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## Performance Evaluation in Project Based Organization with Agile Project Management Using DEA: Case study

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### ABSTRACT

Today's performance evaluation system is the key factor in organization for evaluates the efficiency then plan for the future. Organization requires the methods that evaluate different aspects of the organization in spite of traditional methods that just consider to financial aspects of organization. Considering agile project management is useful because of the variation of changes in the business world and trying to satisfy the customer then gain the competitive market. Succeed organization are which have more ability, speed and flexibility to answer the marketing changes. So notice agile project management in project based organization with the talent to consult and performing constructional project is so an important object. The purpose of this study is performance evaluation in project based organization with agile project management approach using data envelopment analysis. proposed model perform in 6 project based organization in Isfahan organization with constructional background that end their project in 2011-2014. The results of the study show that with notice to per approach and its effective index, can reach to higher efficiency.

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## 1. Introduction

With the increasing competition in the field of manufacturing and services indices and models are needed to evaluate its performance. Weakness of traditional metrics need to redesign and change the

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competitive environment of organizations has raised the performance measurement system, but index funds are limited, so knowledge of all aspects of an organization's performance is critical for management decision making. Moreover, these measures should be in line with the organization's mission and vision, also should cover all aspects of an organization's short-term goals focus only on the financial aspects and don't recognize the other aspects (Valhamdy & Firozeh, 2009).

Senior management is always looking for the solution to ensure the implementation of their strategies, so evaluation the performance of their organization as an inevitable necessity in order to achieve their strategic objectives (Tavakoli et al., 2011). In this regard, the project manager's performance evaluation project can be successful in achieving the goals of the project and therefore the project will help. Project-based organizations and the textures are dynamic range and volume of projects is constantly changing, So consider the concept of agile project management, attention to understanding the factors affecting its structural aspects of these organizations is of particular importance agile project management is an iterative process and enhance the project's developers stakeholders together active cooperation in identifying the needs of construction and operational priorities are (Haas, 2007).

Performance evaluation tool for achieving the goals (whether in corporate, individual or project) is system that will measure and measure outcome obtained with the scale of the desired quantity and quality indicators that can accurately.

Because of reaction in project based organization under uncontrolled and unsafe environment and high speed in technology and changing on them acts as a competitive advantage, then performance evaluation of this organization with APM approach has an important effect.

In this study performance evaluation of 6 organizations with constructional background in Isfahan analysis. Inputs of the DEA model calculated with information that fill questioner 35management, expert and boss of organization. The outputs of the model calculate from formulas that show differences between real data and forecasting data.

## 2. Background

Several researchers have studied about APM, Performance evaluation, etc. Table 1 expressed some related literature about this subject.

**Table 1.** background of research

Researcher(s)	Year	Research	Conclusion
Yauch	2010	The agility performance metric was developed by creating a theoretical model and then operationalizing the model through literature review	The agility performance metric is demonstrated using data from four manufacturing plants, which represent the four possible combinations of success and turbulence
Ebrahimpour et al.	2012	Relationship between Agility Capabilities and Organizational Performance: a case study among Home Appliance Factories in Iran	The data analysis reveals that there is a significant positive relationship between agility capabilities and performance of the company in confidence level of 0.99
De Oliveira et al.	2012	Using Bayesian Network model to analyze the influence of leadership style and factors associated with organization agility on project performance	It can use combination of leadership style, agility and organization factor to achieve high project performance

**Table 1.** background of research

Researcher(s)	Year	Research	Conclusion
Wang et al.	2012	Identifying of Performance Evaluation Factor in Constructional Project with F- MCDM in Chain	Performance monitoring has benefit to ensure project quality, to reduce project costs and to improve the effectiveness of government investment projects
Rezaeean and Falaki	2012	Project management maturity model has been used to evaluate the effectiveness of project management and to determine the maturity level of organization	Most team members agreed on establishing a systematic project management by informing the benefits of project management to managers and employee
Khalili-Damghani et al.	2013	A New Fuzzy Network Data Envelopment Analysis Model for Measuring the Performance of Agility in Supply Chain	Evaluate and ranking 40 dairy company with notice on agility capability
Stare	2014	Agile Project Management in Product Development Project	Considering agile project management is useful way on product development projects

### 3. Definitions and Concepts

#### 3.1. Agile Project Management

Agile project management is not new, but it has increased in popularity in the past few years. “Gartner” predicts that by the end of 2012, agile development methods will be used on 80% of all software development projects (Schwalbe, 2012). Different concepts of agile project management have been raised and there is no unique definition of Agile Project Management.

APM is the way of project management which facilitates, revitalizes and allows the project team to deliver the customer requirements swiftly and consistently. This is accomplished through continuous learning and adapting to the changing arena and also by the active involvement of customers in the project (Senthilkumar et al., 2012). Success or failure depends on how Agile Project Management for Business Agility partnership project scope due to limitations of cost, time and quality are (Macherdis, 2009).

#### 3.2. Critical Success Factor

Critical success factors are those few key area of activity in which favorable results are implicitly essential, things that must go right to reach goals of management (Rockart, 1979). CSFs can have significant impact on performance results by controlling a few developments (Ducker, 1973). CSFs refer to the limited areas in which satisfactory results will ensure successful competitive performance for organization and department (Alazmi and Zairi, 2003). Ranjan and Bhatnagar expressed that CSFs are need continual attention to cause high performance; they advocate that CSFs are the crucial factors required for ensuring the continued success of department (Ranjan and Bhatnagar, 2008). Key Success Factors to consider factors that will significantly improve the chances of project implementation (Pinto and Slevin, 1987).

### 3.3. Critical Success Factor of APM

There has not been any formal study on CSF's in the Agile software development project per se, based on recent searches in peer reviewed academic literature or practitioner literature related to this topic. However, there are case studies and research theories on successes or failures problems in agile implementation and agile software development projects. The review of both failures and successes in the literature will be beneficial in identifying the possible success factors in agile software development projects, as failures can contribute to the understanding of how to avoid certain serious pitfalls that are critical to the success of a project (Chaw & Cao, 2008). Chaw and Cao (2008) in their research with study related literature collect success factor of agile project management that shows in Table2.

**Table2.** critical success factor of APM (Chaw & Cao, 2008)

Dimensions		Factors
<b>Organizational</b>	Strong executive support	Organizations where agile methodology is universally accepted Facility with proper agile- style work environment Collocation of whole team Reward system appropriate for agile
	Committed sponsor manager	
	Cooperative organizational culture instead of hierarchal	
	Oral culture placing high value on face to face communication	
<b>People</b>	Team members with high competence and expertise	Team members with great motivation Managers who have light-touch or adaptive management style Good customer relationship
	Managers knowledgeable in agile process	
	Coherent, self-organizing teamwork	
<b>Process</b>	Following agile-oriented requirement management process	Following agile-oriented configuration management process Strong communication focus with daily face-to-face meeting Strong customer commitment and presence
	Following agile-oriented project management process	
	Honoring regular working schedule – no overtime	
	Customer having full authority	
<b>Technical</b>	Well-defined coding standards up front	Regular delivery of software Delivering most important features first Correct integration testing Appropriate technical training to team
	Pursuing simple design	
	Rigorous refactoring activities	
	Right amount of documentation	
<b>Project</b>	Project nature being non-life-critical	Project type being of variable scope with emergent requirement Projects with small team Projects with up-front cost evaluation done
	Projects with dynamic, accelerated schedule	
	Projects with no multiple independent teams	
	Projects with up-front risk analysis done	

### 3.4. Project Based Organization

Today, more than ever, organizations are managing their business by projects which led to the creation of a new kind of project based organizations. In these organizations, decisions are taken on a project, other projects can be as unpredictable or even harmful affect In these organizations, decisions are taken on a project, other projects can be as unpredictable or even harmful effect, because these organizations are located in an environment that increases the complexity and the increasing demand for faster, cheaper and better to do a project that features (Nori, 2010).

The project-based organization that its activities are essentially "mix of the project consists of two kinds.

- A) Organizations that earn them by doing projects for others, such as construction companies and consulting engineers.
- B) Organizations that have chosen project management. Many of these organizations tend to have management systems to facilitate efficient management of their projects.

### 3.5. Performance Evaluation

Performance evaluation is critical and exploring survey of different organization's activities. Performance evaluation is both preventive and diagnostic. Performance evaluation identify the current situation, determine strengths and weaknesses in the performance of duties and responsibilities, determining training needs, mentoring organizations in improving their work (Farzianpour,1999).

Data Envelopment Analysis (DEA), due to Charnes et al. is a non-parametric linear programming method

For the estimation of the relative efficiency of multiple decision making units (DMU)s. In this study the efficiency of organization calculate with DEA.

#### 3.5.1. Inputs of model

Inputs of DEA model gather with information of questioner that gives to 35 manager and experts in organization. APM factors rank and their mean in per factor use for inputs of the model.

#### 3.5.2. Outputs of model

For calculating the outputs of model using some formulas witch analysis information of project that finish 2011 between 2014. This information gathers from some data that record in project office in organization. At first deviance mean of execution time and predicted time, execution cost and predicted cost and execution satisfaction and full satisfaction with 1-3 formulas calculate then their difference with perfect coincidence with 4-6 formulas use as models outputs.

$$\bar{T} = \frac{\sum \frac{|execution\ time - predicted\ time|}{Max\{execution\ time \& predicted\ time\}}}{number\ of\ project} \tag{1}$$

$$\bar{C} = \frac{\sum \frac{|execution\ cost - predicted\ cost|}{Max\{execution\ cost \& predicted\ cost\}}}{number\ of\ project} \tag{2}$$

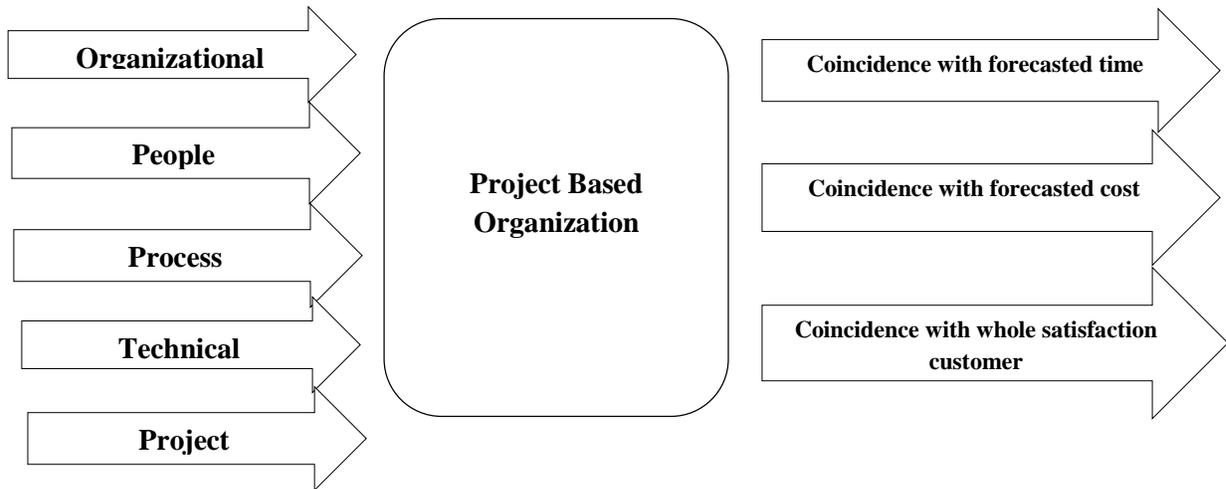
$$\bar{Q} = \frac{\sum \frac{100 - customer\ satisfaction}{100}}{number\ of\ project} \tag{3}$$

$$T = 1 - \bar{T} \tag{4}$$

$$C = 1 - \bar{C} \tag{5}$$

$$Q = 1 - \bar{Q} \tag{6}$$

The model of research was shown in figure 1.



**Figure 1.** Modeling of agile project management with DEA

Result of solving model with CCR show in table 3. For getting better result and identifying efficient organization model solve with supper efficiency method, and the result indicate in table4.

**Table 3.** Efficiency of project based organization

Efficiency with APM	Organization
1	Tose Peyman Sepahan
1	Shahr & Sakht Zayanderod
0.95921	Tose Maskan Isfahan
0.99652	Banasazan Sepahan
1	Saman Gostar Isfahan
1	Shams Omran

**Table 4.** Ranking project based organization with APM

Rank	Supper efficiency with APM	Organization
3	1.09546	Tose Peyman Sepahan
1	1.32066	Shahr & Sakht Zayanderod
6	0.95933	Tose Maskan Isfahan
5	0.99660	Banasazan Sepahan
2	1.10140	Saman Gostar Isfahan
4	1.00482	Shams Omran

**Priorities APM factor in project based organization**

In this section the impact of each input variables on the performance of project based organizations are reviewed by agile project management approach. The gap between efficiency in first mode with efficiency that eliminate each factor calculate with 7 formula and show in table5. The rank of the index indicates in table 6.

$$\sqrt{\sum_{i=1}^6 (xi - xj)^2} \tag{7}$$

**Table 5.** The value of the objective function with deletes any input Agile Project Management

Organization	Objective function value by eliminating project index	Objective function value by eliminating technology index	Objective function value by eliminating process index	Objective function value by eliminating people index	Objective function value by eliminating organizational index
Tose Peyman Sepahan	1	1	1	1	1
Shahr & Sakht Zayanderod	1	1	1	1	1
Tose Maskan Isfahan	0.93136	0.95922	0.95923	0.95925	0.95926
Banasazan Sepahan	0.98006	0.99653	0.93829	0.99654	0.99655
Saman Gostar Isfahan	0.90359	1	1	1	1
Shams Omran	1	1	1	1	0.97719

**Table 6.** The gap between the performance and value of the objective function of the CCR method to remove individual variables APM approach

priority	Sum of gap with whole efficiency	Eliminated index
3	0.0228	<b>Organizational</b>
4	0.0000447	<b>People</b>
2	0.05823	<b>Process</b>
5	0.0000141	<b>Technology</b>
1	0.10169	<b>Project</b>

#### 4. Conclusions

Nowadays in competitive advantage environment with changing in customer satisfaction, customer demands and etc. Notice on organization performance is so important and help to select better company to receive better satisfaction. In this study performance evaluation in project based organization with APM approach using data envelopment analyzed. The main components of agile project management use for input variable of the DEA model and three indices as compliance execution time and time predicted, compliance execution cost and cost predicted, the compliance between customer satisfaction and complete satisfaction use as outputs DEA model. Solving the DEA model identifies efficient organization and sensitive analysis represents the effective factor in organization performance. Proposed model

perform in 6 project based organization in Isfahan organization with constructional background that end their project in 2011-2014. The results of study show that with notice agile project management the good staff helps to reach better performance. This study perform in organization with constructional background it is better that model perform in some other project based organization. For future research it is recommended that some no sensible factor in organization use as model's input also using expert though for analysis results.

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