Knowledge Management: Developing System for Construction Contract Management and facing the challenge of managing tacit knowledge
Mourad El Meziane¹, Khadija El Meziane, Professor Yang Liang

Abstract
Many projects are necessary for the development and industrial growth and benefits of technology transfer. But failures have occurred during or after the construction of some projects. A poorly construction management includes contract management, project management or environment damage will be impact to unnecessary delays and incur expensive losses. Construction Firm in one country must be prepared of all the risk and managed project especially in this issue, contract management, to get estimated goal and survival. The management of knowledge for construction contract is promoted as an important and necessary factor for organizational survival and maintenance of competitive strength. The contract baseline includes the basic ingredients of a construction agreement. It is the documentation of the "meeting of the minds." It establishes two things: first, a starting point and second, a snapshot of the agreement at that moment in time. It signals the end of all prior negotiations and is the starting point for all future negotiations. All prior schedules, estimates, discussions of finishes, and details are moot if not included in the contract baseline documents. For a customer to determine what they want out of a project, the mind flits back and forth while weighing decisions; unfortunately, many conflicting options may emerge as the customer discovers what they want. Many times the contractor is "following the bouncing ball" as the customer explores the available options. The problems occur when the customer has discussed everything and anything and conclusions are not documented.

Key words: Knowledge Management, Construction Contract Management, Construction Projects, Management Project

INITIALIZING NOTE
Knowledge management has generated much interest in recent years and has become the latest management buzz in town. Many people start wondering whether knowledge management is here to stay or it is just another consultancy fad. To put things in perspective, it is important to look at the sequence of events that led to the rise of knowledge management. The arrival of the information society and the move toward the knowledge-based economy highlighted the importance of tacit knowledge and the need to manage knowledge resources including skills and competencies. Knowledge management as a concept with people taking the centre stage has prompted us to rethink information management and shift focus from trying to develop intelligent systems to that of developing tools for intelligent people. It is this realization in my opinion that makes knowledge management attractive to many organizations. While the focus in information management is mostly on explicit knowledge, knowledge management brings a new dimension, the need to manage tacit knowledge by focusing on people and enhance their capability by improving communication, information transfer and collaboration.

INTRODUCTION
Knowledge management involves the identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets so as to fulfil organizational objectives. Knowledge assets are the knowledge regarding markets, products, technologies and organizations which implementation in contract management, that a business owns or needs to own and which enable its business processes to generate profits. This is a strategic view of Knowledge Management that considers the synergy between technological and behavioral issues as necessary for survival in "wicked environments". To Prepared what market and client needed as change of world and technology, this paper try to give information and developing a Knowledge Management system for construction contract management for company to survive and get progress in new world business and construction area which make fast decision.

¹ Contact: 008615387020165, moradchina@hotmail.com, China University Of Geoxiences, Faculty of Management and Economic, Wuhan, China
Without a secure contract baseline and the initial meeting of the minds, the abilities of the construction firm may mean little when faced with the customer from the underworld. Establishing clear boundaries and starting points between customer and contractor will ensure the contractor’s right in collecting money from delays and changes and if necessary enforce it with the law. The contract baseline is a tool for implementing sound leadership and management principles.

Some of the documents included in a contract baseline are
- Contract documents (general and special conditions)
- Scope of work (technical specifications, drawings, and other relevant data)
- Contract schedule
- Site conditions (such as information furnished to bidders, soil and geology reports)
- Applicable laws and regulations (depending on the specifics of a project)

A contractor cannot ignore the importance of the contract baseline. Because the contract and its documents will change over the course of the project (especially the schedule), it is important that the contractor be able to take note of these changes and to make claims on those that affect performance. For important thing to keep in construction and industry that to establish one of the main factors of contract baseline, the company must come up with an accurate and reasonable cost estimate. Aside from the obvious hard costs associated with construction projects, there are many hidden costs that can creep in and lay waste to the unwary contractor. Poor estimating and scheduling are two of the biggest causes of project failures.

Construction estimates have some requirements that must be fulfilled:

1. A construction estimator. Whether this is the contractor, project manager, superintendent, or dedicated office estimator, it is a person who has the experience and qualifications to do the following:
   - Pre-qualify and contact subcontractors, suppliers of products to solicit bids and proposals.
   - Prepare quantity take-offs for various types and forms of construction.
   - Determine general requirements needed for the project.
   - Determine site conditions.
   - Qualify unknowns and determine exclusions and allowances.

2. Quantities and cost. Whether this comes from the estimator’s own job histories or from an outside source, an accurate cost base must be established:
   - Historical labor cost records.
   - Quantities of materials.
   - Material quotes and unit prices.
   - Job plan and schedule.
   - Subcontractor’s bids.
   - Job site overhead (direct costs).

Even though managing the money on construction projects is the focus of most project management "how to" books and management software, if they do not include some basic ingredients they are neglecting one of the most powerful tools available. A good job cost system monitors the "projected cost at completion" during the course of construction. This is different than an "after the fact" accounting of what it ultimately will cost. The "to date costs," "cost to complete," and "projected costs at completion" are three lines that are important indicators of the financial status of a project. They have a direct effect on each other and tracking them gives the ability to plan forwards and backwards during the project. The same is true with the financial aspect. Simply adding up all the costs after the fact only reveals how far on or off the budget was. This is important information, but if company are only doing "after the fact accounting", company are denying the conscientious project manager one of the most valuable tools in project management.

Tracking costs and projecting final costs in the contract document during the course of construction is vital for the contractor who wants to be paid for all his work. Aligned with a good schedule, tracking and projecting costs forms the powerhouse needed in managing the job, the customer,
and the profits. The natural by-product that follows are projects that are completed on time and in budget as contract agreement.

**METHODOLOGY and ANALYSES**

Management of the construction process must be re-conceived from the purchase of a product (transactional contracting) to the execution of a production process (behavioral contracting). These dictates that the current standard construction contracting forms which are wholly based on the transactional contracting model, be revisited.

There are several ways parties to any construction contract management can avoid or minimize costly contract dispute likes:

- Negotiate workable and fair contract language, avoiding inappropriate risk transfer (i.e., risk transfer to parties that cannot control the risk, or who are not being adequately compensated to justify assumption of the risk)
- Project Management team must knows and manage the contract administrative requirements.
- Develop and use, the day-to-day contract management control systems or procedures necessary to capture variances from baseline budgets and schedules with Knowledge Management.
- Be fair in all dealings with the other parties to make easier problem solve together.

The clauses within a contract should fit together to form a logical whole, be procedurally correct and relevant to modern construction practice. The paper looks at the issue of clarity in the New Engineering Contract. One of the principal aims of the NEC was to achieve a higher degree of clarity compared to other existing contracts. According to the specification prepared for the ICE in 1987 (Martin Barnes Project Management, September 1987), clarity was to be achieved by:

- Using simple and commonly occurring language and avoiding legal jargon;
- Using identical phrases where possible;
- Excluding contract specific data so that there is no need to change, delete or add to the core conditions of contract;
- Setting out duties and responsibilities clearly and precisely, using engineering terminology common to all disciplines wherever possible;
- Not attempting to paraphrase existing law;
- Settling for clarity above fairness in minor matters which would involve complicated text and
- Omitting matters which are more effectively covered in the technical specification.

Additionally, it was aimed to have a more logical structure avoiding cross referencing between clauses, but treating procedures as processes and checking that they are logically complete by the use of flow charts and having a modular system of ‘bolt on’ optional clauses through which the contract can be tailored to meet the requirements of the project. It was intended to reflect modern and up to date construction practice - for instance, regarding subcontracting as the normal practice. However, in looking to see whether clarity of drafting affects the likelihood of disputes and conflicts arising, one must also remember that the NEC is also aimed to stimulate good project management, which should not only reduce the source of disputes, but also their impact - therefore it is hard to completely separate the effects of clarity and the stimulus to good project management.

In order to set a framework for the analysis of contracting deficiencies and the future of construction contracting it may be helpful to consider country historical model set against a spectrum of project types. The nations would find their construction industries somewhere else along the continuum, arguably the sequence of events may not differ substantially.

A “construction order” is a contract for doing a certain type of work. The nature of the work to be done drives the design of the production control system (Melles and Wamerlink 1993). Construction work may range from slow, certain, and simple (stodgy) to quick, uncertain, and complex (dynamic). Managing stodgy work is quite different from managing dynamic work. Further, the relationship among the organizations involved in performing that work must also change. There are three levels upon which
this needs to be examined: the nature of work to be done, the system for managing that work, and the organizational structure and relationships between the parties.

A framework and (most urgently) to spur discussion of the hindrance of transactional contracting to the future success of lean Construction on a broad scale with knowledge management. To move forward the following must happen:

1. Develop production control models appropriate to dynamic projects. Consider such issues as:
   - The nature and extent of uncertainty
   - Planning hierarchy: extent and detail of each level
   - Distribution of mobilization (lookahead planning) and allocation (commitment planning) decision functions
   - Integration of production control systems throughout the supply chain
   - Make/Buy decisions; i.e., when/what to subcontract
   - Investing in flexibility in the form of multi-skilled labor or multi-functional tools
   - Buffer sizing and location for intermediate product (schedule buffers), materials, and excess production capacity
   - Handoff management; i.e. improving/assuring the quality and timeliness of handoffs between production units

2. Direct partnering to the design and management of production control systems; include opportunity exploitation as well as problem solving. Current contracts and mental models are obstacles to improved performance both as regards problem solving and as regards opportunity exploitation. Partnering has been primarily oriented to problem solving, the key to which is flexibility, especially on dynamic projects. For example the supply chain depends on knowledge management of diverse areas including raw materials, planning, manufacturing and distribution. Partnering has hardly addressed the opportunities for supply chain performance improvement that are now all but invisible, and the key to which may well be solving the riddle “Who pays, who gains?”

3. Embrace the trend toward cost reimbursable contracts with performance-based fees, but for dynamic projects, treat “performance” as participation on the project team as opposed to exceeding predetermined cost or schedule goals.

4. Explore structuring incentives that promote increased plan reliability. It is arguable that fee-only general contractors and construction managers have no incentive to maximize the productivity of specialty contractors. Consequently, insufficient investment is made in proactive production planning and control, resulting in low plan reliability, i.e. a low probability that work assigned to a specialty contractor can be done productively or at all. Obviously, this failure to maximize specialty contractor productivity within the constraints of project objectives is a failure to improve total project performance.

5. Further develop the implications of relational contracting for contract design. How can/should contracts be structured to exploit the tremendous opportunities for performance improvement? This must include pragmatic appreciation of the resistance that will be felt from traditional sources of standard contracts, internationally. It must also recognize that this will likely meet with more virulent opposition from the legal professions than did ADR and Partnering.

6. Identify the likely allies in the effort to revise current contracting to move it toward the relational end of the axis. Keep in mind that the strongest support for other innovations have come from unexpected and indirect sources.

From describe of construction contract management above, the contractor, owner and architect must remember that they share a common goal, which is the successful completion of the project.

(see appendix Knowledge Management system for construction contract administration)

CONCLUSION

The management of knowledge is promoted as an important and necessary factor for organizational survival and maintenance of competitive strength as market and client needed. In that
function knowledge management will be improve contract management and administration system to avoid or minimize losses that usually come from lingering and unmanaged contract dispute. Considering knowledge management System and development of the standard construction forms, it would be unsurprising if the standard of drafting and clarity, in the broadest sense, was as good as it could be. This appears to be confirmed by comments of the courts, legal commentators and the actual daily users of the contract who all appear to be of the opinion that it could be improved. The management of construction company shall thoroughly review the complete set of documents, collectively referred to as the contract documents, and modify the construction administration procedures for each project accordingly. The contractor, owner and architect must remember that they share a common goal, which is the successful completion of the project.

Construction firm must be prepared of all the risk and managed project especially in this issue, contract management, to get estimated goal and survival to pretend and through competition in global market. All prior schedules, estimates, discussions of finishes, and details are moot if not included in the contract baseline documents. Without a secure contract baseline and the initial meeting of the minds, the abilities of the construction firm may mean little when faced with the customer from the underworld.

REFERENCE
Shanghai Hold Heavy Industry Co.,Ltd, Journal Paper.2010
Other References:
Contracts Referred to are :
ACE : Form of Agreement and General Conditions of Contract for use in connection with Work of Civil Engineering Construction. Published in 1930.
- Guidance Notes.
- Flow Charts.
JCT : Joint Contracts Tribunal. A family of standard forms of contracts published by the Building Employers Federation.
Joint IMechE / IEE Committee on Model Forms of General Conditions of Contract. MF/1, MF/2 & MF/3. Institution of Electrical Engineers.

APPENDIX
Knowledge Management System for Construction Contract (Administration, Procedure and Job description)
The management of construction company shall thoroughly review the complete set of documents, collectively referred to as the contract documents, and modify the construction administration procedures for each project accordingly. The contractor, owner and architect must remember that they share a common goal, which is the successful completion of the project. With knowledge management system, a good-fair contract document is essential and should provide a clear roadmap on how issues are to be addressed, e.g., how project documentation and record management can being control, how payments will be issued, how change orders will be processed, etc.

Some step will make successfully project as consider:

**STEP 1 - SCOPE OF PRE-CONSTRUCTION SERVICES**

In the bidding or negotiations phase the owner and the architect, respectively, following the owner's approval of the construction documents and of the most recent statement of probable construction cost, shall provide those services designated in the schedule of designated services necessary for the architect to assist the owner in obtaining bids or negotiated proposals and in awarding and preparing contracts for construction.

In the case of phased construction, the owner may authorize bidding and/or negotiation of portions of the work prior to completion of the construction documents phase. The following descriptions shall apply to those services assigned in the schedule of designated services as the responsibility of the party indicated therein.

1.01 Bidding or negotiation phase

- Construction
- Research
- Conferences
- Communications
- Travel Time
- Progress reports
- Direction of the work of in-house architectural personnel.

1.02 Disciplines coordination and document checking services

1.03 Agency (representative) consulting/review/approval services during the bidding or negotiations phase relating to applicable laws, statutes, regulations and codes of regulating entities relating to the owner's interests before construction begins.

1.04 Owner-supplied data coordination services

1.05 Bidding materials services consisting of organizing

1.06 Addenda services consisting of preparation and distribution

1.07 Bidding/Negotiations services

1.08 Analysis of alternates/substitutions services

1.09 Special bidding services

1.10 Construction contract agreements services

**STEP 2 - SCOPE OF CONSTRUCTION CONTRACT ADMINISTRATION SERVICES**

In the construction contract administration phase the owner and the architect, respectively, shall provide those services designated in the schedule of designated services necessary for the administration of the construction contract as set forth in the general conditions of the contract for construction. Unless otherwise provided in the schedule of designated services, the administrator's duties and responsibilities during construction shall be as set forth in the agreement between owner and administrator for designated services. The following descriptions shall apply to those services assigned in the schedule of designated services as the responsibility of the party indicated therein.

2.01 Project administration services and construction contract administrative

2.02 Disciplines coordination and document checking of construction contract administration

2.03 Agency (representative) consulting/review/approval services

2.04 Owner-supplied data coordination services of activities construction contract administration

2.05 Office construction administration services

2.06 Construction field observations services consisting of the progress and quality of the work with the contract documents, and preparing related reports and communications.
2.07 Project representation services consisting of selection, employment and direction
2.08 Inspection coordination services relating to independent inspection and test agencies.
2.09 Supplemental documents services
2.10 Quotation requests/change orders services
2.11 Project schedule monitoring services consisting of monitoring the progress of the contractor(s) relative to established schedules and making status reports to owner.
2.12 Construction cost accounting services
2.13 Project closeout services initiated upon notice from the contractor(s) which is acceptable to the owner.

PHASE 3 - SCOPE OF POST CONSTRUCTION SERVICES

In the post construction phase the owner and the architect, respectively, shall provide those services designated in the schedule of designated services necessary to assist the owner in the use and occupancy of the facility. The following descriptions shall apply to those services assigned in the schedule of designated services as the responsibility of the party indicated therein.

3.01 Project administration services consisting of post construction administrative functions
3.02 Disciplines coordination and document checking services of post construction activities
3.03 Agency consulting/review/approval services relating to applicable laws, statutes, regulations and codes of regulating entities that require compliance during post construction, occupancy and operation.
3.04 Owner-supplied data coordination services consisting of post construction activities during occupancy and operation relative to owner-supplied furniture, furnishings and equipment.
3.05 Maintenance and operational programming services
3.06 Start-up assistance services of the project
3.07 Record drawings, data and information services of project
3.08 Warranty review services

PRE-CONSTRUCTION MEETING AGENDA

Following the acceptance of the successful bid and subsequent award of the contract for construction, the owner, contractor and administrator (project management) shall schedule and attend the pre-construction meeting. The purpose of the pre-construction meeting is to discuss the specific requirements of the contract documents and how they relate to the daily operation of the construction project. The following is a sample agenda for the pre-construction meeting and should be edited to conform to the specific requirements of each project. Items listed in the sample agenda are more comprehensively discussed later in this manual.

AGENDA FOR PRE-CONSTRUCTION MEETING
1. Introductions of parties involved in project
2. Communications information flow
3. Bond, insurance & notice to proceed
4. Plans and specifications
5. Schedule of values
6. Progress schedule
7. Weekly and monthly job meeting
8. Drawings and data review/catalog
9. Substitutions of materials and equipment
10. Coordination of the work
11. Project management structure in site
12. Field office responsibility
13. Signs and authority per contract documents
14. Temporary utilities according to contract document
15. Record drawings-as builds
16. Observations-schedule on site
17. Survey and inspection
18. Soil, concrete, and other testing
19. Requisition and invoices for payment
20. Certificate for payment
21. Proposal request (PR), change order (CO), architects supplemental instructions (ASI), and
   construction change directives (CCD).
22. Stored material and equipment policy
23. Schedule and daily log of contractor
24. Access to site
25. Jurisdiction by authority or agencies
26. Non-compliance notices
27. Final completion and project close-out

CONSTRUCTION DOCUMENTS and OWNER/CONTRACTOR MEETING

Following the construction meeting and prior to beginning construction the administrator or owner
and/or architect, will verify that the following documents have been properly executed between the
owner and the contractor:
1. "Notice of Commencement" from owner
2. "Notice to Proceed" from the owner.
3. Property survey from the owner.
4. Permits, licenses and governmental approval as required. (i.e. SWFWMD, County, State and DER)
5. Insurance coverage and bonds as required by the contract documents.

Notice of commencement
The notice of commencement is a legal document, which is prepared by the owner's attorney or financial
lending institution and recorded with the clerk of the county court. The purpose of the notice of
commencement is to provide at the project site and on public record the name of the owner, contractor
and surety, so that those wishing to file notice to owner may do so to the appropriate parties.

Notice to proceed
Work to be performed under the owner/contractor agreement generally commences on the date
specified in a notice to proceed, as established in the general conditions of the contract for construction. The notice
to proceed should not be issued until the following documents (or copies thereof) have been received and
reviewed by the owner and/or architect:
1. Evidence to the contractor of satisfactory financing for the project, or sufficient funds available, by the
   owner.
2. Recording of the notice of commencement.
3. Issuance of a building permit(s) by the applicable governing authorities.
4. Certificate of insurance from the contractor as specified in the owner/contractor agreement.
5. Performance and payment bonds.
The owner and/or architect shall recognize that the "Date of Commencement" is the official date for the
start of the construction project and is specifically identified in the notice to proceed. The contractor
should not necessarily be expected to commence work on the very date the notice to proceed is issued
unless the contractor has had adequate time to mobilize his resources and equipment to the site.

Schedules for construction
Project management will receive and review the following schedules from the contractor prior to
processing the first application for payment:
1. Schedule of values
   The Schedule of values shall be prepared as required by the contract documents and equal the total cost
   of the project.
2. Project construction schedule
   The Project construction schedule shall be prepared as required by the contract documents in PERT, BAR,
   GANTT, or C.P.M. format.
3. Cash flow schedule
   The contractor will prepare and transmit to project management a cash flow schedule for the owner's use.
4. Shop drawing review schedule
The contractor will prepare and forward to project management a shop drawing review schedule prior to the first application for payment.

The project meeting is a useful forum for discussions involving owner requested changes, problems with construction and/or field observations, which feels require correction. All items that may directly impact the completion of the project should be addressed at this meeting as:

- Project site observation.
- Project photography.
- Project safety.
- Project logbook.
- Application for payment.
- Construction change directive.
- Testing / review.
- Architect’s supplemental instructions (ASI's)
- Proposal request / change order.
- Time extensions.

The management of construction company shall thoroughly review the complete set of documents, collectively referred to as the contract documents, and modify the construction administration procedures for successfully project accordingly.
Figure 1: An historical model

Traditional Cooperation

Confrontation

Tight market & Swarm of locust

"Forced" Cooperation

Self-interest, Project Success Motivated Cooperation

Pre Litigation Explosion Contracts

"...not responsible for means and methods...”, “... site inspections observations...

Post Litigation Explosion Contracts - Risk Shifting and Protection

Damage Control Era Contracts

Damage Control Contract Plus Partnering Patch

Lean Construction, New Contract Form

Arbitration Mediation ADR etc.

Project Spectrum

Quick, Uncertain and Complex

Figure 2: Relation type
Figure 3  Duration

- Transactional
  - Limited Personal Involvement
  - Limited Communications
  - Easily Monetizable Valuation

- Relational
  - Unlimited Personal Involvement
  - Extensive Formal & Informal Communications
  - Both Monetary & Non-Monetary Valuation

Figure 4  Framework

- Transactional
  - Short agreement process
  - Short time between agreement and performance
  - Short time of performance

- Relational
  - Long term
  - No finite beginning
  - No end to relationship or performance