

# Procurement and process design

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To achieve sustainable buildings and construction processes, strategies, policies and initiatives are needed to improve and enhance procurement and project delivery systems employed by private owners and government clients. However, fundamental concerns are hindering progress in many areas.

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Sustainable development means achieving four objectives at the same time: effective protection of the environment; prudent use of natural resources; social progress which recognises the needs of everyone; and maintenance of high and stable levels of economic growth and employment. Buildings and the way they operate have a fundamental impact on the environment, consume large quantities of resources, involve large numbers of workers, and represent a large proportion of economic activity, so decisions made during all stages of the construction procurement process are vital for maximising sustainability.

Sustainable building aims for no overall net environmental burden by considering a building's total economic and environmental impact and performance, from raw material extraction and product manufacture to building design, construction, operations and maintenance, and building reuse or disposal. Although sustainable building practices have, so far, been primarily voluntary it is anticipated they will become more prominent, and be reflected more strongly in procurement and project delivery systems.

## The project cycle

Constructing a building usually represents a major investment for an owner (individual, a private firm or a public agency). Since the investment is motivated by market demands or perceived needs to be met in a timely fashion, the building is expected to satisfy objectives specified by the owner and relevant regulations. Most buildings, being non-speculative, are custom made in consultation with the owner.

Since an owner is acquiring a building on a promise in some form of agreement, it will be wise for any owner to have a clear understanding of the acquisition process in order to maintain firm control of the quality, timeliness and cost of the completed building.

Procurement in this context is the process that an entity initiating a project uses to achieve delivery of a project by obtaining services from both third parties and in-house providers, in conformance with applicable laws and regulations. The process spans the whole cycle, from identification of needs, through to the end of a services contract or the end of the useful life of an asset. Solutions at various stages are integrated to obtain the final outcome.

Procurement processes have been brought to the fore with the realization that without a high quality of construction it will be difficult to ensure the required high performance standards for sustainable construction. However, a 2001 FIDIC survey showed that construction quality continues to deteriorate and is a worldwide problem involving both developed and developing countries. Poor quality arose owing to fundamental characteristics of procurement by competitive tender (tight budgets; stake sharing; over-rigorous application of regulations; unfair selection; inexperienced, unfair and poorly transparent selection) leading to poor practice in virtually all areas (poor project supervision; poor materials; poor workmanship). Solutions need to address the entire procurement process, hence the importance of understanding how procurement works.

Similarly, from the owner's perspective, with the advent of many alternatives for project delivery, selecting the method and procurement process that match project requirements is crucial. The owner may choose to decompose the entire process of construction or refurbishment into more or fewer stages, and thus obtain the most efficient results in implementation. Since operation and maintenance of a building will go on long after the completion and acceptance of a project, it is usually treated as a separate aspect except in the consideration of the life-cycle cost. All stages from conceptual planning and feasibility studies to the acceptance of a building are lumped together and referred to as the design-construct process.

Stages may not be strictly sequential. Some require iteration, and others may be carried out in parallel or with overlapping time frames. All owners, both public and private, use outside agents to a greater or lesser degree when it becomes more advantageous to do so. By examining the project life cycle from an owner's perspective one can focus on the proper roles of various activities and participants in all stages regardless of the contractual arrangements for different types of work.

### **Project delivery**

Clearly stated objectives and knowing the balance between these objectives are fundamental for owners in deciding which project delivery system yields what the owner requires. Objectives and considerations include:

- quality of the completed building.
- need for independent expertise to develop the design, and selection of a design team.
- required time schedule and delivery of a specific product.
- appropriate risk allocation, by for example, transferring risk to those best able to manage it.
- compliance with legal requirements and fulfilling legislative or executive intent.
- financing alternatives, leading to say certain levels of cash flow.
- contracting method best suited for the physical construction.
- whether operation and maintenance should be bundled into project delivery or considered separately.
- need to accommodate a lack of definition at the early stage (some project delivery methods are better able to handle this situation).
- control of the total project cost,

The total project cost is clearly the most important consideration and the one most immediately affected by sustainability issues. It includes life-cycle costs and the initial construction cost ("first cost"). Saving small amounts of money during construction may not be worthwhile if the result is much larger operating costs or not meeting the functional requirements for the building. Thus, owners must be very concerned with the quality of the finished product as well as the cost of construction itself.

Since a building's operation and maintenance is a part of the project life cycle, the owners' expectation to satisfy investment objectives will require consideration of the cost of operation and maintenance. Therefore, the building's operating management should also be considered as early as possible, just as the construction process should be kept in mind at the early stages of planning and programming. Adopting sustainability recognizes this need to internalise costs. For example, calling for tenders to achieve lowest price may seem like an attractive option, but once all external costs such as future costs due to lack of quality are internalised, the outcome may be different.

### **Design-Bid-Build**

The traditional design-bid-build (DBB) process is widely used and relatively straightforward: construction is separated into design and physical production as a phased process involving definition of the project structure and project management approach, followed by project planning, the evaluation of possible delivery methods, the formulation of a design brief, design, cost plan and programme, contract preparation, tendering and construction.

Since there is a succession of discrete activities or phases, requiring completion and possibly separation in time, it is an orderly process with clear lines of authority, scope of services and schedules, where all designs are completed before construction starts resulting in a high level of certainty of what will be constructed.

#### Strategic, concept planning, project programming and needs stage

Implementing sustainability issues starts at the strategic and concept planning and project programming stage where the technical and economic feasibility of alternatives will be compared in order to select the best possible project. Sustainability decisions made at the beginning of a project life cycle have a far greater influence than those made at later stages since design and construction decisions will influence the continuing operating costs and, in many cases, revenues over the building's lifetime. For public owners, it will usually not be procurement staff who set the user's requirements and develop the business case, so it is essential that all stakeholders work closely together to ensure that full advantage is taken of the scope available to consider sustainability issues before the subsequent development of specifications. Multilateral development banks and other international funding agencies have traditionally been very weak in identifying needs.

Prior to setting a specification, there is little in terms of procurement policy or legislation that affects the scope for taking sustainability into account. However, efficient and effective use of financial resources does, of course, need to be assured. To gain time, some owners forego thorough planning and feasibility study and proceed with inadequate definition of the project scope. Subsequent changes in project scope will increase construction costs that are justified by increased profits.

#### Engineer selection

The owner will select an engineer or designer who serves as the owners' management and technical advisor throughout the project, offering tender evaluation and construction supervision. The owner thus has a high degree of control of final design details, the main advantage of design-bid-build.

The objective at the engineer selection stage is to select the candidate most able to execute the agreement between the owner and engineer for services. The general principle of selection is that requirements relating to a supplier's capacity must be

directly relevant to the subject of the agreement. Owners are urged to adopt a quality-based selection approach for the procurement of consulting services.

Quality management is also a prerequisite for sustainability as poor adherence to appropriate quality standards will lead to waste in goods and services. Owners should adopt a quality management approach, especially selection criteria that require quality management systems for in-house operations as a prerequisite for suppliers at both the design and construct phases. This will help, for example, avoid faulty construction, whether by over-design, under-design or incorrect design, requiring high maintenance costs or replacement. Suppliers should also have in place systems to manage business integrity, environment, risk and project indicators, along with professional indemnity insurance and membership of a recognized industry body.

The agreement between the owner and the engineer, and the contract between the owner and constructor (see below), are the cornerstones of project quality. The quality is directly related to the clarity with which the team members understand and express their requirements. The process of developing documents provides a structured forum, managed by the engineer, for all stakeholders to align their interests by agreeing on, for instance, sustainability indicators.

#### Specification and detailed design

After the scope of the project is clearly defined, detailed engineering design will provide the blueprint for construction, and the definitive cost estimate will serve as the baseline for cost control.

The specification stage is a key stage at which to consider sustainability issues since it is preferable to introduce sustainability criteria up front, at the earliest stages of the procurement cycle as part of the specification, to avoid any potential conflict later in the procurement process between sustainable purchasing and securing value for money.

Owners and government authorities have a great deal of scope to decide how they draw up their specifications. As discussed below, they do not need to specify the cheapest product, and are able to purchase products such as recycled paper, green electricity or energy-efficient appliances in accordance with their own policies and objectives, subject to the need to ensure efficient and effective use of financial resources.

#### Call for tenders

A key feature of project delivery is the selected procurement procedure, where suppliers are invited to submit a tender offer or a proposal (occasionally qualification information, or a response to a request for information). Procurement includes the ways in which these tenders or proposals (or information submissions) are treated.

The owner is seeking the best-value for money, or the most economically advantageous offer, namely the optimum combination of whole life costs and quality (or fitness for purpose) to meet requirements, having due regard to propriety and regularity. A request for proposals is used when the owner seeks a solution to resolve a problem, but is not sure how to achieve it. It is not an offer, and only contemplates an offer. Similarly, the receipt of a proposal is not an acceptance, so it does not result in a contract.

A call for tenders is used when owners know exactly what services they want, and are looking for the best value for money offer, and not simply the lowest price. Tendering is the formal and detailed exercise of using a particular source selection to ensure

delivery of a project which generally has a relatively high value and/or the specification is detailed or complex, and/or special terms and conditions may apply.

Bidding is based on a bid package ready for advertisement or distribution to selected contractors. Bid documents must be comprehensive and of an appropriate technical quality and clearly defining scope and quality of the work required. The owner receives and evaluates bids, and selects and appoints a contractor using a fair, competent and transparent system. FIDIC's *Guidelines for the Quality of Construction* provide examples of the recommended non-price evaluation of tenders and a non-price tender assessment method that ensures project quality.

Tendering is usually competitive, involving the preparation of tender documents, including terms and conditions for submission, the criteria for selecting tenders, requests for tenders, the submission of offers for a call for tenders, the receipt of tenders, the opening of tenders, and tender evaluation involving the exclusion and selection of tenderers, evaluation of offers, and award of contract for a price and time in accordance with the contract.

Since the marketplace varies for various services and construction, it is recommended to use a variety of source selection techniques designed to provide the best competition for all types of procurements. Source selection for tendering procedures includes open competitive tendering (any eligible supplier can submit a bid), selective competitive tendering (some or all of the bidders on a list are invited to submit a bid), and weakly competitive, special single sourcing/direct contracting or limited tendering (allows contracting a sole supplier or a number of suppliers individually). Typically, there will be either competitive sealed tender bids and proposals, or less-competitive, special procurement procedures.

For government procurement, it is often possible to define one or more options with higher sustainability performance in addition to a basic option. At the award stage, when considering bids, the procurement authority can then decide which option best meets the needs, according to criteria previously decided by the authority and made clear in the bid documentation.

For example, a basic requirement for post-consumer waste content could be set, along with variant specifications setting higher post-consumer waste requirements. The authority can then choose the variant option that best meets its needs, selecting the best value for money bid, within that option, according to the award criteria it has set out in the tender documentation.

### Selection of tenderers

Under some procurement procedures, the selection of tenderers may usefully be divided into two parts. First, if candidates do not meet certain basic requirements they can be excluded from participating in the tendering process. The selection can then be narrowed down further according to other permitted criteria.

Candidates can often be excluded from tender lists when they have been convicted of a criminal offence or grave misconduct concerning professional conduct on matters such as health and safety. The ILO has further proposed that there should be immediate exclusion of contractors and their subcontractors who do not fully comply with legislation and contractual obligations, especially labour and health and safety requirements.

Government procurement regulations also provide an exhaustive list of the evidence procurement authorities can request as proof of technical capacity. Several of these

can relate to sustainability matters. Where relevant to the subject of the contract, contracting authorities can ask for evidence of a track record specific knowledge or experience, an environmental performance record, description of technical facilities and measures for ensuring quality, statement of tools, plant and technical equipment, and an indication of environmental management measures relevant to the execution of the contract including the requirement to use best-practice environmental management practices during construction.

Since the preparation of bids requires a substantial investment of effort and money, the pre-qualification or shortlisting of contractors guarantees that the bid will not be rejected in the evaluation stage of the bids. The preparatory work for pre-qualification as well as the subsequent processing by owners is greatly facilitated by the use of standard forms.

The aim of pre-qualification is to establish a list of capable (qualified and competent) firms which appear suitable to provide the required works whilst ensuring that proper competition is maintained. The number of firms to be invited to compete should normally be in the range of three to seven. Requiring a previous track record excludes possible new entrants and makes the procurement less competitive, but is essential to ensure appropriate capability.

The overall objective of prequalification is to receive from suitably qualified firms proposals that respond to all requirements at a reasonable cost to the engineer and the owner. Pre-qualification will not guarantee of quality, but it at least excludes those who are obviously less likely to execute the contract successfully.

Pre-qualification involves an invitation to pre-qualify, the issue and submission of pre-qualification documents and assessing the pre-qualification applications. Evaluation aims at minimizing subjective judgments by defining before the evaluation begins, the factors that are to be evaluated and the criteria to be used.

Subcontractors in DBB are nominated by contracting entities, often after the contract has been awarded, giving the contracting entity control over the selection of subcontractors. Detailed design specifications are not issued to subcontractors, but to a restricted list of tenderers, and price plays an important role in the award of contracts. Innovation is not encouraged since subcontractors bringing non-price benefits to a contract find it difficult to win contracts. As for engineer and contractor selection, contracting entities should operate formal pre-qualification programmes that do not impose unnecessarily stringent qualification criteria on subcontractors.

### Government procurement

Government procurement represents an important share of total government expenditure. It is an unusual phenomenon. It is a commercial operation undertaken in a noncommercial environment, surrounded by a complex set of political, legal, administrative and management structures where the public procurement market is not isolated from the private market. Advancing sustainability in this environment is not simple.

The principal objective of government procurement is to deliver efficiency and value for money in the use of public funds while adhering to the fundamental rules of international agreements. Performance and efficiency in government procurement are ultimately determined by the market interaction between purchasers and suppliers. So the purpose of regulations for government procurement is to guarantee fair and transparent competition in order to obtain the best quality-price ratio for the optimum use of public funds.

Legal and institutional frameworks set the basic conditions for the way procurement may be undertaken procedurally, the results that can be expected, and the potential efficiency gains that can be achieved. The professionalism of public purchasers in managing the procurement process and taking advantage of the competition in the market is therefore decisive. Since sustainable construction involves a mix of complex issues, many developing countries must develop the capacity to implement the procurement of sustainable buildings (see below).

While ensuring best value for money through an open and non-discriminatory procurement regime, governments sometimes seek to achieve other domestic policy goals, such as promotion of local industrial sectors. However, award criterion must be directly and objectively connected to the object of the procurement contract: considerations of general policy, important as they may be, should not be a factor.

Measures to prevent the excessive use of selective tendering, non-open technical specification requirements and lack of transparency in tendering procedures were omitted from multilateral WTO trade rules until 1979. The WTO General Agreement on Trade in Services (GATS) now contains detailed procedural obligations which procuring entities have to fulfil. However, their purpose is to ensure equal opportunity for all suppliers, without consideration of sustainability issues. Foreign suppliers in signatory countries can bid for contracts which exceed thresholds. Thresholds for developing countries will be not modified in such a way that the GATS architecture is modified. Instead, "specific commitments" to strengthen aspects such local capacity and overseas marketing will be negotiated in exchange for restricted competition (or "unsymmetrical opening" of markets). Such measures go some way towards promoting sustainable construction.

#### Award criteria

For tenders, the choice of the winning bid is in principle simple: the best value for money, most economically advantageous offer that is responds to all the requirements of the bid package is awarded the construction contract. Factors other than price to be used in the award (or tender evaluation) criteria should be expressed, to the extent practicable, in monetary terms. Award criteria include cost, quality and performance, time, ingenuity and environmental effects.

The scope for taking social issues into account during procurement is more limited than for environmental issues because, by virtue of their nature, they are less likely to be clearly related to the subject of the contract. And, frequently, there will be more efficient and effective means of achieving social outcomes than through the procurement process. However, there will be cases where social issues can legitimately be taken into account.

How relevant social issues can be appropriately reflected in public procurement is being actively debated. As with all public expenditure, any cost premium incurred through the inclusion of requirements of a social nature must be critically tested for need, affordability and cost-effectiveness to ensure that they can be justified in public expenditure terms. Risk assessments of the social impacts of procurement will help establish the key social impacts from procurement, notably suppliers' compliance with social legislation that presently focuses on health and safety.

Consideration of social issues during the procurement process is most likely to be appropriate when:

- an authority has obligations of a social nature in relation to a particular function the performance of which it is contracting out. For example, an

- obligation to monitor the ethnicity of prisoners may need to be passed on to the contractor as a contract condition.
- adherence of staff employed on a contract to a code of practice can be a legitimate condition of contract where, for instance, a contractor is to work on the owner's own premises.
  - where the contract requires particular skills or expertise of a social nature, this can be reflected in the specifications, or in selection criteria.

When a design - construct responsibility is contracted out against an owner's design specification that defines fitness for purpose, there are some measurable parameters. However, many parameters that respond to quality (for example, durability and maintenance), and to function and environment remain subjective, difficult to measure and thus difficult to award profit against. These issues require continuous analysis to set standard and specifications that are actionable.

Procurement regulations in many countries in fact allow environmental, social and strategic criteria to be used at the award stage. This is not revolutionary since courts have ruled that when the award of the contract is made to the best value for money, most economically advantageous offer, environment and similar criteria can be used as an award criterion provided there is an economic advantage. Required is an assessment of the ongoing revenue and resource costs as well as the initial capital investment and not the lowest initial price option. This allows, for instance, the cost of maintenance or the cost of treatment of waste to be considered. Some would hope that regulation will go much further by allowing the contracting authority to use as criteria aspects linked to a general social or environmental objectives (e.g., a campaign against unemployment), provided the criterion is consistent with the law, notably non-discrimination.

A viable, quality-based selection, approach for handling sustainability criteria is to weight award criteria on the basis of a quality plan and other aspects such as professional and technical qualifications, financial resources, managerial capability, experience, track-record, existence of management systems for quality, business integrity, etc. A weighted approach to awards has the added advantage that it can be extended to include sustainability aspects by submission of a social plan and an environmental management plan. In general, however, depending on the risk profile of the contract, for instance, routine versus complex and high-risk, price should constitute no more than 80% of the tender, with the other 20% used for the non-price award criteria.

A recommended tool is a checklist or set of project indicators in all bid assessments designed to allow an evaluation of the sustainability impacts of the submitted bid.

### Contracts

It is not the role of the construction contract between two parties, the owner and the contractor, that is enforced by each party to incorporate the environmental and social obligations of the two parties with respect to a third party, namely society at large. These third-party obligations are covered by other instruments such as the loan agreement for the project, or by law.

The contracting parties are bound by law to respect environmental and social requirements independent of the contract, and as discussed above, owners or procurement authorities can opt for environmentally and socially sound requirements by specifying what is required in the call for tenders.

Contract conditions should be relevant to the performance of the contract and achieving value for money. As a general rule, contract conditions should be used sparingly, as they are unlikely to contribute to cost-effectiveness or affordability; they should certainly not be disguised technical specifications, or selection or award criteria.

Major construction projects acquired by traditional phased procurement are generally subjected to an environmental impact assessment that takes place during a pre-contract evaluation phase to examine feasibility and alternatives, and not during the main phase involving detailed design and physical construction. A working and functioning contract for construction such as a FIDIC *Construction Contract* will require disclosure of this data, typically as a statement by tenderers that they have supplied, in tender documentation, all “relevant data” - data that influences the feasibility, planning or cost of the project.

The main issue here is that there exist data that affects none of these, but is relevant for the sustainability impact of the project. Withholding this data would not be in breach of contract, but it would be against the interests of society. Since the contract is not the proper place to secure sustainability goals, sustainability assessment carried out during pre-contract evaluation and specification must therefore be of the highest quality.

A related issue is that construction contracts assert that the “... Contractor shall take all reasonable steps to protect the environment (both on and off the Site) ... as a result of his operations”. And that emissions and the like “shall not exceed specified values and values prescribed by law”.

It has been argued that commercial tendering covered by contract fundamentally cannot handle environmental contingencies unrelated to the contractor’s activities that are discovered during the construction phase. In DBB, for instance, the parties would need to respond by updating the design, a possibility that is not covered by the contract.

A further, related, criticism is that procurement on the basis of the contract itself does not provide for implementation and monitoring of the results of the environmental impact assessment.

For traditional project delivery by competitive tender, the contractor’s environmental obligations can be detailed in the project specifications or in the client’s requirements in such a way that they are enforced by a quality management clause. For the FIDIC *Construction Contract*: “The Contractor shall institute a quality assurance scheme to demonstrate compliance with the requirements of the contract. The system shall be in accordance with the details stated in the contract. ....”

Adding a special clause to enforce environmental obligations is unworkable because standard conditions of contract must cover projects of very different sizes. It is difficult to see how a clause covering complex environmental considerations could be used for small contracts. Clients would simply delete the clause. It is preferable to exploit the provisions of existing, generally accepted quality management clauses to enforce environmental compliance.

#### Post-award

Construction usually begins with all plans and contract documents in place, where the contractor has a clearly stated role, which does not involve participation in the design. The contractor is responsible for delivery of materials and their safe erection on site, both of which must be carefully planned and controlled. Construction is extremely competitive, with contractors winning bids by lowering costs of which labour costs is a major component. In this situation, the construction contract is seen by many stakeholders as

important mechanism for implementing labour standards and health and safety measures at the construction stage, including HIV-AIDS programmes, that enhance project sustainability. It is therefore important to develop processes around the contract such as a bill of quantities for an HIV-AIDS plan, which involve awareness raising and which put in place agreed mechanisms for monitoring compliance with social and environmental undertakings.

After the construction is completed, there is usually a brief period of start-up or shake-down of the constructed building when it is first occupied. Finally, the management of the building is turned over to the owner for full occupancy until the building lives out its useful life and is designated for demolition or conversion. Government procurement authorities now often insist that local capacity must be developed on many projects for the purposes of ongoing management, operation and maintenance.

### **Quality-based selection in design-build**

Owing to several disadvantages of design-bid-build, design-build (DB) is growing and now accounts for some 50% of construction in developed countries. Reasons are: the contractor does not participate in DBB design, thus limiting innovation, a crucial factor for achieving sustainability goals; the linear delivery process limits opportunities for a fast track; cost overruns often arise owing to changed conditions during construction. In design-build, the contractor takes full responsibility for the design, and the owner is guaranteed a defect-free finished works. This frees the owner from having to provide technical skills, and on the other hand, the greater involvement of the contractor in the economic cycle of the project leads to larger returns. Inclusive and integrated design-build teams where the contractor is involved also creates the complex interdependencies between building systems and the project organization which are needed for sustainable construction.

Multi-national companies experience significantly better outcomes with design-build procurement, while governments, in needing to maintain or increase output, while reducing expenditure have increasingly turned to methods that involve private finance in projects, notably design-build.

In design-build project delivery, the owner focusses design and construction responsibility through a single contract giving better coordination of contracts, elimination of interfaces between different contracts and clearly defined contractual obligations. The design-builder may be one of several entities, including a design firm, a contractor, or an integrated design-build firm or joint venture. Selection of the design-builder is through advertising the work to a selected list of bidders, negotiated contracts, a design competition, or quality-based selection (QBS).

The advisor's role in this two-party context will be to work for and report to the owner, and not to act as a traditional third-party to ensure efficient management of the contract, and to maintain proper relations between the two contracting parties in accordance with the contract terms.

The two-envelope QBS appointment system is proposed on the basis that it is the only method that can generate fairness and equity in appointment together with a fee level necessary to produce a quality of design compatible with the owner's interest. It has one envelope containing a commercial and technical appreciation of the project, methodologies, innovations, project team, value adding, techniques, etc. This envelope is opened first and an assessment panel grades the tenderers on the quality of their commercial and technical appreciation. The second envelope containing the price is then opened. If the price of the leading bid is less than the project budget, it will be

awarded the project; if the leading and next bids are close, the decision between them is made on price.

It is claimed that QBS allows:

- life-cycle costs such as construction, operations, and maintenance to be factored more efficiently into project design;
- the owner is more likely to obtain a qualified supplier through QBS than through competitive bidding because the QBS procedure requires tenderers to submit information that outlines the applicability of their qualifications;
- the owner can competitively test the quality and price of all design-build proposals before selection, and before choosing between different project delivery methods.

The two-envelope system is rarely used for design-build because owners argue that it is their entitlement to optimize the financial conditions. Where it has been used, the commitment to the commercial and technical issues has been an act of faith rather than a contractual deliverable. To increase its use, commitments and perceived benefits contained in the first envelope must be made contractual, with a margin of profit allocated to ensure implementation. For as always, where margin is allocated to a defined deliverable which can be partly or fully implemented, a risk reward formula must apply, and an independent person nominated in a contract to manage it.

In addition, the owner must provide sufficient design services to prepare the design-build request for proposal, otherwise the design will be insufficiently developed to allow the identification of the skills needed in the design-builder and the fixed price to be set as one of the award criteria. Second, the owner has virtually no control over the design process after the design-builder has been awarded the contract, so the contract expressing the owner's requirements must be carefully thought out.

Given these demands on the owner, design-build with QBS is mainly used when innovation or unique technology from the design-build team will yield enhanced results or greater economy. Instead, the so-called value-based delivery method is used. It also supports qualifications-based selection as the preferred selection criteria, but, in addition promotes the use of the most appropriate system of delivery.

However, while QBS is difficult to apply to the overall DB selection process, many specific process should involve QBS to maximize sustainable construction. For instance, in DB the selection of subcontractors is left to the main contractor. This reduces competition and quality, as main contractors do not have to tender and their sole criteria in awarding a subcontract can be price. Organization representing subcontractors therefore urge procurement agencies to include lists of qualified subcontractors with tender documents.

### **Innovative methods of project delivery**

Owners, both public and private, will continue to produce and refurbish buildings using DBB or DB, followed by long-term operation and maintenance.

However, interest in other procurement systems has grown as owners seek greater single-point responsibility and a change from an adversarial approach to partnerships. Project delivery systems include turnkey, Private Finance Initiatives, Public Private partnerships, and build-operate-transfer (BOT)-type projects, where private investors build infrastructure, operate it on a commercial basis for a certain period and then turn it over to the government on pre-agreed terms.

Several service delivery models may be considered, with the preferred model detailed in the business case before procurement commences. Typical options are a public sector consortium, a non-profit-distributing organization, a joint venture company, a framework agreement, a design-build-finance-operate (DBFO) contract, or a concession or franchise.

In effect, there is a move from the simple and confined goals of cost and time for construction to focus on the macro issues of overall project outcomes in project delivery, where the outcomes should be used as goals for all project participants. This shift comes not simply from pressure for sustainability, but for strictly commercial reasons (elimination of disputes and cost and time overruns; increased owner satisfaction), and the understanding that as management techniques advance it should be possible to take a more global view.

Project delivery by competitive tendering and construction contracts - the principal means for sustaining and bringing discipline to the relationship between clients, project teams and their suppliers - is questioned. It is claimed that a narrow, formal contractual relationship focuses parties on their own goals and adversarial positions, leading to conflict, inefficiency, and duplication of work. Other bases for the relationship are sought. These should be more rewarding (to enhance motivation), more demanding (to maximise value), "soundly based" and reflect "mutual interdependence".

It was initially felt that contractual relationships could be replaced by long-term relationships based on the outcome, determined by clear measurement of performance, of a process involving sustained improvements in quality and efficiency.

Such arrangements are not sufficiently rigorous, so other methods based on outcome-based delivery are being tried, such as the partnering of project teams. Partnering means the creation of sustainable, collaborative relationships with suppliers in the public, private, social enterprise and voluntary domains. Project delivery then focuses on a project business plan, and comparing this to the project outcome, apportions profit to the delivering parties according to their ability to produce, replicate or exceed the plan's requirements.

Partnering aims for all team members to share in success in line with the value that they add for the owner. Owners should not take all the benefits: there should be proper incentives to enable cost savings to be shared so that all members of the team make fair and reasonable returns. Claimed benefits include better designed solutions, integration of services for customers, access to new and scarce skills, economies of scale and scope, and community benefits (including jobs and local economic effects).

Partnering is often appropriate where high-value, high-risk requirements are clearly the strategically important ones and need to be treated accordingly. The key to successful delivery are: a sound business case, proper planning and resourcing, effective project and risk management, a robust team-based training plan, a challenging appraisal of service delivery models, an independent best-value and similar strategic reviews; measures to reduce the total time and cost to procure; management of relationships with suppliers; incentives for continuous improvement in contracts, including payment for performance linked to performance indicators.

Partnering and similar forms of project delivery are based on aligning incentives, and they are managed using outcome-based project delivery methods. For instance, an outcome-based contract may require the construction team to produce one, two, or a matrix of deliverables that can be either fixed or benchmarked for improvement. Among the most widely used is alliance contracting, where Australia has been taking the lead

with alliance contracts (or project alliancing). Another is engineer-procure-construct-manage (EPCM) that can also be seen as a form of producer-controlled turnkey undertaking, with greater competition over costs at the physical construction stage by having the owner work in close cooperation with a project management team.

Some believe that partnering will have a limited success because it merely relies on best endeavours and acts of faith: partners simply tell each other that they will act reasonably and fairly while expressly disavowing any legal obligation to do so. Moreover, alliance contracting and EPCM, instead of reducing the scope of co-called “adversarial” contractual obligations in fact extends it. This is because these project delivery methods require the parties to integrate the management of work and key aspects, notably risk, in a much broader way than by simply transferring work and risk via separate contracts, as in the traditional DBB project delivery process.

It is too early to judge whether partnering will significantly improve owner values and facilitate proper recognition of sustainability performance in the selection process. However, it has opened the way forward to the consideration of more efficient project delivery methods for complex projects based on aligning incentives to give the best overall value for money.

### **Performance-based building**

Government procurement authorities have identified several initiatives that would boost the sustainability outcomes of procurement processes:

- targeted support for selected technologies and for taking risks on innovative products.
- targets for specific types of procurement (such as the use of recycled waste as standard) and for embedding innovation in the procurement process.
- performance based building (PBB) based on non-prescriptive performance specifications that go beyond best practice, and specify outputs rather than products.

PBB has seen the most development and is increasingly becoming a necessity. Owners and stakeholders are dictating the future of construction: they want to specify the performance requirements, budget and timescale of a building, and to purchase buildings in the same way as purchasing say a computer. These goals cannot be met by working to detailed and prescribed processes and procedures, since the needs demand innovation, creativity and constant change.

Innovation in construction is heavily circumscribed by building regulatory systems based on a prescriptive approach, where a single or very few solutions are provided as ways to comply with building regulations. This has the effect of creating a design and construction industry that is restricted to designs that fit specific solutions.

The advantages of prescriptive codes are that they provide a simple, easy to understand, easily monitored, cook-book approach, and for the majority of construction buildings they provide the least costly method of ensuring that an acceptable level of health and safety, etc. are achieved without placing an undue burden of proof upon the contractor in meeting the required performance. However, its inherent inflexibility stifles innovation, leading to a poor match between true user requirements and the building, and perhaps poor value for money.

The PBB concept is simple: the basis of all building activities should be the performance of the building in use rather than the prescription of how the building is to be constructed. PBB considers the performance requirements throughout the design

life of the building and its components, in terms that both the owner and the users of the building understand, and which can be objectively verified to ascertain that requirements have been met. The requirements are concerned with what a building is required to do and not with prescribing how it is to be constructed.

The advantages of PBB are that:

- project outputs go beyond traditional measures, namely owner objectives of cost, time and quality which cannot assess the sustainability performance of a building. By focusing on the functionality desired and understanding what regulations are intended to achieve, suppliers have the opportunity to innovate, to suggest more sustainable solutions, and to find the most cost-effective ways of meeting sustainability objectives.
- production processes can form a part of the specification by specifying the performance characteristics of a product, where the characteristics need not be visible in the product. This avoids confusion as to what constitutes a valid award criterion, and sustainable production processes such as organically grown food, green electricity and sustainable timber may be specified without extensive discussion in procurement.

On the positive side: some countries have implemented PBB building regulations; there are strong drivers for PBB requirements governing noise, fire and sustainability, the use of PBB is being promoted by advanced digital modeling that can check a design against sophisticated performance requirements involving accessibility, crime, acoustics, sustainability, energy, etc.; tools are becoming available that explicitly separate stakeholder requirements from prescriptive measurement of compliance by comparing what functionality users require, and how well the proposed building design supports these needs.

However, to be workable the PBB concept must be applied not to certain phases of the procurement process, but to the entire process, from constructed asset planning, programming, design and construction, through to life-cycle management and operation and building regulation control. To achieve this wide application, all aspects of building must be performance-based, including design, development of materials and components, the physiology of the building, innovation, regulation, the built environment, operations and documentation. In addition, all parties - the building industry, regulators, researchers, owners, users and managers - must be performance-orientated. PBB will affect the preparation of contract awards (the design and its specifications will be open to all technical solutions that comply with the pre-defined requirements), execution and control, quality assurance, and the safety of the works to be performed.

Achieving the widespread penetration to reap the logical advantages of PBB will take considerable effort and time. Nonetheless, a partial, sporadic implementation has been possible, with government procurement authorities already specifying in terms of performance requirements. The aim should be to permit a mixed PBB - prescriptive approach to prevail, with PBB available to those who require more complex innovative developments driven by stakeholders' requirements.

Holding back PBB to this limited uptake are: lack of PBB data; limitations placed on innovation by indemnity insurers and tendering procedures (e.g., requirements to circulate contractor's change proposals); uncertainty over the risk and liability; the need for significant resources and personnel; lack of verification methods and a standard performance-based specification format; lack of codes, standards and regulations and

differentiation between what is mandatory and what is voluntary; changes needed to contractual awards; lack of ways to check conformity with performance regulations.

### **Capacity building**

Improved procurement systems are needed if sustainability is to be embedded into government procurement, because the scope and issues involved go well beyond those encountered in traditional approaches. However, reviews of developing country procurement systems reveal their inability to address the sustainable building challenge.

#### Inadequate systems

The inadequacy of public procurement became a major issue following a shift to policy-based adjustment lending (lending based on policy reform) that calls for periodic assessment of a recipient country's entire budget to understand the public expenditure management and financial accountability environment for all government funds. The need for this type of lending followed recognition that aid and external financing will be effective when given in support of sound policies to a legitimate government. In other words, the project-by-project effectiveness of external financing is determined by government management (overall economic and social and environmental policies). For instance, donors lending to developing countries are now accountable for assessing the risk that aid resources are stolen or poorly allocated..

Procurement is a strategic component of proper budget use and effective expenditure management. Since financial resources available to recipient country are fungible, and convertible resources fully so, external funding agencies are now aware that the government procurement system in recipient countries determines whether assistance will reach its goals. Externally funded programmes cannot be insulated from the local public expenditure environment: funds earmarked for a well-supervised project can release government resources to finance an unsupervised project. This is especially the case in the social sector where donor funding has grown considerable, procurement is highly decentralized and follows national practices, and contracts are small in value. It is therefore necessary to review the entire investment portfolio when donors or international funding institutions (IFIs) finance much of a country's public investment.

Moreover, all types of funding are involved, not just "developmental" investment funded by borrowing and "non-developmental" current expenditure fully financed by domestic receipts. This is because investment and current expenditure form an integrated whole (new textbooks are just as "developmental" as the new schools).

#### Decentralisation and commercialisation

Local authority operations use a wide variety of structures in order to provide services that are responsive to client needs and local conditions. However, central planning, neglect and weak investment has concentrated at the national level many traditional responsibilities of local government for providing services, with little decision-making or responsibility at the local level. Many authorities now recognise that they are responsible for operations which need to be more efficient and productive, and that users need to pay to the extent possible for the services delivered.

Many local governments rely heavily on central government tax sharing for revenues that often only cover operating costs, but not capital investments, and are too unpredictable for making long-term investment decisions. Decentralisation seeks ways to improve the predictability of local revenues and the accountability of local officials in making investment decisions on a delegated basis. Commercialisation by incorporating

commercial practices allows local government to focus on reducing costs through either more effective public sector management or private sector participation. Practices include cost recovery to match revenues with expenditures and incentives for managers to introduce greater efficiency and reduce unit costs of service delivery. In some cases, commercialisation can best be introduced through involvement of the private sector which brings sectoral expertise and established business practices focusing on efficiency, cost control and improved service levels.

### Incentives

Given the limited administrative and financial management capacity of governments, the costs of uncoordinated assessments have become very heavy. Monitoring public expenditure management therefore requires better coordination, harmonization and integration between financing agencies, governments and other stakeholders. The overall approach now is based on a coherent and integrated medium-term strategy to streamline the coverage of instruments to avoid unnecessary duplication, enhance collaboration, share information and provide a more complete, accurate and timely assessment of fiduciary risk.

In the case of procurement, with coordinated action to build procurement systems for providing decentralized, commercially-based services:

- the quality and cost efficiency of local infrastructure and services can be improved by placing responsibility close to the point of service delivery and having costs borne at the local level to motivate the public sector to be responsive to clients and to make rationale investment decisions.
- financing agencies can harmonize their procurement procedures thus reducing the burden on recipients of demands for special systems for management and control in order to receive funds
- financing agencies can use the recipients' systems to manage and implement the use of funds, thus reducing the work needed to maintain their own administrative and oversight organization.

However, in spite of these major incentives, significant challenges remain because local authority operations that incorporate client-driven design, engineering, public procurement, contracting and construction schedules have lengthy project preparation and implementation timetables. The disbursement of funds occurs as and when contracts are fulfilled and certified and financial and operational covenants met.

In spite of the wide variety of structures used by local authority operations, funding agencies have been able to take risk at the local level with limited recourse to regional or central government by introducing sub-sovereign security structures. These structures emphasis the importance of contracts since they bind relevant parties contractually to provide governance, authorisations, permits, services, guarantees, etc. so that risks are appropriately distributed to the parties best suitable to bear such risk.

Unfortunately, procurement is often viewed as a routine downstream, clerical function, with a subsidiary role during the early design and final implementation stages of projects, where the traditional focus has been on the monitoring role procurement plays during the bidding, evaluation and contract award stages, since this is when crucial decisions are taken triggering the release of scarce funds. Supervision and monitoring is generally limited to periodic financial and operational reviews of the implementing organization and the status of physical implementation by engineers and contractors.

A more global view is not adopted because public procurement law in many countries, despite a strong link between the "macro" budget-level and the "micro or operational"

project-level aspects of procurement, excludes areas of low direct influence on the public procurement processes by focussing on macro variables which do not necessarily reflect the standard at the level of contracting entities.

The outcome is that:

- Procurement is underfunded, with many implementation teams having insufficient resources.
- The personnel assigned are usually mobilized after strategic planning decisions affecting project sustainability have been made. They often lack the full range of procurement planning and implementation skills and experience needed.
- Actions to improving the quality and efficiency of public procurement systems focus on improving implementing agency capacity to carry out the bidding, evaluation and award stage of the procurement cycle: they concentrate on donor-specific policies and procedures, not on the basic fundamentals of procurement and project management.
- Important elements of the procurement system are ignored, such as the public expenditure and budget approval process, procurement planning and preparations, the internal management and decision-making systems, contract administration, and expost financial control and audit.

### Reform

In taking a more global view of procurement needs, it has become apparent that the principles of a good public procurement system can be implemented in many different ways depending on a country's governance and cultural environment. These principles are: maximum economy and efficiency, open participation, competition, fair and equitable treatment, accountability, transparency. Funding agencies are therefore vigorously addressing the basic components of government procurement systems, namely

- legislative and regulatory framework: international legal models such as the UNCITRAL Model Law provide benchmarks for procurement law.
- central institutional framework and capacity: whatever organizational model is chosen, adequate central institutional capacity must be in place to support the implementation of public procurement legislation and to ensure the continuous development of the government procurement system.
- procurement operations and market environment: the procurement system depends on the quality of procurement law and contracting entities, and the ability to implement procurement legislation, manage the procurement process, strengthen capacity building process and establish favourable market conditions while taking advantage of the competition in the market.

Crucial for reform will be training that includes the full range of project management and procurement topics, starting with the principles of procurement. The institutional capability of local authorities must be developed to ensure that a) the management of services adopts a commercial approach while incorporating local understanding and accepting the consequences of user pays, polluter pays and cost recovery concepts; and b) decision makers make economically rational investment choices, aiming for services provided at the optimal mix of quality and cost and acknowledging that resources are constrained by budget constraints.

Before signing a contract for investment in a project, funding agencies should implement a reform agenda and set up a detailed pre-financing agreement which covers the actions required to achieve a satisfactory operational, legal or regulatory

framework, so that: all decision makers are clear about the project parameters up-front; project champions have sufficient time to rally support in decision making bodies; sound governance is established. For it is recognized that once a contract has been signed, changes to policies should not be introduced since they take time to implement and may conflict with physical implementation.

Contracts and processes around contracts are successfully binding sub-sovereign structures to contractually provide governance, authorizations, permits, guarantees, etc., so that the risks for external financiers can be distributed at all levels. Their further development will have a significant impact on the procurement of sustainable construction.

Project design should be used to enhance procurement capacity by a) funding the development of institutional capabilities, and b) establishing procurement and contracting strategies that anticipate implementation challenges (e.g., procurement strategies based upon a few large contracts; support for special units responsible for implementing a specific project).

The complexity of urban infrastructure projects and the broad range of stakeholders places a premium on assessing the political, economic and financial viability of a project at an early stage. Pre-financing agreements and project design should therefore incorporate the management and reporting of stakeholder-driven, performance-based project indicators that align project goals in decision-making process. Following the principles of Project Sustainability Management, the indicators would be refined throughout the project cycle, and formally announced at specific points such as DBB bid assessments.

Change management will need to recognize that it depends on the broad institutional and policy environment in which it operates. Where wider governmental framework is weak and not improving, it is unlikely that transformational change for sustainable procurement can successfully take root.

In seeking improvement in their procurement system, government may first need to consider undertaking a stakeholder analysis covering the wide range of groups affected by procurement improvement. If powerful stakeholders are opposed, a plan to ameliorate resistance to change can then be developed, possibly by relating improvement in procurement to the wider vision of meeting multilateral and global goals for sustainable development.

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