

# A Systematic Change Management Capability Maturity Assessment Framework for Contracting Organizations

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## Abstract

The complexity of construction projects coupled with the fragmentation of design and construction process made it to be affected by varied factors that trigger project changes which incorporate risks of cost and time overruns, conflict, and quality defects. Hence the need for a pragmatic approach that will provide systematic assessment of the management capability maturity in order to mitigate the deleterious effects of project changes. This paper therefore presents a change management capability maturity assessment framework for contracting organizations. The paper describes the development process of a fuzzy synthetic evaluation based framework, including its contents and validation. The framework has five capability areas of; leadership; application; competencies; standardization; and socialization. These attributes are measured against five levels namely: Absent/adhoc; isolated project; multiple projects; organizational standard; and organizational competency. The research adopted survey approach that uses questionnaire survey as data collection mechanism. Adopting normalization method and fuzzy synthetic evaluation method as quantitative data analysis technique, it is found that the weakest capability area is 'socialization'; followed by 'application' of standardized change management process. It is also found that the overall change management capability maturity level (CMCML) was 'moderate' (3.29). Furthermore, the research finding shows that the proposed framework is users' friendly, comprehensive and easily comprehensible. Finally, the research concluded that the proposed framework is suitable for contracting organizations to individually assess their CMCML and find ways for continuous improvement based on lessons learned.

**Keywords:** Change Management; Capability Assessment Framework; Capability; Maturity Level; Fuzzy; Contracting Organization.

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## **1. Introduction**

Construction projects are complex in nature; it embraces multi-disciplinary and multi-organizational team structure, have short-term and is affected by varied factors which trigger project changes that incorporate high levels of risks. Project changes are synonymous with cost and time overruns, conflict and quality defects; hence the need for a pragmatic approach to provide a systematic methodology for the assessment of contracting organization's management capability to reduce the problems of project failures arising from inconsistent management of project changes. Previous studies in construction have established management capability of contractors as very significant for effective project delivery [1] and some of the studies had clearly shown that higher capability maturity levels leads to better and more consistent performance [2]. Against this background, several researchers have proposed theoretical models and extensive mapping of the change management process. Over the years, many of the change management tools or models developed in support of managing project changes in construction have certainly proved capable of facilitating change management processes nevertheless they are not intended to systematically assess the change management capability maturity of contracting organizations. Based on process improvement methodologies developed originally in the software industry, capability assessment in construction is principally based on capability maturity models (CMM) [2]. Hence, a number of project management capability models have been launched in this regard. Therefore, this paper adopts the concept of CMM to present a framework for the assessment of change management capability maturity of contracting organization

### ***1.1. Change Management in Construction***

Changes in construction projects remained unavoidable in both the design and construction phases; hence inconsistent management of its process can result in many disruptive effects. Change management can be linked with project planning techniques and change management processes. It seeks to forecast possible changes; identify changes that have occurred; plan preventive impacts and coordinate changes across the entire project [3]. Research on change process in construction has tended to focus on process improvement and this has resulted in extensive mapping and modeling of the change management process. Examples of such modeling includes: an advanced project change management system [4], a systematic change process model [5], a generic change process model [6], a toolkit that supports anticipation of potential changes and evaluation of their impacts by project team [7], a change prediction framework developed through software patterns [8], and an integrated fuzzy logic-based change prediction model [3]. Several of these models and frameworks actually support change management in construction but they do not provide for an assessment via framework of the change management capability maturity and consequently, cannot be regarded as a basis for systematic assessment for contracting organization. This fact was reinforced by [9] claim that the construction industry is still looking for a methodological framework that enables process capability assessment.

### ***1.2 Capability Maturity***

Capability maturity relates to comparative level of advancement which an organization has achieved with regards to given set of activities. However, emphasis on unique method for process improvement within the

software industry was successfully achieved through the development of capability maturity models (CMM) and following the concept of CMM originally developed in the software industry a number of generic frameworks were developed for the construction industry within the last decade. These frameworks have largely focused on the establishment and improvement of the project management process quality level of organizations. Following this development in the industry, [10] recently developed a CMM model that was built on the principles of capability maturity model. This model shows the varying level of change management capability across individual organizations and the model consists of five levels. The model is found adaptive in business organizations and lack sufficient information to be successfully applied in construction environments. Similarly, [2] following the same concept developed a change management maturity model that is directly applicable to construction project teams that includes individuals from different organizations with possible processes of different maturity. Capability maturity model is a generic framework for assessment and continuous process improvement. However this has been applied in varied domains such as project management, systems engineering, risk management and e-learning hence the need for its adoption in change management capability maturity determination. Therefore, the paragraphs hereunder describe the process of developing the proposed systematic change management capability maturity assessment framework for contracting organizations.

## **2. Development Principles of the Framework**

A framework is a prescribe set of things to do [11]. Systematic framework of decision making process is made up of some key characteristics such as presence of prescriptive and descriptive process, addressing the entire decision making process and containing proper details [12]. The process of development of the framework involves four stages of; identification of evaluation factors; evaluation of identified evaluation factors; establishment of overall change management capability maturity level (CMCML); measurement or rating of the overall CMCML against the five – level maturity scale.

The development is based on the latest version of the CMM identified as capability maturity model integration (CMMI) [13] which on its own has defined 22 generic process areas and five process maturity levels. The model assesses an organization against the existence or otherwise of these process areas and then produces an overall maturity level rating. Therefore, following the same concept, the proposed framework in this study has five capability areas and five maturity levels.

## **3. Research Methodology**

To achieve the set objective of this study, an extensive review of literature was conducted and this was complemented with a survey approach that uses questionnaire survey to rate the identified capability areas [14]. The questionnaire was initially piloted to ensure that the research instrument establishes the most productive form of data analysis. However, a total of 85 refined questionnaires were eventually administered to directors, project managers, contract managers, and project quantity surveyors within every contracting organization that adopts some sort of change management processes selected for the study in south west geo-political zone of Nigeria. Section A of the questionnaire profiled the respondents and their organizations while section B asked respondents to rate the states of change management capability maturity level of their organizations based on the

identified evaluation factors, using Likert scale of 1 – 5 representing very low to very high. With a sample size of 85 based on grade – 1 contracting organizations only, a total of 40 validly completed questionnaires was retrieved out of the 85, thus representing 47% response rate which was above the normal norm of 20 – 30% of most questionnaire survey [15, 16]. Data collected were analyzed using normalization method to extract the significant factors and fuzzy synthetic evaluation method through which fuzzification of the evaluation factors were conducted.

#### **4. Results and Discussions**

The analyses of the survey shows a greater percentage of the respondents to have had requisite academic qualifications ranging between HND (Higher National Diploma) and PhD and have acquired wide experience in construction with an average of about 20years. This thus ensures that the data provided by the respondents can be relied upon for the purposes of analysis (framework development). The analyses further facilitate the establishment of the overall change management capability maturity level that was found to be ‘moderate’. In addition, five key capability areas of leadership; application; competencies; standardization and socialization were identified. The paragraphs below gives detail description of the framework as developed.

##### **4.1. Key Capability Areas**

As stated earlier, the framework development follows the philosophy of CMM and the results of the quantitative analysis which uses five key capability areas of leadership; application; competencies; standardization and socialization.

KCA 1: Leadership – This capability measures the level of involvement and commitment of senior management of the organization in preparing their staff to deal with project changes. Leaders are required to ensure that the project team has the required skills to perform the project tasks effectively and provide necessary training. Other factors to be considered here include leadership accessibility, decision making and leader’s engagement with project team.

KCA 2: Application – The main objectives of this capability area is to assess the degree of adoption of change management practices in project implementation as well as the extent to which fund is made available for sponsoring the application of change management in the organization.

KCA 3: Competencies – Collaborative efforts of both the top management staff and other organizational members in implementing change management is assessed by this capability. Organizations must establish good training programs for all ‘executors’ of change management for them to be referenced to have done well in this attribute.

KCA 4: Standardization – This capability seeks for full integration of change management processes with project management and inclusion of change management in other improvement approaches. However, leadership forms a critical criterion for stabilizing standardization as a capability area.

KCA 5: Socialization – A good level of commitment and buy-in plays a major role here in an organization. Both the top management staff and employees must show a high level of commitment and buy-in to achieve successful change implementation. Attaining top management's commitment will enhance successful change implementation, [17] and adjustment to embrace change will be very low if not completely rejected if employees' experience low psychological commitment [18].

#### ***4.2 .Maturity level***

The framework as built on the principles of CMM has five levels of maturity for the assessment of organization's CMCML. The maturity levels are spread on a scale of 1 to 5. However, this is similar to scale used by other researchers such as [2, 10, 19]. The maturity of each capability areas is rated against the five levels. The meaning of each maturity level is described hereunder:

ML I: Absent or Adhoc – At this level organization is characterized as having no change management processes in place, few processes are defined on regular basis and success basically depends on individual efforts and experience. An organization is in a dormant state as far as change management is concern.

ML 2: Isolated project – Informal change management process are introduced. Only isolated projects are exposed to the use of change management at the beginning of the project and resistance to changes by employees is common at this level. Change management integration with project management is not fully implemented at this stage, though some degrees of communication planning do occur early in the life-cycle of projects.

ML 3: Multiple projects – Systematic protocols and procedures for managing changes is set up by some groups in the organization at this level, even though the application of change management is somehow localized to these groups within the organization. Project team is highly 'adaptive' to managing changes, process is controlled and documented according to pre-agreed set procedures and it becomes a common practice to apply change management.

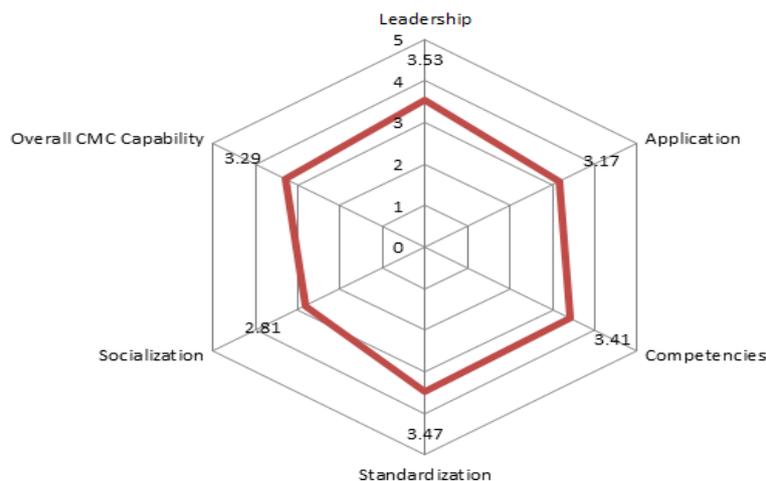
ML 4: Organizational standard – Change management processes are integrated with other functions of project management and throughout the project team. Here, the project team and the employees are 'supportive' to managing changes. Organization has choosing and agreed toward a common approach and standards for applying and implementing change management on every new project from inception.

ML 5: Organizational competency – The main focus here is on learning and improving continuously so as to avoid a repeat of any failures. All steps of change management are comprehensively integrated and continuously improved upon at this level. Focus mainly is on standard practice of integrating change management and project management into planning and design stages of project.

#### ***4.3 .Overall Capability Maturity Assessment Process***

As mentioned previously, evaluation of organization's change management capability maturity level (CMCML)

would include a series of questions covering specific capability areas. The answers received (via questionnaire survey adopted) assess the organization's capability maturity through measuring its performance against these areas so that problems in these areas are identified and prioritized for improvement. Each of the five capability areas has its own maturity level which presents the characteristics of an organization computed via fuzzy synthetic evaluation approach; the results is as displayed in the spider diagram shown in figure 1. The lowest value is considered the weakest link and aspect of the change management capability (CMC) for which improvements is prioritized. Similarly, the overall maturity of a construction organization's change management capability is also defined based on the result of the fuzzy synthetic evaluation and this is measured against the five-level maturity scale.



**Figure 1:** Change management capability maturity level results

Based on this result, an organization with no change management process programme is usually at the lowest level of the maturity rating – level 1 (see figure 2). As the organization adopts the appropriate goals and practices of change management processes defined at higher levels through continuous review of their performance, the organization progresses through the maturity hierarchy until achieving the highest maturity level 5 rating. At this point, the organization is expected to have continuous improvement processes. The framework is found adaptable by construction organizations to individually determine their appropriate level of capability maturity at any particular time of assessment. Figure 2 described the systematic layout and content of the framework.

## 5. Validation of the Framework

A selected group of experts in a Delphi survey approach that uses questionnaire survey was asked to validate the framework. This is to gather the thoughts and opinions of the users in order to improve the framework to better meet the needs of the construction organizations. This forms a key part of framework development process and allows the framework to adequately evolve. The framework was rated and commented on by a group of experienced eight (8) construction industry experts. The experts are from building construction organizations and academic community and they have more than 20years experience in the construction industry. The

applicability, layout structure, clarity and content and systematic process of the framework was validated based on comments gathered from the group. All respondents felt the contents of the framework were easy to understand and interpret; respondents thought the model covered all relevant aspects of change management capability maturity. The experts were generally satisfied with the layout, clarity and contents, applicability and appropriateness of the evaluation criteria of the framework.

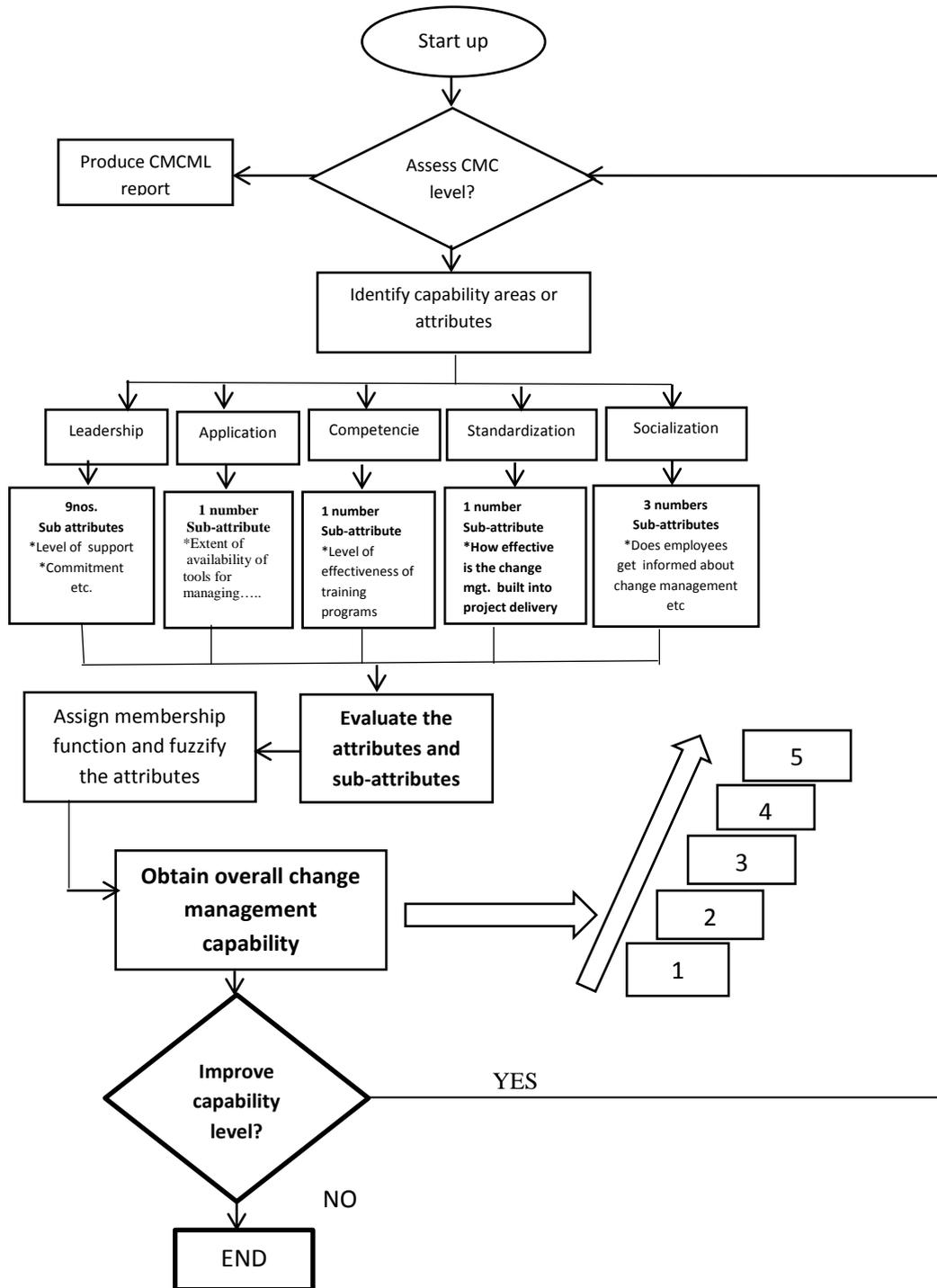


Figure 2: Change management capability maturity level assessment framework

## 6. Conclusion

The framework contains five capability areas of leadership; application; competencies; standardization; socialization and these are measured against five levels namely: Absent/adhoc; isolated project; multiple projects; organizational standard; and organizational competency. The maturity level of these capability areas presents the characteristics of an organization; the lowest value is considered the weakest link that demands improvement. Furthermore, the research found that the overall CMCML is 'moderate' and the proposed framework is found to be suitable and users friendly. Hence, organizations CMCML progresses through the maturity hierarchy level as it adopts the appropriate goals and practices of change management processes thus indicating that higher capability maturity levels leads to better and consistent performance in construction. The research finally concluded that the framework is suitable for contracting organizations to individually assess their change management capability maturity levels and find ways for improvement.

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