FACTORS THAT FACILITATE THE EFFICIENT PERFORMANCE OF BUILDING & CONSTRUCTION PROJECTS

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1. Introduction

This paper summarises certain of the factors that promote project efficiency and minimise disputes on building & construction projects.

The paper is based on the author's experience on a wide range of building and construction projects, independent research studies and the author's participation in the National Public Works Conference/National Building Consultative Council's Joint Working Party charged with the task of identifying ways and means of improving the efficiency of project delivery and the reduction of claims and disputes. The Joint Working Party's Report is titled "No Dispute, - Strategies for improvement in the Australian building and construction industry."

Successful construction projects, - projects that are completed to the required quality, ahead of time and below estimated costs, - occur as a result of team work and professionalism from all members of the Project Team. Successful projects create a "WIN-WIN" situation for all members of the Project Team.

On the other hand if certain key members of the Project Team do not have the necessary skills to fulfil their roles, or if they adopt an adversarial approach to the other members of the Project Team, the project cost, time and quality will suffer. On such projects all members of the Project Team are losers.

The evidence from several independent research studies reveal that project time and construction labour productivity on similar projects can vary from project to project by a factor of three or more. Given this enormous discrepancy between the cost of apparently similar projects, there is a very real incentive for all members of the Project Team to work together to achieve an efficient project environment.

Factors that promote project efficiency and contribute to a successful "WIN-WIN" project include:-

- Clear, objective, performance statement of the client's requirements.
- Minimum variations to the project specification;
- Careful selection of the Project Team;
- Comprehensive planning of all aspects of project, - time, cost, quality;
- Effective communication between the members of the Project Team;
- An appropriate contract strategy and an appropriate allocation of obligations and risk;
- Effective and timely monitoring of time and cost;
- Quality assurance of both design and construction;
- Avoidance of "claim situations";
- Effective and prompt remedial action if a team member defaults.

2. The Client's Performance Requirements

Client and end user performance requirements for the project must be adequately defined at the outset. These requirements may include:

- a description of the functional performance requirements for the project;
- schedules setting out the quality of finishes in various parts of the project;
- performance requirements for particular components for the project, eg. building services;
- concept drawings or scketch plans;
- reference to an existing project of similar quality to that required by the client, for defining the quality of components not expressly described in the client's performance brief.

Independent research studies reveal that inadequate documentation is a major cause of delay, disruption and additional cost. The importance of a carefully thought out and documented client brief cannot be over emphasised.

The design brief should be "frozen" once these performance requirements have been defined. As outlined in Section 3, variations during the detailed design and construction phases of the project causes delay and disruption and otherwise adversely affects the efficient performance of the project.

Training programmes should be established as necessary to assist clients prepare enforceable, objective performance briefs.

3. Variations To The Project

Every effort should be made to minimise variations. Contrary to popular belief, no party benefits from variations, and particulary urgent variations.

Most variations are necessary as a result of inadequate, incomplete or ambiguous documentation or due to the client (or its design consultants) changing the specified requirements as the project proceeds.

Variations, and particularly urgent variations, disrupt the orderly performance of the project, demand a disappropriate amount of management time and resources, and adversely affect the effective management of project quality, cost and time.

The proper valuation of variations is often a complex matter, particularly if the variation affects critical activities and resources. The indirect cost of a variation may not be apparent until the later stages of a project. When properly valued, urgent variations often represent poor value for money.

Delays in resolving the valuation of variations adversely affects the contractor's and subcontractors' cash flow.

4. Careful Selection Of The Project Team

Successful projects require that each member of the Project Team be suitably qualified to carry out its specified role, and that the various members of the Project team

actively co-operate with each other to ensure that the work proceeds in an orderly manner at optimum pace. The various members of the Project Team must have the technical, managerial, financial and industrial relations skills and resources necessary to perform their roles at the rate and in the manner required to satisfy the project programmes and specifications.

Failure by a member of the Project Team to fulfill its role will directly and indirectly delay, disrupt or otherwise impact upon the performance of other members of the Project Team. If the client does not have the necessary skills in-house, it should engage a suitable representative to act on its behalf.

It is imperative that the various members of the Project Team, ie; the client/head contractor/consultants/subcontractors/financier, have the proven ability and available resources to satisfy the project requirements. It is false economy to let a contract to a organisation without such proven ability and resources, merely because it offered the lowest price. The real cost to the project of inefficiency and default far outweighs any apparent initial savings.

One of the reasons head contractors object to the nominated subcontract system is that clients sometimes nominate unsuitable subcontractors. Competent head contractors only wish to do business with subcontractors with the appropriate technical, financial, and managerial resources and experience. Similarly subcontractors should be concerned at the prospect of being nominated to an unsuitable head contractor. Contractors and subcontractors should be entitled to enter into contractual relationships with organisations of their choosing. Such relationships should not be imposed by the client.

The human element is an important factor in the success of a project. All members of the Project Team must have a positive attitude to the project, so as to create an environment conducive to the efficient performance of the project. As outlined in Section 1, the efficient performance of the project can substantially reduce cost and time without compromising quality. It is in the self interest of all parties to promote such efficiency. Distrust and antagonism between members of the Project Team is a recipe for delay, expense and poor quality.

5. Design Co-ordination, Construction Planning, Value Management and Buildability

Considerable time, cost and quality benefits can be achieved as a result of careful co-ordination of the design/construction interface, detailed construction planning during the design phase and reducing the complexity of the form of construction.

Value management and buildability analyses during the design phase of a project invariably identify means of reducing project time and cost without loss of project quality or function.

Value Management analysis is a process by which every aspect of the proposed project design is systematically analysed by the design team and the construction team so as to optimise the project cost, time and quality and the project's life cycle operation and maintenance costs.

Buildability analyses seek to optimise the design so that it can be constructed quickly and economically whilst maintaining the client's quality and performance requirements. For example, the off-site manufacture or fabrication of critical items may reduce the number and/or the duration of activities on the project critical path and thereby reduce the time required to construct the project.

Considerable time and cost can be saved by developing designs that can be constructed quickly, economically and safely as a result of using work techniques that are already well known or can be readily learned by tradesmen and operatives of average skill. Such optimum designs provide for maximum repetition and do not require work to be constructed to other than normal construction tolerances. Other factors relevant to buildability include flexibility of construction sequence, ensuring a safe and comfortable work environment, minimising the number of trades and minimising of the overlap of different trades.

Tenderers for the head contract and critical subcontracts should be encouraged to discuss proposed programmes for the project, construction sequences and methods, and the necessary interdependencies between the various trades. Unfortunately, the nominated subcontract system frequently necessitates the concurrent calling of tenders for a head contract and certain critical nominated subcontracts and thereby prevents such important pre-contract communication between the parties.

All members of the Project Team should have the opportunity to contribute their skills and expertise to the development of the optimum design and construction strategy for the project.

Certain specialist subcontractors promote the nominated subcontract system because they believe it allows the specialist contractor to contribute its expertise to the project design. Set out below is a suggestion as to how the project design can benefit from specialist subcontractors' expertise, whilst avoiding the problems of the nominated subcontract system, through the use of client performance specifications.

Client performance specifications provide the opportunity for appropriate specialist subcontractors to be engaged by the head contractor to be responsible for the design and the construction of the specialist areas of the works concerned. In such circumstances the specialist subcontractor would be responsible for the engagement of the relevant specialist consultants. Such arrangements would provide the opportunity for the specialist subcontractor and the specialist consultant to work together to prepare the optimum design to satisfy the client's performance specifications. Such arrangements simplify the lines of communication between the specialist subcontractor and the specialist consultant and avoid the problems associated with the nominated subcontract system as described above.

6. Effective Communication Between The Members Of The Project Team

Unnecessary costs and delays can be avoided if all parties are aware of factors that may affect the perform-

ance of the project. Effective communication between the relevant members of the Project Team is a key factor in minimising project cost and time. Such communication may include, for example:

- Regular site meetings and informal discussions;
- Routine correspondence including site memoranda and requests for information;
- Contractual notice provisions;
- Realistic programmes and method statements.

Day to day discussions are necessary throughout the design and the construction of the project, involving as necessary the client, designers, contractor and subcontractors to ensure effective information flow and feedback regarding factors affecting, or likely to affect, the orderly performance of the project. The role of correspondence should be to record discussions and agreements and provide supplementary information. "Conversations by correspondence" should be avoided. The parties should manage the project, as well as manage the contract.

All members of the Project Team must commit sufficient, authorised management and technical personnel to the project to allow outstanding matters to be identified and resolved as the project proceeds. Failure to provide such adequate management and technical resources can lead to a breakdown of communication between the parties, often with dire consequences for the project.

A breakdown of communication can occur when one or more parties tries to perform the project with insufficient project staff. In such circumstances the staff are often too busy dealing with short term problems to communicate effectively with other members of the Project team. This problem is a symptom of the high costs of low overheads. Market forces encourage tenderers to minimise tender prices by reducing the tender allowance for "preliminary costs". Before accepting a tender, the client (head contract) or contractor (subcontract) should ascertain the number and qualifications of management and technical staff to be committed to the project by the preferred tenderer, and satisfy itself that such personnel will be adequate for the proper management of the project and the contract.

Timely notices of potential delays, variations, and other factors likely to affect the performance of the project are necessary to enable action to be taken to avoid or minimise the potential problem, or allow agreed records to be maintained. Unrealistic procedures and notice provisions, such as requirements for legally precise statements as part of day-to-day contract administration, tend to be counter-productive.

Realistic, regularly updated programmes are an important factor in this communication process. The project master programme should include client decisions, authorities' approvals, design, off-site work, materials procurement, etc, as well as on-site construction activities. The project programmes should be regularly updated after detailed discussions with all parties to reflect the rate of progress that can be realistically achieved with available resources.

Contract clauses for extensions of time for delays should avoid direct reference to the project programmes. The over-emphasis of the contractual role of project programmes is counter-productive, because in such circumstances project programmes tend to reflect contractual considerations rather than concentrate on establishing a realistic estimate of likely performance.

The contractual role of project programmes can be reduced if the client's contractual obligations for the supply of information, access to site, etc, are defined in a separate contract schedule. Accordingly the head contract and subcontracts should include a proforma schedule setting out the agreed dates where outstanding information, etc, will be supplied. On a project using traditional contract strategy the proforma schedule would define the timing of the design/construct interface, including the timing for information relating to provisional sums and the nomination of subcontractors. The schedule should also include matters such as the contract dates for possession of particular areas of the site, and details of any other restraints on the performance of the project.

Entitlement to an extension of time should be based on an analysis of all relevant factors affecting the completion of the work, including, but not necessarily limited to, analysis of the current project programme. Contractual arguments regarding the ownership of time contingency can be avoided by contract provisions such as the following provision contained in Clause 35.5 of AS2124-1986 and an equivalent clause its companion subcontract document AS2545-1987:-

> "In determining whether the Contractor is or will be delayed in reaching Practical Completion regard shall not be had to:
>
> - whether the Contractor can reach Practical Completion by the Date for Practical Completion without an extension of time;
> - whether the Contractor can, by committing extra resources or incurring extra expenditure, make up the time lost."

7. Contract Strategy And Allocation Of Obligations And Risk

The contractual arrangements between the various members of the Project Team should be such as to encourage effective communication and to avoid adversarial relationships. In general, the contract forms traditionally used on construction projects do not provide for an effective dialogue

between the parties regarding the optimum strategy for the design and construction of the project. The lack of an effective opportunity for the construction team to contribute to the project in this regard tends to lead to adversarial relationships, particularly if the design team is perceived not to be fulfilling its role in a timely or proper manner.

It is suggested that the traditional contract strategy is really only suitable for projects where all three of the following requirements are satisfied:

(i) where the optimum design for the project can be established without involving the prospective contractor or subcontractors; and

(ii) the time available for the project is such that the detailed design of the project is complete or may be substantially completed before construction commences; and

(iii) few variations to the project design are anticipated to be required during construction.

Traditional contract strategy is inappropriate for fast track projects because the traditional "arms length" relationship between the design team and the construction team is inappropriate when the detailed design is carried out concurrently with the construction of the project. The use of such strategy on fast-track projects is a significant cause of delay, disruption, and additional cost. Provisional sums and nominated subcontracts are often an indication of fast track projects using a traditional contract strategy.

Certain alternative contract strategies facilitate better communication between the design team and the construction team. These alternative strategies include:

- Detail Design and Construction
- Design and Construction
- Project Management
- Construction Management

It is beyond the scope of this paper to describe these alternative strategies in detail. However, experience with these strategies indicates that, when used in appropriate circumstances, significant project efficiencies can be achieved that benefit all members of the Project Team.

Regardless as to which strategy is selected for a project, project obligations and risks should be carried by the party that can best control or influence that obligation or risk. The allocation of "neutral" risks beyond the reasonable control of all members of the Project Team, should reflect the extent to which a party may be able to influence or overcome such "neutral" risk and the commercial capacity of a party to absorb the consequences of a neutral risk.

The allocation of obligations and risk should encourage efficiency and innovation. Risk allocation should not allow one party to pass to another the consequences of its acts, defaults or omissions. For example, the party carrying out an aspect of the project should accept responsibility for the accuracy of its work. For example the party responsible for providing Bills of Quantities and/or Geotechnical Reports should accept responsibility for the accuracy of these documents. If a client wishes to avoid the responsibility for an aspect of the project it should select a contract strategy that requires the contractor and subcontractors to perform that work.

An appropriate contract strategy and risk allocation encourages the efficient performance of projects, with a positive effect on time, cost and quality that benefits all members of the Project Team.

It is essential that each party to a contract properly understands its rights, obligations, powers and duties. Special conditions of contract should not repeat matters already covered in the general conditions. Technical matters should be dealt with in the specifications. Contracts should be expressed in clear, unambiguous language.

8. Monitoring Of Time And Cost

Time and cost monitoring is essential for effective project control.

Realistic programming for the project is an essential prerequisite for effective monitoring of project time. Delays to apparently non-critical activities can sometimes delay the completion of a project due to the criticality of certain resources. Programmes for complex projects, such as major building projects, should be based on both activity and resource criticality. Simple charts plotting production v time provide useful supplementary data to back-up time forecasts produced by the more sophisticated programming techniques. Such charts can often provide a telling insight into the resources and time required to complete a particular section of a project.

A careful analysis of the project budget is a prerequisite for effective cost control. The project budget should be allocated to the various elements of the project. Each element of the project should be given a cost code against which costs can be booked as the project proceeds. Care should be taken to establish an optimum number of clearly defined cost codes. Too many cost codes, or a lack of precise definition, tend to confuse field supervisors, resulting in costs being booked to the wrong code. A cost code system with too few cost codes may not be sensitive enough to provide feed back on the particular elements of the project. Computerised cost monitoring systems allow rapid analysis of cost data. It is important that the cost reporting systems are highly disciplined to ensure that cost data is collected and analysed and the results distributed in a timely manner. Management effort is typically concentrated on correcting over-budget elements of the project. However an over-concentration of effort on over-budget items can result in lost opportunities to further reduce the cost of below-budget items. All elements of major expenditure should be the subject of continuing review to identify legitimate means to minimise cost within the time and quality restraints of the project. It is a false economy to minimise costs at the expense of sub-standard work. It usually costs no more to carry out work correctly the first time. Defective work is costly and disruptive to correct and can cause significant ripple effects onto other aspects of the project. Sub-standard work does not minimise project costs.

9. Quality Assurance

Traditionally, the quality control of construction has

been the province of the client and its design consultants. The client's clerk of works and design consultants have acted as policemen to ensure, as far as possible, that the specified construction requirements have been achieved.

Quality control of a party's work is, in fact, in the self interest of that party. Achieving the specified quality first time saves both cost and time. In addition, an established reputation for quality provides increased credibility and marketing opportunities.

Quality assurance systems have been developed on the basis that the party carrying out the work is best suited to carry out routine testing and checking of quality as the work proceeds. The client's role is to audit the quality system.

An important facet of the quality assurance of construction work is that designers must specify work in objective rather than subjective terms. This requirement alone can assist greatly in reducing the specification uncertainty and disputes.

Quality assurance is also appropriate for the project design and documentation. Quality assurance of design documentation and other contract documentation prior to issue for tendering and construction purposes significantly reduces the incidence of errors contradictions and ambiguities in such documentation.

The current relevant Australian Standard is AS2990-1987. This is a comprehensive document, based largely on the equivalent Canadian standard, and is particularly suited to the requirements of the manufacturing industry. The Standards Association of Australia has recently agreed to develop an Australia Standard document to suit the specific requirements of the building industry.

Certain contractors and subcontractors consider quality assurance systems to be another bureaucratic burden for them to absorb. However, if properly implemented, quality assurance systems can be a cost effective method of ensuring that the specified quality is achieved in a systematic, orderly manner and without remedial work.

10. Avoiding Claim Situations

Claims arise between members of the Project Team as a result of factors that have allegedly delayed and disrupted the orderly performance of the project.

Contrary to popular belief, legitimate claims do not represent a windfall profit for the claimant, but are merely an attempt to recoup increased costs actually incurred as a result of the alleged delay and disruption. As indicated in Section 1, these costs increases can be of frightening magnitude.

Given:

- the subtle nature of delay and disruption;
- the practical difficulties of establishing the causal links between day-to-day events on the project and the alleged affects on the performance of the project;
- the claimant's duty to mitigate its costs in such circumstances; and
- the high cost of resolving such matters in formal arbitration and litigation,

it is rarely, if ever, possible for the claimant to recover the full extent of the additional costs incurred as a result of delay and disruption.

Accordingly, it is in the self interest of all members of the Project Team to be ever vigilant to avoid potential "claim situations". Prevention is better than cure.

Experience shows that the most profitable contracts for all members of the Project Team occur on projects that have been carried out without significant delay and disruption to the orderly performance of the work. No party wins from delayed and disrupted projects. On such projects all parties invariably suffer increase costs, cash flow problems, lose money and reputation and lose their faith in their fellow team members.

If a claim situation cannot be avoided, it is in the interests of all parties that the matter be resolved without resort to formal arbitration or litigation. The claimant's submissions should show clearly the basis of its claims, the relevant facts, the valuation arising out of the matter.

Certain claimants fail to show the necessary logical links between the basis, the facts and the valuation. Indeed, certain claimants value their claims as the difference between tender price and actual price, seemingly without reference to the facts relevant to the claim event. Except in most unusual circumstances, claims presented in such format will not succeed, and will cost the claimant dearly both in financial terms and credibility.

If a subcontractor's claim relates to a matter for which under the head contract the client is responsible, the subcontractor's entitlement should be ascertained pursuant to the terms of the head contract. The contractor and subcontractor should be required to co-operate with each other to facilitate the orderly and expeditious resolution of such matters. Such procedure overcomes the potential problem of parallel arbitrations under the head contract and the subcontract in respect of the same matters.

11. Remedies For Default

The preceding sections of this paper indicate the importance of team work to ensure the success of a project. If one of the team cannot, or will not, perform its role as required for the project, this failure can jeopardise the success of the whole project.

Most contracts provide a series of contractual remedies that can be implemented if a member of the project team is not fulfilling its role. The very existence of such remedies seems to provide an (albeit negative) incentive to perform. However, as discussed above, efficient project performance provides its own reward in reducing costs, and such negative incentives should not be necessary.

By far the best way of remedying a default (or potential default) is to reach an amicable agreement with the defaulting party. Handled sensitively, such a default agreement can allow the defaulting party to make arrangements for the completion of outstanding work at far less cost to all concerned than may have been possible if the contractual procedures for default had been applied. Such default agreements can be implemented quickly, and minimise the delay and disruption to the project. Such default agree-

ments may provide for support to assist the existing team member overcome its default. In certain circumstances the appropriate remedy may be to agree that certain of the outstanding work be carried out by others. On occasions both sides agree on terms to terminate the contract.

If agreement cannot be reached the contractual procedures for default must be implemented. This procedure usually involves the issuing of a "show cause" notice to the defaulting party prior to determining the employment of the defaulting party.

If a party is in breach of its obligation to complete its work by the contractual completion date, as extended, the party is liable in damages for such late completion. Often such damages are pre-ascertained and liquidated damages in an amount stated in the contract.

Remedies for delay and default should be regarded as a last resort. If the various factors outlined in Sections 2 to 11 inclusive are observed, the project would be unlucky if a member of the team defaults. If the factors outlined above are not observed, the costs incurred by each member of the Project Team will increase without a corresponding increase in income, thereby causing a cash flow and liquidity squeeze. In such circumstances otherwise viable organisations can be forced into financial problems and default to the detriment of all team members.

12. Conclusion

It is in the self interest of every member of the Project Team to play its part in promoting an efficient project environment, so as to minimise costs and time for performance whilst achieving the specified quality of work. Successful projects create a "WIN-WIN" situation for all members of the Project Team. Contractual remedies for delay and default should be used only as a last resort after all other options have been tried but have failed.