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Application an integrated assessment model to assess the role of housing projects in achieving urban development

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الملخص:

ان مشروعات التشييد هى الاساس فى تحقيق التنميه العمرانيه، وقد اصبح تقييم الاداء من الاشياء الهامه فى قياس مدى نجاح تلك المشروعات فى تحقيق هذا الهدف منها . ولكى يكون هذا التقييم واقعيا وداعما لقرار مستير لابد ان سيكون متكاملا وشاملا . وقد قدم البحث بناءا لنموذج متكامل لتقييم مشروعات الاسكان ودورها فى تحقيق التنمية العمرانية. حيث سيقوم النموذج بتقييم تلك المشروعات من خلال محددين رءيسيين ثم يتم تقييم كل محدد من خلال مدى تحقيقه لثلاثه اهداف مع تقييم كل هدف من هذه الاهداف من خلال خمس مؤشرات لقياس الاداء.

فالمحدد الاول يختص يتقييم خواص المشروع ومدى توافقها مع الخطه العامه للتنميه الشامله وسيتم تقييم هذا المحدد من خلال الاستراتيجية والاستدامة و المزايا .اما المحدد الثانى فيختص بتقييم جوده الحياه المقدمه من المشروع ومدى تحقيقها لرضا مستخدمى المشروع من خلال الرضا والمحافظه والتحسين . وقد تم عمل دراسه ميدانيه لاعتماد هذا النموذج وكذلك للاستنتاج نسبة تاثير كل عنصر على الاخر وكذلك اهميه كل عنصر من هذه العناصر فى التقييم المتكامل للمشروع . وبناءعلي تحليل نتائج الدراسه الميدانيه تم بناء النموذج ليقيم دور مشروعات الاسكان فى تحقيق التنميه العمرانية .

Abstract:

Construction projects are the basis for achieving urban development; performance assessment has become an important factor in measuring the success of these projects in achieving their goal. This assessment has to be integrated and comprehensive to support an informed decision. This research introduces the development of an integrated assessment model for assessing housing projects role in achieving urban development. The assessment will 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 characteristics which will be assessed through strategy, sustainability and advantages. The second criterion is life quality which will be assessed through satisfaction, preservation and improvement.

A survey study has been conducted to approve this model and determine the effective percentage of each parameter as well as the importance of each one on the integrated assessment. Based on the results analysis, the model was developed to assess the role of housing projects in achieving urban development.

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

1.1 Introduction

Construction industry is vital to the development of any nation. In many ways, the pace of economic growth in any country can be measured by the development of physical infrastructure, such as buildings, roads and bridges. The construction industry plays and includes many of the parties, the various processes, different stages and phases of work. Construction industry consumes a great deal of the national budget as it is the basis of

urban development which is essential for the national development plans.
The success of projects means success of industry as the projects are the basis of construction industry. This success means high quality housing, hospitals, transportation and infrastructure. (Egan -1998).

1.2 Performance Assessment

Performance assessment has become the subject of considerable interest over the last 20 years. Traditionally, businesses have measured the performance in financial terms, profit, turnover and etc. These financial measures of performance have been the sole method to assess the organizations success. However, performance measurement that has been based around financial measures cannot cope with the recent changes occurring in the industry, particularly due to the emergence of new technologies and increased intensity of competition. (Isik - 2009).

1.3 Key Performance Indicators –KPIs

Key Performance Indicators KPI, also known as Key Success Indicators (KSI).KPI are quantifiable measurements, agreed-on beforehand, that reflect the critical success factors of an organization. They will differ depending on the organization.
These indicators help an organization define and measure progress toward organizational goals. Once an organization has analyzed its mission, identified all its stakeholders, and defined its goals, it needs a way to measure progress toward those goals. Key Performance Indicators are those measurements. (Reh-2007)

1.4 Research Background

Performance measurement systems are needed to support an informed decision about housing projects implementation. These projects are a part of construction industry which is becoming more complex, a more sophisticated approach is necessary to deal with initiating, planning, designing, approving, implementing and completing these projects.(Isik -2009).

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 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 urban development achievement assessment index .The assessment will be applied through the integration among KPIs which represent the project ultimate goals.

1.6 Public housing project importance

Construction projects importance is essential to us all. We all benefit from high quality housing, hospitals, transportation and infrastructure that are constructed efficiently.
Housing projects importance arises from being the main director of the urban development which is the basis for comprehensive development as an important national objective. This is shown in figure (1)

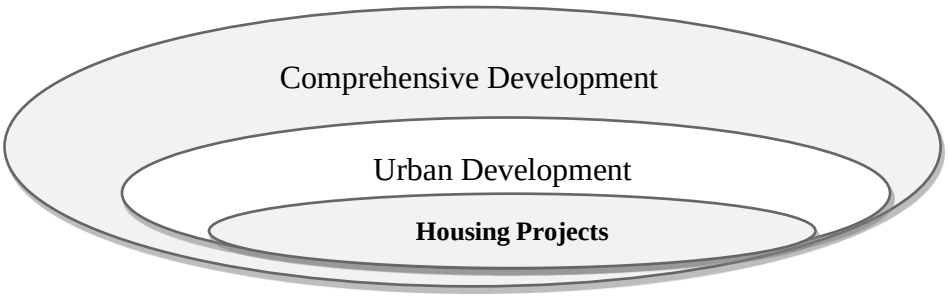

Figure (1): Housing project importance

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 housing 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 housing projects execution.

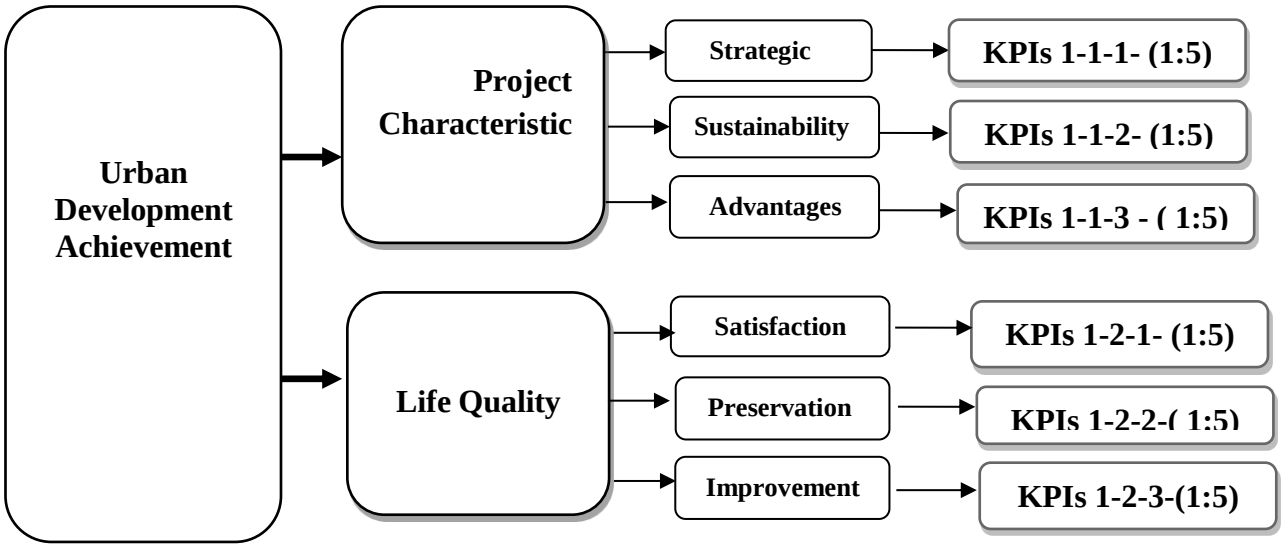

Figure (2): hypothetical Structure for integrated assessment model

1.8 Urban development achievement

The achievement of urban development is one of the important elements in national strategic plan. Urban development achievement approach is aligned with the United Nations sustainable development goals related to sustainable cities and communities.
The Egyptian vision 2030 put it as a main pillar for comprehensive sustainable development. It introduces an illustration of urban development strategic vision and objectives, key performance indicators, challenges, and the priority programs to overcome those challenges. (Egypt vision -2030)
The assessment of housing projects performance toward achieving urban development will be done through the integration between two defined criteria:

- C1-1: Project characteristics
- C1-2: Life quality

First assessment criterion is the project characteristics alignment with the national comprehensive development plan, which can be considered the project external performance connected with urban development achievement.
The second assessment criterion is the life quality level reached by the project, which can be considered the project interior performance connected with users.
Every criterion will be assessed through a three goals and every goal will be assessed through five KPIs (as presented in figure 2).

1.9 Project Characteristics: C-1-1

The first criterion in assessing project performance toward achieving urban development is the project characteristics and their alignment with the urban development plan which is part of national comprehensive development plan.
Egyptian vision 2030 has clarified this criterion saying: A balanced spatial development management of land and resources has to be adopted to accommodate population and improve the quality of their lives. It focuses on achieving three main objectives during the upcoming fifteen years.
Through the references and in light of this vision, the assessment goals of IAM have been produced for housing projects integrated assessment. Project characteristics criterion is to be assessed through the integration between three goals and fifteen KPIs which are:

- Strategy: independence, involvement, modernization, opportunities and income.
- Sustainability: lifespan, LEED, economic, social and environmental.
- Advancement: infrastructure, investment, inhabitation motivation and innovation.

1.10 Life Quality: C- 1-2

The second criterion in the housing project performance assessment toward achieving the urban development is the rise of life quality level provided by the project.
Life quality is defined as the people's satisfaction, happiness and ability to get their needs. This can be achieved through providing the best housing, health, social, educational and psychological services. (Mansy and Kazem /Arabic – 2006)
Good life quality can be achieved through public construction projects taking into account urban, psychological, social, professional and physical determinants. IAM assess construction project performance towards providing high life quality, through the integration between three goals and fifteen KPIS which are:

- Satisfaction (will be assessed through five KPIs): access, systems, utilities, suitability and comfort.
- Preservation (assessed through five KPIs): health, human psycho, culture, natural resources and heritage.
- Improvement (will be assessed through five KPIs): services, safety/security, lifestyle, time saving, and Productivity

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 are 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 urban development integrated assessment index will be shown in a separate sheet.

1.13 Input data for project characteristics C 1-1.

Project characteristics as shown in table (1) are assessed through three goals: strategy, sustainability and advantages. Every goal is assessed by evaluating its KPI.

Table (1): Computer model input data for project characteristics C1-1.

Project :					
Phase :				Date :	
Assessment Parameter		2		Project Characteristic	
Assessing Criteria		**Assessing Goals**		**KPIs**	**Evaluation**
Project Characteristic	0%	Strategy	0%	Independence	
				Involvement	
				Modernization	
				Opportunities	
				Income	
					0%
		Sustainability	0%	lifespan	
				Leed	
				Economic	
				Social	
				Environmental	
					0%
		Advantages	0%	Infrastructure	
				Investment	
				Inhabitation	
				Motivation	
				Innovation	
	0%		0%		0%
Page	**3**	**from**	**8**		

1.14 Input data for life quality C 1-2.

Life quality as shown in table (2) is assessed .through three goals: satisfaction, preservation and improvement. Every goal is assessed by evaluating its KPIs group.

Table (2): Input data for life quality C 1- 2.

Project :					
Phase :					Date :
Assessment Parameter		3		Life Quality	
Assessing Criteria		Assessing Parameters		KPI	Evaluation
People Satisfaction	0%	Satisfaction	0%	Access	
				System	
				Utilities	
				Suitability	
				Comfort	
					0%
		Preservation	0%	Healthy	
				Human Psycho	
				Culture	
				Natural Recourses	
				History	
					0%
		Improvement	0%	Services	
				Safety/Security	
				Lifestyle	
				Time saving	
				Productivity	
	0%		0%		0%
Page	**4**	**from**	**8**		

1.15 IAM output data

As soon as, the data is inputted, the goal assessment and the criteria assessment are shown in the same sheet while the complete output data containing the integrated assessment index are shown in the output sheet, as shown in table (3) includes:

Table (3): IAM Output sheet.

Project :			
Phase :		Date :	
Assessment Parameter		Integrated Assessments Index (IAI)	
Axes		**Criteria**	**Assessment**
Urban Development Achievement	0%	Project Characteristic	0%
		Life Quality	0%

1.16 Research Conclusions

- The most important criterion in the assessment of urban development achievement is: project characteristics where its importance factor is (62.0%).
- The most important goals are:
  Sustainability in project characteristics and Preservation in life quality.

- The most important KPIs are:
  Modernization in project characteristics and Health in life quality.

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 assessment that will givie 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.
- Carry out complete urban development plans therefore execution stages have to produce an integrated facility.
- Implement integrated assessment approach that means linking all assessment parameters and goals to achieve the prospective urban development and afterwards comprehensive development.
- Applying the model on case study.

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References

1. Egypt Vision (2015) .Egypt Vision 2030 - (2015)-Ministry of Planning, Monitoring and Administrative Reform - Cairo, Egypt - Sustainable Development Strategy:(Egypt's- 2030) .http://sdsegypt2030.com/
2. Australian –A (2013) - Australian National Audit Office - General - Report No.28 (2012–2013)- ANAO Report -The Australian Government Performance - Measurement and Reporting Framework - Commonwealth of Australia 2013 - ISSN 1036-7632 -ISBN 0 642 81295 0 (Print) -ISBN 0 642 81289 6 (On-line).
3. Langston (2013)- Craig Langston, (2013), Development of generic key performance indicators for PMBOK® using a 3D project integration model , Australasian Journal of Construction Economics and Building, 13 (4) 78-91.
4. Team – (UK)(2011) - The KPI team -Measurement and Benchmarking Task Group (2011) , 2011 UK Industry Performance Report - Based on the UK Construction Industry Key Performance Indicators-www.glenigan.com-0870 443 5373.
5. Lavy ,Garcia and Dixit (2010) -Sarel Lavy , John A. Garcia and Manish K. Dixit (2010), Establishment of KPIs for facility performance measurement: review of literature , Emerald Group Publishing Limited 0263-2772, Facilities- Vol. 28 No. 9/10, 2010, pp. 440-464q , DOI 10.1108/02632771011057189.
6. IŞIK-(2009) - ZEYNEP IŞIK (2009) - A Conceptual Performance Measurement Framework For Construction Industry- A Thesis submitted to The Graduate school of natural and applied sciences of middle east technical university – In partial fulfillment of the requirements for the degree of doctor of philosophy in civil engineering.

7. Reh (2007) - F. John Reh (2005-2007) - Key Performance Indicators (KPI) - From F. John Reh,Your Guide to Management - How an organization defines and measures progress toward its goals. http://chandankambli.blogspot.com.eg/2005/07/how-organization-defines-and-measures.html
8. Cable and Davis - (USA1) (2005) -John H. Cable and Jocelyn S. Davis in conjunction with the Federal Facilities Council Ad Hoc, Committee on Performance Indicators for Federal Real Property Asset Management, National Research Council -Key Performance Indicators for Federal Facilities Portfolios - Federal Facilities Council Technical -Report Number 147 - ISBN: 0-309-54718-0, 52 pages, 8 1/2 x 11, (2005) -This free PDF was downloaded from: http://www.nap.edu/catalog/11226.html
9. (Raosoft-2004), http://www.raosoft.com/samplesize.html - 2004 , by Raosoft, Inc. http://www.raosoft.com/samplesize.html.
10. Egan- UK (1998) - John Egan - Rethinking Construction , The report of the Construction Task Force to the -Deputy Prime Minister, John Prescott, on the scope for Improving the quality and efficiency of UK construction-Department of Trade and Industry - 1 Victoria Street –London -Crown Copyright 1998 URN 03/951.
11. Mosse and Sontheimer-World bank (1996) - Roberto Mosse and Leigh Ellen Sontheimer (1996) Performance Monitoring Indicators Handbook - ISSN: 0253-7494 -Copyright © 1996-The International Bank for Reconstruction and Development – the world bank - 1818 H Street, N.W.- Washington, D.C. 20433, U.S.A.

.----------.

1. يوسف – (2009)- (Yosof) -أيمن محمد مصطفي يوسف – (2009) - قياس وإدارة تنمية المجتمعات العمرانية الجديدة من خلال مؤشرات جودة الحياة - الجهاز القومي المصرى للتنسيق الحضاري - المؤتمر الدولى لتنمية المجتمعات العمرانية الجديدة - قضايا وأولويات مصر 2009.
2. سيد و حافظ - (Said and Hafz) - (2006) --
مها عز الدين سيد و ندى محمد حافظ -(2006) --- دليل تكوين المؤشرات المركبة - الإدارة العامة لجودة البيانا - مركز المعلومات ودعم اتخاذ القرار التابع لمجلس الوزراء المصرى.
3. فرحات - (2006) - (Farahat)
باهر إسماعيل حلمي فرحات –(2006)- تأثير لامركزية الإدارة علي التنمية العمرانية في مصر- رسالة مقدمة لنيل درجة الدكتوراه في الهندسة المعمارية (تخطيط عمراني) -قسم التخطيط العمراني – كليه الهندسة – جامعه عين شمس.
4. منسى و كاظم –(2006) -- (Mansy and Kazim)
محمود عبد الحليم منسى و على مهدى كاظم -2006 - مقياس جوده الحياه لطلبة الجامعه -- وقائع ندوة علم النفس وجودة الحياة، جامعة السلطان قابوس -مسقط - ديسمبر ٢٠٠٦
5. على–(2003) (Ali)
عصام الدين محمد على –(2003) - تقييم التجربة المصرية في إنشاء المدن الجديدة بالمناطق الصحراوية- مجلة العلوم الهندسية-جامعة أسيوط،- المجلد (31) العدد(1) يناير 2003.
6. الكواري –(1981) - (AlKawary)
علي خليفة الكواري –(1981) – دور المشروعات العامة في التنمية الاقتصادية --- عالم المعرفه 42 -- المجلس الوطني للثقافة والآداب والفنون بالكويت .