Al-Azhar University Civil Engineering Research Magazine (CERM)
Vol. (40) No. (1) January, 2018

Applying an integrated assessment model to assess the implementation of standard processes in housing projects

Ahmed Gomaa Asran [1], **Moheb El-Said Ibrahim** [2] , **Hatem Shaker Elbehairy** [3] , **Ahmed Mohamed Alsudi** [4].

1. Department of civil engineering .Azhar University, Cairo, Egypt.
2. Department of civil engineering .Cairo University, Cairo, Egypt.
3. Department of civil engineering .Azhar University, Cairo, Egypt.
4. Department of civil engineering .Azhar University, Cairo .Egypt.

الملخص:

ان تطبيق الاجراءات القياسية فى مشروعات التشييد يعتبر من دعائم نجاح تلك المشروعات نحو تحقيق اهدافها ، وتبدا هذه الاجراءات من دراسه فكره المشروع وحتى انهاء تنفيذة ثم تبداء اجرات تشغيل المرفق وصيانته وتسجيل الملاحظات على اداءة . وقد اصبح تقييم الاداء من الاشياء الهامه فى تحديد مدى نجاح المشروعات وتحديد نقاط القوه والضعف ، ولكى يكون هذا التقييم واقعيا وداعما لقرار مستير لابد ان سيكون متكاملا وشاملا .

وقد قدم البحث بناءا لنموذج متكامل لتقييم تطبيق الاجراءات القياسية فى مشروعات الاسكان . حيث سيقوم النموذج بتقييم هذا التطبيق من خلال محددين رءيسيين على ان يتم تقييم كل محدد من خلال مدى تحقيقه لثلاثه اهداف وتقييم كل هدف من هذه الاهداف من خلال خمس مؤشرات لقياس الاداء.

فالمحدد الاول يختص بتقييم تطبيق الاجراءات فى المشروع وسيتم تقييم هذا المحدد من خلال مرحل المشروع التى تبدا بمرحله المقترح ثم ما قبل الانشاء ثم الانشاء .اما المحدد الثانى فيختص بتقييم تطبيق الاجراءات فى المرفقوسيتم تققيم الاجراءات ايضا من خلال ثلاث مراحل وهى الانهاء والتشغيل والخبرات. وقد تم عمل دراسه ميدانية لاعتماد هذا النموذج وكذلك للاستنتاج نسبة تاثير كل عنصر على الاخر وكذلك اهمية كل عنصر من هذه العناصر فى التقييم المتكامل للمشروع . وبناءعلي تحليل نتائج الدراسه الميدانيه تم بناء النموذج لتقييم تطبيق الاجراءات القياسية فى مشروعات الاسكان .

Abstract:

The standard processes implementation in construction projects is one of the pillars of the success towards achieving their objectives. The processes start from studying project idea until facility operation. Performance assessment has become an important factor in success measuring as well as identifying strengths and weaknesses points.

This research introduces the development of an integrated assessment model for assessing the implementation of standard processes in housing projects .The assessment will be done through integration between two main criteria where every criterion is assessed through achieving three goals and every goal is assessed through five key performance indicators. The first assessment criterion is project process and will be assessed through proposal, pre-construction and construction. The second criterion is facility process which will be assessed through closing, operation and experience. A survey study has been conducted to approve this model and determine the effect percentage of each parameter as well as the importance of each one on the integrated assessment. Based on the study results analysis, the model has developed to assess the implementation of standard processes in housing projects.

Keywords: Assessment, integrated, KPIs, housing, project and process.

1.1 Introduction

The level of success in carrying out construction projects and development activities will depend heavily on the degree of standard process implementation as well as the integration between the projects and facilities. The level of success also will depend on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration, the associated risk management, the business environment, and economic and political stability. (Takim and Akintoye - 2002)

1.2 Performance Assessment

The terms of assessment and monitoring are associated with work responsibilities dealing with discipline, control and accountability. However, properly designed and implemented, a measuring and monitoring program can be encouraging, motivating and rewarding.

It can show process improvement if systems aren't running optimally or it can highlight positive results, efficiency and cost savings if everything is running smoothly. The key, though, is that a process is created, developed, implemented and maintained. A facility professional needs to be able to track both operations and stakeholder satisfaction in the workplace as well as plan for a future that will involve comprehensive sustainability reporting. (Gilmer and others - 2014)

1.3 Key Performance Indicators –KPIs

KPIs represent a set of measures focusing on those aspects of organizational performance that are most critical for the current and future success of it.(Parmenter - 2007)

The purpose of the Key Performance Indicators (KPIs) is to enable measurement of project and organizational performance throughout the construction industry. This information can then be used for benchmarking purposes, and will be a key component of any organization’s move towards achieving best practice. (Costruction-2000)

1.4 Research Background

To assess and improve decision-making concerning construction investments, it is important that agencies track an integrated tool for performance measures that characterizes their facilities portfolios, the level of alignment of their portfolios with development missions, investment directions and the facilities services.(Cable and Davis - 2005)

1.4.1 Government Studies

In this context many governments have taken large steps in applying the performance measuring systems to monitor and control the construction of public construction projects. The experience of the UK, the USA and Australian governments in the application of KPI concept in the evaluation of public construction projects has studied. The Egyptian government also applied this concept to measure and monitors the sustainability plan Egypt vision 2030. Where, KPIs are stated to manage the plan progress.

1.5 Research Objectives

The research main objective is developing an integrated performance assessment model (IAM) for the housing public project. This model final output will be the stander process implementation assessment index .The assessment will be applied through the integration among KPIs which represent the project ultimate goals.

1.6 Process implementation

The main objective of executing housing construction projects is the urban development achievement. These projects should optimize to achieve financial efficiency also. These objectives can be controlled (as shown in figure 1) through the standard processes implementation.

Figure (3-5): IMA –Framework

1.7 IAM - Development Idea

The idea of IAM development is to get quantitative values representing the integrated assessing index IAI as well as a sub-assessment index for construction projects.
This assessment will be done as shown in figure (2) through the integration between defined parameters which describe the project phases and goals. This assessment introduces comprehensive view which can support an informed decision about the project execution and facility operation

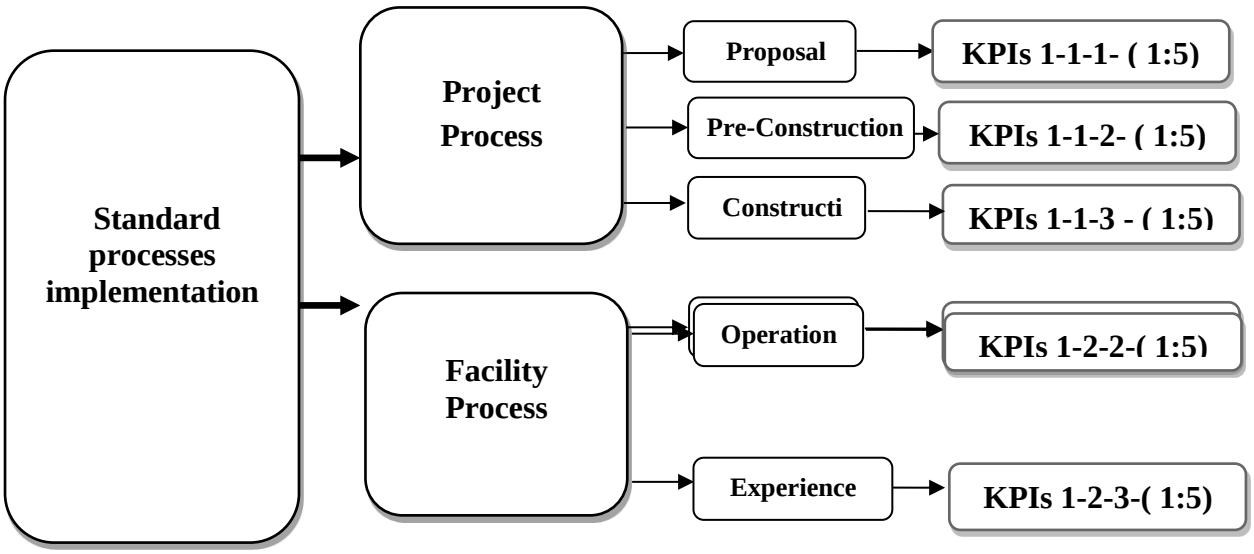

Figure (2): the hypothetical Structure for integrated assessment model

1.8 Process Implementation

The implementation of standard processes is the proper way to guarantee project high performance. In this regard, several specialist agencies offer a group of standard processes to be implemented starting from the project idea to the end of facility operation.

The American project management institution PMI has issued "project management body of knowledge" PMBOK including a group of standard processes for construction projects.

PMBOK defined project process as a set of interrelated actions and activities that are performed to achieve a pre-specified set of products, results, or services.(PMBOK-2004)
The American bar associations cooperating with the engineering associations issued a reference for the construction projects. This reference introduces construction projects processes. It said that: construction is an art, not a science.
In delving into all of the steps that occur at each phase of construction - from the owner's planning and budgeting phase, through the design stage when the drawings and plans are created, to the contractor selection stage, and through the physical construction phase of the project when the project is completed and turned over to the owner for use - it is clearly an art of coordination and management that must occur at every step to keep any construction project on schedule and budget.(Klinger,Susong/ABA 2006).
The processes of the project execution starts from the application of the lesson learned from the previous facility .This integration between projects and facilities are important in expertise transferring to achieve development and growth. Where, the new projects design has to start from studying the similar facilities management to preventing the defects which exist during its operations and maintenance.(Al -Suwidi- 2016).
The Success of any construction project can be represented in its excellent service and its continuity; these matters can be achieved by the integration between project and facility.

The experience of the project execution should be kept and the similar problems should be avoided as well as the experience of operation should be taken into consecration in the future projects to achieve the continuity improvement .these issues can be assessed thought a standard processes application . The processes implementation assessment is done through the integration between two criteria:

- Project process
- Facility process

Every criterion will be assessed through three goals and every goal will be assessed through a group of five KPI,(as presented in figure 2)

1.9 Project Processes integrated Assessment: C-2-1.

The management of construction projects requires knowledge of modern management as well as an understanding of the design and construction process. Construction projects have a specific set of processes. Project Management Institute PMI defined a group of project process. The American Bar Association (ABA) also, issued a reference which introduces an overview of the construction project, starting from the idea until the finishing.
This reference describes and discusses the many steps that occur in each phase of the construction project. While the construction project phases are broken into three main sections, simply described as Pre-Construction, Construction, and Post-Construction, the activity that occurs during each phase of a construction project is anything but simple.(Klinger -2006) .

Project Process implementation is assessed through three phase goals. Where; every phase will be assessed through a group of five KPIs.

- Proposal: will be assessed through five KPIs: Definition, preparation, Evaluation, Correction and Approval.

- Pre-Construction: will be assessed through five KPIs: manger selection, studies, design, contractor selection, Responsibility distribution.
- Construction: will be assessed through five KPIs: work plan, submissions and approval, process managing, Team performance and stakeholder performance.

1.10 Facility Processes integrated Assessment: C- 2-2.

Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. It deals with the management of built assets and incorporates controlling services necessary for successful business operation of an agency. It should aim not only at simply reducing the operating expenses of a built facility, but also at enhancing efficiency of the facility as well. (Lavy-2010)

Facility Management can now be viewed as a pro-active, far-seeing force that will assist in sustaining an agency for long-term success. However, in order to project future assumptions and drive strategic initiatives, no professional can look ahead without understanding the past and knowing their current situation. Measuring and monitoring facility performance is of utmost importance. (Gilmer and Others - 2014)

Poor facility management could result in inadequate facilities to support functioning, excess facilities not contributing to the agency mission, cost inefficiencies, inadequacy, and unavailability of facilities for future needs.

On the other hand, a strong facility management approach provides needed support to the agency mission, the realization of future facility requirements, greater cost efficiency, and the ability to anticipate results of current management decisions.

Thus, to gauge the effectiveness of facility management, it is necessary to reach an understanding of the current conditions of the facility and to postulate changes in facility management practices. To achieve the desired performance; the facility management has to be implemented through a standard process.

IAM assesses facility process implementation through three goals where, every goal will be assessed through a group of five KPIs.

- Post-Construction: will be assessed through five KPIs: Technical notice, Corrective action, Closing, Final payment and Dispute resolution
- Operation and Maintenance: will be assessed through five KPIs: Technical evaluation, financial rates, Functional, Modifications and Extension.
- Experience: will be assessed through five KPIs: location, architect, civil, electric and mechanical

1.11 Survey Study Overview and results.

The survey study aims to collect data related to approving IAM organizational structure designing and deducing the mathematical formulas between its parameters. This is the basis of IAM development.

- This survey study is done through a comprehensive questionnaire involving two main categories. The first is to approve the organizational structure and the second is to determine the mathematical relationships between parameters.
- The sample size is calculated by using Raosoft software that is database web survey software for gathering information. (Raosoft-2004)
- The sample size which calculated was (104) with response distribution ratio

(75%).

- The participant sample includes experts, professionals and specialists. The sample was classified into stakeholders, government agencies officials, consultants and investors.
- Based on analysis of the survey study data IAM has developed.

1.12 IAM development and operation

In this stage IAM is presented as a computer model that has developed based on the approved organization structure and deduced mathematical formulas. IAM operation is done through entering KPIs evaluation that is classified based on assessment criteria. This means that the input data will be two groups. KPIs evaluation will be done by stakeholders, experts, specialists.

As soon as, the data is inputted, the goal assessment and the criteria assessment are shown in the same sheet while the complete output containing the process implementation integrated assessment index will be shown in a separate sheet.

1.13 Input data for project Process C 2-1.

Project process as shown in table (1) is assessed through three goals: strategic, sustainability and advanced. Every goal will be assessed by evaluating its KPIs group.

Table (1): Computer model input data for Project process C -2- 1

Project :					
Phase :				Date :	
Assessment Parameter 3				Project Processes	
Assessing Criteria		Assessing Parameters		KPI	Evaluation
Project Processes	0%	Project Proposal	0%	Definition	
				Preparation	
				Evaluation	
				Correction	
				Approval	
					0%
		Pre - Construction	0%	Manager Selection	
				Studies	
				Design	
				Contractor Selection	
				Responsibilities distr.	
					0%
		Construction	0%	Work Plan	
				Submissions	
				Progress	
				Team Performance	
				Stakeholder Performance.	
	0%		0%		0%
Page	**1**	**from**	**3**		

1.14 Input data for facility process C -2-2.

Facility process as shown in table (2) is assessed through three goals: post-construction, operation, maintenance and recommendation. Every goal is assessed through its KPIs.

Table (5-32): Input data for facility process C 2-2

Project :					
Phase :				Date :	
Assessment Parameter	4	Facility Processes			
Criteria		**Goals**		**KPIs**	**Evaluation**
Facility Processes	0%	Post-Construction	0%	Completion	
				Correction	
				Closing Documents	
				Final Payment	
				Dispute Resolution	
					0%
		Operation	0%	Technical Evaluation	
				Coast Rates	
				Functional	
				Modifications	
				Extension	
					0%
		Experience	0%	Location	
				Architect	
				Civil	
				Electric	
				Mechanical	
	0%		0%		0%
Page	**2**	**from**	**3**		

1.15 IAM output data

The goal assessment and the criteria assessment are shown in the input sheet while the complete output data are shown in the output sheet, as shown in table (3):

Table (3): IAM Output sheet.

Project :				
Phase :			**Date :**	
Output	**1**	**Integrated Assessment Index (IAI)**		
	Axes		**Criteria**	**Assessment**
	Standard processes implementation	0%	Project Process	0%
			Facility Process	0%
Page	**3**	**from**	**3**	

1.16 Research Conclusions

- The most important criterion is the project process where its importance factor is (58.2%).
- The most important goals are:

  Construction in project processes and operation for facility processes.
  - Construction importance factor is (38.9%).
  - Operation importance factor is (48.7%).
- The most important KPIs are :

  Work plan for project processes and correction for facility processes.
  - Work plan importance factor is (27.6%).
  - Correction importance factor is (29.7%).

7.1 Recommendations

General recommendation of this research is the implementation of IAM in assessing housing projects. The additional recommendations related to IAM application are:

- Approve IAM as an assessment reference for housing projects.
  This helps in keeping and transferring experience as well as producing a quantitative reference helping in priorities of project execution.
- Apply IAM to give an effective tool providing an overall view about project performance toward achieving their goals.
- Using IAM to carry out ongoing assessments that will give an overall view about project performance during its life cycle.
- Use IAM for database preparation which will be an effective tool for recording performance about projects execution and facilities operation for agencies.
- Implement integrated assessment approach that means linking between project process and facility process.
- Applying the model on case study.

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