

A NEGOTIATION MODEL FOR THE VALUATION OF VARIATIONS IN CIVIL ENGINEERING WORKS

M. Sutrisna and K. Potts

Built Environment Research Unit,
School of Engineering and the Built Environment
University of Wolverhampton, Wulfruna Street
Wolverhampton, WV1 1SB, United Kingdom
E-mail: monty01@cbn.net.id

ABSTRACT: Negotiation has been defined as a process for resolving conflict between two or more parties whereby both or all modify their demands to achieve a mutually acceptable compromise. However, the process of negotiation very much depends on the dimensions surrounding it, such as the specific condition, the organisations and negotiators involved. In construction projects, especially civil engineering works, variations and their valuation are known to be a subject of conflict and disputes mainly due to the large amount of investment involved in civil engineering works.

Even though several schemes are provided, most of the rules for valuing variations are open to different interpretations of the parties. This paper intends to explore and discuss a scheme provided in the ICE 7th edition, Measurement version 1999, requiring negotiation between the contractor and the engineer over the valuing a variation.

The negotiation model presented here has been developed to elucidate the position of each project stakeholder as part of an on-going research project, attempting to develop a robust mechanism for valuing variations in civil engineering works.

Keywords: model, negotiations, valuation of variations

1. INTRODUCTION

In construction project management, the issue of variations and their valuation has long been acknowledged as a major contributor to conflict and disputes (McGowan *et al* 1992; Potts 1995). While providing the necessary flexibility to accommodate changes in a construction project (Wainwright 1970; Murdoch & Hughes 2000), the negative impacts of such conflicts on variations include a reduction in the labour productivity (Thomas & Napolitan 1995; Hanna *et al* 1999a; Hanna *et al* 1999b), and the additional cost incurred from claims for loss and expense (Alkas *et al*, 1996). This is reinforced by the fact that most civil engineering projects involve an extensive amount of investment (Atkinson, 1992; Seeley & Murray 2001), which means that variation events can have a significant financial impact on the project.

In attempting to resolve conflicts, one of the schemes provided and discussed here requires negotiation between the project stakeholders. However, conflicts can be of two kinds in the negotiating context; namely conflict of interest and conflict of rights (Kennedy *et al*, 1987). Conflicts of interests occur where terms of executing the works have been settled or having been settled before, are now being re-negotiated. Conflicts of rights occur where there is an existing agreement between the parties and there are differences of interpretations between the parties. Observing the nature of the conflicts occurred in valuing variations, they can be categorised as the conflicts of rights.

By understanding the nature of the negotiations to be conducted in valuing variations, the elements that provide dimensions to the negotiation process can be realised. The main element is the human-negotiators involved in the process, influenced by the organisational,

social, and legal environment. A model has been developed to demonstrate the interrelationship between the elements surrounding the negotiation process and the human-negotiators. This model can be used by the project stakeholders in a negotiation to reflect each of their positions in such a process, providing both micro level understanding and macro level overview. In order to make a further use of the model, a list of potential items to be considered in a negotiation process for valuing variations has been developed.

2. VALUING VARIATIONS

The valuation of variations has been acknowledged as one of the main causes of conflict and disputes (McGowan *et al* 1992; Potts 1995; Seeley & Murray 2001; Winter 2002). The main reason is the contractor's claim that the measured quantities of permanent works priced at billed rates have failed to represent the actual value of the construction works. The price and rates quoted in the bills of quantities (BoQ) are estimated as a collective value of the works in the project. These rates and prices do not necessarily represent the value of each work item and hence a problem occurs when the price and rate is simply applied to varied works. The guide lines in establishing the rate and price to be used in a variation event is the rate which the contractor would have inserted against that item had it been included at the time of tender (Haswell 1963). However, different conditions require different methods of valuation and the different perceptions of the project stakeholders regarding the conditions encountered may create problems.

From the contractor's point of view, the rate and price included in the tender may contain a low profit margin with a high degree of risk that is taken to maintain the competitiveness of their tender. Or simply a one-off opportunity occurred to save some cost due to parallel jobs being executed during the period and/or vicinity of the project site. Thus, if such a low rate and/or price is applied for further extensive amounts of similar works, the contractor may suffer reduced profit or even significant losses.

From the employer's point of view, an authorised variation, which is necessary for the completion of the overall works, should be valued similarly to the original works. Thus an increase to the rate and price, which increase the liability of the employer to the project, may cause significant discrepancies to their initial investment benefit analysis. This phenomenon has been demonstrated by the legal cases of *Dudley Corporation v. Parsons & Morrin Ltd.* in 1959 and *Aldi Stores Ltd v. Galliford (UK) Ltd* in 2000 in which the courts decided the application of prices/rates in the BoQ resulted in a significant loss for the contractor while in the legal case of *Henry Boot Construction Ltd. v. Alstom Combined Cycles Ltd* in 2000, the result was a large profit for the contractor.

Forms of contracts were especially drafted to accommodate such risks and then distribute the risks fairly to the project stakeholders. The ICE Condition of Contracts 7th edition Measurement Version, 1999 provides certain schemes for valuing variations. The first scheme, provision to pre-price the variations by quotation, implements the recommendation of Latham (1994). According to this pre-pricing scheme, after a variation has been authorised by the Engineer, the Contractor may be requested to prepare a quotation [Clause 52(1)]. The formulation of this quotation is to the discretion of the Contractor. In the event that the Engineer rejects the quotation or in the absence of such a request, the Contractor is required to prepare a quotation based on the prices and rates in the Contract [Clause 52(2)].

In the event that the Engineer rejects the quotation, a scheme for negotiation is provided by Clause 52(2)(b)(ii). However, successful negotiations will depend on each party's openness and willingness to reach a mutual agreement. A mutual agreement, which is the objective of this negotiation scheme, is unlikely to be achieved when the parties apply

aggressive negotiating approaches in seeking to take advantage over the other party during a variation event (Scott & Billing 1990). When the negotiation fails, the Engineer has to determine the valuation which then provides an opportunity for an unsatisfied Contractor to proceed into further claims [Clause 53(1) and (2)] or even dispute [Clause 66].

3. NEGOTIATION SCHEME FOR VALUING VARIATIONS

Negotiation, provided in the ICE Condition of Contracts 7th edition Measurement Version, 1999 as one of the schemes for valuing variations, has been defined as a process for resolving conflict between two or more parties whereby both or all modify their demands to achieve a mutually acceptable compromise (Kennedy *et al*, 1987). However, it has to be noticed that the negotiation scheme only come into play when the first option, quotation mechanism, has failed (Sutrisna *et al*, 2004). Attempting to prioritise pre-pricing of the variations to avoid conflict and disputes, if the quotation was rejected, this may lead the relationship between the contractor and the engineer into a different stage. In other words, by having the quotation(s) for variations rejected by the engineer, the contractor and the engineer may have established their positions and attitudes against each other unintentionally. The contractor and the engineer have to negotiate for a mutual agreement while they may have started ‘off on a wrong foot’.

The danger emerging here is that the contractor and the engineer start the negotiation by taking a position. When negotiating parties take and bargain over positions, they tend to lock themselves into those positions. The more the parties clarify their positions and defend them against attack, the more committed they become to the positions. A mutual agreement is less likely to be achieved because more attention is paid to positions and less attention devoted to meeting the underlying concerns of the parties (Fisher & Ury, 1999). Providing that the contractor has composed a fair quotation, the fact that the engineer rejected the quotation may be perceived as a statement that the engineer is trying to play hard or even taking advantage of the contractor. On the other hand, an unreasonable quotation that was composed and submitted by the contractor may be perceived as an indication that the contractor will use every opportunity to take advantage over their counterparts to render more profit. Either condition will unintentionally set each party’s position against the other and can results in aggressive negotiation.

It has been generally agreed that the most essential elements of negotiation come from the individual(s) that actually perform the negotiation process, i.e. the human aspect of the negotiation (Fisher & Ury, 1999). Negotiations have also been defined as occasions on which representatives of two or more parties interact in an explicit attempt to reach a jointly acceptable position on a divisive issue (Stephenson, 1971). It should be noticed the notion of ‘representatives’ being used in the definition here that underlined the significance/importance of the individual negotiator during negotiation processes. The individual negotiators have several dimensions that affect their performances and attitudes during negotiations, which can be grouped as psychological, organisational, social, and legislatorial (Kniveton & Towers, 1978).

Using these essential elements of negotiations and also the importance of the initial position prior to negotiations, a model of negotiations for valuing variations in civil engineering works can be developed and proposed, demonstrating the interrelationship between these elements and how they may affect the negotiation process. The model is illustrated in Figure 1. Subsequent parts of the paper discussed the elements in detail, demonstrating how to make use of the model and deriving conclusions.

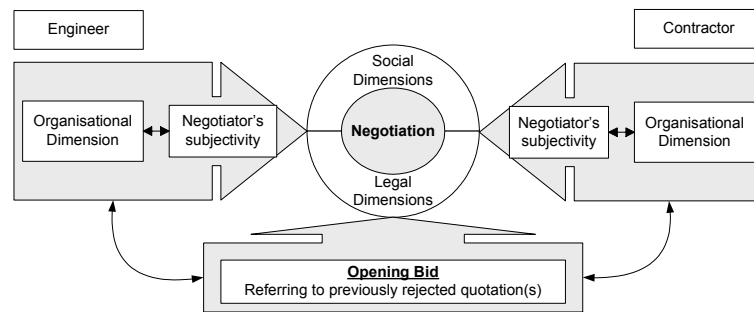


Fig1. Negotiation Model for Valuing Variations in Civil Engineering

3.1. Psychological Dimension (Negotiator's Subjectivity)

The individuals that are actually sitting together in negotiations are the negotiators that represent the project stakeholders. When valuing variations, the negotiators stand on two different sides. The first side is the contractor who tries to negotiate the price/rate previously quoted. On the other side of the fence, the negotiator from the engineer who negotiates on behalf of the project owner. The contract conditions require that the engineer should act as a neutral party, securing the rights of both sides. On the other hand, the fees of the engineer are normally paid by the employer. This fact, in many cases, has been presumed to slightly shift the engineer's subjectivity onto the employer's side. In this paper, the negotiation model is developed by considering the engineer and the contractor as the main negotiating parties.

There are many psychological dimensions affecting a negotiation. However, the most important elements are personality, perception, expectation, persuasion, and the interaction of these elements to describe and explain the negotiation process (Spector, 1978). The negotiator personality identifies the basic predisposition toward the 'opponent' and motives for future actions and responses. Personality factors are likely to influence the toughness or softness of positions that are taken, the strength of commitment to these positions, the choice of strategy and opening tactics, the potential for compromise and concession, and the personal need for goal maximization. Personal dispositions and motives have long been acknowledged as the major driving forces in the bargaining process (Nicolson, 1964; Douglas, 1957; Cooper, 1975). This personality element can be perceived as the most complicated and the main factor for disagreement when valuing variations, mostly due to the negotiators' subjectivity in perceiving the circumstances when a variation event occurred (Sutrisna *et al*, 2003). These differences of perceptions, especially in associating their subjective interpretations on the contract to the varied works, are also likely to be the major cause of the failure under the quotation scheme provided by the ICE Condition of Contracts 7th edition Measurement Version, 1999 (Sutrisna *et al*, 2004)

Perceptions and expectations of the opponent's strengths, weaknesses, intentions, commitments, and goals are likely to affect the negotiators responses, the tone of interpersonal communication, and the learning process. As previously highlighted, these perceptions and expectations may endanger the negotiation; even before the negotiation process itself begins. In the valuation of variations under the ICE Condition of Contracts 7th edition Measurement Version, 1999, the failure of the quotation scheme in a variation event may result in one or both of the negotiators developed a negative stereotype of the counterpart and coming into the negotiation process bearing this negative stereotype of their opponent in mind. This condition may bring the negotiation into a stage where the outcome of the negotiation has been decided before the negotiation takes place and leave the negotiation as a procedural obligation to be fulfilled (Walton & McKersie, 1965; Kniveton & Towers, 1978). On this stage, there will be no differences whether the negotiation is

performed or not performed since each party will not open themselves and will not allow any concessions that may result in a failed negotiation.

The use of persuasive techniques and their success in changing negotiator values toward initially desired end-states should help to achieve acceptable outcomes (Schelling, 1960; Zartman, 1974). In other words, the negotiators should seek for a mutual power and influence relationship to achieve concessions and convergence of formerly conflicting interests. By persuading the opponent to attempt for a mutual power and influence that can be achieved together, a negotiator may be able to change the opposing negotiator's views toward certain goals by making them more compatible to each other's patterns (Spector, 1975; Zartman, 1976). This can be done, for instance, by demonstrating that there exists an optimum solution that will benefit both sides (Raiffa, 1982). However, the success of the persuasive technique will very much depend on the interaction of the other elements previously discussed and the existence of trust between the negotiators (Butler, 1995; Bass & Ndekugri, 2003).

3.2. Organisational Dimension

Another driving force behind the attitude of the human negotiators in negotiation processes is the organisation in which the negotiators are actually employed. The negotiators are representatives of the negotiating parties. There have been some claims that the negotiators do not have any freedom to manoeuvre during the negotiation processes as the organisation they represent may have given a clear brief of what the outcome should be (Kniveton & Towers, 1978). As this represent the extreme, in some other cases, the negotiators' freedom to manoeuvre may be restrained by their organisations' policies, strategic directions and cultures.

The organisation strategic direction requires mapping out the future directions of the organisation based on the resources currently possessed (Ansoff, 1969; Drucker, 1971). Knowing the purpose and direction of the organisation, appropriate actions can be planned and executed accordingly (Lynch, 1997). The strong relationship between the way of conducting negotiations (perceived as direct interactions with other organisations in its environment) and the goal-setting and strategy of the organisation has long been acknowledged (Thompson & McEwen, 1958). The organisation strategic direction may dictate the selection of the approach in performing negotiations

Culture has been defined as a pattern of beliefs and expectations shared by the organisation's members and which produce norms that powerfully shape the behaviour of individuals and groups in an organisation (Schwartz & Davis, 1981). The organisation culture can affect the style of decision-making of the organisation, including the negotiations (Rowe & Boulgarides, 1983). The organisation culture influences the style of negotiation performed by the organisation through the creation of preference for certain approach to another by its members when facing other organisations in a negotiation condition (Pheysey, 1993).

3.3. Social Dimension

The social dimension, wrapping the negotiation process, can be attributable to both the human negotiator and their organisations (i.e. engineer and contractor). It has been argued that in performing negotiations, certain social norms and values affects the outcome of the negotiations such as the concept of fairness (Bartos, 1978). The norms and values of fairness exist in the society influence the attitude of the negotiators directly or through their organisations.

Earlier sociologists have attempted to universally formulate the concept of fairness with the so-called rule of distributive justice, which states that men should be rewarded equally if and only if their contributions are equal (Homans, 1961). In other words, one will only be treated fairly if he/she bears the marks of 'being fair'. This is said to be the 'equilibrium' point between the nature of the human being to earn maximum benefits (competitive individualism) and the other nature of human being to be accepted among their society (cooperative collectivism), and this is central to the above argument by Bartos (1978) regarding the concept of fairness in negotiation process. When negotiating, a negotiator will always bear in his/her mind that the outcome of the process will affect his/her 'reputation' of being fair or unfair. They will try to seek to be known as 'fair negotiators'. The personal reason can vary from simply trying to protect his/her own social status and relationship in the industry to trying to secure his/her own career in the organisation or future career in other organisations by not making any blunders. The pressure may also come from the organisation. The reason can vary from trying to protect the organisation's image in the market as a 'fair organisation' to maintaining good relationship with the counterparts in the negotiation and reserving this good relationship for other/future projects.

However, these attempts to be perceived as a 'fair' negotiator/organisation may not be the optimum solution for the conflicts. And again, there may be differences in viewing the concept of fairness. The forces to have a fair and successful negotiation certainly exist, however the fact that there is a conflict has discredited the term of a universal equilibrium. There are several other schools of thoughts that try to prescribe fairness in an agreement/negotiation condition using mathematical modelling, such as the game theory, utility theory, and the bargaining scheme (Von Neumann & Morgenstern, 1947; Nash, 1950; Shubik, 1952). While including certain socially important phenomena, these mathematical models lack in practicality (Luce & Raiffa, 1967).

3.4. Legal Dimension

The legal dimension surrounding a negotiation is of particular significance. Reference must be to the available options that can be taken following a variation event. This element of negotiation will provide varying contexts for the negotiating parties depending on the role of the project stakeholder specified under the terms of the contract in a variation event. Different form of contract will provide different methods for valuing the variations. In this paper, the form of contract discussed is the ICE Condition of Contracts 7th edition Measurement Version, 1999.

After the Engineer has ordered the variation [Clause 51], the Contractor may be requested to prepare a quotation [Clause 52(1)]. The formulation of this quotation is to the discretion of the Contractor. In the event that the Engineer rejects the quotation or in the absence of such a request, the Contractor is required to prepare a quotation based on the prices and rates in the Contract [Clause 52(2)]. Upon the approval by the Engineer, the rates and prices quoted will then determine the valuation. However, the quotation(s) may simply be rejected due to different perceptions and interpretation of the parties (Eggleston 2001). If the quotation is not accepted, then the Engineer and the Contractor should negotiate to achieve an agreement for the rates and prices to be applied. When the negotiation fails, the Engineer has to determine the valuation which then provides an opportunity for an unsatisfied Contractor to proceed into further claims [Clause 53(1) and (2)] or even dispute [Clause 66].

The knowledge of the scheme provided in the form of contract may differ the attitude of the negotiating parties. This is reinforced by the database of former similar legal cases. For instance, knowing the next stages in the valuation scheme if the negotiation fails, the

contractor can study the possible options, predicting the success of a subsequent claims or dispute based on the database of similar cases. If the chance of being successful in the subsequent stages is relatively low, the contractor may apply a softer approach during the negotiation and trying to settle the conflict in the negotiation instead of proceeding to subsequent stages. On the other hand, the engineer possessing the same knowledge and databases may perform a subtle approach and try to settle the negotiation on his/her terms. In other words, the legal context through its valuation scheme can affect the result of the negotiation process by providing a slightly favourable position for one party from the other.

3.5. Opening Bid

The opening bid in a negotiation process is defined as the point that will be offered by each party in the beginning of the negotiation. However, the opening bid offer is normally based on each party's expectation of the point of which will be accepted by the opponent only with the greatest reluctance (Bartos, 1978). In ordinary circumstances, the opening bid is of importance in most of the negotiation theories in order to determine the optimum solution. Once the opening bids are established, the optimum and fair solution will normally lie in the mid-point between the opening bids from both parties.

However, in this negotiation process for valuing variations under the ICE Condition of Contracts 7th edition Measurement Version, 1999, the opening bid has been determined in advance. In fact, in the case that the contractor has already prepared the first quotation, which is then rejected, the first quotation can be considered as their opening bid. And in the case of a rejected second quotation, the contractor has modified their first bid and has enlarged their concession in the second quotation. The contractor has clearly declared his/her expectation of a fair rate/price to be applied. The uncovered part of this picture is the opening bid from the engineer. The engineer simply rejected the quotation(s) and may not specify their expectation of a fair rate/price for such circumstances.

4. USING THE NEGOTIATION MODEL

The model of negotiation developed above can be used by both negotiators from the contractor and from the engineer sides as a tool to better understand the negotiation process, particularly in valuing variations in civil engineering projects. The model developed provides a micro level understanding and a macro level overview of their position and their opponent's position in such a process. However, in order to expand the contribution of the developed model, a list of potential factors to be considered in a negotiation process in valuing variations has been developed and presented in table 1 that enlists all necessary factors to be considered by both parties based on the model and aims to enhance the chance of the negotiation being successful.

Table 1. Factors to be considered in the negotiation process when valuing variations

Engineer side	Contractor side
<u>Psychological Dimension</u> • Avoid building a negative stereotype of the contractor and learn to accommodate the opponent's point of view • Avoid any expectation of the contractor's	<u>Psychological Dimension</u> • Avoid building a negative stereotype of the engineer and try to learn and understand the opponent's perspective • Avoid any expectation of the engineer's

behaviour and responses in an early stage • Never involve personal emotion during the negotiation process • Avoid aggressive opening tactics and consider the presence of the contractor in the negotiation as a sign of cooperation • Try to recognise the contractor as the one that your firm has selected to do the job and then develop trust based on this	behaviour and responses in an early stage • Never involve personal emotion during the negotiation process • Avoid aggressive opening tactics and respect the engineer's willingness to spare time for negotiating • Try to appreciate the engineer as the one that actually gave the job to your firm and then develop trust based on this
<u>Organisational Dimension</u> • Learn about the contractor firm's strategic directions and culture • Recognise the nature of the contracting firm as a profit-organisation	<u>Organisational Dimension</u> • Learn about the engineer firm's strategic directions and culture • Recognise the role of the engineer firm as a problem solver and a neutral-mediator
<u>Social Dimension</u> • Try to reconcile the perception of 'fairness' • Consider the negotiator from the contractor's side as a professional bound with in certain ethical codes • Consider the contractor's aim is to deliver the project in a good manner in order to maintain their own reputation	<u>Social Dimension</u> • Try to reconcile the perception of 'fairness' • Consider the negotiator from the engineer's side as a professional negotiator with a professional objective to settle the conflict • Consider the engineer's aim is to have the project completed within the planned time, cost and quality for their own reputation
<u>Legal Dimension</u> • Avoid relying on the power of the engineer to determine the valuation given by the contract, try to settle the matters in this negotiation • Avoid relying on previous cases in database, each project is unique	<u>Legal Dimension</u> • Avoid planning on the subsequent schemes, relying on claims and disputes; instead try to settle the conflict/matter in this negotiation • Avoid relying on previous cases in database, each project is unique
<u>Opening bid</u> • Avoid looking at the previously rejected quotation(s) as an attempt from the contractor to be unfair • Articulate and explain clearly why the previous quotation(s) was rejected, what is expected and what can be accepted • Listen carefully for the contractor's justification on their previous quotation, then be prepared to give concession based on those which are acceptable	<u>Opening bid</u> • Avoid looking at the previously rejected quotation(s) as a statement from the engineer to demonstrate their 'muscles' • Try to explain clearly the facts and the reasoning behind the previously rejected quotation(s), try to be as open as possible • Try to reconcile the engineer's expectation with your previous quotation by giving concession from the opening bid to achieve solutions

5. CONCLUSION AND FURTHER RESEARCH

The current problems in valuing variations have been described. Based on the ICE Condition of Contracts 7th edition Measurement Version, 1999, there are three schemes provided, namely the quotation scheme, the negotiation scheme and the decision-making scheme. As a part of an on-going research to develop a robust mechanism in valuing variations based on this standard form of contract and investigating the three schemes, this paper has explored the negotiation scheme. The relevant factors have been identified as the human factor bringing subjectivity and referred to as the psychological dimension, the organisational dimension that is concerned with the influence from the firms' strategic directions and cultures, the social dimension as one of the main counter-forces maintaining the negotiating parties hold on the value of fairness, the legal dimension that may influence the self-confidence of the negotiating parties based on subsequent scheme of valuing variations and similar legal cases that have been documented as references.

The aim of developing this model was to provide a micro level understanding and a macro level overview of the whole negotiation process for the negotiating parties. In order to provide a further contribution, a list of factors to be considered by both of the negotiating parties has been developed based on the negotiation model. This list can be used by both negotiating parties as a guideline to achieve a successful negotiation. The next stage of the research will forward the result of the investigation on the three valuing variations schemes provided by the ICE Condition of Contracts 7th edition Measurement Version, 1999 to a group of credible experts/practitioners by conducting an in-depth interview to acquire feedback and applying necessary minor modification. At the current stage, the targeted experts/practitioners have been contacted and many have agreed to be interviewed at a later stage. The result of the interview and modification will then be finalised and reported in subsequent academic papers and PhD thesis.

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