

Developing Improvement Planning Phase in Project Management Maturity Models

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Abstract

The suggested cycle of project management maturity model generally include phases of evaluation, planning, improvement and finally cycle repeat which is largely based on a cycle known as Deming or PDCA. "Improvement Planning Phase" is the most important phase requiring development among these models that it is not discussed much. The major criteria for prioritization and planning in this phase were investigated in a research by authors. At first, the literature of subject is reviewed, by doing a series of interviews with project management consultants then prioritization criteria is identified, and eventually it is continued with more analysis on each of these criteria by distributing the questionnaire. The most significant criteria can be mentioned as current maturity level, desired maturity level for each process, relative balance between maturity levels of different processes, relations (predecessor & successor) between processes, the impact of each process on success, resources and organizational effort required for implementation, the role of organization (employer/contractor) and the acceptance of organization in different processes. Finally, according to the criteria a model was developed for "improvement planning phase". A model is regarded as an improvable point in these models if it pays attentions to all criteria in addition to the relative importance of each criterion and importance of each process compared to each criterion in form of a specific procedure.

Keywords: improvement, planning, prioritization, processes, project management

1. Introduction

Considering the fact that no enduring success is achieved without reason or based on chance, project-oriented organizations cannot be hopeful to catch their goals in this way. It is necessary that these organizations try and plan to succeed more and maintain their success. But how organizations can develop the project management in their firms? One way is to facilitate managing project by acceptance and attraction of project management processes, evaluation of the maturity and gradual improvement of the processes (Gilbert and Bulletin).

After providing the first maturity models in the early 1990s (in software), project management experts started to think that these models can be used as step by step methods in order to improve project function. It means that project management standards and maturity models can be regarded respectively as the basis of knowledge and tools of evaluation and improvement.

The logic of these models is almost the same. For example, if we want to survey from perspective of maturity model such as OPM3, the phases of evaluation, planning, improvement and cycle repeat are recommended in order to progress project management processes. Among those considered here, the main focus will be on improvement planning phase. Because while the organization has a long way to reach final maturity, it cannot suddenly make all domains get the maturity's high degrees. So the basis should be found in determining and prioritizing the best strategies (Saniee Monfared, 2010). In this regard, search for improvement planning has always been a concern (Azizi and et al.). The research has attempted to review the literature of maturity models according to project management consultants' valuable experiences through some interviews with them to identify prioritization criteria and then provides a model in this field. So according to the research process, weighting prioritization criteria, known as developing maturity model planning phase, have been identified.

2. Literature Review

Some of the most important maturity models in project management are called Organization Project Management Maturity Model (OPM3), PM-Solution Project Management Maturity Model, Berkeley Model, Kerzner Maturity Model (PMMM), Project Management Process Improvement Model (Wysocki) and Project, Program and Portfolio Management Maturity Model (P3M3). Most of these items have not clearly suggested specific ways or criteria for improvement planning, except OPM3 and Wysocki Maturity Model which have proposed some items in general and they will be discussed later.

In Wysocki model, prioritization processes have been suggested due to the effect that each process has in achieving critical success factors (CSFs). That's why a matrix is used in which rows and columns represent, respectively, project management processes (based on PMBOK) and critical success factors (table 1).

Table 1. Process improvement prioritization matrix in Wysocki Maturity Model (Wysocki 2004)

Project management processes	Critical success factor 1	Critical success factor N
Developing the project plan (process 1)			
The end of contract (process 47)			

The final matrix in this model consists of three columns: project management processes, process maturity and the importance of the project success. The improvement priority is given to those processes with higher importance and lower maturity (Wysocki 2004). Although the model has presented strategies for improvement planning and prioritization (matrix excellence, etc.), the only criterion used in prioritization of processes is known as "the impact on success". In OPM3 model, some criteria including accessibility, strategic priorities, profit and cost has been mentioned in improvement planning (Sanice Monfared, 2010). But in the first two approaches of the evaluation advised by this model i.e. self-assessment and online assessment, they are only suggestions and nothing else more. In new evaluation approach (Product Suite), these items are secretly presented in the software logic that a few people can access it. In addition, while this model is known as one of the most prestigious maturity models, a great tendency to quantitative results has made researchers neglect how to analyze the results in order to imagine the way of organization improvement (Norang, 2007)

To sum up, the review of the maturity models indicates that in improvement planning phase many maturity models have only focused on assessment phase output or they have assigned the decision-making related to improvement priorities to the organization. Thus, there is no systematic model considering all involved criteria.

3. Methodology

The approach of this research is descriptive-survey and due to applied results, it is set into applied researches. The information has been collected from library studies and field researches. The research tool is also to consult with experts (Danaeifard, 2011). In terms of the research process whose studies are broader than this text, the subject of "effective improvement of project management processes" has been discussed in three levels as follows: 1- the consultation of Project Management Process Improvement 2- four phases for increasing maturity (evaluation, planning, improvement and cycle repeat) 3- development of "Improvement Planning Phase".

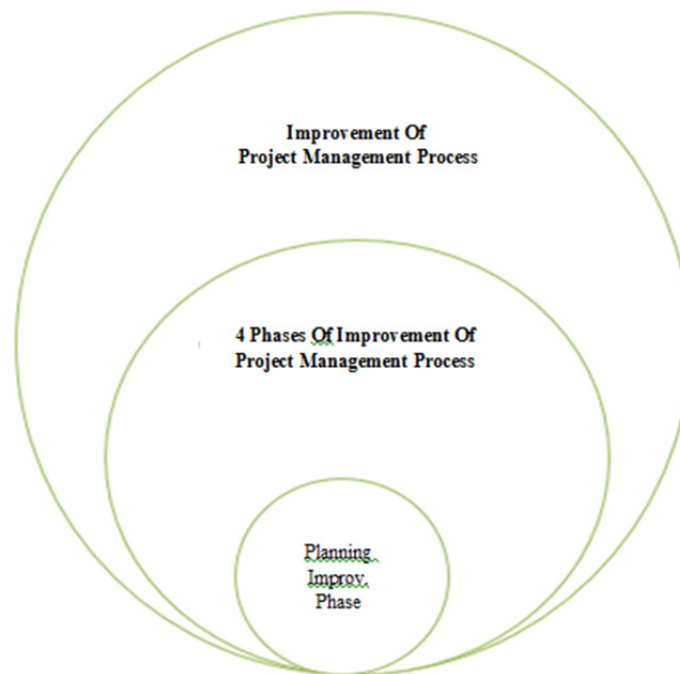


Figure 1. The triple levels of study on the subject

4. Identified Criteria to Plan for Improvement Phase

Some interviews has been conducted with project management consultants (over twenty countries directly involved with improvement and project management consultation and each of them has had over ten specific experiences of project management process improvement) in order to identify planning criteria of improvement phase and project management process prioritization. In the next step, the weighing is done by concentrating on all criteria in the statistical population. Finally, we look for a model which contains identified criteria with relative weights altogether and makes the planning for improvement phase possible in a systematic and gradual way.

4.1 Current Maturity Level of the Process in an Organization (Criterion 1)

Evaluation phase output includes numbers in the interval between zero and the highest maturity level. Obviously, the lower this number is, the more distance is existed with “desired maturity” and thus the higher priority will probably be in improvement planning.

Desired maturity level for the process (Criterion 2)

There is certainly a difference between two processes which have the same priority for improvement in terms of other criteria but one is going from the first to second maturity level and the other one is going from fourth to fifth maturity level. The reason of this difference refers to various difficulty in movement between various maturity levels as well as different effectiveness in each maturity level, which is briefly explained later:

4.1.1 The Difference in the Difficulty of Movement between Different Maturity Levels (Sub-Criteria 1-2)

The early belief saying that difficulty increases in moving towards higher maturity levels is not necessarily correct. In Kerzner's idea, the access to each level is associated with risks which are divided into three categories including low, medium and high risk. The type of risks largely depends on the impact of the change in organizational culture. Determining the type of risks in levels perceives that how organizational culture reacts against the implementation of different levels of the model. Here is the definitions (Kerzner, 2002):

- Low risk: it has nearly no impact on organization culture or organization culture is a dynamic culture accepting fast changes.
- Medium risk: The organization recognizes if the changes is necessary but it may not be aware of consequences of the change. One example of a situation with medium risk is the structure of reporting to several managers.

- High risk: these risks occur when the organization finds out that changes resulting from the implementation of project management cause some changes in organizational culture. Some instances of high risks are project management methodologies, policies and procedures, decentralization and decision-making power. As shown in Table 2, the third level is the highest degree in risk difficulty

Table 2. The difficulty and each maturity level by Kerzner

Maturity Level	Description	Difficulty Degree
1	Common Language	Medium
2	Common Processes	Medium
3	Unique Methodology	High
4	Modeling	Low
5	Continuous improvement	Low

In addition, the following hypothesis was examined via a questionnaire: prioritization is possible between the difficulty of progress from a maturity level to the higher level and the prioritization is meaningful. According to respondents, the highest value for difficulty in moving from maturity level 2 to level 3 is 4.50 (mean) and the least important value for difficulty is 1.27 (mean). These differences is evident in figure 2.

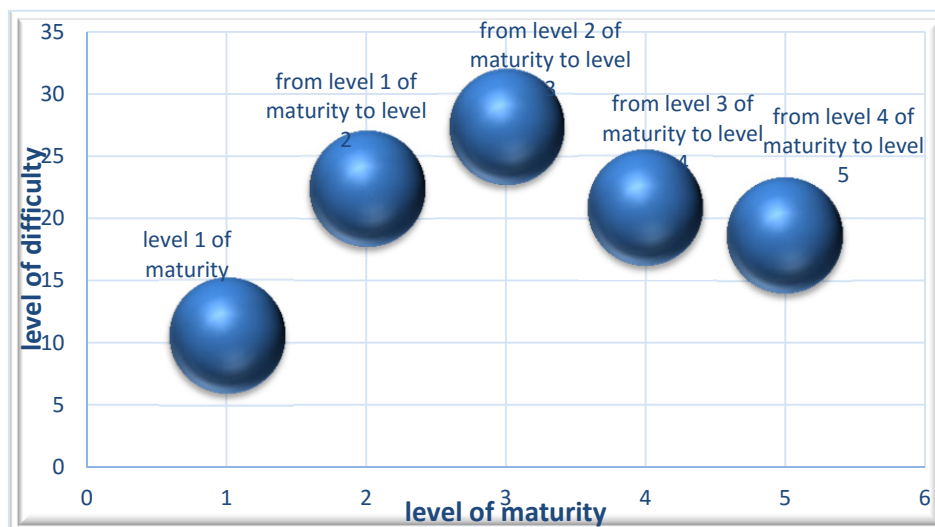


Figure 2. The difficulty of movement between different maturity levels

4.1.2 Difference between the Effectiveness of Movement Between Different Maturity Levels (Sub-Criteria 2-2)

On the other hand, the effectiveness of movement between different maturity levels will be different. It means that assuming the same conditions, one-step growth in maturity (from level 1 to 2 or from level 2 to 3) will not necessarily lead to the same effect.

To analyze processes' situation, two important indexes are measured. Despite having total independence, these indexes are completely dependent on each other:

- PD (Process Definition): The index of process definition in projects or organization which is the first step in creating project management culture.
- PP (Process Practices): the experiences of implementing process in organizations' projects.

One-step growth in maturity from level one to two which results in process definition will not show its effect in project results as much as the growth in maturity from level two to three which leads to the flowing defined process.

In addition, the movement between different maturity levels was studied through some parts of a questionnaire's

results designed with the aim of “the effect of each process on projects’ success”. Thus, following hypothesis was tested according to the results of the questionnaire:

Hypothesis: there is a positive and significant relationship between the mean of maturity level (where the mean goes from one level to the higher one) and slope change of success numbers.

Analysis results in figure 3 & 4 and decrease in the slope of line in higher maturity levels indicates that growth in success numbers in the movement from level 2 to 3 is more significant compared to moving from level 1 to 2, especially considering the fact that the growth of success from one section to next one (going from being good to excellence) will be much more difficult. Of course, maturity levels 4 and 5 can be included in this analysis because examined projects have ultimately had the level 3.

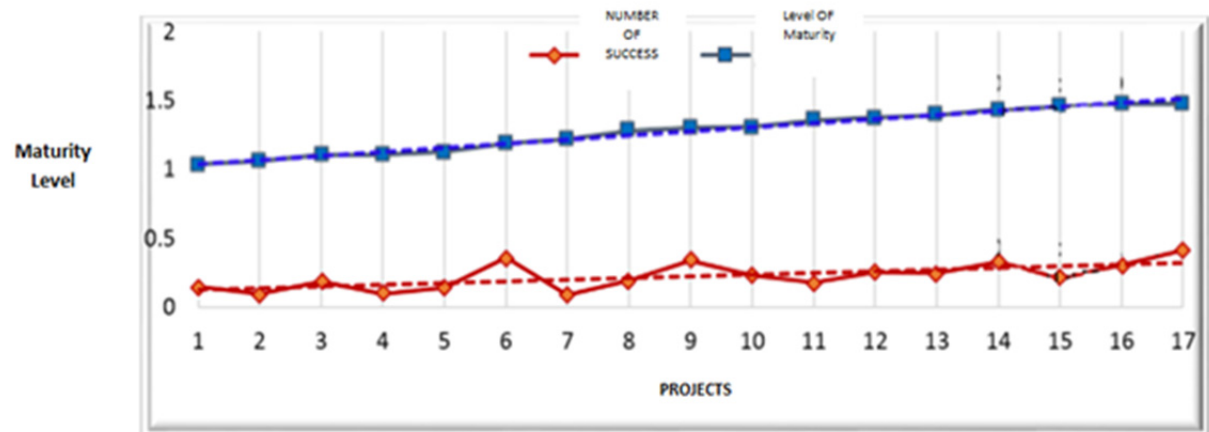


Figure 3. The comparison of the growth in success numbers with maturity levels (movement between level 1 & 2)

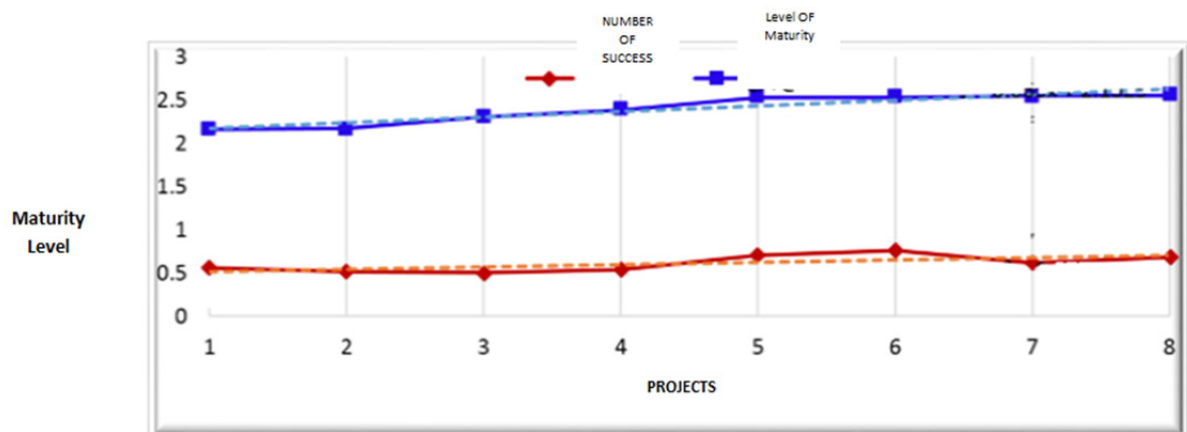


Figure 4. The comparison of the growth in success numbers with maturity levels (movement between level 2 & 3)

4.2 The Relative Balance between Different Processes' Maturity Level (Criterion 3)

In addition to the difference between various maturity levels due to movement difficulty and their different effects, there is also a question that what optimum mode mean for different process with the same maturity level. Is it necessary that all processes have relative balance in maturity level or some of them should be much more mature than others? The answer is yes for the processes which are preferred in this particular organization (for example, 30 of 47) but the answer is no if there should be the same maturity among selected and preferred processes as much as possible. It should be noted that desired or optimal level which has to be considered as the

basis of all “processes”, should be in equilibrium with other aspects of project management, namely, “people” and “technology” in that organization (figure 5).

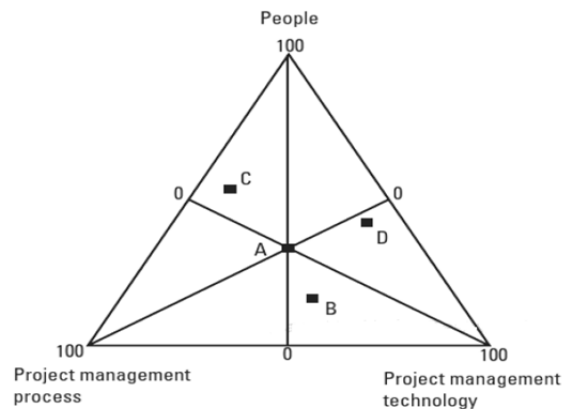


Figure 5. Three dimensions of project management

Point A in the centroid of the triangle indicates that system is in equilibrium. “People” aspect represents employees whose experiences and skills are in equilibrium with organization’s needs. “Technology” aspect suggests that organization has used an appropriate technology level supporting “processes”, project management and its users.

4.3 Relations (Predecessor & Successor) between Processes (Criterion 4)

Relationships and predecessors between different processes should be paid attention in prioritizing process improvement. For example, “cost estimation” process has been identified as a process requiring improvement. When this process is going to be implemented, some processes are needed in its input as follows: “creating work breakdown structure”, “development of the schedule” and “identification of risks”. This exists a challenge for the prioritization done in previous steps. Now another criterion should be regarded as the prioritization criterion for processes.

The number of predecessor processes is associated with weakness and intensity in different processes (for example, see the two processes in table 3) and this can be a basis for considering this criterion in prioritization.

Table 3. Some parts of tables related to analysis of predecessor & successor (based on number of process in PMBOK)

predecessor	process	successor
-	4-1	4-2
-		5-1/5-2/5-3
-		6-1
-		7-1
12-2		11-1
-		-
		13-1
4-1/4-3/4-4/4-5	4-2	4-3/4-4/4-5/4-6
5-4/5-6		5-1/5-6
6-6		6-1/6-7
7-3		7-1/7-4
8-2/8-3		8-1
9-4/9-2		9-1
10-3/10-2		10-1/10-3
11-5/11-6		11-1/11-6
12-2/12-3		12-1/12-3/12-4
13-3/13-4		13-2/13-4

Finally, several excel tables were designed in which negative and positive scores is respectively applied for having predecessor and being predecessor, as a standard and they will help to prioritize processes (table 4). The existing predecessors can be divided into two categories, namely, direct and indirect predecessors and a different coefficient is taken for these two items.

Table 4. A part of scoring table for the process relation criterion (predecessor & successor)

Quality Management	Cost Management	Time Management	Scope Management	Unification Management	
					Charter Project Project management plan Leading and managing project Controlling and monitoring project Controlling the integrated change The end of project or phase Planning of scope management Collecting requirements

4.4 The Effect of Each Process in Success (Criterion 5)

Another criterion is the relationship between each process and success of projects which many interviewees emphasized on it. This criterion has been evaluated in two ways:

Study on the relationship between success and use of processes

Analysis based on experts' opinion

In the study on relationship between success and use of processes (first way), firstly the balance of project is examined in step 2 to see whether they are compared correctly or not. In this case, projects are selected similar and large in terms of size, cost scale and time (based on a division in excellence model). All selected large.

Table 5. Classification of project in PEM Model (Farahani, 2012)

Criterion	Medium Projects	Large Projects	Megaprojects
Time	At least 12 month	At least 12 month	At least 24 month
Cost	Less than 5 M Euro	At least 5 M Euro	More than 100 M Euro

In addition, secondly the differences between them has been minimized by defining a series of coefficients. In the other words, two projects which are similar in size but different in features have been matched via coefficients. It is done by a previous research in this case (Ziayee, 2007) and considering some items such as "lack of previous experience and new hardware resources of the project (including materials, equipment, etc.)", "complexity of the resources consisting of various and large number of elements", "new method used to construct and lack of previous experience", "dependent on external factors of project", "number of factors such as main contractors and so on", "lack of full understanding of the project environment", "cash time and use of the overlapping for activities", "required liquidity for the project" and etc.. Finally, it has been tried to determine more effective fields based on hypothesis definition and success' four criteria called "cost", "time", "quality" and "satisfaction":

Hypothesis: "there is a significant relationship between projects' success and level of using each field." The correlation test is applied to check the validity of this hypothesis. Studies shows that there is a stronger relationship between the growth in success numbers and growth in maturity level in fields such as unification, risk, relations and scope known as more comprehensive one. While despite of growth in success numbers there is no significant difference between the weakest and most successful project in using fields such as time and cost (figure 6).

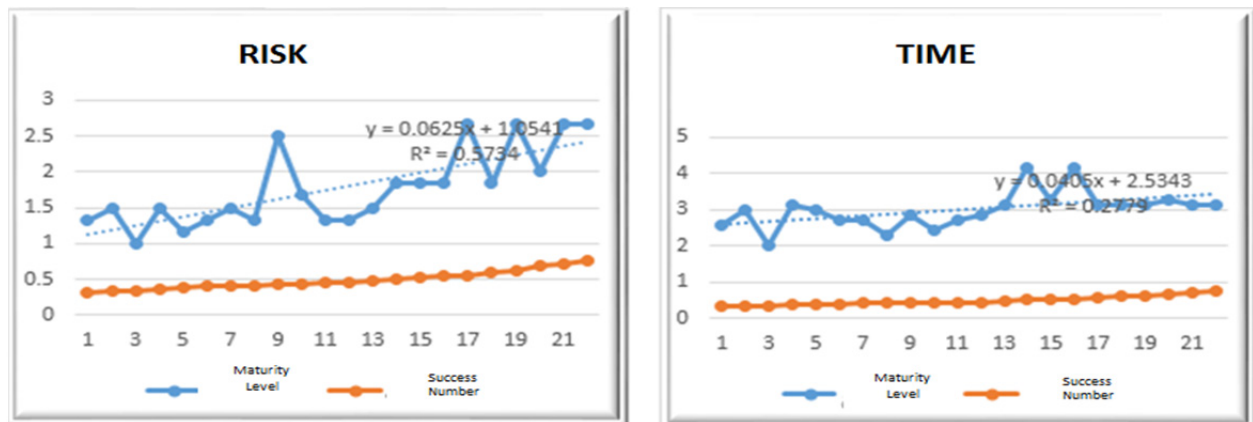


Figure 6. The comparison of “increase in success numbers” with “maturity level” in knowledge fields

There is also a strong correlation between the growth in maturity level of initial process groups and planning with growth in success numbers while despite of growth in using other process groups, the numbers of regression and relationship are less significant (figure 7).

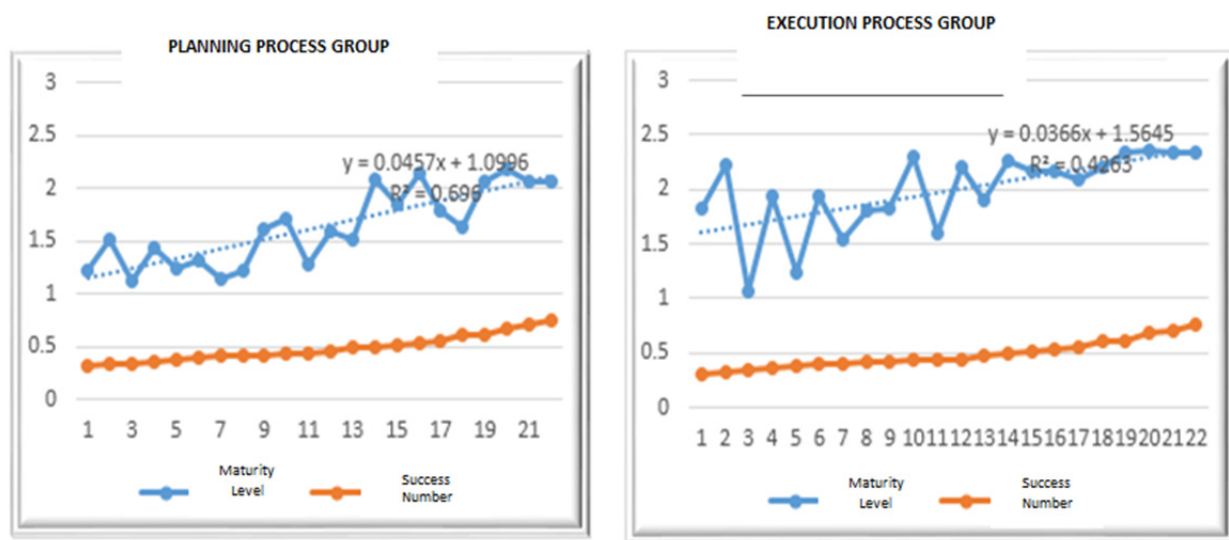


Figure 7. The comparison of “growth in success numbers” with “maturity level” in different process groups

The survey on the effect of each process in projects’ success is predicted by the second way i.e. experts’ opinion. The results have been summarized in figures 8 and 9.

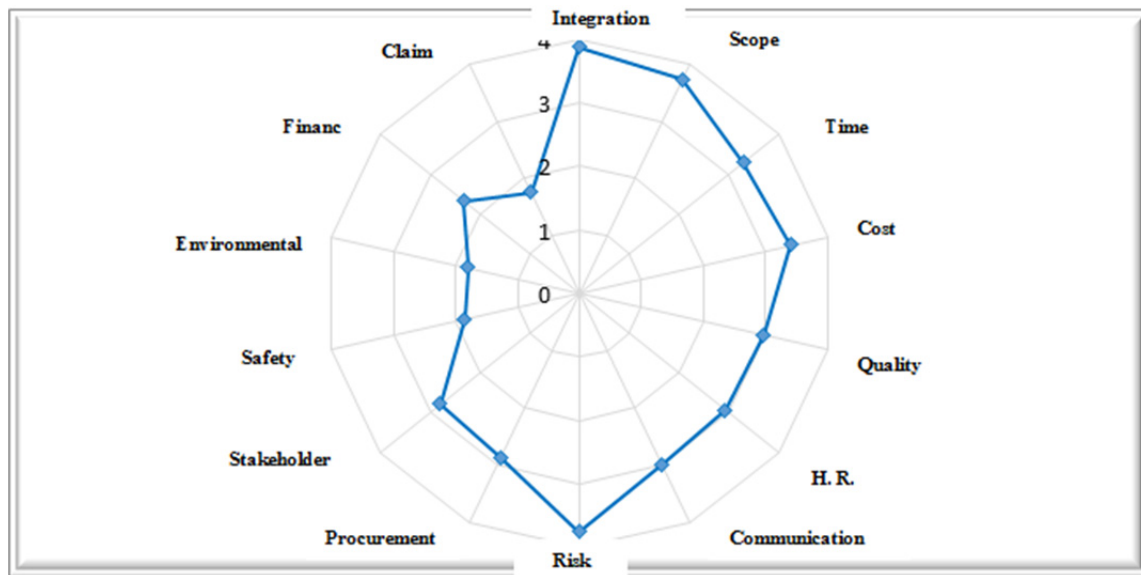


Figure 8. The comparison between “knowledge fields of management project” regarding “the effect in success”

Hypothesis: there is the ability to prioritize between the effects in success of different process groups and this prioritization is meaningful.

In respondents’ opinion, the most effect in successes of process groups is referred to the monitoring process groups with the mean 4.30 and the least effect in successes is related to closing process with the mean 1.80.

Results of this analysis is presented in figure 9.

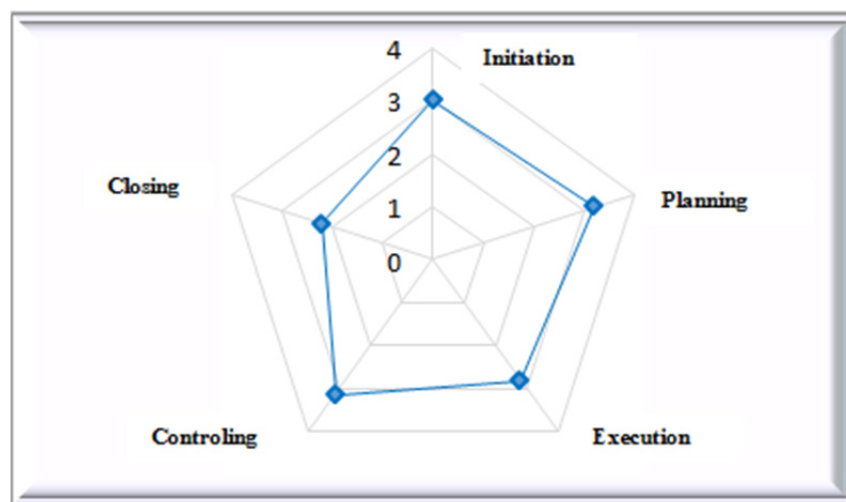


Figure 9. The comparison between “process groups” regarding “the effect in success”

4.5 Resources and Organizational Efforts Required for Implementation of Each Process (Criterion 6)

The required organizational efforts to implement various processes are not the same and they are different in “cost”, “time” and “human resource” allocated to themselves. In fact, “the required organizational efforts” criterion contrasts with “the effectiveness of each process in success”. So it is important to achieve a balance which is the organizational optimal point in “cost-result”. A common mistake among most organizations is that they suddenly decide to perform a standard like PMBOK completely. But maybe their organizational decision, which is the beginning of their organizational efforts, is only as much as a limited number of processes in this standard (Kerzner, Saladis, 2011).

Hypothesis: there is the ability of prioritization in the organizational efforts required to implement each of process groups.

Results of this analysis is presented in figure 10 and 11.

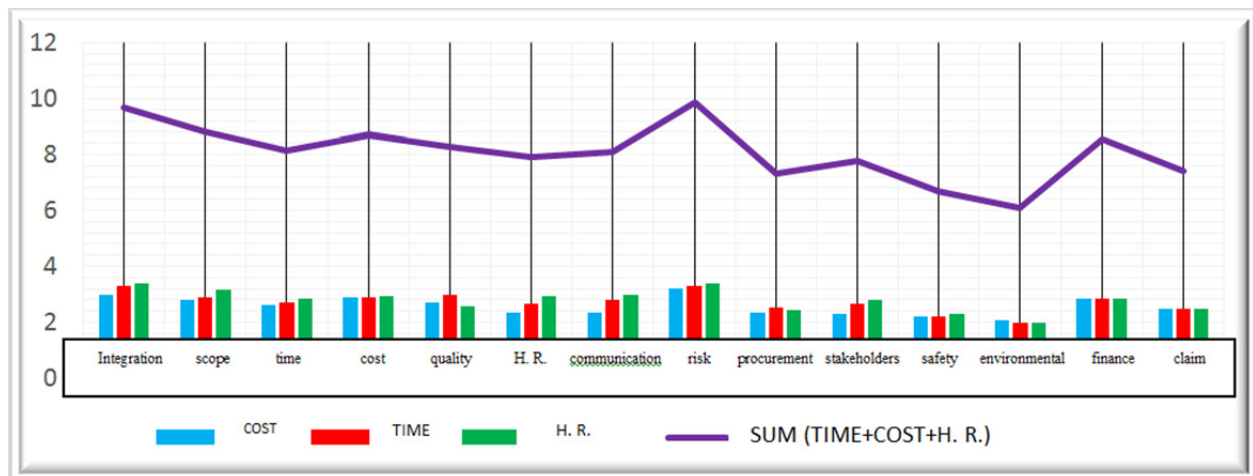


Figure 10. The comparison of knowledge fields of project management in terms of required organizational effort

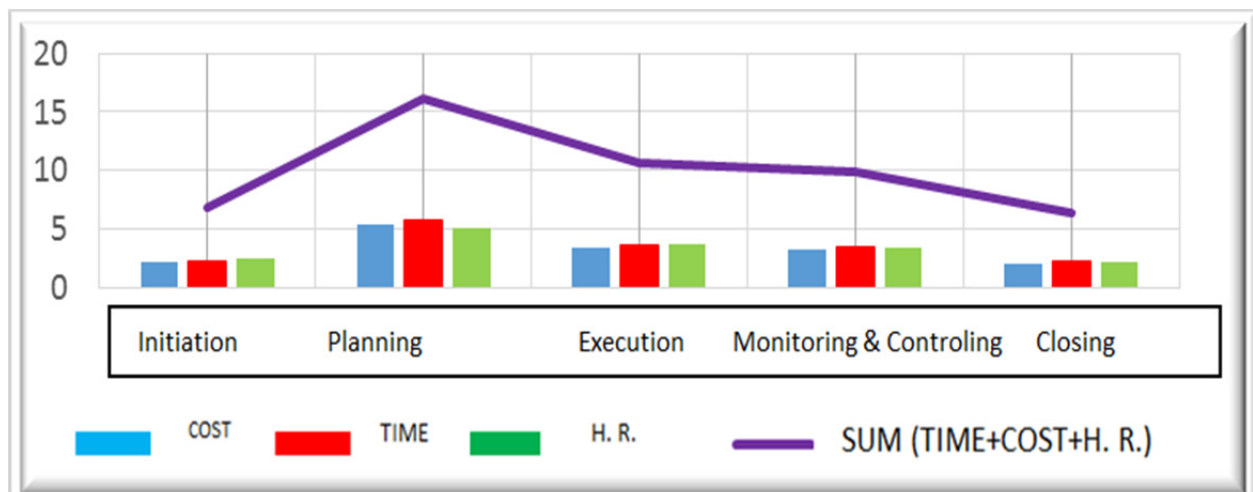


Figure 11. The comparison of process groups of project management in terms of required organizational effort

4.6 The Role of (Employer/Contractor) Organization which is Consulted (Criterion 7)

Some employer organizations often think they do not need to develop project management processes while it is not true. Contractor system usually has a better understanding in this case because in each day when its project lags behind, it misses a dollar but it doesn't mean that these processes don't belong to the contractor system. In fact, the difference refers to the attitude and use of processes in these two systems and there is a distinction in respect to processes' selection priority and way of using them.

Employer system has no authority to change the rules so it assumes that doing do's and don'ts of these rules is a trouble and it can make them less important wherever is possible, unaware of that this can help to reach those do's and don'ts easier. Another issue is that employees of employer systems are unmotivated because they meet their demands through the state budget (easier than modification and improvement system). But the fact which not be ignored in differences among the employer and contractor system includes two main aspects:

First one: the attitudes towards a special process are different in each of these systems. For example, employer (to ask for project charter with these items while it is not necessary to complete such a thing as an employer myself), contractor (to complete the charter for my projects).

Second one: special knowledge fields in employer system and special fields in contractor system are more known. For example, relations in employer system seems to be more important. Since the employer is a transferee, he needs to invest less in human resource and related fields due to the number of personnel. Or for example about process groups, the control process is more significant in employer system (for all fields).

4.7 The Organizational Acceptance of Different Processes (Criterion 8)

Most of the time, despite knowing that a special knowledge field is in improvement priority for this organization according to considered criteria, regarding organizational acceptance for that special process is an important criterion itself. For instance, need to improve risk processes or unification filed are usually less essential tangible in organizations with low maturity compared to fields like cost and time. But this leads to the fact that sometimes improvement begins from these fields so some of them like risk and etc. which can completely solve time and cost problems of the projects will be placed on the agenda.

To check the accuracy of this, we referred to information of the studied project in “the effect in success” criterion and after comparing the current situation with desired one, it was concluded that the greatest gap among all knowledge fields belongs to the unification, scope and risk field.

It means that although the most focus is on time and cost, the effect of fields such as risk, unification and etc. is much more in success (figure 12)

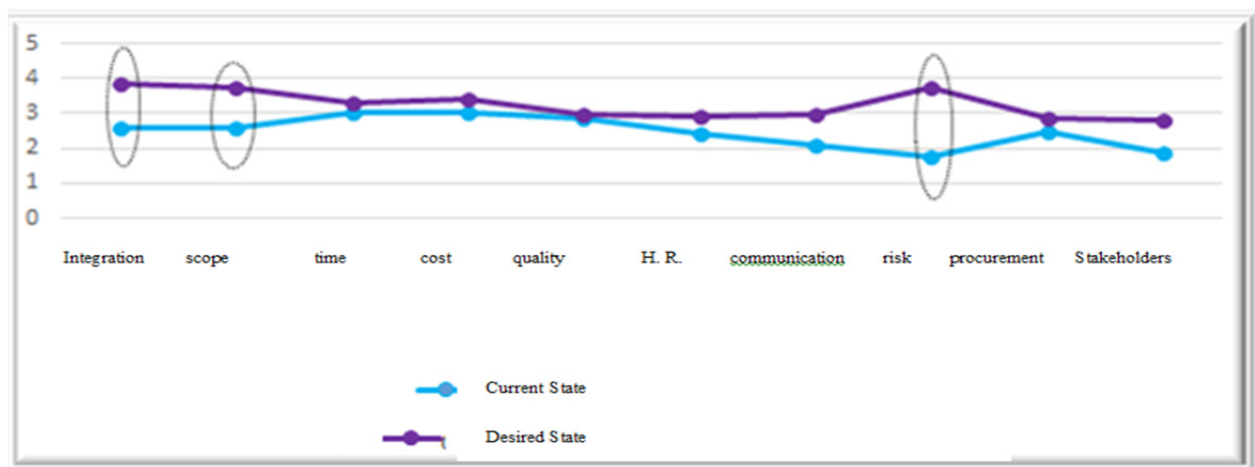


Figure 12. The comparison of current situation with desired one in knowledge fields

Therefore, it can be said that fields are divided into two general categories as a measure to ensure improvement plan continuity (this division is somewhat influenced by the conditions and organizational scale as well as maturity):

Fields with more tangible results: including time, cost, quality, relations)due to reporting)

Fields with less tangible results: other fields (unification, risk, scope and etc.)

5. Conclusion and Suggestions

“Improvement planning phase” is an important issue as a basis for next steps in project management process improvement. As mentioned before, there is occasionally some criteria for this planning in each of maturity models or even this main phase is sometimes influenced by implementing other improvement phases like evaluation. Due to the importance of subject, the research has concentrated on the most important prioritization criteria of processes in planning improvement. Identified criteria consists of: “current maturity level in organization”, desired maturity level in process (the difference in difficulty of the movement between different maturity levels, difference in the effectiveness of movement between different maturity levels)”, relative balance between different maturity levels of processes”, “relations ((predecessor & successor) between processes”, “the effect of each process in success”, “the role of (employer/contractor) organization which is consulted”, “the organizational acceptance of different processes”.

Moreover, case study on each of criteria in an appropriate population has made it possible to pay attention to all criteria and facilitate decision-making. The prioritization is carried out for all criteria according to figure 14 by prioritization matrix based on the results of studies.

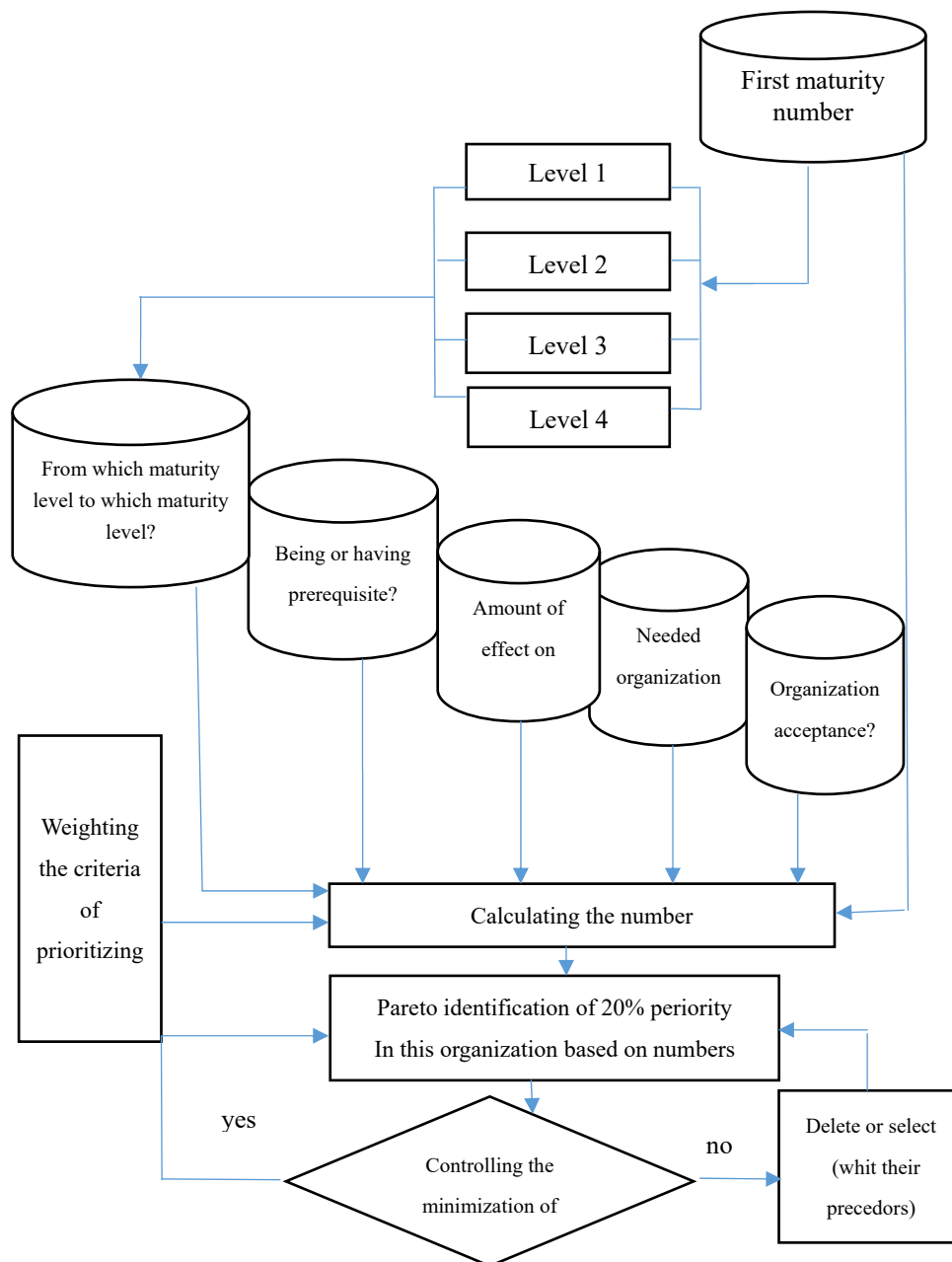


Figure 13. Suggested model for planning of improvement phase

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