Competitive intelligence (CI) for evaluation of construction contractors

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Mahdi Safa [a,*,1], Arash Shahi [a,1], Carl T. Haas [a,2], Dawn Fiander-McCann [b,3], Majeed Safa [c,4], Keith Hipel [d,5], Sandra MacGillivray [e,6]

[a] Department of Civil and Environmental Engineering, University of Waterloo, Canada
[b] Df Consulting Inc., Calgary, Canada
[c] Department of Agricultural Management and Property Studies, Lincoln University, New Zealand
[d] Department of System Design Engineering, University of Waterloo, Canada
[e] Valency Inc., Waterloo, Canada

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ABSTRACT

This paper investigates the application of competitive intelligence (CI) techniques for construction contractor selection process, as part of the overall construction contract management. While comprehensive and ongoing CI applications are employed in a variety of industries to provide valuable input for broad strategic decisions, the construction industry lags behind in adopting this methodology. The use of CI for contract management is an important development in light of the realization on the part of major construction contractors that the diffuse nature of the information and lack of robust analysis create numerous uncertainties during the decision-making processes. The findings of this paper show that CI has the potential to improve the process for assessing and selecting contractors, through supporting an unbiased and auditable decision making process. A case-study on using CI for contractor selection on a megaproject in the industrial sector is presented along with the guidelines for the use and implementation of CI in the construction industry as a whole.

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1. Introduction

Current trends suggest that construction project management may be well "behind the curve" in effectively applying the competitive intelligence (CI) approach. Construction project management is a challenging and complex process involving coordination of many tasks and multiple parties (including consultants and contractors) with different priorities and objectives. Effective decision making approaches for construction projects require the deployment of various strategies, tactics, and tools. Contractor selection is one of the critical and strategic decisions that need to be made with respect to contract management on a project. For selecting a contractor, the status of the contractor needs to be evaluated and analyzed in detail. Lack of accurate data about the contractors, subjective information, inexplicit information, and inaccurate

judgment cause shortcomings during contractor selection process. Hence, the main purpose of introducing a CI model in this context is to support decision makers and to enhance the contractor selection process. The model provides a framework to make use of the existing information; by collecting, analyzing and transforming this information to meet the selection's requirement. In other words, it introduces steps to progress from data to information to intelligence. The intelligences are the outputs of the CI process and deliver some meaning from the gathered data and information through the analysis. The outputs of the CI model are treated as favorable inputs to the selection methods such as Multiple Attribute Decision-making (MADM). A benefit to using such a model would be in reducing the natural potential for selection bias (negative or positive) where the contractor may have a reputation that may or may not be accurate in the context of the evaluation, or more importantly, the needs of the client. Since competitive intelligence (CI) has become more important to a firm's knowledge development and decision making efforts, decision makers and contract managers, as the CI professionals, must play an active role in the selection of contractors [1,2].

Several CI models and programs are in use in other industries, but the theories, methods, and results related to these industries cannot always be applied directly to the construction industry with the same level of success. The scope of this research focuses specifically on the industrial sector projects in the construction industry, but the concepts and models developed are applicable to other construction industry sectors. In general, the industrial construction sector involves projects

* Corresponding author.
  E-mail addresses: msafa@uwaterloo.ca (M. Safa), ashahi@uwaterloo.ca (A. Shahi), chaas@uwaterloo.ca (C.T. Haas), dawnfiander@gmail.com (D. Fiander-McCann), Majeed.Safa@lincoln.ac.nz (M. Safa), kwhipel@uwaterloo.ca (K. Hipel), sandra@valencyinc.com (S. MacGillivray).
  [1] Tel.: +1 519 888 4567x31173.
  [2] Tel.: +1 519 888 4567x35492.
  [3] Tel.: +1 403 470 6228.
  [4] Tel.: +64 3 4,230,263.
  [5] Tel.: +1 519 888 4567x32830.
  [6] Tel.: +1 519 883 7136.

such as power plants, refineries, and process facilities. It is characterized by a high concentration of participants (contractors, owners, etc.) and by a high level of engineering and project management sophistication. The research presented in this study concentrates on industrial construction and, in particular, on megaprojects.

The CI function influences a wide range of decision-making areas in different industries. The CI is adopted by many scholars and practitioners in a rather fairly uniform way despite small variation [3]. The top five industries adopters include 1) Consulting; 2) Communications; 3) Chemical/Pharmaceuticals; 4) Information; and 5) Defense/Aerospace [4]. The integration of knowledge management and advances in information technology has helped in adoption of CI in different industries [5]. It is difficult to recognize any industry which could not acquire a certain benefit from CI process's results. The CI process is used for making the best possible business decisions and in supporting decisions in the area such as: mergers and acquisitions; Corporate or business strategy; bids and proposals; lawsuits; R&D/technology decisions; due diligence; product development; market entry decisions; marketing plans; and business development [6,7].

The contract is one of the most important parts of the bidding process. To accomplish well-executed projects, we must have knowledge about the contract management and contractor selection process and the best ways to manage contracts more effectively. Decisions made during the bidding process are concentrated at the managerial level, the point at which public officials and designated decision makers have the power to accept or reject a contractor for a specific project or its subprojects. The contractor selection as well as many other multi-criteria decisions impacting the overall project should be made during the front end planning (FEP) stage of a project. The bulk of the project costs, the major risks, and contractor selection strategy are defined during this stage [8].

Therefore, using appropriate CI tools to facilitate informed decisions early in the process is critical in making sure that measurable improvements can be realized with respect to the contractor selection. The ethical and legal risks of the selection process can be minimized by maintaining clarity regarding the process of gathering information and interacting with the sources of information [9]. This approach builds a trusting relationship and creates transparency within the contractors' communities [9]. Also, early introductions build alignment and mutual understanding of deliverables' scope.

There is no standard and universal definition for CI as experts and scholars with different background and experience have different views on CI. Blenkhorn and Fleisher (2013) defined CI as "the ethical and legal process of discovering, analyzing, and delivering intelligence from publicly available, non-proprietary, and proprietary information sources for the purpose of becoming more competitive in the marketplace"[10]. Alternatively, "CI is a necessary, ethical discipline for decision making based on understanding the competitive environment"[11]. This information is about potential contractor' abilities and desires to assist project teams in making the correct strategic decisions. It is critical that project teams have access to evolving knowledge and instruction in the field for decision makers to remain proficient in competitive intelligence [12]. CI team members should be proficient in assorted analytical approaches. They also need to consider that each CI process require a certain analytical model/approach. While CI tools cannot supply the final solution, the tools could help to reveal the uninvestigated knowledge to support the selection process.

2. Construction contract management challenges

In large construction projects, optimally dividing the work among contractors is challenging. This process is typically executed during the front end planning phase by project leadership team, who rely on their experience and judgment, making it difficult to demonstrate that the results are optimal or to defend the decision making rationale after the fact. Most construction capital projects face uncertainty in

the estimates of the performance ratings and criteria weights due to the subjectivity of procurement experts' judgments [13,14]. Addressing these problems requires an auditable and robust method that still incorporates the expertise of the project leadership team.

The contractor selection process always plays a strategic role in reaching higher quality, reduced costs, and shorter lead times [15]. Numerous construction selection methods in the construction management context have been investigated by many scholars and experts in this field, including case-based reasoning (CBR) data envelopment analysis (DEA), multi-criteria utility theory models, the simple multi-attribute rating technique (SMART), the Compromise Ranking method (VIKOR), evidential reasoning, fuzzy set theory, the analytic hierarchy process (AHP), the analytic network process (ANP), genetic algorithms (GA), and mathematical programming [16–24]. CI can be used as an independent method which employ all possible sources of information, and could also be used for providing input to these other methods.

The scope of knowledge required for conducting the selection process is influenced by the type of project and the site specific details [25]. Construction megaprojects are often one-off and not similar in terms of management system, design, complexity, personnel, project strategies, site condition, and other aspects of the project management [26,27]. Therefore, the development of the CI model includes consideration of the size, location, and schedule of the project as well as any cash flow constraints, the owner's philosophy, management team dynamics, and the overall project strategies.

Significant changes, learning curves, adaptation challenges, and overall growth are inevitable when a CI methodology is implemented. As mentioned earlier, the evaluation of the contractors is a vital component of this system and plays a significant role in risk management for the project [28–30]. To select the best contractors and to prepare the most realistic and accurate bid proposals as part of the contract management process, the experts must be aware of all financial, technical, organizational culture and general information about the projects.

The modern construction contractor selection processes, requires the owners and contractors to maintain long-term partnerships with contractors and subcontractors (fewer but more reliable contractors) [31]. However, during the contract management process, ineffective partnership strength can be a significant risk to the project, particularly when the relationships between managers (decision makers) and contractors become biased and based on personal ties and past relationships. Unfortunately, in the reality of the construction industry, a large part of decisions are affected by such connections. While this type of selection practice has associated benefits, such as stability, mutual trust, and reduced transaction and search costs, it also entails a number of obvious challenges, including the associated ethical uncertainties. For the development of the CI model during this phase, a critical recommendation is the avoidance of any unsystematic CI tendencies and reliance. Instead, emphasis is placed on a systematic method for designating a contractor. While the results of the CI model assist in approaching the ideal optimal decisions, ultimately the managers make the final choice. Therefore, the CI model will not be replacing the decision makers and instead will be assisting them with the decision making process.

The model developed in this research was created based on interviews with the construction project managers who are in charge of numerous mega projects in North America. The selection of the best contractor for each work package within a mega project influences not only the success of the construction project but also the quality of the results produced by any model based on those decisions as outputs. In particular, during the bidding process, the optimal selection of the contractors is vital because it results in an accurate and realistic bid proposal. During this phase decisions are focused at the managerial level, the point at which public officials and designated decision makers have the power to accept or reject a contractor for a specific construction project based on management-level considerations.

An evaluation project team (comprised of CI professionals) is frequently involved in the contract management process. Five typical