trying to find a compromise, it's possible that one or both sides may feel that the compensation they receive doesn't fully cover their losses. The progress of technology can lead us toward a more objective stance, laying the groundwork for fairer negotiations and, perhaps one day, eliminating the need for negotiation entirely. Nonetheless, it is worth noting that there remains a deficiency in technological tools to effectively support and enhance these processes.

B. Complexity of Construction Disputes

I. Heading Level 3

The complicated nature of construction disputes makes things difficult for new people joining the industry and for lawyers who are working on such cases. This is especially true for those who aren't very experienced in this area (Breakspear et al., 2021).

Effective conflict resolution prevents the waste of significant and precious resources. Nevertheless, illogical behaviors pose obstacles to settling. Reactive devaluation, a widely acknowledged psychological hurdle to successful dispute resolution, encompasses various categories of behaviors. A principal component factor analysis identified five types of reactive devaluation

behaviors in the context of conflict resolution: (1) resistance to change, (2) questioning the abilities of the other party, (3) excessive self-assurance, (4) partiality in processing information, and (5) distrust towards the opposing party. These reactive devaluation behaviors hinder the exchange of proposals and result in the rejection of constructive suggestions (Cheung, Li, & Chow, Reactive Devaluation as a Psychological Impediment to Construction Dispute Negotiation, 2020).

The decision to use alternative methods, rather than the courts, to settle contract disagreements is driven, to some extent, by the aim to steer clear of escalating expenses and the lengthy process associated with legal proceedings. The development of performance model construction techniques such as design-build or construction manager will bring forth fresh difficulties, affecting not just builders but also dispute resolution organizations. These novel techniques will raise the possibility of conflicts arising to different extents. Therefore, an adaptable approach will be necessary to address these challenges (Coulson, 1983).

The study of the human element in construction project management is greatly lacking. The complicated contracts and large resources involved make it difficult to analyze construction-related decisions logically (Cheung, 2014). Regardless of the contractual obligations, the potential time and cost savings linked to quickly resolving change orders and disputes related to claims, it is a wise decision to pursue a negotiated settlement for any construction disagreement (Levin, 2016).

C. The Economic and Temporal Dimensions of Conflict

According to Arcadis Global Construction Dispute Report (2022), the global average value of disputes is \$52.6 million, and the average dispute length is 15.4 months where the highest dispute value reaches up to \$2 billion. In another report that CRUX published in 2020, out of 1185 projects that they reviewed the total amount of disputes exceeds \$48.6 billion and the total extension of time claim is 593 years (Engineering and Construction a Regional Analysis of Causation, 2020).

Referenced in the "Construction Adjudication in the United Kingdom: Tracing Trends and Guiding Reform" report by Nazzini and Kalisz (2022), it is highlighted that the typical overall fee for adjudicators varies, ranging from \$12,000 to \$14,000. However, it is important to note that in certain instances, this fee can escalate significantly, exceeding even \$50,000 for particularly

complex cases. According to JLT Specialty Limited (2017) Construction Employer's Liability Claim Index report, the average claim cost is \$37,300 and the average settlement time is 824 days.

To ensure cost-effective proceedings, an adjudicator can employ various strategies that include avoiding in-person arbitration hearings, utilizing technology for electronic document bundles and virtual meetings, and implementing advanced case management techniques such as clearly defining the scope of the dispute and the issues to be resolved from the beginning or after initial pleadings. Additionally, limiting the number and length of submissions can be an effective approach to streamline the process. These measures are widely adopted and proven to be highly effective in achieving cost efficiency (Gaitskell, 2011). Many individuals in a disagreement may prefer a fast and affordable solution, even if it's not flawless, over an extremely costly and slow resolution that's nearly perfect. (Christie et al., 2021).

Based on the aforementioned conditions, a compelling necessity arises for a technological solution within the construction industry. This tool should proactively address potential disputes in alignment with prevailing project conditions and claims. Its implementation would ideally take place before the initiation of formal dispute resolution processes, whether they entail final determinations or preliminary procedures. This strategic approach is driven by the aim to mitigate the high costs and time investments associated with dispute resolution. Given the complex nature of the construction sector, the tool's design must prioritize simplicity and user-friendliness. The tool, named The Claim Strength Calculator ("CSC"), was developed and made publicly available (<https://claims.laminarprojects.com>) in November 2022 by Laminar Projects Ltd. This paper comprehensively examines the genesis of the CSC, its intended goals, operational guidelines, and prospective implications within the construction sector.

4. HOW THE CLAIM STRENGTH CALCULATOR WORKS

The study comprises two main sections. The initial part involves collecting information from existing sources to develop a survey tool capable of forecasting potential outcomes of construction disputes. The aim of this tool is to utilize data for evaluating the strength of a claim made by an individual, whether in support of or in response to it.. Evaluation of the results has been reviewed by users in the second part to enhance accuracy of prediction. While previous efforts in the

literature have sought to digitize construction claims, there is a noticeable absence of tools capable of technically assessing these claims.

During the tool's creation phase, relevant prior studies were reviewed, and the most crucial elements of a claim were incorporated into the tool. A parameter was determined for each section and response. According to users' responses, the tool calculates the strength of the corresponding section. The subsequent section involved receiving feedback on the tool from construction experts to make further improvements, and to validate the claim strength scores generated during the beta stage. Following the initial draft of the tool, a survey was prepared and distributed to various users. Constructive input from construction professionals led to updates in both the survey and the result section of the tool. This process was repeated for diverse project types and involved different construction professionals across five iterations. The factors within each response that influence the importance of the question (weighting) for assessing strength, were fine-tuned based on the feedback from construction experts. As these parameters hold proprietary value, they won't be unveiled in this article.

The first phase of the research takes on a non-experimental approach, as the central research question is expansive and exploratory. This mirrors a scenario that cannot be manipulated in an experiment but can solely be evaluated in real-world contexts. This research phase can be characterized as an exploratory descriptive research design. This design involves identifying, investigating, and describing an existing issue that lacks a comprehensive background in the literature. The research aims to gain a profound understanding of existing phenomena and to propose solutions to their associated problems. Additionally, alongside the descriptive research design, other research designs are also utilized. A literature review is conducted to examine previously documented claim outcomes and to establish the foundation for the CSC. A third research design, a cross-sectional design, can also be considered for the first part. This is because one of the primary outcomes of the research is to increase awareness of time and money losses during construction disputes. The second research part involves a questionnaire and primarily deals with qualitative data.

The CSC works through a web browser and requires users' input to related questions. After receiving responses, answers are transferred to a server to run the algorithm. Survey results are stored in the database and shared with the user as a report page.

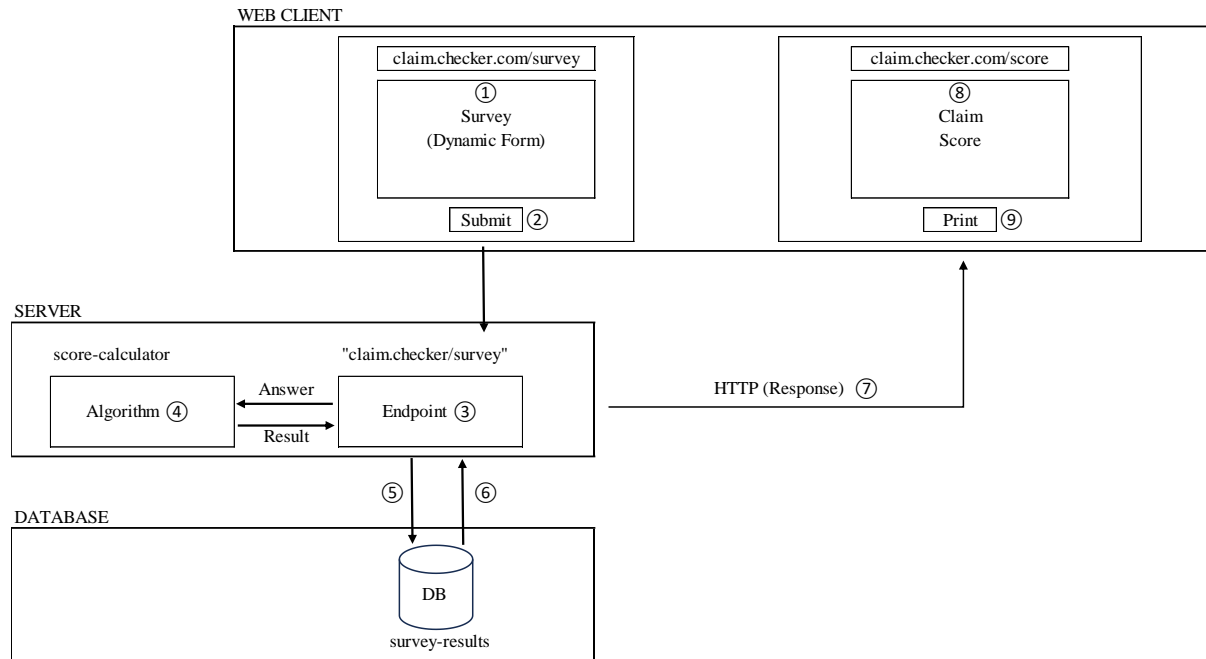


Figure 4. CSC Data Flow Back-end

The system is a web application designed to be hosted on a website. Its primary purpose is to enable users to complete a questionnaire about a commercial claim and subsequently receive an automated evaluation of the claim's strength. The system relies on four main technologies, which are briefly outlined below. However, this article will not go into the complicated technical details of these technologies.

- Client web application: This component serves as the user interface, allowing individuals to access and interact with the system via their web browsers.
- Server-side application: The server-side application handles the processing and logic behind the scenes, ensuring that user input is properly evaluated and generating the corresponding strength assessment.
- Cloud-hosted database: To ensure efficient storage and retrieval of data, the system utilizes a cloud-hosted database. This choice of database enhances scalability and reliability.
- Typeform: Typeform is a tool integrated into the system to provide both the questionnaire form inside the web app and the responses API as part of their CRM service.

5. WHAT CLAIM STRENGTH CALCULATOR AIMS

A. Clarity of Claim Strength

The field of construction claims support services has long needed innovation, requiring the introduction of novel technologies. This arises from a desire to establish cost certainty and move away from the conventional open-book approach. Unfortunately, this has led to a negative perception of claim consultants in the industry. CSC's primary objective is to provide clarity regarding claim strength even before any commitment is made in terms of cost or time, thereby preventing wasteful investments. CSC aims to present the facts of a claim in a visual manner, avoiding the use of lengthy legal jargon.

B. Contract Management and Coordination

According to Schneider (1991), there are two approaches to contract management and coordination. The first approach involves clearly assigning responsibilities between the contractor and employer, while the second approach employs a neutral third party to handle contract administration and interface management. With the advent of the CSC, there emerges a promising third option that could potentially replace the need for a third-party intermediary. This innovative solution offers a more robust and efficient approach to contract management and coordination, opening new possibilities for enhanced collaboration between parties. The CSC can open the doors for a third option that can replace the third party and come up with a more robust solution.

C. Early Involvement

Early Neutral Evaluation ("ENE") is a different way to solve disagreements without going to court. The primary objective of ENE is to address the unresolved matters in a dispute and provide insight into the probable outcome if the dispute were to proceed to court or arbitration. ENE serves to bring clarity to the issues in contention and offers a realistic assessment to both clients and their legal representatives. Furthermore, it enables the decision-makers involved in the dispute to gain a comprehensive understanding of the strengths and weaknesses of their respective positions (Gaitskell, 2011).

ENE is used when one party has an unrealistic view of their chances of winning at trial. A neutral evaluator can point out the weaknesses in a case that would become evident if the matter went to

court. On the other hand, the CSC does not require the appointment of an evaluator to be used. It can be used instead of ENE and help with any type of pre-action dispute resolution method. It is important to note that the reasons outlined above may overlap, but they are presented distinctly to highlight the versatility and potential of the CSC in adding value to the construction industry.

6. CLAIM STRENGTH CALCULATOR AREAS OF USAGE

The CSC is a multifaceted tool that not only predicts the outcome of claims but also serves as a valuable resource to enhance project progress focus and increase confidence among all parties involved in any disputes. Its intended application goes beyond prediction and extends to guiding responsible personnel in collecting essential documentation to support the claimant's position.

Below are several primary factors explaining why this tool holds importance across various dimensions of project management.

- **Supporting Contract Management Performance:** The CSC assists the company's commercial representatives in evaluating contract management performance, allowing them to make informed decisions and improve overall efficiency.
- **Conducting a Multi-disciplinary Project Health Check:** Using a method characterized by a subtle approach, the tool conducts a thorough evaluation of the project's well-being. This empowers teams to spot possible challenges and primarily address them to safeguard the project's achievements.
- **Proactively Resolving Issues:** By leveraging the CSC, project stakeholders can identify vulnerabilities in contracts, site records, visual site progress, cost capture, progress reports, and meeting minutes. This information empowers them to address weaknesses and resolve issues efficiently.
- **Empowering Planners:** The CSC equips planners with valuable insights that can be brought to the management's attention, accompanied by a comprehensive playbook of resolutions for any scenario.
- **Standardized Claim Evaluation:** It provides a standardized method for evaluating all claims, facilitating easy comparison of claim details, and promoting fair decision-making.

- **Identifying Document Improvement Opportunities:** The tool helps identify areas where project documentation for a strong claim may be lacking, creating opportunities for improvement, and strengthening future claims.
- **Preventing Unnecessary Litigation:** For claims that may not be strong enough to warrant litigation, the CSC acts as a safeguard, guiding parties to seek alternative solutions and avoid unnecessary legal actions.
- **Encouraging Settlement Agreements:** Conversely, when the claim proves to be robust, the CSC can be instrumental in persuading respondents to settle on favourable terms, promoting amicable resolutions.

In conclusion, the Claim Strength Calculator can be used as an instrument that enhances project management, fosters proactive decision-making, and facilitates fair dispute resolution.

7. HOW TO USE THE CLAIM STRENGTH CALCULATOR

The CSC operates through a website interface accessible from any web browser. The language employed in the tool is intentionally kept simple, ensuring that professionals of all levels can easily utilize it without requiring extensive commercial knowledge. Before entering any information, the CSC strongly recommends that users fully comprehend the terms of the contract and the allocation of risks involved. The quality of the results depends on how accurate the data is. Therefore, if more members of the project team, especially those from both operational and commercial sides, participate in completing the CSC, the results will be more accurate.

Each user response can lead to a diverse array of follow-up questions, creating a unique path of inquiry. However, considering all possible responses and their corresponding paths could be time-consuming. Hence, for the sake of brevity in this article, we will focus on a single illustrative path.

The CSC caters to both claimants and respondents, primarily focusing on client, contractors and subcontractors. To begin, users are prompted with a crucial question: whether they are initiating a claim or responding to one. This initial input will dictate the subsequent questions presented to the user. Example in this article is prepared for a general contractor claimant.

A. Section 1 – Contract

When looking at a construction dispute, the first thing to do is to ignore the name of the problem and understand where it's coming from and what it's about. The agreement or contract decides who is responsible for time-related issues and what can be done about them (Breakspear et al., 2021).

As per the Society of Construction Law (2017), delay and disruption issues can be categorized into two main types: time-related and cost-related matters. Therefore, the CSC offers the following options for selection:

2 → What impact is the claim event in question, having/could have on the project?*

A Time

B Cost

C Time & Cost

D Not Sure Yet

Figure 5. The Interface of the CSC for Single-choice question

While using the CSC, it is important to acknowledge that projects can sometimes be complex, and obtaining information for all questions may not always be straightforward. To address this, an option has been included for those who are unsure about certain details. By offering this flexibility, the CSC aims to accommodate the practical challenges faced by projects and provide a comprehensive analysis even when some aspects may not be entirely clear at a given moment.

In order to cover as many issues as possible, Time & Cost option is selected. The corresponding questions and responses for this example continue as below.

<i>Question</i>	<i>Response</i>
Has a contract been executed between the relevant parties?	Yes
What form of contract was executed between the relevant parties?	NEC Suite
Is this questionnaire being answered based on a single claim event or multiple?	Single
How much delay is currently being forecast to completion?	0 to 10 days
Have the relevant parties been formally notified of the claim(s)?	All events
Have claim notice(s) been issued in compliance with the contract?	Some of them

Has the client responded to formal notification(s) in compliance with the contract?	Some of them
Is there a formal log of all contractual change notifications?	Yes but with gaps
Is there a risk of incurring damages?	No
Has the value of the claim been estimated?	Yes - £51K to £100K

Table 1. Contract Section Questions and Responses

B. Section 2 - Programme

The well-known saying suggests that time is money, emphasizing its significance in various aspects, including project management. Despite this fact, inadequate planning and programming continue to be consistently ranked among the top three reasons for project failure in most surveys (Gibson, Construction Delays Extensions of Time and Prolongation Claims, 2008). Failing to meet the scheduled target for a project leads to a compromised project scope. As a consequence, the project fails to accomplish its intended goals (Ward, 2018). For this reason, programme is dealt with comprehensively in Section 2 of the CSC".

One of the recurrent problems that plague projects is related to unagreed contract schedules according to (Klee, 2015). According to Kakalik et al.(1996), due to the distinct departments often responsible for preparing the contract forms and technical schedules, there are frequent and significant discrepancies in these documents. These inconsistencies become the foundation for contractor claims. In the programme section, the CSC asks for an agreed contract programme between parties first. It is assumed for the example that there is an agreed contract programme between parties. The CSC continues questions for the programme section as below.

<i>Question</i>	<i>Response</i>
When was the last programme accepted by the client i.e. the last baseline agreed?	Within the last 3 months
How much of the programme is driven by logic links?	61-80%
Is the planned sequence of works currently being followed? If not, how long ago did works stop following the plan?	No – stopped less than 1 month ago
Has the critical path been agreed between the relevant parties in every programme update?	Yes
Are the revised programmes fully compliant with the contract?	No
Does the programme accurately reflect the event in dispute?	Yes

During the claim period in question, are there any gaps in the revised programmes? Yes

Table 2. Programme Section Questions and Responses

C. Section 3 – Site Records

Site records encompass a variety of data primarily concerning finance, quality, and progress. These records must incorporate specific details, such as the events' timing, the utilized resources, and any instances of disruption or delay. The records regarded primarily as progress-related documents comprise site diaries, weekly progress reports, daywork sheets, joint records, photographs, as-built programs/schedules, and minutes of progress meetings (Scott & Assadi, 2010).

Consistent documentation of the activities carried out by all parties at a construction site is essential not only to validate that work is being performed as per specifications but also to evaluate any claims for additional time or cost. Unfortunately, site records frequently suffer from inadequacies and inaccuracies (Hegazy, Elbeltagi, & Zhang, 2005).

In this section, the CSC focuses on ensuring site record accuracy to identify potential claim outcomes and asks about the frequency of site record updates. After selecting "daily," the CSC presents a series of multiple-choice questions for them to answer. It not only provides single-choice questions but also seeks to diversify inputs by offering a range of multiple questions.

22 → Do the site records capture:*

Select for Yes, leave blank if No. If somewhere in between, leave blank.

Choose as many as you like

- A formal acknowledgement by the client i.e. signed and returned?
- B the number of people onsite daily? ✓
- C each individual name of those working onsite?
- D the grade/role of the people onsite? ✓
- E the hours worked onsite?
- F the hours attributed to specific grades?
- G the hours attributed to specific people?
- H a detailed description of daily activities undertaken? ✓

OK ✓

Figure 6. The Interface of CSC for Multiple-choice question

The following questions and responses are listed below.

<i>Question</i>	<i>Response</i>
Do the site records capture:	-Any delays experienced onsite -The quantities and type of the plant on site -The weather onsite daily
Are there any gaps in the site records during the claim period in question?	None

Table 3. Site Records Section Questions and Responses

D. Section 4 – Cost

The ultimate goal of most claims is to restore the contractor to the position they would have been in had there been no delay; their original profit (or loss) should remain as initially included in the bid. Consequently, it becomes essential to examine the factual additional costs borne by the contractor during the time of the loss – as long as these costs have been reasonably and justifiably incurred.

Claims for prolongation and disruption involve two tiers of evaluation. Initially, the focus is on assessing the direct consequences of the event or change, which typically entails analyzing the impact on the contractor's resources and working methods – this often forms a major part of the claim. Subsequently, consideration must be given to any indirect consequences, such as heightened overheads or increased costs (Potts & Ankrah, 2013). Measurable expenses play a crucial role in the majority of claims, and if costs aren't accurately recorded, potential funds will consistently go unclaimed. Questions and sample responses to this section are listed below.

<i>Question</i>	<i>Response</i>
Do the project costs consist of elements of self-delivery, or are the costs solely derived through a managed supply chain?	Self-delivering at least certain aspects of the project
Are the project's self-delivered costs based on invoices alone?	No
Are the invoiced costs supplemented with project cost accruals?	Yes
If yes, how frequently are these cost accruals updated?	Monthly
Which statement best reflects how detailed the cost accruals are?	Project team estimations of costs before invoice

Table 4. Cost Section Questions and Responses

E. Section 5 – Progress Reports

According to Ruman (2013), work progress is tracked using daily and monthly progress reports. The monthly report includes photographs that document the physical advancement of the work. Meanwhile (Sears, Sears, Clough, Rounds, & Segner, 2015) suggest collecting and transmitting data in weekly cycles.

Progress reports are not bound to a fixed frequency but rather adapt to the specific requirements of each client, project type, and size, among other factors. While the reporting frequency can vary, it is crucial to preserve consistency in delivering these updates, ensuring they comprehensively reflect the current site conditions and encompass all essential details. Therefore, the CSC initiates this section by inquiring about the existence of a formal project progress report between the involved parties. After selecting "Yes" for this example, the CSC proceeds to ask the following questions.

<i>Question</i>	<i>Response</i>
How frequently are these progress reports issued?	Weekly
Is progress monitored and reported in any other less formal ways? (e.g., ad-hoc emails, site workshop minutes, etc)	Sometimes
Does the progress report(s) accurately represent the events of the claim period in question?	Yes
Are there any gaps in the progress reports during the claim period in question?	Some

Table 5. Progress Report Section Questions and Responses

F. Section 6 – Visual Site Progress

A crucial aspect of effective project management is the continuous and methodical monitoring of progress. This involves identifying, processing, and visualizing any differences between the planned and actual performances. Such practice becomes essential in providing early warnings to project managers, enabling them to pinpoint and address progress discrepancies and performance issues promptly through appropriate corrective actions (Fard, Savarese, & Mora, 2009). This section, the CSC asks for any visual records that the claimant may have.

<i>Question</i>	<i>Response</i>
Do you visually capture site progress i.e. marked-up drawings, site photographs, 360 camera walk-throughs, BIM, etc	Yes site photographs
How regularly are these visual site progress records captured?	Weekly

Are the records timestamped?	Yes
Do the records reference specific site locations?	No
Are there any gaps in the frequency of visual progress records during the claim period in question?	None

Table 6. Visual Site Progress Section Questions and Responses

G. Section 7 – Meeting Minutes

As per Ward (2018), it is crucial to handle the recording and notification aspects during meeting management with caution. The minutes should follow a consistent format across all meetings, be comprehensive in content, and avoid references to external documents. All decisions and the responsible parties should be accurately recorded in the minutes, and target dates for completing action items must be specified. It is important to note that meeting minutes with a client can be considered legally binding agreements unless there is a prior agreement stating otherwise.

During site meetings, it is customary to compare the real-time progress with the planned schedule and to document any claims the contractor might have for time extensions or outstanding variation orders. It is of utmost importance to diligently record the proceedings in minutes, as these records could potentially serve as the foundation for contractor claims (Cartlidge, 2015). Good contemporaneous records can be the difference between winning and losing a claim. Therefore, CSC discovers the quality of meeting minutes records in this section.

<i>Question</i>	<i>Response</i>
Are meeting minutes captured for all project meetings?	Always
Do the project meeting minutes contain:	-Actions -Deadline
Are there any gaps in the frequency of meeting minutes taken during the claim period in question?	Some

Table 7. Meeting Minutes Section Questions and Responses

H. Section 8 – Design

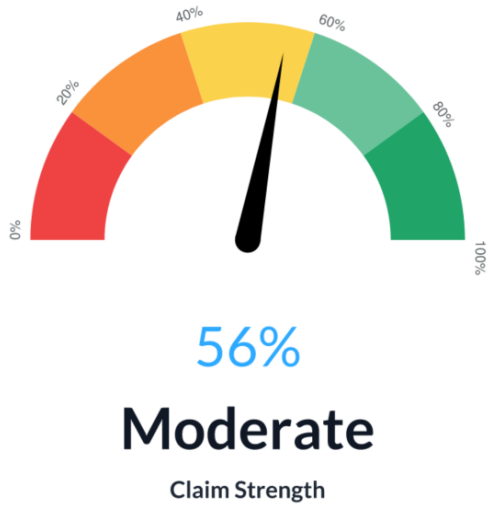
The extent of design information provided for pricing in the market aligns with the chosen procurement strategy and the level of risk the client anticipates contractors to handle. In general, a higher level of design detail and site information made available to potential head contractors and subcontractors reduces their risk exposure. Comprehensive design documents play a pivotal role in conveying the design and, when applicable, the construction requirements of the project. To

ensure accuracy and reliability, every phase of the design and documentation process should be diligently monitored through an effective quality assurance process (Cooperative Research Centre for Construction Innovation, 2009).

Essentially, design can be categorized into two options: 2D and 3D. The research titled “Building Design Coordination: Comparing 2D And 3D Methods” Shih (1996) indicates that the 3D approach outperforms the 2D methods for design coordination due to its enhanced efficiency and effectiveness. Shih supports this by highlighting additional advantages of the 3D model, such as 3D spatial analysis, volume, and area quantity estimation, increased overall drawing production efficiency, consistent data across drawings, and reduced manpower requirements (Santos & Ferreira, 2008). Therefore, the CSC asks whether the design has been developed in 2D or in 3D for this section.

I. Section 9 – Result

After completing all the sections, the CSC processes the results and communicates them to the user via the email address provided during the process. Each section covered earlier is scored independently, and the strength of the case is evaluated individually for each section. The selected response for this example determines the results shared in Figure 7. Based on these findings, users can gather valuable information about the strength of their claims and identify areas where they might be lacking. This enables them to take the required steps before deciding on moving forward with any form of dispute resolution. Based on the outcomes, these results can also give the claimant the necessary motivation to enhance their document management and reporting skills, thereby preparing themselves for potential future challenges.



ATTRIBUTE	POINTS AVAILABLE	POINTS SCORED	OVERALL SCORE	STRENGTH SCORE
Site Records	47	24	51%	Moderate
Programme	38	24	63%	Strong
Visual Site Progress	25	14	56%	Moderate
Costs	16	8	50%	Moderate
Contract	15	9	60%	Strong
Progress Reports	14	8	57%	Moderate
Meeting Minutes	12	6	50%	Moderate
Total	167	93	56%	Moderate

Figure 7. The Interface of CSC for Overall Case Strength

8. FUTURE WORK

A. Disclaimer

Claim Strength Calculator is a tool designed to weigh numerous variable factors, generating an indicative only claim strength, and is not intended to be relied upon as professional advice.

The results produced have been generated based on the experience of construction and claims professionals. Each question has been scored and weighted by the perceived importance of the role they would play, in the successful resolution of a claim. Additionally, results depend on the information provided by the claimants themselves. There's a challenge when it comes to assessing the quality of this information. The CSC cannot evaluate it digitally, so it necessitates consultation with professionals before taking any legal action. Therefore, the results should only help make decisions about whether to pursue a claim and prevent wasting money, rather than being used as the basis for legal action in formal proceedings.

These results are therefore for guidance purposes only, to provide an indicative claim strength and improve the users' understanding of any current position regarding the live or upcoming claim events. The paper intends to demonstrate a possible approach to predict the outcome of a

construction claim and its impact on the industry. The author believes that there is a big potential to develop a more precise approach with the progression of artificial intelligence (“AI”).

B. Improvements with AI

AI technologies bring big changes to arbitration, a type of legal process that's well-suited to benefit from new legal advancements due to its contractual nature. Right now, AI legal tools in the United States are designed to help lawyers with tasks related to managing cases and handling administrative work. These tasks involve things like checking documents, doing legal research, creating contracts, analyzing cases, and managing cases. (Bakst et al., 2022).

AI can examine previous choices and knowledge of arbitrators to pick or suggest the best candidates. This means an AI tool would look at facts and legal points to decide on an award, using legal examples. AI might help a human arbitrator like an expert decision-maker by assisting them in making their decision (Bakst et al., 2022).

That being stated, the CSC's future could be enhanced through the incorporation of machine learning and natural language processing. Cases that are shared publicly and the outcomes they yield can be recorded within the CSC, enabling it to learn from these interactions. Instead of depending solely on individual perspectives, the CSC has the potential to forecast outcomes based on patterns from past cases.

9. CONCLUSION

In the evolving landscape of construction disputes, the need for innovative solutions has become increasingly apparent. As discussed throughout this article, the complicated nature of these conflicts demands approaches that are beyond conventional methods. The construction industry, characterized by its complex web of contractual obligations, diverse stakeholders, and challenging projects, necessitates a tool that not only predicts outcomes but transforms the way disputes are managed and resolved. The introduction of the Claim Strength Calculator represents an advancement in this field.

The CSC represents a comprehensive solution that addresses multifaceted challenges encountered across the project lifecycle. By presenting a clear assessment of claim strength, it empowers professionals with the tools to make strategic decisions early on, preventing wasteful investments

and fostering communication between parties. Its utility extends to enhancing contract management performance, conducting project health assessments, proactively resolving issues, and guiding planners to navigate complex scenarios.

In an era marked by technological advancements, the introduction of the Claim Strength CSC emerged as progress in the construction industry. It marks the beginning of a fresh approach to solving conflicts by blending the strengths of data analysis with a deep understanding of legal and contractual factors. With the advancements in AI, this approach can affect dispute resolution deeply in the near future.

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