

## TRENDS IN CONTRACTING PRACTICE FOR CIVIL WORKS

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As contracting practice evolves, there is growing awareness of the need to refine the basic documents on which it rests--the bidding documents and the contract itself--to ensure that the facility owner gets the work on time, to specification, and within budget; and the contractor realizes his expectation of profit, which is the primary reason for his being in business. Contractors are also experimenting with new ways of acquiring business and enhancing profit. Two areas in particular have been subject to close scrutiny in recent years: the definition of risk, and the optimizing of incentives.<sup>2</sup>

Both these factors, risk and incentive, come hand-in-hand in the construction industry. Contractors who succeed have learned to manage risk and maximize profit-taking, often in conditions of almost suicidal competition. But for every contractor who succeeds, many are victims of poor planning, poor budgeting, and poor resource management. The failed contractors are a measure of the industry's inefficiency, and their failures necessarily affect the facility owner and his expectation of results from the economic asset that was under construction.

Worldwide, the industry has a poor reputation for coping with risk. On the contractor's side, many excellent craftsmen and engineers attempt to become entrepreneurs, usually with little or no knowledge of good management practice; contractors' ranks are also graced by adventurers, lured by the aura of the "fast buck" which construction conjures for many. On the owner's side, minimizing cost is often the absolute goal, regardless of market realities; impossibly low prices are accepted in bids, and contracts of adhesion are foisted on contractors, often with clauses that give the owner all the rights and the contractor all the obligations. A fairer meeting of the minds will lead to a more harmonious contractual relationship and the achievement of the contract goals.

As the construction industry gains recognition as one of the pillars of economic development and sustained economic strength, more and more work is being done by business and academic circles in trying to define risk, and in improving the overall business environment and internal management of the industry. These are means to improve the reliability of contracting and the value that the owner receives for the money he invests in construction. In the United States, for instance, the Business Roundtable carried out in 1982-1983 a construction industry cost effectiveness project<sup>3</sup> that investigated the market and

managerial shortcomings of the industry. The summary report of the project presented a dark picture. It began with the statement, "By common consensus and every available measure, the United States no longer gets its money's worth in construction," and went on to give some chilling figures on the drop of productivity that the industry had experienced over the preceding decade. Part of this drop was blamed on labor and regulatory constraints, poor management practices, and, in no small measure, on the "constant state of confrontation," internally and with its clients and regulators, in which the industry carries out its business. Regarding this last point, the report included, as part of the action plan it proposed, a recommendation for owners to "accept that contraction is complex; recognize that astute contract preparation . . . can yield improved project cost effectiveness; develop appropriate expertise; and develop a formal contracting plan in depth as a means of arriving at a logical method of risk management based on the project objectives."

The concerns expressed in the 1983 Business Roundtable report are still in effect, judging by the frequency and character of the papers on contracting, risk management, and business failures that appear in the ASCE Journal of Construction Engineering and Management.

Those concerns are, to a large degree, universal, and do not apply exclusively to the United States.

In the United Kingdom, the University of Manchester Institute of Science and Technology (UMIST) has been studying ways of handling construction work in which risk is poorly defined, for instance, through the use of target contracts; and more recently, looking at risk management in broader terms. Among the principal conclusions of a recent paper prepared by UMIST researchers<sup>4</sup>, they state that "all too often, risks are either ignored, or dealt with in a completely arbitrary way . . . The need for judgment should not be used as an excuse for failing to give adequate consideration to project or contract risk," and that "Clients should ensure that the allocation of risk is clearly stated in the tender documents, and contractors clearly specify the provision made in their bids." The paper discussed techniques of risk assessment, and the ways to handle risk in the formulation and management of the contracts. After defining risk, the contract should deal with the way in which it will be paid for. Not "if" risk should be catered for, but "how": contracts must be clear and specific in this respect.

The World Bank has also been looking at the construction industry and its business environment, seeking to improve bidding and contract conditions, *inter alia*.<sup>5</sup> It is following developments in the field of contract formulation with great interest, realizing that the momentum needed to develop the construction industry in late borrowing countries will have to be propped on a correct understanding of risks and rewards and their fair apportionment among the parties to the contract. World Bank borrowers and the construction industries in their countries cover a wide range in the spectrum of development: from active internal markets, which have permitted contractors to develop and learn to manage risk, including the high level of risk involved in the export business, to countries in which the degree of development and the demand for construction have not allowed a domestic construction industry to arise. In the former case, the problems are similar to those of contracting in developed countries; in the latter case, contractors have to be weaned into basic management procedures, and the owners must initially shoulder most of the risk. Also, in civil engineering construction work simple contract forms are used, and the tasks are initially simple, later increasing in complexity and risk.

In gravel road construction, for instance, a workable progression proceeds from haulage of gravel and spoil; to excavation and haulage; to excavate, haul, spread, and compact; to full construction, with a corresponding increase in the complexity of the contract form and the degree of risk taken by the contractor. Initially, the risk is limited to that of supplying a truck and driver, and performing an operation on a cost-plus basis.

There are also important initiatives in World Bank member countries to develop management skills among contractors: for instance, the courses for project and construction managers given in the Eastern and Southern Africa Management Institute (ESAMI), in Arusha, Tanzania, and the National Institute of Construction Management and Research (NICMAR), in Bombay, India, to quote only two of many notable endeavors. The World Bank follows the work of such institutions, encourages their use by borrowers in other developing countries, and supports them where possible.

## THE FORM OF CONTRACT

One important aspect in contracting is that of achieving that the parties fully understand their rights and obligations as arise from the contract. Language has often been a problem: contracts have tended to be written in tortuous legalese that has in itself been the cause of misinterpretations and disputes. Efforts are being made to simplify the language in which contracts are written, so that both

parties can understand more clearly the intent of their clauses. FIDIC, in the new edition of their conditions of contract for civil works<sup>6</sup> have made a brave attempt at simplifying contract language. The previous edition, launched in 1977 and used worldwide over the last decade, was reputed to be written in a way that "86% of its sentences could be understood by only 4% of the population," in terms of IQ.<sup>7</sup> It is not difficult to visualize the extent to which this kind of language can generate problems of contract administration.

The new FIDIC Conditions also go a step further in defining risk, for example, in the area that traditionally had been dubbed "force majeure" and left to arbitrators or judges to decide on how to resolve disputes over compensation. Whereas the previous edition of the FIDIC Red Book termed these risks special risks, the new Conditions defines them clearly as employer's risks, lists them (including engineering design not supplied by the contractor), and provides for remedies. Although we are still discussing among ourselves the extent to which the new Conditions cover this subject adequately and fairly, in terms of the World Bank disseminating its use among its borrowers (the previous--third--edition of the FIDIC Red Book is included with the Bank's "Sample Bidding Documents for Procurement of Works"), the intent of improving the definition of risk and responsibility is welcome.

Another approach is that taken in the general conditions of contract<sup>8</sup> for projects funded by the European Community in developing countries. In that standard document, the contractor has the right to claim for compensation or termination of the contract in case of unforeseen events that were not caused by the owner (and, of course, are not traceable to the contractor), provided those events result in damages which are "large, unforeseeable, and unavoidable."

The Institution of Civil Engineers (ICE) of the United Kingdom has launched an initiative to design a new style contract for engineering projects, seeking objectives such as flexibility, to adapt to new contractual situations and relationships, particularly the varying degrees to which contractors take part in design; stimulating good management; and clarity and simplicity, to define rights and obligations and the apportionment of risk among the parties in clear language, free of legalese jargon.<sup>9</sup> The initiative is in its early stages of implementation, but the ICE is to be commended for this healthy new approach at designing a contract form that departs from a tradition of obscurantism that plagued earlier standard documents. One such standard document goes as far as stating that the contractor may not be capable of understanding its terms, and encourages him to consult his lawyer before signing the Contract.

## Risk in Bidding

Some attempts have been made to reduce the exposure of contractors to ruinously tight pricing, and to elicit bids that would be closer to realistic prices, allowing adequate financial resources for construction, as well as a fair return for the Contractor's efforts. One example arises from the Peruvian regulations for bidding and contracting for public works,<sup>10</sup> which aimed to achieve this through the averaging of the bids received. Article 4.3.13 of these regulations states (in a slightly abridged translation):

"An award will be made in accordance with the following procedure:

1. When three or more bids have been received:
  - a. The average of all bids and the base budget<sup>11</sup> will be calculated.
  - b. All bids that lie 10 percent above and below this average will be eliminated.
  - c. The average of the remaining bids and the base budget will then be calculated.
  - d. The contract will be awarded to the bidder whose bid is immediately below the second average or, should none of the bids lie below the second average, the award will be made to the bid which more closely approximates the average.
2. If less than three bids are received, the bidding agency may cancel the process, and award the contract to the lowest bidder or to the only bidder if this were the case."

The intent of this procedure was clearly to achieve fair pricing, and draw away from cutthroat competition. However, the system has important drawbacks: in the first place, bidding is transformed into a lottery of sorts, where the contractor's skill in pricing and work management is no longer a deciding factor; and second, concerted pricing by groups of contractors may control awards to a certain extent, by drawing the averages toward a prearranged level.

Another similar practice is that of bracketing, i.e., considering only those bids that lie within a certain range above and below the engineer's estimate. In this system, the lowest responsive bid within the range gets the award. Once again, ingenuity in pricing is discouraged through the arbitrary setting of brackets.

Is it practicable or wise to disregard very low bids? Some contractors complain about the excesses of price competition, and suggest that abnormally low bids should be disregarded. They argue that contractors running into financial difficulties induced by excessively low pricing will be unable to perform, or will strive to reestablish a normal cash flow through claims. In many contracts that

have been let at very low prices, both contractors and owners have suffered. On the other hand, it is difficult for the owner to assess accurately what should be a minimum reasonable threshold; and the more diverse the competition, the harder it will be to establish such a threshold.

The French Public Works Regulations<sup>12</sup> state that abnormally low bids should not be accepted: "Any bid whose price appears to be abnormally low, and consequently may cause implementation problems, should be disregarded without any hesitation..." However, the rule is later qualified by an elaboration of the concept of what is a "normal" price:

"Clearly, the normal cost (to the owner) of the works, to which the bid must be compared, is not the cost which would result from the collusion of contractors in pricing previous works, nor that which would be obtained by updating previous prices by applying general indices or escalation formulae, since one must take into account, *inter alia*, improvements in productivity; in this regard, a careful analysis of the breakdown of unit prices may assist in estimating if the bid prices are reasonable" (in a slightly abridged translation)."

We do not know of any sure method of identifying and excluding an irresponsibly low bid, other than carrying out a careful analysis of the lowest bid, including the work methods proposed and the resources available to the bidder (personnel, equipment, and financial). This procedure requires a thorough preparation of bidding documents that set out well-defined, quantifiable criteria for evaluation of those nonprice factors. Unless they can be quantified objectively, the determination of responsiveness will have to rely on expert judgment, with the attendant differences of opinion and potential for conflict.

## CONTRACTOR-PROPOSED DESIGN AND CONTRACT ALTERNATIVES

For works of a certain magnitude, of a size where prequalification would normally be advisable, contractor's skill and imagination may be tapped, seeking to reduce project costs and construction time. The bidding documents may open up the field of competition to embrace the engineering design and technical specifications, construction methods, time schedule, and even contractual clauses. Care should be taken to establish appropriate rules for bid evaluation, which should be clearly spelled out in the bidding documents. Also, the prequalification of bidders should be carefully carried out, to select only those firms that would be capable of putting forward responsive and responsible bids, particularly if involving design alterna-

tives. Another reason to prequalify bidders is to reduce the impact of the considerable cost that may be involved in the production of alternative engineering design or devising construction methods that improve cost and time performance. Needless to say, narrowing the field to those firms that are eminently qualified for the job will also enhance their interest to produce their best possible effort: their fears of excessively numerous bidders and irresponsibly low bids are allayed.

The French regulations include several bidding procedures that allow for the presentation of alternative proposals for the engineering design and specifications:

1. Bids with restricted alternatives, under which contractors must bid on the basic engineering design but may also propose alternatives for specified parts of the project;

2. Bids with major alternatives, under which the bidders may propose their own alternative engineering design for the whole works, subject to compliance with performance specifications; and

3. Bids without basic engineering designs, where the bidders must propose their own, on the basis of performance specifications.

Bidding documents must of course detail carefully the performance specifications under that the alternatives will be judged, as well as the method which will be followed for evaluation. Those concerned with the preparation of bidding documents and bid evaluation must have a high degree of technical sophistication. The same applies in cases where contractors may offer alternative time and cost-saving construction methods.

The use of completion time as a factor in bid evaluation has also been proposed, for instance, by discounting a stream of costs and benefits (or benefits foregone, in case of late completion) at a given discount rate, and comparing the present values as a means of arriving at the lowest evaluated bid. The authors are reticent to fully endorse bid comparison on the basis of promised time benefits. To be effective and forestall abuse at the time of bidding, contracts would have to include "cast iron" clauses tying the completion date to weather conditions, engineer's instructions, change orders, etc. These are, on the whole, difficult to write and implement in "ad measurement" type contracts. They may apply more readily to "lump sum" contracts, where significant variations are unlikely to occur. For "ad measurement" contracts, the authors prefer alternatives based on tangible proposals such as design or constructional methods.

Certain contractual clauses may also have an impact on cost: payment schedules, working conditions on site, use of the employer's facilities, etc. Whether they may be the

subject of alternative bidding or not depends on each particular case; bidding documents should indicate the permissible departures from a conforming bid, and the method by which they would be evaluated.

The contract itself should include appropriate clauses to cover for whatever alternative is solicited or permitted by the bidding document. Alternatives in fact enhance contractor's risk, in that they place on the contractor the onus for doing something differently, for which added benefits are expected. The contract should therefore assign such added risk to the contractor, and allow for such bonuses or penalties as may be necessary to acknowledge the contractor's production of the promised results.

## TARGET-PRICE CONTRACTS

The use of target-price contracts has been promoted since the early 1960s for situations in which risk is not well defined, and contractors cannot quote a price with any degree of certainty. For example, for very long tunnels where the depth of cover or other circumstances make it impractical to carry out extensive exploratory drilling; or for projects that must be started before full engineering design has been completed. The Contractor must make a best guesstimate on the cost of the project (which becomes a target cost), and quote a fee for completion within a certain range above and below the target. If the final cost, paid on a reimbursable basis exceeds the range, the fee is reduced following a sliding scale; conversely, it increases on a sliding scale if the final cost is below target.

Target-price contracts could therefore provide an answer in situations of rapidly changing site conditions or unquantifiable risk. However, they do require excellent project management on both sides, owner and contractor, with the former providing a sophisticated, well-informed supervisor, capable of managing changing circumstances flexibly and fairly. The key issue is the definition of the target cost at the time of bidding, and its later adjustment as circumstances vary. It has been found in practice that contractors will seek to increase the target level if their calculations of productivity, etc., were on the low side, and address their most strenuous efforts towards that end. In fact, the target itself is the most contentious element of this system.

In a World Bank-financed highway maintenance project in a developing country, a target system was used to create incentives for the contractor providing management support to a force account unit. The target was partly defined in terms of the volume of compacted gravel to be placed in the roads to be resurfaced, but the actual thickness of gravel to be placed was left to be specified by the supervisor on site, as work progressed. The contractor

quickly achieved and exceeded his contract targets by placing excessive thicknesses of gravel near the borrow areas and, although the planned volume of regrading was achieved, a large part of the road network remained untouched. This is an example of how poor supervision can in fact invalidate the target system.

Another use has been proposed for target incentives, providing the same sliding scale for completion before or after a target date, in the determination of a bonus or penalty to be received by the contractor or deducted from his final account.<sup>13</sup> This is a practical way to apply the concept of targets to create incentives for performance, and to a certain extent assist in managing some risks attached to timing.

### THE CONTRACTOR IN A WIDER ROLE

In latter decades, contractors have diversified, and have often made inroads into the field of commercial development. This practice, which is extended within some industrialized countries, is not frequently observed in the international arena. However, as the international market for construction work receded, the larger and more sophisticated contractors in developed countries have been searching for ways to use idle resources (particularly trained personnel) and to generate work for themselves by stepping into areas of risk that hitherto were the domain of governments or utility concessionaires. Increased activity of contractors has occurred in a whole range of pursuits, usually including some form of responsibility over design.

At the lower end of risk and responsibility, and also of potential profit-taking, is the managing contractor, who acts as an agent of the owner in coordinating design, bidding, contracting, and supervision activities, for a fee. The contractor, cast in this role, provides his experience in all aspects of practical and detail engineering, procurement, expediting, site management, cost control, etc. The incentive for quality of performance is almost exclusively that of maintaining good will and reputation.<sup>14</sup> For the owner, this approach means having access to the skills and know-how of a reputable contractor, and potential savings in time and money through skillful project management. A measure of financial incentive can be introduced, for example, by linking the fee to a target cost (but note the risk to the owner, if the target is not properly defined and managed).

Further up the scale of risk and responsibility are the well-known and tried concepts of design-build and turnkey, where the Contractor accepts responsibility for the quality of design, and often takes on a financial risk, for example, where a turnkey job is let on a fixed-price basis. However, the contractor's responsibility ceases more or less at the

same time as it would in a normal construction contract, i.e., on completion of the maintenance period (statutes of limitations excepted).

Of late, however, contractors are often seen as promoters of BOT, BOTT, and BOOT<sup>15</sup> ventures, for projects as diverse as power stations, railways, bridges, and tunnels. Here the contractor's risk is enhanced to the maximum, as he not only takes on the physical and financial risk of constructing the works; he also, and most significantly, embarks on risk related to the marketing of the end product, be it power, transportation, or water. The approach is novel, in that the promoter is no longer an entity whose main activity is that of holding utility or service concessions, but it now involves the contractor himself in the venture.

In developing countries, the introduction of BOT projects has followed a financial motive, spurred by governments wishing to develop a utility without increasing the national debt. The principal constraint is usually the perception of the risk involved in developing the new facility, including any risks perceived regarding the long-term prospects of amortization of the loan principal and transfer of interest and profit. These risks have not deterred entrepreneurs from setting up a number of BOT ventures, mainly in Asia, largely for power generation.

In developed countries, the primary motivators have been political, to induce privatization of utility functions, and financial, to reduce governments' financial strains. Perhaps the most daring BOT ventures today in developed countries is that of the Channel Tunnel, between England and France. This was launched initially through a 50 million pounds sterling equity issue, taken up by 10 contractors and 3 banks. At a later stage, the concessionaire venture Eurotunnel was formed, still including the initial equity partners; this concessionaire venture has raised further equity and loans for a total of about 5 billion pounds sterling. When the "Chunnel" is completed, revenues will come from road tolls and from contracts with British and French Railways. It is interesting to note the types of contracts let by Eurotunnel. The principal ones are:

1. Lump-sum contracts for laying railway track and building the intermodal transfer facilities, which can be defined and quantified before the start of work.
2. Cost-plus-fee contracts, tied to target incentives, for construction of the tunnel, perhaps the best approach for tunneling work under considerable risk. The contractors will be working almost at the limit of tunneling technology. But it will also include certain checks and controls not usually available, because the contractors are themselves partners in the concessionaire venture, and are thus interested in minimizing the capital cost of the tunnel.

3. Management contracts for the procurement of rolling stock and other equipment, an excellent approach, given the amount of negotiation involved with many potential suppliers, and the need for close collaboration in designing equipment that is specifically tailored to the Chunnel's operational characteristics, between the management contractor and the suppliers.

The above three types of contract imply a varying degree of risk for the contractor: from the almost total risk of the lump-sum contract, through the intermediate stage of cost plus fee and incentive, in which risk centers on the amount of the fee, to the management contract, in which risk is minimal. However, underlying the contracts is the risk of success of the whole venture, in itself a potent motivator for efficiency and economies.

In all these types of ventures, over the whole range of contractor responsibility, the form of contract is the critical element: whether defining the risks that the employer acknowledges as his own, or the target in an incentive-assisted management contract, or the government guarantees that will support the floating of a BOT venture, a clear understanding of the risks involved and the responsibility for dealing with them is essential. They must be spelled out in clear terms, fairly stating the rights and obligations of both parties.

## CONCLUSIONS

The quality of bidding and contract documents is critical to the successful implementation of the project. Risks must be properly defined, and the remedies associated with those risks spelled out, in a way that enables the contractor to put his best bid forward. The owner must also be protected against irresponsibly low bids that later result in an excess of claims and controversy. Apart from insisting on clarity of the contract terms, the owner should also carry out a close scrutiny of the bidder's credentials and the responsiveness of his bid. These are the best safeguards for a timely completion of the work, within budget; and they should be used, linked to awarding to the lowest responsive, responsible bidder, in preference to other means to avoid ruinous competition, such as averaging, bracketing, or targets.

There is a considerable resource of unused capacity and skill among contractors, which is available to assist owners in the management of contracts. When charting the course of a new development, new approaches, ranging from management contracts to BOOT, should be considered by owners as valid options, together with the more traditional methods of bidding on the basis of existing designs and specifications.

## ENDNOTES

1. Procurement Advisor (Works), Central Operations Department; and Senior Construction Industry Specialist, Technical Department, Africa Region, respectively, at the World Bank, Washington, D.C.
2. The views and interpretations herein are those of the authors and should not be attributed to the World Bank, its affiliated organizations, or any individual acting on their behalf.
3. *More Construction for the Money, Summary Report of the Construction Industry Cost Effectiveness Project.* The Business Roundtable, New York, Jan. 1983.
4. *Risk Management in Engineering Construction*, by R. W. Hayes, J. G. Parry, P.A. Thompson, and G. Willmer, UMIST, Dec. 1986.
5. See, for instance, *The Construction Industry - Issues and Strategies in Developing Countries*, "The World Bank, Feb. 1984 (Second printing, June 1986); and *Sample Bidding Documents - Procurement of Works*, Inter-American Development Bank and World Bank, Sept. 1985.
6. *Federal Internationale des Ingenieurs-Conseils (FIDIC): Conditions of Contract for Works of Civil Engineering Construction.* Fourth Edition. Lausanne, Switzerland, 1987. (Widely known as the "FIDIC Red Book.")
7. Nail Bunni, quoted by Martin Barnes in "International Construction," Dec. 1987.
8. *Cahier General des Charges des Marches Publics de Travaux et de Fourniture Finances par le fonds Europeen de Developpement, Journal Officiel des Communautes Europeenes*, Feb. 1972.
9. Institution of Civil Engineers, Great George Street, Westminster SW1P 3AA, United Kingdom (unpublished).
10. *Reglamento Unico de Licitaciones y Contratos de Obras Publicas*, Decreto Supreme 034-80-VC, Nov. 24, 1980.
11. Equivalent to the engineer's estimate.
12. *Marches Publics de Travaux. Guide a l'Intention des Maitres d'Ouvrage et des Maitres d'Oeuvre.* Commission Centrale des Marches. *Journal Officiel de la Republique Francaise* No. 2009, Paris, France (Current Edition).

13. See, for example, *Contract Time Determination*, compiled by P. E. Irick, T. L. Copas, and H. A. Pennock, TRB, National Research Council, Washington, D.C. Oct. 1981.

14. See, for instance, *The World of the Management Contract*. The Export Group of the Constructional Industries, London, England, 1988. This booklet explores various possibilities of this concept.

15. Build, Operate, and Transfer; Build, Operate, Train, and Transfer; Build, Operate, Own, and Transfer. We refer to these ventures as "BOT" in the text.