

Rethinking the “G” in GMP: Why Estimated Maximum Price Contracts Make Sense on Collaborative Projects

By Joel W. Darrington and William A. Lichtig



Joel W. Darrington



William A. Lichtig

Historically, owners have relied on the transactional model of contracts to buy construction services. Studies, though, have found that up to 75 percent of construction activities under this model do not add project value.¹ A 2005 survey of construction owners by the Construction Management Association of America and FMI² revealed that among the top concerns of owners are:

- Trust and integrity in the construction process.
- Coordination/collaboration among team members.
- Improved relationships among contractors, construction manager staff, designers, and final users.
- Bringing contractors, subcontractors, and suppliers on board during the design phase.³

Owners are not the only ones concerned. Many in the construction industry note that traditional construction delivery methods (based on a transactional model) are fundamentally flawed, as evidenced by low rates of productivity, adversarial relationships, frequent disputes, lack of innovation, and inefficiency.⁴ In response, the industry is clamoring for greater collaboration among designers, constructors, and project owners, spurred in part by the building information modeling revolution. Integrated project delivery (IPD) and lean construction are growing movements that support the contractual relationships and methodologies necessary to promote greater collaboration and trust among the project participants and greater efficiency and innovation in projects.

Project delivery systems encompass three basic domains: project organization, operating system, and commercial

Joel W. Darrington and William A. Lichtig practice law with McDonough Holland & Allen PC, Sacramento, California. Both have written widely on integrated project delivery and collaborative projects.

terms, each of which must support each other, or risk being at odds and causing conflict.⁵ When owners choose a collaborative delivery model, which reshapes the traditional project organization and the operating system, they also must evaluate which commercial terms best support that delivery model. The U.S. construction industry is familiar with the *guaranteed maximum price* (GMP) approach, which uses the traditional method of shifting most cost risk to the construction manager/general contractor. A new approach has been introduced to the U.S. market and is worthy of examination: the *estimated maximum price* (EMP) model, in which the owner, designers, and major contractors share the risk of cost overruns and use financial incentives to align the interests of each team member with the interests of the project. When the right set of circumstances exists, an EMP approach better supports a collaborative project and helps address the concerns noted above.

Contracting Background

Before discussing the EMP approach in detail, it is important to put construction contracting in its proper context. As noted above, owners have traditionally relied on the transactional model of contracts to buy construction services. With this structure in place, over the last forty years, construction productivity has fallen, while nonfarm productivity has more than doubled.⁶

In an effort to address the challenges and past failings of the design and construction industry, several international efforts are now under way to approach design and construction contracting with a “relational contracting” model.⁷ The most prominent of these efforts to date in the United States is the “Integrated Agreement for Lean Project Delivery” used by Sutter Health.⁸ A variation on this agreement has since become part of the standard forms of agreement produced by ConsensusDocs.⁹

Both a collaborative delivery model and a relational contract focus on developing and sustaining the relationships needed to cope with the reality that the future will unfold in ways that cannot be predicted. Although the project teams will forecast and plan for what might happen, on sophisticated construction projects it is universally true that the plan at the outset is usually out of date by the time the ink is dry. Most would agree that the collaborative problem-solving skills of the project leadership team—the owner, contractors, and designers—will be the key to delivering these projects successfully. The goal, then, is to craft a compensation structure that best encourages the participants to function as a high-performing team and causes individuals to take responsibility for the success of the whole project.

Understanding the Basics

Traditional construction compensation structures come in two basic kinds, with several permutations on each: (1) lump sum (also known as *fixed price* or *stipulated sum*) and (2) cost-plus-a-fee. This article does not dwell upon the lump-sum model, in which the owner simply agrees with the contractor to pay a set dollar amount for the contractor to build the building described in the contract documents. Lump-sum contracts purportedly transfer to the contractor the risk of cost overruns as well as the benefits of all cost savings; contractors can increase their profit by executing the project for less than the lump sum paid by the owner. The riskier or more complex a project, the less likely a sophisticated owner would choose a lump-sum approach, since contractors would have greater difficulty forecasting the risks and accurately predicting the actual cost of the project. A contractor's typical response in this setting is either to include a large contingency to protect against perceived risks or pursue claims for those risks that were beyond its expectations, or both. As the "iron-clad" nature of the price "guarantee" has been eroded both by contract clauses as well as legal decisions and statutes, claims have increased. The transactional costs (i.e., the costs not directly associated with designing and constructing the project, but instead incurred for collateral project issues such as documenting and proving whether a cost overrun is inside or outside the contract) of traditional construction contracts have become extreme. As a result, many public and private owners have elected to move away from lump-sum contracting for complex projects, at least at the general contractor level.

The transactional costs of traditional construction contracts have become extreme.

Such owners use some variant of cost-plus compensation to avoid paying a premium for perceived risk that was priced into the contingency but never realized. This added transparency promotes a heightened sense of final-cost accountability, since the price will correlate quite directly with the incurred cost. Also, the "open book" nature of the contractor's expenditures in a cost-plus context is consistent with the openness, collaboration, and mutual benefit contemplated by a collaborative delivery model.

Construction contracts structured on a cost-plus basis come in a few basic varieties. The first is a straight cost-plus-a-fee or "time and materials" contract where the contractor is simply paid its actual costs in constructing the

project plus a stated fee. This would be akin to a professional services contract, such as many legal engagements, where the owner pays for the full measure of the effort, with no risk of cost overruns borne by the performer. The owner assumes the risk that the project will cost more than the original budget, but also gains all the benefit if the contractor's final cost is less than the budget. Except in unique contexts, straight cost-plus contracts are unusual in construction, as it gives the owner all the cost risk and provides little financial incentive for the contractor to contain costs.

The second type of cost-plus contract is a GMP contract. As discussed in more detail below, GMP contracts typically provide for the owner to pay the contractor its actual costs in constructing the project plus a stated fee, with the contractor guaranteeing that the owner will pay no more than the GMP for the project absent allowable claims for additional compensation.

The third basic type of cost-plus contract is the EMP contract, which is not yet widely known or used in the United States.¹⁰ As with a GMP, the owner pays the contractor for its actual construction costs plus a fee, but instead of the contractor "guaranteeing" that the project will cost no more than the GMP, the contractor and owner agree to share costs in excess of the EMP and the savings of a final cost below the EMP. Also, EMP contracts often use other financial incentives to encourage superior project team performance.

In evaluating the relative merits of the GMP and EMP compensation structures, the following issues should be considered:

- *Risk Management.* How is the risk of cost overruns and other project risks apportioned? Who is best able to bear the risk and at what cost? Does the system promote collective action to manage risk or "siloed" behavior?
- *Certainty of Final Cost.* To what degree can the owner be certain of what the final cost of the project will be? Owners need to make sure that sufficient funds are available to finish the project and will need to make informed cost-benefit analyses of the project before starting construction.
- *Usefulness of Cost Estimates.* Will the cost estimates provided by the contractor be transparent? Accurate? Contain appropriate or excessive contingencies?
- *Productivity/Innovation.* Which compensation approach will best motivate the project team to be productive and innovate to achieve greater value for the project? Any risk of inhibiting productivity or innovation by how the project team is compensated?
- *Relationships.* Will the compensation model promote cooperative relationships or adversarial ones? Which approach best aligns the interests of the parties?
- *Value to Owner.* Which approach best allows the owner to realize its intended value from the project?

Which results in lower nonvalue-added transaction costs? Which one encourages added value beyond the fewest final dollars spent?

With these issues in mind, this article next explores the structure and potential benefits and risks of GMPs and EMPs.

Structure of a GMP Approach

In a GMP approach, the prime contractor (usually termed a construction manager (CM), but also could be a design-builder) is reimbursed by the owner for all expended construction costs plus a fee, subject to a guaranteed cost cap (the “guaranteed maximum price” or GMP). Included within the GMP are both (1) *visible*, stated contingencies to address uncertainty, mistakes, and risk for certain construction costs not included in the development of the GMP (e.g., labor disputes) and (2) *invisible* contingencies in the form of padding to line items to cover uncertainty regarding productivity, materials costs, labor availability, regulatory environment, and similar factors.

Usually, the CM assembles bid packages for the various construction trades when the project’s design is at or close to completion, then formulates the GMP based on the bids received, subject to certain qualifications and assumptions on which the GMP is based and allowances for unbid work. If the CM incurs additional cost because an assumption or qualification turns out differently as the project unfolds, or if certain unforeseen conditions or owner-directed scope changes arise, the CM is typically entitled to a change order that increases the GMP and provides added fee. Otherwise, the CM assumes the legal risk of cost overruns above the GMP and typically passes that risk down to its subcontractors for their own scopes of work. However, where the final construction cost is less than the GMP, owners frequently contract with the CM to share the savings, thus providing a financial reward to the CM for controlling costs.

In setting the GMP, the CM typically seeks a level where the likely range of cost overruns does not exceed the amount of contingencies and anticipated profit on the job, so that the CM does not lose money on the job and put its other operations at risk. By assuming the risk of unlimited cost overruns, the CM (and, by extension, each subcontractor) is in effect betting the company’s survival in the event of catastrophic cost overruns for the opportunity to make the profit it anticipates on the job. Like most practiced gamblers, contractors generally do not bet unless they think the odds are in their favor, and they try to ensure good odds by increasing the GMP (and their fee within the GMP) to match up with their view of the project’s risk profile within a safe margin of error.

When subcontracted work on GMP projects is competitively bid, the low-bidding subcontractors are often compelled to price their work with a suboptimal margin in order to win the contract award. This often results in efforts to generate additional profit by searching for ways to

generate change orders or otherwise recoup profit through claims.¹¹ This also may occur if, during construction, the project cost is forecast to exceed the GMP, since the CM and/or subcontractors would otherwise lose money on the job. This is not to say that contractors do not frequently have legitimate claims, but that the nature of the compensation structure has led some contractors to build a business model that depends upon generating change orders to realize their profit goals. Moreover, since all contractors have strong incentives to avoid job losses, this kind of adversarial conduct is expected and defensive measures are typically put in place.

Also, a typical GMP approach has no relationship to how the design team is compensated. Design firms would typically be paid on a fixed-fee basis or on the basis of time and expenses (with or without a cap). The designer’s compensation is not tied to the constructor’s success.

What Is an EMP Structure?

By contrast to the GMP structure, in an EMP approach, the owner, designers, prime contractor, and major trades jointly develop their best estimate of the anticipated collective construction cost of the project—the EMP—and devise a system of financial incentives and risk sharing to align all parties’ commercial interests to design and construct the project within the EMP. The design and construction teams are reimbursed for their project costs and paid a base fee, with the possibility of increased fees under the incentive program. The EMP can be set early in design or at or near the completion of design—there are different schools of thought on that.¹² Jointly motivated by the financial incentives and risk-sharing system, the designers, prime contractor, and major trades work together to develop a design that meets the owner’s budget, quality, program, and other value criteria.

The financial incentives and risk sharing are structured so that all primary parties (owner, designers, and constructors) share the risk of cost overruns and the savings from underruns against the EMP, with the owner taking the final risk of cost overruns once the actual construction cost exceeds some set threshold (which is often set at the entire amount of profit from the design and construction teams). By sharing the risk of cost overruns and the savings from underruns, the parties’ commercial interests are aligned so that all parties mutually support each other in optimizing the project and collectively managing risk, while the cap on designers’ and constructors’ liability keeps the project participants focused on meeting the owner’s objectives instead of unduly focusing on protecting their individual balance sheets. Think of Maslow’s hierarchy of needs: a person cannot focus on satisfying other goals unless survival is assured. The goal of the EMP structure is to achieve the appropriate balance of risk and reward to allow the CM, designers, and the trade contractors to avoid being so consumed with company “survival” that they are unable to strive for higher levels of success, while giving each participant enough “skin in the game” to keep them sharp.

In addition to cost performance incentives, EMP projects frequently use other financial incentives addressing, for example, quality, schedule, safety, and customer satisfaction, so that the team is not slavishly focused on cost savings to the detriment of the project's overall value.

Analysis of Benefits and Risks

Following is an analysis of the shared and distinguishing benefits and risks of GMPs and EMPs.

Cost Cap

From an owner's perspective, the best and most obvious benefit to a GMP is that absent a legitimate claim for additional compensation, the owner is not legally responsible for construction costs above the GMP. This gives the owner legal protection against most cost overruns and arguably provides the owner some certainty as to the project's final cost.

However, this benefit is somewhat illusory and is undercut in several practical ways. First, the more likely a CM sees itself as potentially exceeding the GMP, the greater the temptation for the CM and trade contractors to act as adversaries to the owner and seek additional compensation through filing claims and change orders.¹³ Even if the owner prevails in such disputes, it still incurs significant transaction costs (e.g., "siege" preparation during construction—lawyers, consultants, and expert witnesses) outside of the GMP.

Also, as in any risk transfer scenario, the owner pays a premium to transfer the risk of cost overruns to the contractors in the form of higher fees and larger contingencies.¹⁴ This also increases the transaction costs an owner pays (the riskier the project, the higher the premium). In addition, because the owner has paid the CM to take the risk of cost overruns, the owner is less motivated to be reasonable in dealing with the CM when facing a potential GMP overrun, even if it would be in the owner's long-term interest to preserve good relations with the contractor (or the industry at large)¹⁵ or in the project's short-term interest to preserve good working relationships in order to complete the project in accordance with the owner's non-cost goals (such as quality or schedule).

Perhaps the biggest obstacle to most owners considering an EMP structure is concern with the lack of a stated cost cap. Owners are accustomed to believing that a lump sum or GMP will be an accurate forecast of their actual project costs. As such, at least initially, many owners may perceive that there is a lack of final project cost certainty with an EMP approach¹⁶ and will understandably worry about the risk of cost overruns in an EMP setting. Nonetheless, this perception does not reflect the reality of an EMP structure.

Lump-sum and GMP contracts do not necessarily result in certainty of final cost. Traditional contracting structures have many collateral or hidden costs, because they come with greater risks of increased contingencies, more change orders, higher transaction costs in contract

and claim management, and more frequent and severe disputes. As part of this process, the owner also is paying additional fees to the designers on a time-and-expense basis to handle these claims and disputes. Once this full array of potential costs is understood, then an owner can appreciate that an EMP approach may, in fact, deliver greater cost certainty than a hard contract price. An EMP generally is a better forecast of actual project cost than a GMP, because there is less cushioning in the fee and contingency amounts (due to reduced contractor risk for cost overruns) and less likelihood of transaction costs outside of the EMP in the form of claim management and dispute resolution.¹⁷

In addition, the risk of cost overruns can be mitigated significantly by using the lean construction concept of "target value design" (or TVD). Although a complete discussion is outside the scope of this article, TVD is a design methodology that requires project values, cost, schedule, and constructability to become basic components of the design criteria. In TVD, the architects and engineers, together with the general and trade contractors, jointly prepare a validation study that includes a collaboratively developed detailed basis of design document coupled with a trade level estimate resulting in an "expected cost" for the project—what current best practice would produce. Assuming this analysis supports the owner's business case, the project proceeds with the team charged with designing to the detailed cost estimate, rather than simply estimating the detailed design at designated intervals. Design proceeds with the full involvement of the general and major trade contractors. A target cost is established by the project team as a stretch goal to drive innovation in the design effort by seeking to create design solutions that will deliver the project at a cost significantly below the expected cost (or at the expected cost with added project value).¹⁸ Most EMP contracts have incentive structures (including teamwide sharing of cost overruns or underruns, but also potentially including incentives for noncost performance) that would reinforce the goals of TVD and provide significant motivation for the design and construction team to deliver the project within the EMP.

Market Pricing

A GMP typically rests on a foundation of competitively bid, "hard price" (i.e., lump sum or GMP) subcontracting rather than on estimates based on reliable predictions of end-of-job costs.¹⁹ The distinction between contract pricing and cost estimating is important. Contract pricing is proposed based on a range of factors, some of which are clearly related to the anticipated cost of materials and labor, but others of which have to do with the contractor's appetite for risk, the risk profile of all the unrelated projects a contractor is concurrently performing, how badly the contractor needs work, and other areas not directly tied to how much the project "should" ultimately cost. However, in order to determine affordability and to benchmark the contract prices, the owner needs a reliable,

relatively objective forecast of final project cost without all of the baggage that comes with contract pricing. The problem is that CMs generally rely on trade contractor bid prices to generate GMP proposals.²⁰ As a result, the GMP may not be a reliable predictor of the end-of-job cost, and with the contractors holding the risk of cost overruns, the GMP approach results in larger visible and invisible contingencies, higher fees, and added transaction costs in documenting, preparing for, and resolving potential claims.

On the other hand, because GMP contractors typically utilize competitive bidding to select trade contractors, the competition from various potential trade contractors means that the project pricing directly benefits from market forces. Traditionally, owners view this type of price competition as the sure means for ensuring best pricing because it results in the lowest contract or “first” price.

However, experience teaches that low first price often fails to correlate with low final price. The same pressures that keep pencils sharp also frequently result in adversarial relationships within the supply chain, as contractors put pressure on subcontractors to reduce costs. These adversarial relationships obstruct a collaborative focus on achieving cost reduction at the “whole project” level,²¹ since subcontractors are motivated to act in ways that would reduce their own costs, even if it prevented larger project savings or resulted in disproportionate cost increases for other trades. In essence, each trade is focused solely on optimizing its performance, competing for space, time and money, often resulting in diminished systemwide performance. Also, the pricing pressures can result in reduced quality (as subcontractors try to substitute cheaper materials or construction methods in order to save costs) and subcontractors seeking to recapture profit through change orders and claims.²²

An owner can partially mitigate the hard pricing problems of a GMP in several ways. First, the CM could procure most or all of the trades competitively during the preconstruction period on a best-value basis, rather than after design completion using low bids. The selected trade contractors would provide their hard prices to the CM after the construction drawings and specifications were complete. Thus, the GMP would be set later in the project chronology, after the trades have been able to participate in the design process, resulting in a more informed design and fewer coordination problems. As a result, the CM and the trades would require less contingency within the trade prices and the GMP, and the likelihood of claims based on design problems is reduced. However, the trade contractors would not have their pricing directly influenced by competing with others in the market, and because they would still ultimately hold the risk of cost overruns, some protective premium would still be charged to the owner.

Second, the owner could hire an independent cost consultant to use historical trade costs and productivity rates with current trends as a check on proposed trade pricing. This would give the owner an alternative cost estimate

against which to benchmark the GMP and trade prices.

Third, the owner could require the CM to set the GMP at an amount sufficiently above the owner’s best cost estimate so that the CM’s realistic risk for cost overruns is reduced. In this case, an owner would be well served by setting a target cost at the amount of its best cost estimate and keying certain financial incentives to meeting the target cost. The contingency amount should be included within the target cost, rather than simply being the large buffer between target cost and GMP. For most contract purposes, the target cost would then function as the contract price, with the GMP floating above like a high-deductible insurance policy protecting against cost overruns. As with any insurance policy, the premium that the insured pays for the policy gets smaller as the deductible goes higher. Likewise, the amount of premium the owner pays in fee and contingency should decrease as the buffer between target cost and GMP grows. The owner and CM could then find the “sweet spot” for the target cost and GMP that meets the parties’ appetites for risk assumption and risk premium.²³

Experience teaches that low first price often fails to correlate with low final price.

Fourth, the owner could simply reject subcontractor hard pricing and require that most or all of the trades be contracted on a cost-plus, non-GMP basis. The CM still would place a GMP over the whole project, so in this scenario the CM could not pass down the risk of cost overruns to each of the trades for their part of the work, and as a result the CM will likely increase its contingency and/or fees to compensate for this risk transfer. However, the owner benefits from reducing the contingency within each trade’s contract, so that there is reduced stacking of CM contingency on top of trade contingencies. Also, if the CM’s and each trade’s fee is converted to a lump-sum amount, so that a reduction or increase in scope does not affect anyone’s profit, then the owner would have fewer transaction costs in the case where the whole project can be optimized by increasing the work performed by one trade to reduce even more work to be performed by another trade. Alternatively, the owner could avoid these problems all together by adopting an EMP approach. As stated earlier, under an EMP, contractors are not selected on the basis of bids, but rather are engaged on the basis of qualifications and are involved in the design of the project.

Many owners considering an EMP approach may

express concern that the EMP does not benefit from direct price competition or that they are losing the opportunity to benefit from a contractor making a pricing mistake or really needing the work.²⁴ They also may question whether the EMP really is in line with the market. Such concerns are best addressed by helping the owner understand the nature of contract pricing.

The open-book nature of the EMP development gives the owner the information it needs to satisfy itself that the EMP is in line with the market.

Construction cost estimating is an art, not an exact science, and does not generate precise predictions of what jobs will actually cost at the end of the project.²⁵ Projects, particularly those that are complex and the highest risk, are unique. Thus, historical costs and current market conditions cannot accurately predict actual project cost without a significant “fudge factor,” particularly when it comes to labor costs. The longer and more complex the job, the bigger the fudge factor. However, because owners need to have some way to assess how much money they need to reserve for a project, whether a given project is worth the investment, and whether a project is being designed to the approved budget, cost estimates remain an essential part of the construction process for both GMPs and EMPs. Thus, owners must address the problem of uncertainty in cost estimating.

In a GMP, the uncertainty impacting the construction estimates and the “stakes” that are associated with the GMP “wager” are met with added visible and invisible contingency, and possibly a higher fee, in order to account for the added risk of the contractor. In an EMP, while the uncertainty remains, the temptation to inflate the estimate is minimized by the truncated risk for cost overruns, the incentive structure, the open-book development of the EMP, and the collaborative relationships with project participants. The focus on building trust-centered relationships improves the level of honesty and transparency in the estimating process, which allows a beneficial joint scrutiny of the assumptions that often escalate the amounts of contingency. Thus, despite the lack of direct price competition, an EMP is more likely to better predict actual project cost.

Also, while losing the benefit of direct price competition is clearly a risk in an EMP model, it is not necessarily as great a risk as some may think. First, consider that while competitive bidding may yield first-cost “market pricing,” the price competition only affects the initial contract price

and does nothing to restrain the added transaction costs incurred in the course of a project for change orders, claims management, and dispute resolution, all of which are endemic to the traditional construction environment of low-bid contracting.²⁶

Besides, what is the real benefit of price competition in a construction project? Because contractors can only do so much to control labor or material costs, the real benefit of price competition is its impact on how much fee (overhead and profit) the contractors propose. Although an owner could not get hard contract prices from contractors if it wants to select them early in the design phase, an owner pursuing an EMP approach certainly could have the contractors and trade contractors include their percentage markup for overhead and profit as part of the qualifications they submit in competition with others. Though an owner would not be well served by simply choosing the contractors with the lowest markups, the owner can take comfort knowing that including markup percentages in the proposals will motivate potential contractors to keep their fees within market ranges. Thus, the contractors’ fees will be influenced by market forces, and the owner can gain the benefit of their involvement in preconstruction. Costs of labor and material are still addressed, though, because the financial incentives and risk-sharing program are put in place to reward contractors for containing (or driving down) those costs through sound management and innovation.

Moreover, the open-book nature of the EMP development gives the owner the information it needs to satisfy itself that the EMP is in line with what the market would charge. Because the owner participates with the designers and constructors in the development of the EMP, the owner has a greater opportunity to understand how the job is priced and what assumptions have gone into developing the EMP. Without the ultimate risk of cost overruns and given the incentive structure, the design and construction teams should be more willing to provide the owner with information that a CM under a GMP would keep close to the vest. The transparent nature of the EMP process can give an owner greater knowledge and increased confidence in the achievability of the project within its budget, which also serves to reassure the owner who does not have the cost guarantee of a GMP.²⁷ However, to realize this benefit, an owner must have the necessary in-house or outside project management expertise capable of adequately appreciating the information available under this transparent process.

The owner also could have an independent estimator confirm the reasonableness of the EMP and trade prices.²⁸ In addition, when evaluating the cost estimates and the EMP, an owner could use historical trade costs and productivity rates as a check on the trade pricing, in order primarily to ferret out mistakes and any idiosyncratic influences on a particular trade’s price. Contractors are often tempted to tell owners what they think owners want to hear regarding costs, and historical costs and rates can

help bring objectivity into the picture.

Last of all, an owner could (and typically does) partially mitigate the loss of complete price competition in an EMP by requiring that certain trades be competitively bid on a lowest-cost basis after the design is complete. Although this raises the other risks associated with competitively bid “hard pricing,” it could make sense depending on the particular risk profile of the trade package and whether that contractor would add much value during the preconstruction phase. Although an EMP is a cost-plus compensation structure, there is no reason that certain low-impact trades could not be procured as lump-sum components of the EMP.

Transaction Costs

As mentioned earlier, GMP contracts involve substantial transaction costs. One major cost involves the inordinate amount of contingency built into most GMPs. By assuming the risk of cost overruns, the CM essentially bets its survival for the opportunity to make its anticipated profit. To ensure good odds, the CM will increase the contingency (and often its fee) within the GMP to match up with the project’s risk profile so that the GMP would be within a safe margin of error. This padding of contingencies is multiplied when subcontractors are factored in, because they typically assume the risk of cost overruns for their scope of work. As a result, they include contingency in their subcontract prices, upon which upper-tier contractors’ contingencies get stacked, notwithstanding the small probability that the project would exhaust the full amount of each contractor’s contingency. In some cases, this results in a GMP that exceeds the owner’s budget and makes the project appear unaffordable unless the parties agree to reduce scope or quality—either way, the owner loses value (or simply scraps the project). Moreover, the owner faces a significant opportunity cost by tying up funds for contingency that may never get used, because the owner could otherwise use those funds to capture opportunities in the marketplace that may not be available when the contingency funds are released.

In an EMP, there is less contractor risk for cost overruns and more contractor influence on the design process, so less need for the contractor to build in a contingency. Also, the open-book development of the EMP makes the contingency more visible and thus requires the parties to justify contingency amounts to the team. A good strategy to help align the team is to have one contingency pool that is shared by all team members rather than having each team member carry its own contingency within its piece of the project.²⁹ A shared team contingency allows the team to better match the full amount of contingency dollars in the project with the team’s collective sense of the project’s risk and uncertainty.

Another transaction cost comes from risk transfer. As observed earlier, the benefit of the GMP’s cost cap comes with a price tag—a premium in the form of higher fees and greater contingencies for the contractor to accept the

legal risk of cost overruns. However, under an EMP approach, the owner’s transaction costs are reduced by the amount of this premium.³⁰

In addition, some owners have observed that under an EMP structure, contractors often charge a smaller percentage for base profit because of (a) their reduced risk on the project, (b) the increased reliability of an EMP as a cost predictor, and (c) the possibility of greater compensation under the incentive program.³¹

Also, a contractor’s reduced risk for cost overruns under an EMP in turn reduces the owner’s risk for disputes, change orders, and transaction costs in managing contract performance and potential disputes,³² creating greater cost certainty and value for the owner.

As discussed more below with regard to project culture, EMP projects do involve some added transaction costs for negotiating the project agreements and administering the incentives program, as well as for the partnering and team-building activities typically used to establish and maintain the needed project culture. Some of those costs also may be incurred in a collaborative project under a GMP, depending on how it is structured.

Under an EMP, contractors are not selected on the basis of bids, but rather are engaged on the basis of qualifications and are involved in the design of the project.

Controlling Costs and Risk by Creating a Collective Enterprise

Because the designers and constructors are not taking the risk of catastrophic cost overruns, an EMP approach provides the necessary flexibility and cost-risk environment for parties to address project uncertainties and difficulties in a collaborative, “best for the project” manner.³³ The common wisdom has been that “the party that can best manage the risk should bear the risk.” However, the interdependence of risks and the actions of multiple project participants, coupled with their collective impact on project management and outcomes, suggest that many risks are best managed collectively rather than individually.³⁴

Despite both the common wisdom and the more recent recognition of the interdependent nature of risk, the traditional construction project (lump sum or GMP) parses and packages risk into discrete craft/contract bundles and shifts risk that is not fully controllable to the lowest party in the supply chain.³⁵ This approach provides no effective mechanism to motivate the nonrisk-bearing parties to offer help to the risk bearer that would be in the

best interests of the project. Instead, traditional project economics motivate potential helpers to view those problems as “someone else’s” rather than “ours.” The collective risk sharing (and incentive sharing) under an EMP approach financially motivates all parties to identify and mitigate risks that they might not otherwise assist with in a traditional contracting approach, leading to a more economically efficient (and equitable) approach to risk management.³⁶ When someone else’s failure will have a direct financial impact on you, you are more likely to offer assistance to help avoid or mitigate the problem—promoting an “all for one, one for all” mentality.³⁷

In an EMP, the parties' energies are focused on achieving the owner's business goals in a holistic way, since that is the only way to maximize profit under the shared-incentive program.

Of course, the downside to this risk management approach is that everyone shares the risks of cost overruns to some degree, even risks outside their direct control or not traditionally assumed by them.³⁸ Clearly, this implicates the risk management and relationship issues noted earlier. Among other things, this means:

- All parties collectively share the risk for cost overruns, with the owner retaining the risk of “catastrophic” cost overruns.
- Contractors share the risk of design deficiencies with designers, and designers share the risk of construction defects with contractors, subject to the ultimate limit of liability.
- Insurance policies need to be understood and integrated with the different risk allocations to clarify the uninsured exposure.
- Shared risk motivates all parties to assist in managing risks, which is highly desirable given the interdependent nature of risk and project activities.

Project participants will be more likely to accept this broader sharing—rather than shifting—of risks if they are educated about the interdependence of risk and principles of collective risk management. Project participants are also more likely to accept this risk-sharing approach in exchange for the protection from the risk of catastrophic cost overruns and the possibility of outstanding compensation under the financial incentives program. Many owners will view this broader range of risks as worth the

exchange for the increased likelihood of collaborative behavior, higher performance by the designers and constructors, reduced transaction costs for claims and disputes, and improved quality and customer satisfaction.

In addition to the risk management benefits, an EMP approach encourages the parties to treat the project as a collective enterprise and facilitates moving money across traditional commercial boundaries so that the parties are not discouraged from, for example, investing \$100,000 in one party’s work to save \$150,000 in another’s work.³⁹ A trade contractor would be less hesitant to agree to perform more or less work if it lost no fee and would increase its likelihood of sharing in the project’s savings against the EMP. Thus, an EMP approach allows for an investment or entrepreneurial mind-set in creating project value.

Conversely, in a GMP, since each contractor holds the risk for cost overruns, the contractors are more likely to adopt a profit protection attitude, inhibiting collaboration and whole-project value-adding solutions.⁴⁰ A contractor looking out for number one is not looking out for number four, even if the contractor could significantly help number four’s performance at minimal cost. Again, this is the problem of optimizing the pieces rather than the whole project.

Also, the hard-price subcontracting typical of a GMP inhibits the ability of subcontractors to agree to have one trade do somewhat more work that would reduce substantially the cost of another trade’s work, resulting in lower overall project cost.⁴¹ Such a restructuring creates either of at least two problems. Problem one (less likely): the first trade is being asked to perform more work within the same hard-bid contract price, which obviously reduces its return, while the second trade gets to do less work for the same contract price, giving it a windfall. Problem two (more likely): the first trade is given a change order and more compensation to do the increased scope of work (no problem there), but the second trade is asked to take a deductive change order decreasing the amount of work and its anticipated profit on the job, which motivates the second trade to fight the change in scope. In either case, the owner has to get involved and incurs transaction costs to try to optimize the whole project, with the added cost of potentially damaging the relationship with at least one trade. In short, subcontractor hard pricing typically results in the trades seeking to optimize their own pieces of the project rather than the project as a whole, and this can manifest itself in all sorts of unhelpful ways.

By aligning the parties’ commercial interests, an EMP approach encourages parties to focus on what’s best for the project and not “cover their backs.”⁴² The parties’ energies are focused on achieving the owner’s business goals in a holistic way, since that is the only way to maximize profit under the shared-incentive program.⁴³ In connection with the list of important issues mentioned earlier, this results not only in improved relationships among the parties, but also bears on risk management, productivity, and, ultimately, the value realized by the owner.

Project Performance

Under an EMP approach, contractors are given the chance to achieve superior returns without “betting the company,”⁴⁴ allowing them to focus on achieving success rather than avoiding failure. This not only better the likelihood of increased contractor productivity, but also sets up an environment conducive to greater collaboration and stronger relationships among project participants, leading to better performance. For example, a mechanical contractor is more likely to trust a mechanical engineer if it knows that the engineer will share both the benefits and risks of the impact of the design on the mechanical contractor’s work. Similarly, the reduction in the contractor’s risk under an EMP approach frees the contractor to explore innovative methods and technologies,⁴⁵ and gives better incentives for the designers and constructors to collaborate in developing a building information model.⁴⁶

EMPs also stimulate greater owner leadership on a project. Simply put, assuming ultimate responsibility for cost overruns motivates the owner to remain fully engaged and exercise a greater leadership role in the project.⁴⁷ However, an EMP approach does present the possibility that an owner that initially is willing to accept the risk of sharing cost overruns above the EMP may not be capable of managing these risks appropriately or of accepting the internal and/or political consequences of cost overruns should they ultimately occur.⁴⁸ The best way to mitigate this risk is for the owner to ensure it has sufficient leadership resources, whether in-house or through an owner’s representative consultant, to provide effective owner leadership. Such leadership should include appropriate education of the owner’s organization about the EMP approach and the principles of collective risk management and collaborative project delivery.

Strong owner leadership (not dictatorship) is critical to the success of collaborative construction projects. Project collaboration is much less effective when the owner is not a contributing team player. Strong owner leadership is not synonymous with a hard-driving owner that centralizes all decision making in itself; rather, owners show leadership by being involved—and involving others—in project decision making, listening closely to concerns expressed by participants, energetically seeking solutions that meet both the needs of the project and the needs of participants, and inspiring participants to embrace project values and elevate their level of performance.

The Importance of Understanding the Project Relationships

As noted before, the more likely a contractor sees itself as potentially exceeding the GMP or EMP, the greater the temptation for the contractor to act as an adversary and seek additional compensation through filing of claims or change orders or cut costs by reducing quality.⁴⁹ This risk is greater in a GMP, where the contractor solely bears the legal risk of cost overruns. Although this also is a possibility in an EMP (where a contractor will want to protect its profit on the job), by better aligning the parties’

commercial interests, an EMP approach promotes collaborative relationships and allows/encourages parties to have more trust in each other, to focus on what’s best for the project and not just “cover their backs.”⁵⁰

However, because collaborative projects depend so much upon the owner, designers, and constructors trusting each other and collaborating closely, an EMP project can be imperiled if personal and/or corporate relationships break down and are not quickly repaired.⁵¹ A breakdown of the collaborative model can have major consequences on both cost and other measures of project success. And since owners share the risk of cost overruns, they will feel the financial effects of the breakdown in the collaborative model more in an EMP context than under a GMP.

In addition, EMP projects require addressing relationships with the senior leadership of each major participant. In many (probably most) cases, an EMP structure is implemented by one or more parties for whom the approach is not common throughout its projects. The particular project leaders would have embraced the EMP approach but may have challenges helping their respective “home offices” understand how the project must be implemented differently than the firm’s other projects. This lack of familiarity with the EMP approach from the home office of a party could diminish the commitment and ability of that party’s senior management to implement the needed cost control measures and cooperative methodology that allow an EMP to function.⁵²

In such a scenario, the project leadership needs to carefully determine how to best educate and train their home offices in the EMP approach and collaborative project delivery model. Each major player’s home office should be involved from the beginning of the project in the development of the EMP process and collaboration methods, have representatives periodically attend project meetings and events, and otherwise be integrated into the project leadership process. Also, each project participant should be encouraged to develop and maintain strong relationships with the home offices of the other project participants.⁵³ Those relationships would be especially important should serious project difficulties arise that require the involvement of senior management from the home office.

Gaining Comfort With the EMP Compensation Approach

GMPs are a familiar compensation structure for the U.S. construction industry. However, EMP delivery is not widely known in the United States and may be challenged in the court of public opinion. In particular, because the owner retains the risk for “catastrophic” cost overruns, there is a greater need for accountability, in terms of both costs incurred and team performance.

Obviously, the best way to mitigate this risk is to carefully design and implement a sound EMP approach and deliver the project within the EMP—then the shareholders or public will not be able to complain about the lack of a price cap. Because no one can guarantee success, consider the following other mitigation strategies:

- Use a competitive process to select the designers and constructors, but on a best-value rather than low-cost basis. This is a well-tested public procurement model.
- Engage an independent auditor for the project and involve it from the beginning of the project. (This is a good idea for other reasons as well.)
- Use a third-party estimator or available benchmarking data to verify the reasonableness of the EMP.

Because it is unfamiliar, an EMP approach requires a cultural change to be effective. EMPs are significantly different than traditional construction compensation mechanisms. Because contractors have developed patterns of thinking and behavior based on these traditional structures, using an EMP approach requires a significant change in the attitudes and actions of participants who are new to the process.

Because contractors have developed patterns of thinking and behavior based on traditional structures, a significant change in attitudes and actions is required for an EMP.

Because the dominant industry culture is different, EMP projects usually have to expend costs to establish this new collaborative culture among the project participants.⁵⁴ Even if the parties have done EMP or collaborative projects before, owners often invest in efforts to maintain and strengthen the collaborative culture so that project participants do not backslide into long-ingrained and incompatible attitudes and behaviors. This requires effective project leadership, particularly from the owner. The owner, the prime constructors, and the designers need to exercise great care in selecting project participants who are both well experienced in their field and also open to new ways of project delivery (or, even better, have successfully participated in a similar project). Once the project team is assembled, owners frequently establish a team-building process involving partnering and other exercises. Establishing the right project culture also requires training the project participants in both the methods and advantages of pursuing a collaborative delivery model and an EMP compensation structure. Knowing the “why” makes establishing the “how” both easier and more effective.

Successful EMP Projects

Because an EMP compensation structure is relatively

new to the U.S. construction industry, any skepticism about its potential effectiveness should be dispelled by examining the success it has achieved on major construction projects outside the United States.

One of the ground-breaking projects to establish the benefits of an EMP approach involved the development of the Andrew oil field for British Petroleum in the North Sea. BP repeatedly tried to find a way to develop the oil field at an economical cost. When traditional construction approaches did not yield an economical solution, BP was driven to find a better way, and helped pioneer the EMP approach in combination with a collaborative project delivery model. The project was delivered £30 million under the EMP and more than £150 million under BP’s original estimate of £450 million (and six months ahead of schedule).⁵⁵

Australia has taken this concept and developed it into a project delivery model termed “Project Alliancing,” which is typified by the EMP structure. According to one experienced consultant to project alliances in Australia, nearly all the thirty-plus project alliances of which he is familiar have been completed within the EMP, and the worst case was a 5 percent cost overrun.⁵⁶ Some other specific examples include:

- The National Museum of Australia, which was delivered below its EMP to rave public review.⁵⁷
- The Port of Brisbane Motorway in Australia, which was delivered 10 percent below its EMP, with the direct bridge costs about 30 percent below industry standard costs, a 10 percent reduction in the owner’s traffic management costs, and the owner seeing no need to hold back money to cover residual contractual disputes.⁵⁸
- The Grafton Gully Road project in Auckland, New Zealand, which was completed six weeks early and below its EMP, despite a number of significant project risks and obstacles.⁵⁹


And finally, demonstrating that EMPs can work in the U.S. construction market, a water main installation project in Somerset County, New Jersey, was delivered under an EMP approach with a tight schedule and a restricted budget, resulting in a 3.3 percent savings on the EMP for the initial work and more than 10 percent savings for additional work added midproject.⁶⁰

Greater Likelihood of a Successful Project

Generally, when an owner seeks to construct a project using IPD, lean construction, or some other form of collaborative construction, an EMP approach often will result in a greater likelihood of a successful project from the perspectives of all project participants, as reflected by the relevant considerations:

- In terms of *risk management*, an EMP approach would best manage the project risks *if* the right team

of designers and constructors were selected *and* the owner commits the necessary leadership resources to help all participants manage the cultural change. Otherwise, the benefits of an EMP structure might be outweighed by the risk of cost overruns, reduced quality, and/or disputes, leaving a GMP as the better alternative for the collaborative project.

- In terms of *final cost certainty*, an EMP approach should provide greater cost certainty *if* the right project team is selected *and* the owner commits the necessary resources to fully participate in the development/evaluation of the EMP and the execution of the work in a collaborative environment. Otherwise, a GMP approach should be utilized, since the necessary tools to successfully implement an EMP are missing.
- In terms of *usefulness of cost estimates*, an EMP approach promotes better cost estimates through its greater transparency (as the owner is involved in the process of determining the EMP), by removing much of the incentive to inflate both visible and invisible contingencies, and by avoiding low-cost bidding as the primary mechanism of projecting final cost.
- In terms of *productivity/innovation*, an EMP approach greatly facilitates productivity and innovation by the designers and constructors by, among other things, enhancing the owner's efforts to establish a collaborative environment and removing financial barriers to project participants optimizing the whole project rather than their individual pieces and exploring innovations that would benefit the project.
- In terms of *relationships*, an EMP approach greatly enhances relationships by better aligning everyone's commercial incentives, reducing the likelihood of disputes, and laying the groundwork for enhanced trust and collaboration.
- In terms of *value to owner*, an EMP approach offers enhanced opportunities for cost savings, increased productivity, good project relationships, and effective risk management, and is offset only partially by the additional costs to set up and administer an EMP project, the opportunity costs for not capitalizing on contractor bidding errors or hunger for work, and by holding the ultimate risk of cost overruns. However, the owner needs to have committed the right leadership resources to realize the opportunities for increased value. 

Endnotes

1. JAMES E. DIEKMANN ET AL., APPLICATION OF LEAN MANUFACTURING PRINCIPLES TO CONSTRUCTION, Constr. Indus. Inst. Pub. RR 191-11, at 76 (2004) (report also finds on page 121 that, if indirect construction work is factored in, the rate probably would be closer to 90 percent).

2. The Construction Management Association of America is a nonprofit organization dedicated to the interests of professional

construction and program management. See CMAA, About CMAA, http://cmaanet.org/About_CMAA. FMI provides management consulting and investment banking services to the construction industry. See FMI, About FMI, www.fminet.com/about.

3. FMI/CMAA SIXTH ANNUAL SURVEY OF OWNERS 1 (2005), available at http://cmaanet.org/user_images/sixth_owners_survey.pdf.

4. Patrick J. O'Connor Jr., *Productivity and Innovation in the Construction Industry: The Case for Building Information Modeling*, 1:1 AM. COLL. CONSTR. LAW. J. 5 (Winter 2007).

5. CHUCK THOMSEN, JOEL DARRINGTON, DENNIS DUNNE & WILL LICHTIG, MANAGING INTEGRATED PROJECT DELIVERY 11 (2009), available at <http://cmaanet.org/fellows>.

6. *Id.*

7. The concept of relational contracts (as opposed to transactional contracts) was developed by Ian Macneil. For a historical retrospective of Macneil's theory of relational contracts, see DAVID CAMPBELL, IAN MACNEIL AND THE RELATIONAL THEORY OF CONTRACT (2004).

8. William A. Lichtig, *The Integrated Agreement for Lean Project Delivery*, 26:3 CONSTR. LAW. 25 (Summer 2006). The latest version of the Integrated Agreement used by Sutter Health is based on an EMP approach. Any reader wishing to obtain a sample copy of the Integrated Agreement may contact the authors.

9. See ConsensusDOCS 300, <http://ConsensusDOCS.org>. This form provides for the possibility of a kind of EMP—see Article 11.

10. It should be noted that *EMP* is not a term currently in wide usage, and is called by various names, including “target outturn cost” in the Australian “project alliancing” delivery model.

11. ALCHIMIE PTY. LTD. & PHILLIPS FOX LAWYERS, PROJECT ALLIANCES—AN OVERVIEW 6, 23 (Mar. 2003) [hereinafter PROJECT ALLIANCES—AN OVERVIEW]; see also OFFICE OF THE AUDITOR-GENERAL OF NEW ZEALAND, ACHIEVING PUBLIC SECTOR OUTCOMES WITH PRIVATE SECTOR PARTNERS 59 (Feb. 2006), www.oag.govt.nz/2006/public-private [hereinafter NZ AUDITOR-GENERAL'S REPORT]; H. Fred Smith, *Bucking the Trend: Cost-Plus Services in Lump-Sum Turnkey Market*, J. MGMT. ENG'G, Jan./Feb. 1997, at 39 [hereinafter *Bucking the Trend*]; M. Motiar Rahman & Mohan M. Kumaraswamy, *Contracting Relationship Trends and Transitions*, J. MGMT. ENG'G, Oct. 2004, at 147 [hereinafter *Relationship Trends*].

12. THOMSEN ET AL., *supra* note 5, at 35–36.; see also HOWARD W. ASHCRAFT JR., NEGOTIATING AN INTEGRATED PROJECT DELIVERY AGREEMENT 16–17 (2009), www.images.autodesk.com/adsk/files/negotiating_an_ipd_agreement.pdf.

13. PROJECT ALLIANCES—AN OVERVIEW, *supra* note 11, at 6, 23; see also NZ AUDITOR-GENERAL'S REPORT, *supra* note 11, at 59; *Bucking the Trend*, *supra* note 11, at 39; *Relationship Trends*, *supra* note 11, at 147.

14. Said Boukendour & Rahim Bah, *The Guaranteed Maximum Price Contract as Call Option*, 19 CONSTR. MGMT. & ECON. 564 (2001) (comparing a GMP to a call option, which results in a premium to the owner (reflected in the contractor's fee) analogous to the cost of buying a call option) [hereinafter *GMP as Call Option*]; see also JIM ROSS, PROJECT CONTROL INT'L PTY. LTD., INTRODUCTION TO PROJECT ALLIANCING 5, 23 (Apr. 2003 update) [hereinafter INTRO TO P.A.]; *Bucking the Trend*, *supra* note 11, at 39.

15. INTRO TO P.A., *supra* note 14, at 23; see also *Bucking the Trend*, *supra* note 11, at 39.

16. INTRO TO P.A., *supra* note 14, at 20; see also DEP'T OF TREASURY & FINANCE OF THE STATE OF VICTORIA, AUSTRALIA, PROJECT ALLIANCING PRACTITIONERS' GUIDE 18 (Apr. 2006) [hereinafter PRACTITIONERS' GUIDE]; *Bucking the Trend*, *supra* note 11, at 40.

17. INTRO TO P.A., *supra* note 14, at 15, 19; *see also Relationship Trends*, *supra* note 11, at 156; Matthew W. Sakal, *Project Alliancing: A Relational Contracting Mechanism for Dynamic Projects*, LEAN CONSTR. J., Apr. 2005, at 76, www.leanconstructionjournal.org.
18. For more on target value design, *see*, for example, Greg Howell, Hal Macomber & John Barberio, *Target-Value Design: Nine Foundational Practices for Delivering Surprising Client Value*, www.leanconstruction.org/files/I2LD_Proceedings/Reverse%20Phase%20Scheduling%20-%20George%20Zettel/Target%20Value%20Design%20AIA%20Practice%20Digest.pdf.
19. *See* Davide Nicolini et al., *Can Target Costing and Whole Life Costing Be Applied in the Construction Industry: Evidence from Two Case Studies*, 11 BRIT. J. MGMT. 306, 318 (2000) [hereinafter *Target Costing*].
20. *Id.*
21. *Id.* at 308.
22. PROJECT ALLIANCES—AN OVERVIEW, *supra* note 11, at 23.
23. *Cf.* Diana Hoag & Nancy Gunderson, *Contract Incentives and Design-Build: Rethinking Acquisition Strategies*, DESIGN-BUILD DATELINE (Feb. 2005) (describing the innovative compensation structure for the Pentagon Renovation Program, which inspired our conception of the “high-deductible” GMP strategy).
24. INTRO TO P.A., *supra* note 14, at 19; *see also Bucking the Trend*, *supra* note 11, at 41.
25. *See*, e.g., Chris Fortune, *Process Standardisation and the Impact of Professional Judgement on the Formulation of Building Project Budget Price Advice*, CONSTR. MGMT. & ECON., Oct. 2006, at 1091, 1092, 1096 (citing widespread problems with accuracy of construction estimates in the U.K. construction industry and characterizing the current estimating process as “quasi-rational”).
26. INTRO TO P.A., *supra* note 14, at 19; *see also* PROJECT ALLIANCES—AN OVERVIEW, *supra* note 11, at 23; ALCHIMIE PTY. LTD., TARGET OUTFURN COST: DEMONSTRATING AND ENSURING VALUE FOR MONEY 3 (June 2004), www.alchimie.com.au/links.html [hereinafter ENSURING VALUE]; *Relationship Trends*, *supra* note 11, at 156.
27. PRACTITIONERS’ GUIDE, *supra* note 16, at 17.
28. THE BRITE PROJECT OF THE COOPERATIVE RESEARCH CENTRE FOR CONSTRUCTION INNOVATION, INNOVATION CASE STUDY NO. 3—MOTORWAY ALLIANCE DRIVES PERFORMANCE IMPROVEMENT 11 (2004) [hereinafter INNOVATION CASE STUDY NO. 3].
29. THOMSEN ET AL., *supra* note 5, at 38–39.
30. *GMP as Call Option*, *supra* note 14, at 564–66 (arguing that the amount of premium charged owner for a GMP increases when (a) the project is more volatile (i.e., less predictable in outcome) and/or (b) the project is of relatively long duration (although this can be offset by the discounting of the GMP to present value)); *see also* INTRO TO P.A., *supra* note 14, at 5, 23; PHILIP L. BRUNER & PATRICK J. O’CONNOR JR., BRUNER & O’CONNOR ON CONSTRUCTION LAW § 6:18 (2008).
31. PRACTITIONERS’ GUIDE, *supra* note 16, at 109–10.
32. *Id.* at 17; *see also Bucking the Trend*, *supra* note 11, at 40.
33. INTRO TO P.A., *supra* note 14, at 2; *see also* NZ AUDITOR-GENERAL’S REPORT, *supra* note 11, at 32; *Relationship Trends*, *supra* note 11, at 147–48, 150, 157.
34. THOMSEN ET AL., *supra* note 5, at 33–34.
35. *Target Costing*, *supra* note 19, at 306; *see also* Sakal, *supra* note 17, at 68.
36. INTRO TO P.A., *supra* note 14, at 7; *see also Relationship Trends*, *supra* note 11, at 147–48, 150, 157 (arguing that traditional risk transfers in construction contracts are not optimal for effective risk management, as some risks require joint efforts to manage).
37. *See* Nadine M. Post, *Sutter Health Unlocks the Door to a New Process Paradigm*, ENG’G NEWS-REC., Nov. 26, 2007, at 80.
38. PRACTITIONERS’ GUIDE, *supra* note 16, at 18.
39. *See* Owen Matthews & Gregory A. Howell, *Integrated Project Delivery: An Example of Relational Contracting*, LEAN CONSTR. J., Apr. 2005, at 47, www.leanconstructionjournal.org.
40. *Per* Erik Eriksson & Ossi Pesämaa, *Modelling Procurement Effects on Cooperation*, CONSTR. MGMT. & ECON., Aug. 2007, at 894–95 [hereinafter *Modelling Procurement Effects*].
41. Matthews & Howell, *supra* note 39, at 47.
42. *See* NZ AUDITOR-GENERAL’S REPORT, *supra* note 11, at 57; *see also Modelling Procurement Effects*, *supra* note 40, at 894–95.
43. PROJECT ALLIANCES—AN OVERVIEW, *supra* note 11, at 32; *see also* PRACTITIONERS’ GUIDE, *supra* note 16, at 11.
44. *See* PRACTITIONERS’ GUIDE, *supra* note 16, at 17.
45. INNOVATION CASE STUDY NO. 3, *supra* note 28, at 10.
46. Howard W. Ashcraft, *Building Information Modeling: A Framework for Collaboration*, 28:3 CONSTR. LAW. 5, 18 (Summer 2008).
47. *Bucking the Trend*, *supra* note 11, at 40.
48. NZ AUDITOR-GENERAL’S REPORT, *supra* note 11, at 32.
49. *Id.* at 59; *see also* ENSURING VALUE, *supra* note 26, at 10; *Bucking the Trend*, *supra* note 11, at 39.
50. *See* NZ AUDITOR-GENERAL’S REPORT, *supra* note 11, at 57; *see also Modelling Procurement Effects*, *supra* note 40, at 894–95.
51. INTRO TO P.A., *supra* note 14, at 21; *see also* ENSURING VALUE, *supra* note 26, at 3.
52. NZ AUDITOR-GENERAL’S REPORT, *supra* note 11, at 27, 59; *see also* INTRO TO P.A., *supra* note 14, at 22.
53. NZ AUDITOR-GENERAL’S REPORT, *supra* note 11, at 59.
54. *Id.* at 30.
55. Sakal, *supra* note 17, at 69.
56. INTRO TO P.A., *supra* note 14, at 17; *see also* ENSURING VALUE, *supra* note 26, at 9.
57. Allan J. Hauck et al., *Project Alliancing at National Museum of Australia—Collaborative Process*, J. CONSTR. ENG’G & MGMT., Jan./Feb. 2004, at 150.
58. INNOVATION CASE STUDY NO. 3, *supra* note 28, at 5.
59. NZ AUDITOR-GENERAL’S REPORT, *supra* note 11, at 60.
60. *Vianini Pipe Joins Team Behind Watershed Agreement*, CONCRETE PRODUCTS, Dec. 1, 2002, www.concreteproducts.com/mag/concrete_vianini_pipe_joins/index.html.