FACILITATING AGREEMENT IN DISRUPTION CLAIMS THROUGH DISRUPTION ANALYSIS METHODS

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Disruption in construction projects is one of the major causes of claims. The extent of each contracting party's responsibility for disruptions in a project is a frequently asked question in such claims. Over the years, various disruption analysis methods have been developed to address this question, but the consensus among experts and contracting parties on this matter is still sparse. Such lack of agreement on a uniform disruption analysis method often results in disputes between contracting parties. An investigation of the recommended disruption analysis methods is conducted in this research by interviewing 22 disruption claims experts in Australia. Results revealed that most experts preferred using the baseline productivity method (23%) followed by the measured mile method (18%) because they promote objectivity in the assessment. Results from this study suggest that the objectivity in analysis methods along with information availability can enable agreement between contracting parties for their application in disruption claims. This study identifies the need for an established information management system to facilitate resolution of disruption claims.

Keywords: contracting; dispute resolution; information management; productivity

INTRODUCTION

Disruption claims also known as inefficiency claims or loss of productivity claims arise in construction projects because of the occurrence of triggers of disruptions. Disruption in construction projects is defined as "a disturbance, hindrance or interruption to a contractor's normal working methods, resulting in lower efficiency" (SCL 2017). These are actions or events which prevent the contractors from proceeding with their work or some planned activities. Changes in design, rework, excessive overtime, bad weather, unforeseen site conditions, out-of-sequence work, the lack of materials or equipment, conflicts with other contractors, a delay in responding to information requests, poor coordination, and poor supervision are factors or events that can trigger disruptions (Davison and Mullen 2009; SCL 2017). Disruptions are detrimental to the performance of contractors and could lead to time overruns in construction projects (Klanac and Nelson 2004). Further, it increases the contractor's cost of work due to changes in the contractor's anticipated working conditions, planned resources or manner to perform work (Schwartzkopf 1995). Contractors can use disruption claims to get compensated for the loss if the catalysts

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for disruption are outside their control, entitled in the contract and proven to be factual (Klanac and Nelson 2004).

However, disruption claims often result in disagreements leading to disputes between contracting parties (Davison and Mullen 2009). Such disputes may grow and eventually be litigated, which is a very expensive and lengthy experience for the parties involved (Cheung *et al.,* 2004). Arcadis (2022) published a report on the global disputes in construction projects including infrastructure, buildings, and roads, and estimated the average annual dispute cost to be $52.6 million with an average resolution time of 15.4 months.

One of the major problems in disruption claims' resolution leading to disputes is the lack of uniformity and consistency in the techniques for analysing and assessing disruptions in construction projects (Aibinu 2009). The contractor may quantify or substantiate its productivity and financial loss arising out of disruption events using a variety of methods, and the owner or its representative (claim's certifier) may also then evaluate the submitted claim based on one or more of the available methodologies. Using different approaches for the same disruption event will yield different results and lead to disputes as demonstrated by Kumaraswamy and Yogeswaran (2003).

Some of the key methods for analysing disruption claims include (1) measured mile method; (2) baseline productivity method; (3) earned value analysis; (4) program analysis; (5) work trade sampling; (6) system dynamic modelling; (7) project comparison studies; (8) industry studies; and (9) cost-based method. The measured mile method compares productivity in areas or periods of the works impacted by identified disruption events to productivity in areas or periods of the works not impacted by those identified disruption events (Zink 1986). Baseline productivity method is a modification to the measured mile method and is based on intermittent unimpacted periods period (Robert 2017). Earned value analysis calculates the planned man-hours for performing specific construction activities and compares it to the actual man-hours spent (Schwartzkopf 1995).

In program analysis, specialist programming software assists in determining periodic percentage completion for impacted activities (SCL 2017). In work trade sampling, contemporaneous records of direct observations (time ad output) from workers are used to determine productivity (SCL 2017). System dynamic modelling is a computer simulation strategy that creates a model of the disrupted project using specialised software (Williams *et al.,* 2017). In project comparison studies, the productivity of a disrupted project is compared to a similar project or activities on un-disrupted projects (SCL 2017). In industry studies, industrywide research is used to estimate the productivity-loss, provided such studies are relevant to the disrupted project's characteristics (SCL 2017). In cost-based method, the difference in unit cost is calculated for the impacted and unimpacted periods after deducting the non-labour costs (Robert 2017).

The results obtained from different analysis methods to determine the contractor's entitlements for the inefficient hours due to disruption events often varies. This has also been established by Robert (2017) through a case study project. These differences in the outcomes often lead to disagreements and disputes between contracting parties (Aibinu 2009). Similarly, due to the availability of multiple disruption analysis methods, disruption claims involve a high degree of "cognitive conflict" (Aibinu 2006). Cognitive conflict results when people understand data

pertaining to factual concerns differently. Different perspectives on what is significant, as well as disparities in the methods and processes used to evaluate claims and disputes, can lead to cognitive conflicts (Moore 2014).

Thus, it is vital to establish an agreement on the use of a common disruption analysis method for analysing disruption claims. This could be beneficial in the following ways: (1) improving consistency in the claims' analysis and assessment, (2) ensuring that the parties share a consistent understanding and expectations of how claims will be evaluated, and (3) increasing the transparency in the evaluation and substantiation of claims to foster trust between the parties.

Research Gap and Aim

Owing to its significance, this area of disruption claims has always been of great interest to researchers. The key research in this area can be classified as improving the existing and developing new disruption analysis methods (Ibbs and Liu 2005), guidelines and recommendations for the selection of appropriate disrupting analysis methods for analysing disruption claims (Nguyen and Ibbs 2010), and utilisation of computer-based tools and technology to improve disruption analysis (Al Malah *et al.,* 2013). However, despite the volume of research work on disruption claims, limited focus has been made on improving the agreement between contracting parties on a uniform method for analysing and assessing disruption claims for construction projects. To minimise the potential for conflict, it is important to develop a consensus among contracting parties on an acceptable and effective method to be used for analysing disruption claims when they arise.

To develop a consensus and enable agreement between contracting parties on a suitable disruption analysis method, it is important to recognise the preferred methods for analysing disruption claims by the experts in this area. This information will enable contracting parties to agree and select the most viable method for analysing disruptions in construction projects. Accordingly, the aim of this study is "to explore the methods of disruption analysis that can enable agreement between contracting parties when analysing and assessing disruption claims". The specific objective of this research is to investigate the experts' recommended disruption analysis methods and determine the reasons for their preference.

Theoretical Background

One way of improving the process of disruption claims and minimising the disagreements and disputes between contracting parties is through pre-contract negotiation and agreement on the disruption analysis method. Aibinu (2009) empirically proved that the higher the extent of pre-contract negotiation and agreement between the contracting parties on the methods for analysing and quantifying the disruptions, the lower will be the chances and intensity of disputes in construction projects. The theoretical underpinnings can be found in social psychology literature (concept of control), which suggests that the participation of the parties involved in any conflict resolution process could reduce the conflict's intensity and raise the likelihood that the outcome of the decision-making process would be respected by the parties (Thibaut and Walker 1978). To achieve the early participation of contracting parties, agreements on rules for quantifying and assessing the impact of anticipated disruption should be widely promoted (Aibinu 2006).

The agreement on the adoption of a uniform disruption claims analysis (by contractor) and assessment (by owner) method can have both instrumental (quality of decision-

making) and non-instrumental (social-psychological) effects. Through improvement in quality of decision-making, it could help to diffuse conflicts (Aibinu 2009). Similarly, Thibaut and Walker (1978) proposed that allowing control to the dispute participants for influencing the outcome of dispute will make them believe in the fairness of the process and will increase the chances of outcome acceptance (non-instrumental effect).

METHOD

This research is phenomenological and has adopted a qualitative method for its data collection. Phenomenological research is used to describe the real experience of participants (Creswell and Clark 2017), which owing to the complexities around disruption claims is vital to consider. To ensure that the data generated depicts the first-hand experience of participants with disruption claims, descriptive phenomenological approach is applied. Descriptive phenomenology helps to investigate, analyse, and describe a phenomenon while keeping its richness, breadth, and depth in order to obtain "a near-real picture" of it (Speziale *et al.,* 2011). Similarly, the qualitative method fosters a deeper understanding of participants' perspectives (Tashakkori and Teddlie 1998) and is found to be more suitable for achieving the goals of this research. Data collection was done through interviews, which can aid to reduce non-responses and collection of quality data (Lavrakas 2008). The interview format was set as semi-structured because it allows asking a set of questions based on certain themes and probing when necessary.

Data Collection

To address the objectives of this research, 22 disruption claims experts in Australia were interviewed. A purposive sampling technique was used to select participants for this research requiring experts who have experience working on different stages of disruption claims for construction projects. For sample selection, experts were shortlisted and contacted from the major contractor and owner companies, independent 3rd party companies offering disruption claims' analysis, and dispute resolution services. 22 interviews were conducted in this research, which according to Creswell (1998) also aligns with the recommended sample size for qualitative interviews in phenomenological research i.e., at least 6 or between 5 to 25.

Figure 1 shows the experience and roles of experts recruited as research participants for this study. Most interviewees had the experience of working in multiple roles while handling disruption claims on construction projects including commercial managers, contract managers, project managers, contract administrators, delay analysts, project planners, construction lawyers, adjudicators, expert witnesses, arbitrators and mediators. Selected participants had decades of experience working in the construction industry with 55 % of participants having more than 20 years and 36 % of participants having between 10-20 years of construction experience.

Similarly, the interviewed participants were experts in different stages of disruption claims and have dealt with several disruption claims in their professional careers. The experience of the interview participants across disruption claims including preparation and submission, assessment, and resolution (negotiation, adjudication, arbitration, mediation, litigation, dispute avoidance board, and expert determination) is shown in Figure 1.

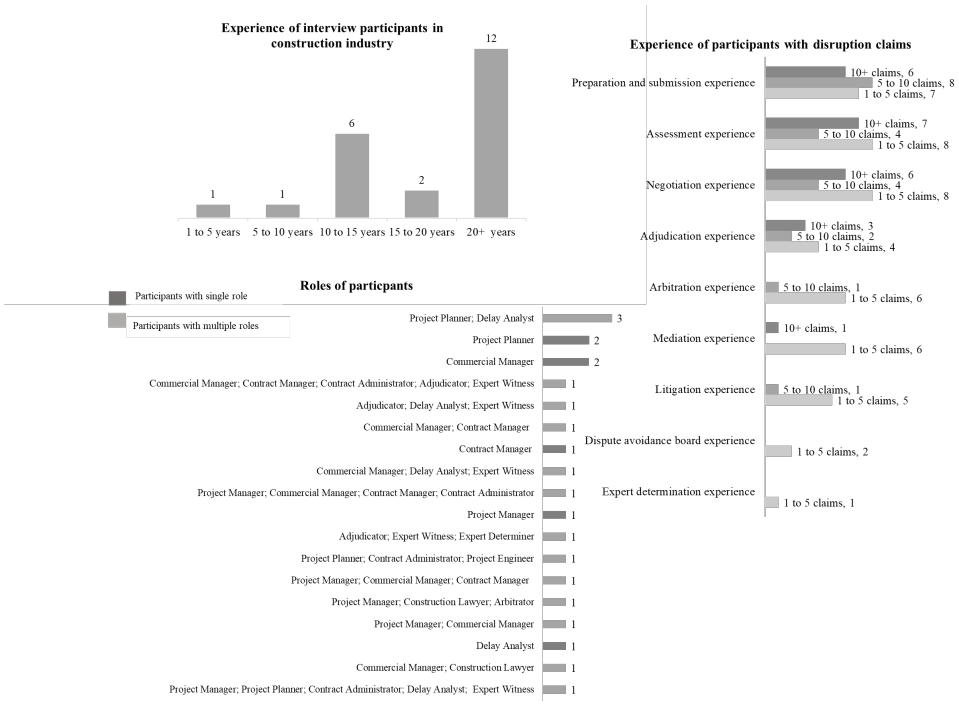

Figure 1: Demographics of interview participants

Interview Themes

Apart from asking about the professional experience of participants and their involvement with disruption claims, the following were the key themes of interviews during data collection.

Identification of Recommended Disruption Analysis Methods
This theme helped to identify the disruption analysis methods recommended by experts for analysing disruption claims. For this theme, a list of disruption analysis methods identified from literature was presented to the experts and were asked to select the method/methods they prefer to use for analysing disruption claims.

Reason of Preference for a Disruption Analysis Method
This theme helped to understand the reason for the preference for the selection of certain disruption analysis methods by the experts. As part of the interview, experts were asked to provide the reason for their selection and preference of a particular disruption analysis method/methods and how it can help in improving the process of disruption claims.

Data Analysis

Content analysis was the data analysis technique employed in this study, which can help to detect the frequency of words while analysing qualitative data and is one of the effective means of analysing qualitative research data. It (Mayring 2004). It was used to perform the frequency analysis of the recommended analysis methods for disruption claims. Besides content analysis, a thematic analysis of the interview transcripts was also conducted. Thematic analysis is defined as "a strategy for detecting, analysing, and reporting patterns (themes) within data" (Braun and Clarke, 2006). It helped to organise and separate data from textual and qualitative data sets into helpful themes of reasons of preference. The analysis was done in a computer-based software, NVivo 12. Figure 2 displays the word cloud for top 50 words from the interview transcripts generated in NVivo 12 during data analysis. Some of the

notable words identified during the interview transcripts included baseline, productivity, measured, mile, method, program, objectivity, information etc.

Figure 2: Word Cloud of Interview Transcripts

FINDINGS

Figure 3 shows the recommended methods for analysing disruption claims. Mixed responses were identified from the collected data.

Single Method Approach

Majority of experts (68%) prefer using a single method. Out of 68%, most experts (23%) have selected the "baseline productivity" method as their go-to method. According to experts, it is the most objective method among other methods as it tries to analyse the disruption events by reference to the most relevant comparative data. It shows the causes and impacts of disruption events, which is key for any disruption claims. Also, most experts were of the view that it allows presenting the claim in a way to owners or their representatives that is simple to understand.

Similarly, the measured mile method was also reported as best disruption analysis method by 18% of experts. Experts opined that it could help in logical reasoning and analysis of causes and impacts.

The next preferred method by experts is program analysis (18%). For program analysis, experts believed that it is easier to show the impacts through program analysis. Experts said it is viable to use program analysis for demonstrating the impact on resources as it helps to load the program with the resources to show the impact on resources.

Then, there were 14% of experts, who have selected earned value analysis as their preferred method for disruption analysis. Regarding earned value analysis experts responded that it could help you to track the impacts on completion time and cost. Moreover, earned value can measure the schedule variance and the cost variance to complete your project.

Hybrid Approach

Similarly, some experts (18%) chose to use a hybrid approach or combination of methods for disruption analysis because it can help to fully apprehend the disruption causes and its impacts on the project. These recommended combinations according to experts include program analysis and cost-based methods (9%), measured mile method and program analysis (5%), and measured mile method and direct evidence (5%). For program analysis and cost-based methods, experts said program analysis

helps to quantify the time loss, whereas cost-based methods can help to track the impact on the project budget. Experts believed program analysis can provide the strongest basis for a disruption claim as it determines how much time is lost and what impacts it has on the project's milestones. Later, the cost-based method would then help in calculating cost impact of the disruption events. Similarly, by combining the measured mile method with program analysis, it is easy to establish the cause-and-effect valuation through the measured mile method and show the difference between the plan and actual achievements through program analysis. One of the experts also talked about using the measured mile approach with direct evidence because sometimes the measured mile method does not track the additional cost on its own and direct evidence is required to quantify the additional incurred cost.

Inexplicit Approach

The remaining experts (14%) did not specify a particular method as their preferred method and said that it depends upon the information availability and how they can achieve the most suitable financial outcomes. According to these experts, to be able to negotiate a reasonable settlement, it is important to consider the information available and different ways to get the greatest outcome in terms of financial impact. Therefore, the selection of an appropriate method for analysis and getting the anticipated outcome is dependent on the quality of available information.

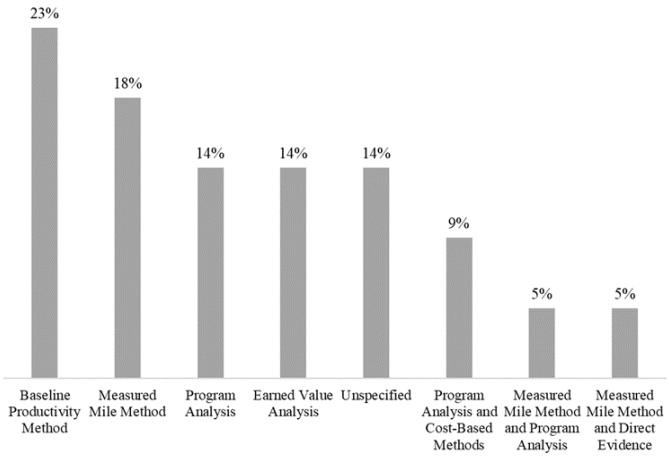

Figure 3: Recommended methods for disruption analysis

DISCUSSION

Objectivity

From the analysis of the interviews, it can be perceived that during disruption claims "objectivity" is a key factor parties consider and can help increase agreement by parties on a uniform disruption analysis method. The reason behind most experts being in favour of the baseline productivity method can be traced back to its objective nature. It relies on a comparison of actual work done (what the contractor was able to achieve) during the unimpacted period with the work performed during the impacted period (Robert 2017). It represents the best and most consistent productivity that the contractor was able to maintain on the project. Further, it is a cause-and-effect analysis method, therefore, to perform baseline productivity analysis, relevant contemporaneous information on the disruption events is essential. The relevant contemporaneous information acts as evidence to substantiate the disruption claim objectively rather than relying on verbal witnesses, which can be subjective at times

due to a strong underlying conflict of interest between contracting parties (Aibinu 2009).

Similarly, the second highest recommended method by experts i.e. measured mile method is also similar to the baseline productivity method, but it uses a continuous baseline of unimpacted productivity period as compared to the baseline productivity method, which uses several periods of unimpacted productivity period. This also involves cause and effect analysis that requires contemporaneous evidence and promotes objectivity in the analysis of disruption claims.

Disruption claims if analysed with such analysis methods can promote objectivity or neutrality in the quality of decision-making for the entitlement and compensation for the losses incurred by the contractor due to the occurrence of disruption events in projects. Thus, the higher the objectivity of a disruption analysis method, the higher is its preference of use to decide on the outcome of a disruption claim. In other words, the more objective an analysis and assessment method is, the easier it to agree contracting parties on its use for disruption claims.

Information Availability

To perform the suggested objective disruption analysis methods, the availability of relevant information is vital. The contractor must be able to substantiate its claim through the best possible information to prove the cause and effect of events, actions or inactions of the owner or other parties (Ali *et al.,* 2023). Many claims have been unsuccessful due to poor documentation, inadequate supporting evidence, and lack of accurate records (Aibinu 2009). The reason for not specifying a particular disruption analysis method by certain experts is also related to the availability and quality of information. Hence, it is important to improve the process of information management of disruption claims for the application of the most effective disruption analysis method.

Similarly, in addition to the agreement between contracting parties on the disruption analysis method, agreement on the information sources is also very important to promote objectivity and avoid disputes (Aibinu 2009). The information used by contracting parties during disruption claims may contain uncertainties and inaccuracies that are in favour of presenting party, which results in doubts and disagreements on the presented information. Consequently, contracting parties usually do not agree on each other's information and the outcome of these claims, which then leads to disputes between them.

In addition, the agreement on the disruption analysis method and on information use can have a social psychological impact on contracting parties as it will promote fairness in the process of disruption claims and disputes settlement. This concept was put forward by Thibaut and Walker (1978) for disputes who suggested that the procedure which is most likely to promote fairness among the disputants and help in resolving conflicts is the one that gives them control over the process. In terms of disruption claims, control over the process will mean providing control to the contracting parties to agree on the disruption analysis method and information sources.

CONCLUSIONS

One way of minimising the intensity of disputes between contracting parties is the agreement between contracting parties on the methodology for analysing disruption claims (Aibinu 2009). However, there are various disruption analysis methods

currently available for selection and each of them provides a different outcome. These differences in the outcome of an analysis method are also one of the causes of disputes between contracting parties. Hence, the question remains which disruption analysis method provides better results and is predominantly recommended by experts in this area? The answer to this question can enable contracting parties to select and agree on a uniform method for analysing and assessing disruption claims. To do so, this study attempts to explore the most preferred method for analysing disruption claims. For this purpose, 22 experts with a wide range of experience in disruption claims were interviewed. According to most experts, the objectivity of an analysis method is key to agree contracting parties on the outcome of an analysis method and the decision of a disruption claim. Therefore, the top 2 methods for analysing disruption claims are the baseline productivity method and the measured mile method, which are recommended by 23% and 18% of experts. These methods provide an objective outcome by looking into the most relevant contemporaneous records to show the cause and effects of disruption events on construction projects.

For effective implementation of the suggested disruption analysis methods (baseline productivity and measured mile), it is important to manage the relevant information required for disruption claims. However, there are various challenges and difficulties associated with the current practices of information management for disruption claims (Ali *et al.,* 2022; Ali *et al.,* 2023). To improve the process of information management and availability of contemporaneous records for implementation of suggested objective disruption analysis methods, the traditional manner of information management should be replaced with the wide application of modern available technologies. For instance, drones, laser scanners, cameras, Radio-Frequency Identifiers (RFIDs), and Building Information Modeling (BIM) can be used to collect information efficiently without any loss. Similarly, Big Data Analytics and Machine Learning can improve the storage, access, and usage of information required for disruption claims for effective and objective analysis.

This study was performed in Australia. However, because disruption claims and disputes are a global issue, the results of the study can also be used for international comparison.

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