



**T.C. DOĐUŐ UNIVERSITY**  
**INSTITUTE OF SOCIAL SCIENCES**  
**MASTER OF BUSINESS ADMINISTRATION**

**COMPARING ORGANIZATIONAL PROJECT MANAGEMENT MATURITY  
MODEL WITH OTHER PROJECT MANAGEMENT MATURITY MODELS  
IN BALANCED MATRIX ORGANIZATIONS**

**MASTER'S DEGREE THESIS**

**DİDEM AKSARAY ARICAN**

**201681003**

**ADVISOR:**

**ASSISTANT PROF., AYŐE İLGÜN KAMANLI**

**İSTANBUL, FEBRUARY 2019**



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## **PREFACE**

My special thanks to my advisor Assoc. Prof. Ayse Ilgun Kamanlı for her support and guidance. Her uplifting attitude and valuable advises contributed to the preparation and writing of this thesis.

I also would like to thank to Aykut Kutlusan, who guided me on my career way and shared his valuable experiences about project management.

Finally, I wish to express my sincere gratitude to my parents; Oya Aksaray and Levent Aksaray and my beloved spouse; Çağrı Arıcan for their spiritual support, encouragement, and faith in me during this process.

Istanbul, Feb 2019

Didem AKSARAY ARICAN

## ABSTRACT

Today's competitive business environment, budget and time constraints lead organizations to use more effective business models. In order to find a solution for organization and management problems resulted from growing and complex business life at the end of 19th century, Project management model is accepted as one of the most beneficial models. The significance of Project Management concept is realized to achieve strategic targets and balance time, budget, quality aspects. Therefore, organizational structures are transformed into matrix structure and Organizational Project Management mentality is adopted. International corporations such as PMI (Project Management Institute) and PRINCE (Projects In Controlled Environments) developed some methodologies which support Organizational Project Management mentality. Continuously developing these methodologies, companies measure added value via certain performance indicators of project management maturity models (Badiru & Pulat, 1995).

The objective of this study is researching effects of PMI's (Project Management Institute) Project Management Maturity Model applications, which is more regarded in Turkey and worldwide, on projects' time and budget performance in balanced matrix organizations. Hypotheses in this study are predicated on project time and budget performance criterion. In order to test the hypotheses in this model a survey was conducted among professionals having experience in project management processes and then the results were compared with literature review. This survey consists of 23 questions and was answered by 449 employees working in different sectors. The analysis shows significant results to show the relation between model elements.

In the final section, discussing the results, suggestions are given to organizations using project management methodologies about improving these methodologies, on the other hand these suggestions are also beneficial to organizations not using project Management methodologies about adopting project management methodologies.

**Keywords:** Organizational Project Management Maturity Model, project management, balanced matrix, time, cost, performance.

## ÖZET

Günümüzün rekabetçi iş koşulları, bütçe ve zaman kısıtları şirketleri daha etkin iş yapış modellerine yöneltmiştir. Bu modellerin başında 19. yüzyılın sonlarında büyüyen ve karmaşıklaşan iş hayatı ile birlikte ortaya çıkan işletme ve yönetim sorunlarına çözüm bulabilmek adına geliştirilen modern proje yönetimi gelmektedir. İşletmelerde stratejik hedeflere ulaşılması ve süre, maliyet, kalite gibi unsurların dengelenmesi açısından proje yönetimi kavramının önemi fark edilmiştir. Böylelikle, işletmeler matris yapıya dönüştürülerek Organizasyonel Proje Yönetimi anlayışı benimsenmiştir. İşletmeler hedeflerine ulaşmak için kullandıkları bu metodolojileri sürekli geliştirerek katma değeri belirli performans göstergeleri kullanarak proje yönetim olgunluk modelleri vasıtasıyla ölçmektedirler (Badiru & Pulat, 1995).

Bu çalışmanın amacı, PMI (Project Management Institute) tarafından yayınlanan ve Türkiye ve dünya çapında kabul görmüş olan Organizasyonel Proje Yönetim Olgunluk Seviyesi Modeli uygulamalarının dengeli matris organizasyonlardaki yönetilen projelerin zaman ve maliyet performansına yansıyan etkisini araştırmaktır. Bu çalışmada yer alan hipotezler projenin zaman ve maliyet performans kriterlerine dayanmakta olup, bu modeldeki hipotezleri test etmek amacıyla proje yönetimi profesyonelleri çapında ankete dayalı bir yol izlenmiştir ve sonuçlar literatür araştırmaları ile desteklenmiştir. Bu anket, 23 sorudan oluşup, farklı sektörlerde çalışan 449 çalışanın ankete katılımı vasıtasıyla gerçekleştirilmiştir. Analizler, modeli oluşturan unsurlar arasındaki ilişkiyi belirlemek açısından önemli sonuçlar ortaya koymuştur.

Çalışmanın son bölümünde ise bulgular tartışılarak, proje yönetimi metodolojilerini kullanan işletmeler için bu teknikleri geliştirmeye ve henüz proje yönetim metodolojilerini kullanmamış işletmeler için ise bu teknikleri benimsemeye yönelik önerilere yer verilmiştir.

**Anahtar Kelimeler:** Organizasyonel Proje Yönetim Olgunluk Modeli, proje yönetimi, dengeli matris, zaman, maliyet, performans.

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## ABBREVIATIONS

<b>AC</b>	: Actual Cost
<b>AMM</b>	: Agile Maturity Model
<b>ANSI</b>	: American National Standards Institute
<b>CCM</b>	: Critical Chain Method
<b>CMMI</b>	: Capability Maturity Model Integration
<b>CPI</b>	: Cost Performance Index
<b>CPM</b>	: Critical Path Method
<b>CV</b>	: Cost Variance
<b>EV</b>	: Earned Value
<b>EVM</b>	: Earned Value Management
<b>EVMS</b>	: Earned Value Management System
<b>IT</b>	: Information Technologies
<b>KPI</b>	: Key Performance Index
<b>OE</b>	: Organizational Enablers
<b>OPM3</b>	: Organizational Project Management Maturity Model
<b>OPMM</b>	: Organizational Project Management Maturity
<b>PMBOK</b>	: Project Management Body of Knowledge
<b>PMI</b>	: Project Management Institute
<b>PMO</b>	: Project Management Office
<b>PM2</b>	: Project Maturity Model
<b>PPM</b>	: Project Portfolio Management
<b>PRINCE</b>	: Projects In Controlled Environments
<b>PV</b>	: Planned Value
<b>PWC</b>	: Pricewaterhouse Coopers

<b>P2MM</b>	: PRINCE2 Maturity Model
<b>P3M3</b>	: The Portfolio, Program, & Project Management Maturity Model
<b>SAM</b>	: Self-Assessment Module
<b>SPI</b>	: Schedule Performance Index
<b>SPSS</b>	: Statistical Package for the Social Sciences
<b>SV</b>	: Schedule Variance
<b>WBS</b>	: Work Breakdown Structure



## 1. INTRODUCTION

In today's world, competitive and chaotic global economy brings about companies' searching for more efficient ways to maintain a successful business and achieve their goals. The field of project management enables companies to create a strategic value chain by delivering projects on time and budget. In order to increase that value chain executives of many global companies set up Project Management Offices, which serve as a bridge between company strategies and results. According to the Economist Intelligence Unit survey, project management methodologies were ranked as a crucial element for a company in order to deliver success for remaining competitive by ninety percent of senior executives in the world (Project Management Institute, 2010).

So as to enhance the quality of project management in an organization it is essential that companies adopt project management techniques as entire organization. This kind of adaptation is named Organizational Project Management, which has different maturity levels showing how an organization adopts project management techniques and models (Vergopia, 2008; Ibbs & Kwak, 2000).

In 2004, Pricewaterhouse Coopers (PWC) conducted a survey in order to evaluate impacts of project management maturity on project performance. According to the result of this survey, PWC found that project performance increases as project management maturity level increases. PWC repeated this survey in 2007 and 2012. As a result, they concluded in similar findings. International institutes like Project Management Institute (PMI), Projects In Controlled Environments (PRINCE) created methodologies in order to measure organizational project management maturity level (Pricewaterhouse Coopers, 2012).

This thesis will focus on Organizational Project Management Maturity Model (OPM3) provided by Project Management Institute (PMI) and researching the impacts of using Organizational Project Management Maturity Model (OPM3) on project budget and time performance indicators in balanced matrix organizations.

### 1.1 The Aim And The Scope of the Study

The aim of this study is analyzing the effects of Project Management Institute's Organizational Project Management Maturity Model (OPM3) in balanced matrix organizations. Doing this thesis research, importance and responsibilities of Project

Management Offices in balanced matrix organizational structures and performance improvements by applying Organizational Project Management Maturity Model in a correct way to this type of organizations will be searched.

Balanced matrix organization type gained popularity in the late 1970's and it is one of the most common organizational structures in today. In this type of organizations, without adopting a specific Project Management maturity model, it is difficult to complete projects with desired success. Because both business units and Project Management Office are responsible for Project Management in balanced matrix organizations, it is crucial that two sides understand and adopt Project Management and track some specific methods (Degen, 2009). Business units are responsible to inform project manager while they plan and provide communication inside them. It is discussed in many of the literature sources that companies which get success achieve sustainable profitability and financial status owing to conditions. As soon as companies raise the level of their Project Management maturity level by adopting methods, they will be able to reach success. Since there is no any comprehensive study in literature, it is evaluated that this study can enlighten balanced matrix organizations in order to show them what values they can add by raising their Project Management maturity level (Hanover Research, 2013; Kuprenas, 2001; Cameron & Quinn, 1999).

Organizational Project Management Maturity Model is an internationally valid model. Due to model's structure, there is some differences according to a nation and a sector. Therefore, this thesis covers not only local organizations in Turkey but also other organizations in the world in perspective of general Project Management.

In scope of this thesis, Project Management performance will be evaluated by time and cost, which are the baselines and main key performance indicators of Project Management along with scope. Other organizational structures and other maturity models except OPM3 will not be detailed and out of scope.

## **1.2 Historical Background**

The history of project management started to be written in 2,500 years BC, when magnificent Egyptian pyramids were constructed. Project management's roots are related to development of scientific management theory. The promoters of that scientific management theory are Frederick W. Taylor, Frank and Lillian Gilbreth, Henri Fayol and Henry Gantt.

“The Principles of Scientific Management” paper was written by Frederick W. Taylor in 1911. In this paper, Taylor defined the scientific management principles. These principles are as the following:

- Using scientific ways of work
- Choosing in a scientific way of workers and improving their skills
- Good employee cooperation
- Division of labor according to their being skilled or unskilled

Frank and Lillian Gilbreth contributed in developing scientific management, especially in the field of industrial psychology. Lillian Gilbreth wrote the most popular book about this area and named it as "The Psychology of Management" in 1912. Another paper about management theory, whose name was “Administration Industrielle et Generale” (Industrial and General Administration), was published in 1916 by Henri Fayol. The father of project management is accepted as Henry Gantt developing planning and control techniques, which is called Gantt chart and implemented in project management tools.

From the general management theory to application of methods and management techniques in the project field, Project Management discipline was shaped during the 50’s and 60's. At the beginning of this period the project management application was limited in the Gantt charts. The Gantt chart is the easiest to understand and use in order for planning and controlling activities. This chart shows the activities within a project in a graphical way, on the time scale.

The application of new methods and techniques for project management was started to be undertaken in 1958. The project was named as Polaris. The purpose of this project was to design and make nuclear ballistic missile named "Polaris". Due to its importance, a new technique was designed and used which led to create PERT (Program Evaluation and Review Technique). PERT method is used when the level of risk and uncertainty is high. Probabilistic estimations are made for the activities. Three estimation methods are used in PERT in order to estimate duration of activities. These methods are optimistic, pessimistic and the most likely. Around the same time, another method named Critical Path Method was introduced for the first time. In this method, the duration of the project is set according to the duration of the activities which have no reserve time.

In 1969, Project Management Institute was founded in United States. This was the first organization which offered to develop project management. Apart from that the technological development supported the evaluation of project management. During the 70s to 90s, first specific software for project management was launched and the softwares became cheaper and more available in the following years. Artemis (1977), Oracle (1977), and Scythian Corporation (1979) etc. were the first examples of project management tools. In 1998, an article named "Project Management Journal" was published and it introduced the most used software for project management. The Top 10 softwares are listed as the following:

1. Microsoft Project
2. Primavera Project Planner
3. Microsoft Excel
4. Project Workbench
5. Time Line
6. Primavera Sure Trak
7. CA-Super Project
8. Project Scheduler
9. Artemis Prestige
10. FasTracs

After 1995, the Internet has become more common. As a result of that, project management softwares began to provide people connect and work together on internet platform by staying online and connected on the same network. Nowadays, it is easy to find a suitable project management software, since they are cheaper than before and easier to reach.

In the late 90's, Project Management Institute has created a set of standards and practical guidance about project management field. Project Management Institute documented these standards and guidance with a book named PMBOK (Project Management Body of Knowledge), the book defined fundamentals of project management for several fields, like engineering, construction, Information Technologies



(Drob & Macarie, 2007). After the 1990s, project management field has become independent. When companies have become aware of the benefits of project management, implementation of project management application has increased and projects have developed. In 2006, there were over 200,000 people who have obtained Project Management Professional (PMP) certification given by Project Management Institute (PMI). This exam is based on a question set asked from the book PMBOK standards. The PMP certificate, which provides credibility, is given by the Project Management Institute.

By the 1990s, companies had begun to comprehend that project management implementation in an organization was necessary. Table 1.1 shows the phases of life-cycle of an organization goes through when implementing project management. The first phase is the Embryonic Phase, which the organization becomes aware of the need for project management. Then they inform the executives that there is a need for project management activities (Kerzner, 2009).

There are some forces making executives aware of the need for project management:

- Capital projects
- Customer demands
- Competitiveness
- Executive understanding
- New project development
- Efficiency and effectiveness

When an organization understands that it needs project management, it enters the second life-cycle phase named as Acceptance Phase. There is no any chance to implement project management without executive support. In addition, executive manager should support it visibly.

The third life-cycle phase is Line Management Acceptance. Acceptance of project management goes down from executive to line in an organization, therefore, the support of executives is essential in order for line managers accept and adopt project management

The fourth life-cycle phase is the Growth Phase. This phase is a development phase for the organization where the organization commits itself to project management. In this

phase, project management methodologies are determined and an appropriate software is selected. Some of the improvements in this phase can be started in the earlier phases

The fifth life-cycle phase is Maturity. In Maturity phase, the organization begins to use methodology and tools which are developed in the previous phase. In this phase, the organization is fully committed to project management. The organization can develop itself via trainings and educations supporting the methodologies and tools developed (Kerzner, 2001).

Table 1.1 Life Cycle Phases For Project Management Maturity

<b>Embryonic</b>	<b>Executive Management Acceptance</b>	<b>Line Management Acceptance</b>	<b>Growth</b>	<b>Maturity</b>
Recognize need	Get visible executive support	Get line management support	Recognize use of life-cycle phases	Develop a management cost/schedule control system
Recognize benefits	Achieve executive understanding of project management	Achieve line management commitment	Develop a project management methodology	Integrate cost and schedule control
Recognize applications	Establish project sponsorship at executive levels	Provide line management education	Make the commitment to planning	Develop an educational program to enhance project management skills
Recognize what must be done	Become willing to change way of doing business	Become willing to release employees for project management training	Minimize creeping scope Select a project tracking system	

Source: Project Management, A Systems Approach to Planning, Scheduling, and Controlling, 2009, p.47

Project Management Institute (PMI) Standards Committee, which was led by Bill Duncan, discussed that they need to develop some project management development methods in 1998. In order to realize this idea, a project was started to develop an international standard in order to enhance organizations' ability to complete their projects

within desired performance metrics for accomplishing the strategies and improve organizational effectiveness. This standard was developed as a project management maturity model which aims to improve project, program, and portfolio management best practices and explain the necessary abilities to use these practices. This model was named as Organizational Project Management Maturity Model (OPM3) (Friedrich, Schlichter & Haeck, 2003).

In the beginning of 1999, other maturity models were reviewed and what maturity means for organizations was discussed. As a result of those discussions Delphi rounds were held within Project Management Institute (PMI) and Organizational Project Management Maturity Model (OPM3). Delphi process ended up with identification of individual elements contributing to an organization's project management maturity. The elements were named as "Best Practices" and were divided into ten categories as the following (Friedrich, Schlichter & Haeck, 2003):

1. Standardization and Integration of Processes
2. Performance Metrics
3. Commitment to the Project Management Process
4. Alignment and Prioritization of Projects
5. Continuous Improvement
6. Using Success Criteria to Cull or Continue Projects
7. People and Competence
8. Allocation of Resources to Projects
9. Organizational Fit
10. Teamwork

The second important improvement on Organizational Project Management Maturity Model (OPM3) was developing the processes to execute strategies. In order to ensure alignment to Project Management Institute (PMI)'s A Guide To The Project Management Body of Knowledge (PMBOK) standard, the first edition of OPM3 was published in December 2003. After releasing OPM3 many organizations expressed their interest on adopting the model to develop their project Management processes.

The second edition of OPM3 was published in 2008 to enrich the standard based on experience and make them compatible with PMI standards. After the Second Edition, the Third Edition in 2013 was published. PMI standards, along with OPM3, are also the standards of American National Standards Institute (ANSI). Since it was published by Project Management Institute, which is the most popular institute in project management, these standards are acceptable (Friedrich, Schlichter & Haeck, 2003; Khoshgoftar & Osman, 2008).



## 2. LITERATURE REVIEW

In the Literature Review section, the sub topics, developing the main topic of the thesis is explained. These sub topics should be known to comprehend the main goal of the thesis. Various sources were researched and used for making literature review.

### 2.1 Definition of Project and Project Management

According to Project Management Institute (2018), “A project is a temporary endeavor undertaken to create a unique product, service, or result” (p.2). A project includes activities to be achieved within determined project baselines, which are scope, time, and budget.

A project has the following characteristics in general:

- Consists of predetermined start and finish dates
- Has a goal or set of goals
- Has its own budget
- Has resources
- Creates unique outputs

Success in project management can be obtained by achieving objectives under the circumstances given below:

- Within time
- Within budget
- At desired performance
- An effective and efficient way to utilize the resources
- Customer acceptance

The potential benefits of project management are as the following:

- Defining functional responsibilities
- Minimization of continuous reporting
- Identification of scheduling time limits
- Identification of a trade-off analysis
- Measurement of accomplishment against plans

- Detecting problems earlier than it occurs
- Future planning estimation enhancement
- Knowing if objectives can be met or not

There are some obstacles to reach objectives as the following:

- Complexity of projects
- Private demands of customers
- Organizational structuring
- Project risks
- Technological changes
- Forward planning and budget limitations (Kerzner, 2009)

Project management also needs knowledge, skill, tools and methodologies to conduct a project successfully. Project management predates the construction of the pyramids (Grant and Kelly, 2009; Burhan, 2009). Project management aims creating an appropriate environment in an organization in order to set reachable goals and accomplish the objectives. Management functions can be classified under planning, organizing, staffing, leading, controlling and coordination and communication. It carries operational works to strategic disciplines (Reddy, 2015; Cooke-Davies, Crawford & Lechler, 2009).

Projects include processes and each process is defined by a process group. Process groups are related to each other and some process groups can execute in parallel as shown in the Figure 2.1. There are five process groups and 49 processes. (Project Management Institute, 2018) In the Table 2.1, these process groups and processes are given.

According to PMI (2018), The Project management process groups are distributed like in the Figure 2.1. Project management provides integration between activities by initiating, planning, executing, monitoring and controlling, closing project processes.

**Initiating Process:** Process for initiating a new project or a new phase for an existent project by authorized to start (CGIAR Internal Audit Unit, 2017; Kerzner, 2009).

- Selecting the most appropriate project
- Identifying the benefits of the project
- Preparing the initiation documents
- Assigning the project manager

Table 2.1 Project Management Process Group and Knowledge Area Mapping

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.556

Planning Process: Process for establishing scope and define activities (CGIAR Internal Audit Unit, 2017; Kerzner, 2009).

- Defining requirements
- Defining resources
- Scheduling activities
- Detecting and evaluating risks

Executing Process: Process for conducting the tasks defined in the planning process to meet project specifications (CGIAR Internal Audit Unit, 2017; Kerzner, 2009).

- Negotiating for team members with resource managers
- Managing the work

- Working with the team members

Monitor and Controlling Process: Process for monitoring and controlling the progress and taking actions upon any need change request comes (CGIAR Internal Audit Unit, 2017; Kerzner, 2009).

- Tracking project progress
- Comparing actual and planned outcome
- Analyzing variances and their impacts

Closing Process: Process for finalizing all activities and making the formal closure of the project or the phase (CGIAR Internal Audit Unit, 2017; Kerzner, 2009).

- Verifying accomplished works
- Closure of the contracts
- Financial closure
- Administrative closure

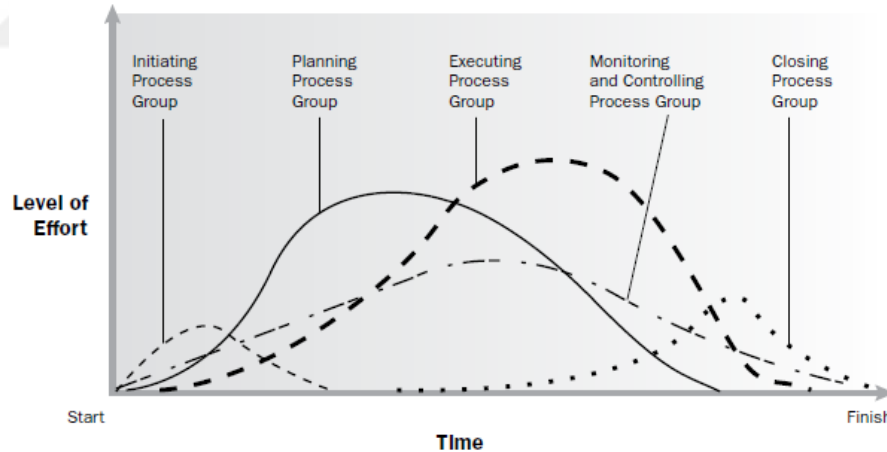


Figure 2.1 Project Management Process Groups

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.555

Process groups are related to each other with inputs and outputs and in order to implement processes tools and techniques are needed. The processes are iterative and sometimes phases can be repeated. In the Figure 2. 1 project management process groups and the flow between them are given. Maturity in Project management means performing each process groups, establishing Project management and performance measurement standards (The Michigan Department of Technology, Management, and Budget, 2014).



## 2.2 Project Management Knowledge Areas

Knowledge areas are presented by Project Management Institute, showing the skills of a project manager should have. Knowing them, a project manager can manage projects more effectively. There are ten knowledge areas and each knowledge area has processes (PMBOK, 2018; Westland, 2018):

- Project Integration Management
- Project Scope Management
- Project Schedule Management
- Project Cost Management
- Project Quality Management
- Project Resource Management
- Project Communications Management
- Project Risk Management
- Project Procurement Management
- Project Stakeholder Management

### 2.2.1 Project Integration Management

Project Integration Process area contains tasks gathering all elements of a project together and integrate them. Project Integration Management overview is shown in Figure 2.2. The processes under Project Integration Area are as the following (PMBOK, 2018; Hartney, 2016):

- **Develop Project Charter:** A project charter, which initiates the project and give authorization the project manager, is developed.
- **Develop Project Management Plan:** Project management plan is developed after planning phase. It includes all sub management plans and approved by stakeholders and sponsor.
- **Direct and Manage Project Work:** This is the process of managing and leading project works and obtain project's deliverables.

- **Manage Project Knowledge:** This process is used to use existing and learned project knowledge and create new knowledge obtained from directing and managing the project.
- **Monitor and Control Project Work:** In this process project performance is monitored and tracked, earned value analysis are performed.
- **Perform Integrated Change Control:** In this process change request and change control is performed. Steering Committee and sponsor approvals are needed to apply changes.
- **Close Project or Phase:** This process includes tasks which are necessary in order to close the project or phases.

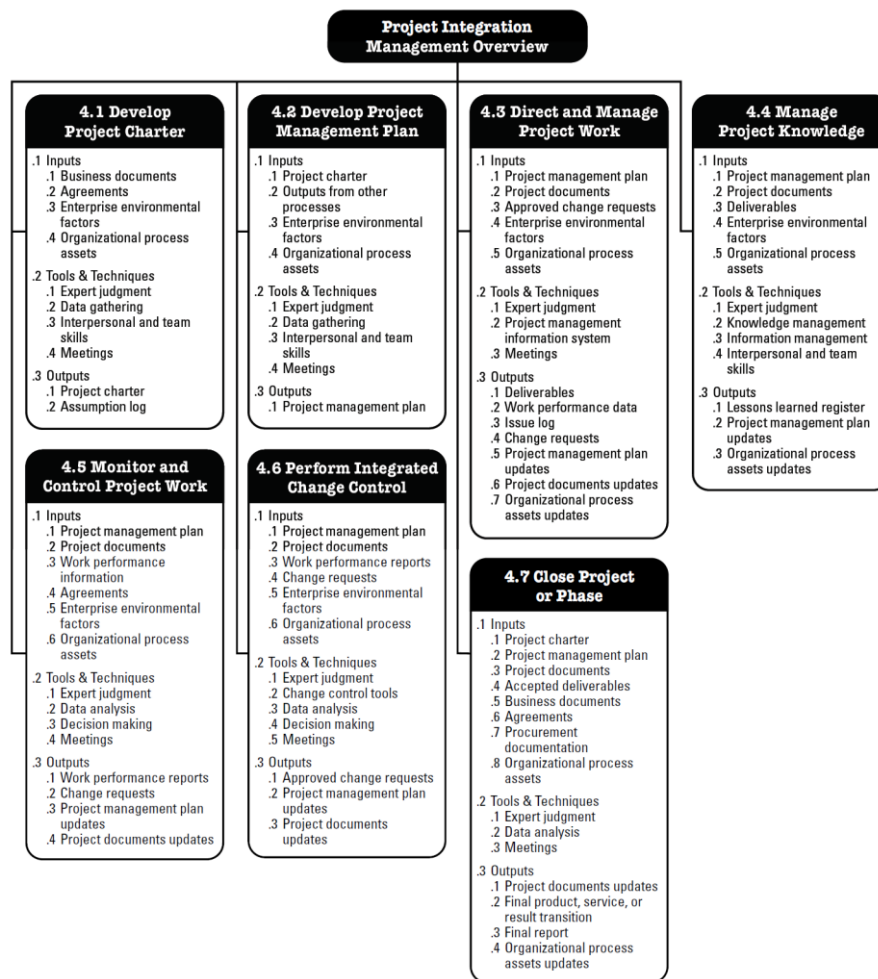


Figure 2.2 Project Integration Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.71

### 2.2.2 Project Scope Management

This knowledge area contains all processes needed to be sure that project includes required works in order to complete the project successfully. Project Scope Management overview is illustrated in Figure 2.3. The processes under Project Scope Area are as the following (PMBOK, 2018; Hartney, 2016):

- **Plan Scope Management:** The Scope Management Plan is a sub plan of project management plans to be used for documenting how scope will be defined, approved and controlled.
- **Collect Requirements:** At this stage project requirement are collected and documented.
- **Define Scope:** A scope statement is created to describe project's or product's scope.
- **Create WBS:** A Work Breakdown Structure (WBS) is created in this process. WBS is used for dividing project deliverables into small pieces.
- **Validate Scope:** In this process project deliverables are validated according to specifications.
- **Control Scope:** According to specifications product or project scope are controlled if it is aligned with the scope baseline.

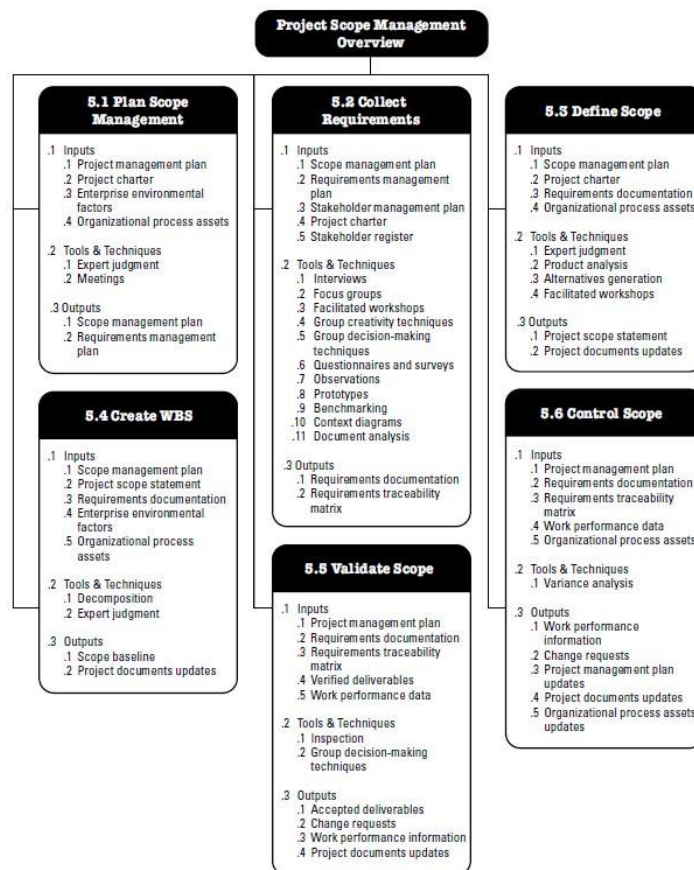


Figure 2.3 Project Scope Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.130

### 2.2.3 Project Schedule Management

Project Schedule Management is one of the most important parts of knowledge areas. Schedule and time management is significant for attaining successful projects. Project Schedule Management overview is shown in Figure 2.4. The processes under Project Schedule Area are as the following (PMBOK, 2018; Westland, 2018):

- **Plan Schedule Management:** This plan is one of the sub project management plans and it contains information about schedule's creation and responsible.
- **Define Activities:** The activities required to complete the projects are defined clearly.
- **Sequence Activities:** The dependencies and sequence of activities are determined in this process. There are different relationships between tasks such as Finish-to-Start (FS), Finish-to-Finish (FF), Start-to-Start (SS) and Start-to-Finish (SF).
- **Estimate Activity Durations:** In this process, durations of activities are forecasted.

- **Develop Schedule:** Determined duration estimation and resources are developed as a schedule. Using some methods like Critical Path Method (CPM) and Critical Chain Method (CCM), schedule can be developed.
- **Control Schedule:** Earned value analysis is performed so as to check project's time compliance.

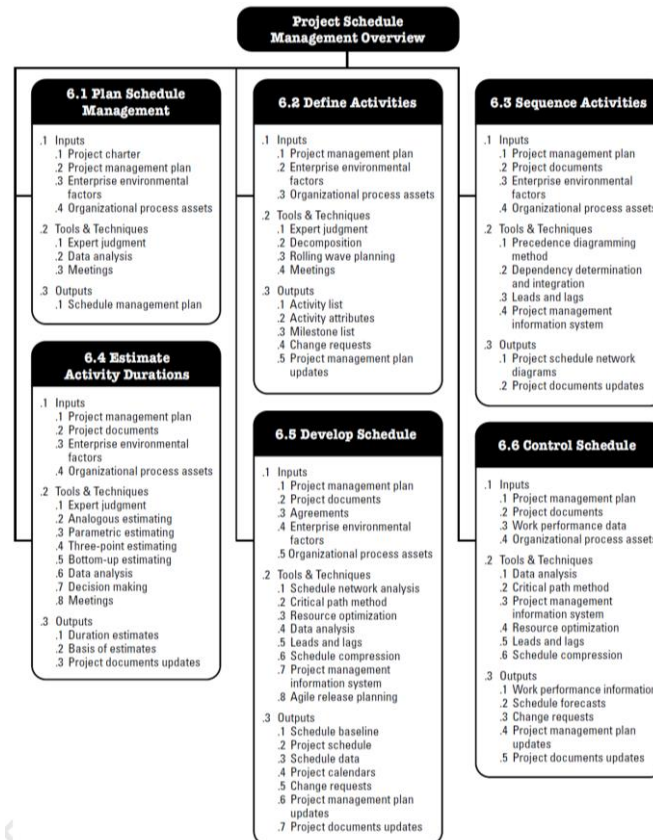


Figure 2.4 Project Schedule Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.174

## 2.2.4 Project Cost Management

Including the processes involved estimation, budget determining, cost control, therefore the project plan can be completed within the approved budget. Project Cost Management overview is shown in Figure 2.5. The processes under Project Cost Area are as the following (PMBOK, 2018; Jainendrakumar, 2015):

- **Plan Cost Management:** The Cost Management Plan establishes methodologies to determine budget, and control.
- **Estimate Costs:** Costs of all activities are estimated.
- **Determine Budget:** Budget is made in account of estimated costs.
- **Control Costs:** Earned value management is conducted to control costs.

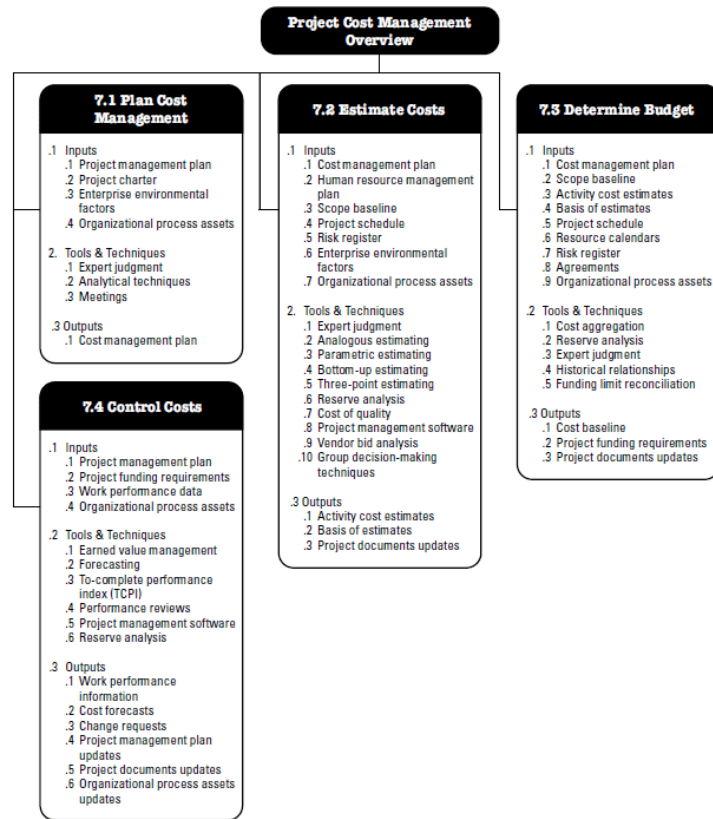


Figure 2.5 Project Cost Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.232

### 2.2.5 Project Quality Management

Quality management is so crucial for organizations to prepare procedures and policies for planning, managing and controlling project and output to check if they meet customer expectations or not. Project Quality Management overview is illustrated in Figure 2.6. The processes under Project Quality Area are as the following (Gresoi et al, 2013; PMBOK, 2018; Westland, 2018):

- **Plan Quality Management:** Quality Management Plan is a sub plan of project management plan and it includes quality specifications for the product or service. Quality management plan describes the way of implementing quality policy.
- **Manage Quality:** In this process quality assurance measurements are made.
- **Control Quality:** This process contains operational activities' techniques to monitor overall performance by tools such as checklists, control charts, Pareto charts, flow charts, etc.

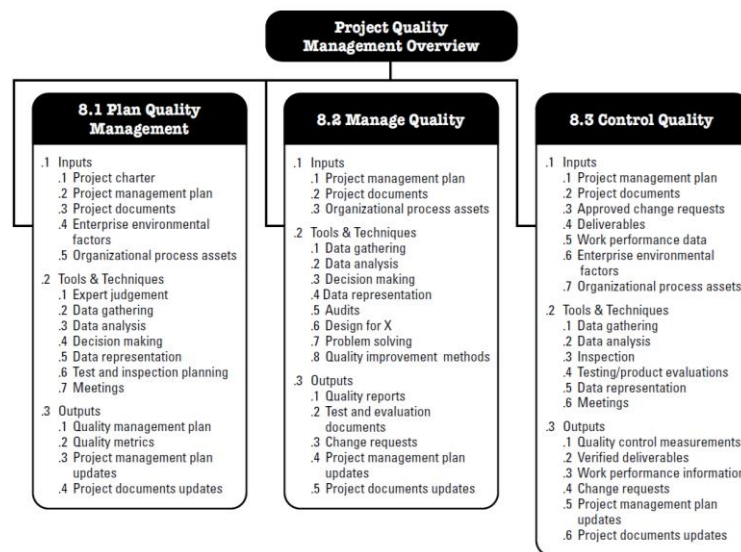


Figure 2.6 Project Quality Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.272

## 2.2.6 Project Resource Management

Project resource management is the most important knowledge area of all. Projects are made and implemented by project team members and it is always crucial to make sure team member's satisfaction. A good project team leads to successful projects. Project Resource Management overview is illustrated in Figure 2.7. The processes under Project Resource Area are as the following (Dinsmore & Cabanis-Brew, 2011; PMBOK, 2018):

- **Plan Resource Management:** Human Resource Management Plan is a sub plan of project management plan defining the roles and positions of project team member and their management.
- **Estimate Activity Resources:** In this process project manager ensure the resource availability is enough and how much effort needed.
- **Acquire Resources:** Acquiring resources upon estimating number of needed resources.
- **Develop Team:** This process includes both developing and training individual abilities and increasing the ability of people in order for them to work together as a group.
- **Manage Team:** Members of the team are managed effectively to provide efficient and fruitful working environment.
- **Control Resources:** Members of the team are controlled.

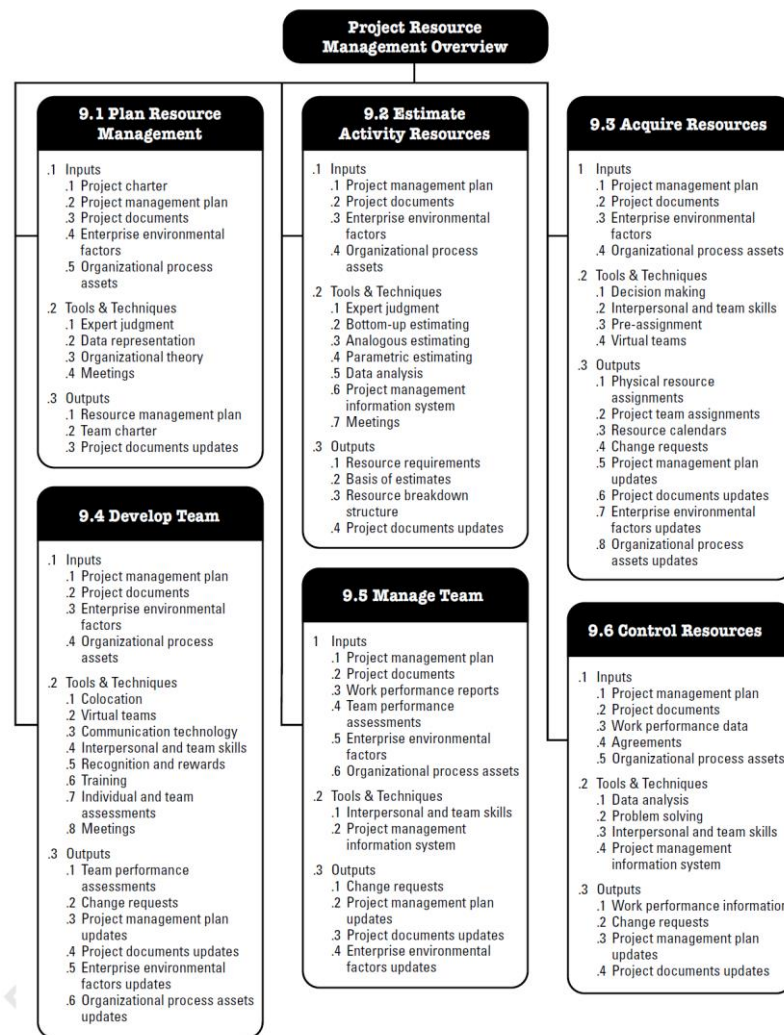


Figure 2.7 Project Resource Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.308

### 2.2.7 Project Communications Management

Communication with stakeholders is the key factor to satisfy stakeholders and provide correct and updated information flow. Project Communications Management overview is illustrated in Figure 2.8. The processes under Project Communications Area are as the following (Sonta-Draczkowska, 2015; PMBOK, 2018):

- **Plan Communications Management:** Communications Management Plan is a sub plan of project management plan. It defines regular communication ways and period for project team and stakeholders.
- **Manage Communications:** During project written or verbal communication ways can be used. The key meetings are Steering Committee Meeting, Project Status Meeting, and Project Meeting. Defining meeting objectives before,



identifying correct participants, developing agenda and setting correct time and location leads to efficient meetings. During meeting actions and outputs should be recorded and then should be shared.

- **Monitor Communications:** In this process, information is controlled if it is met according to stakeholders' requirement and information status is tracked.

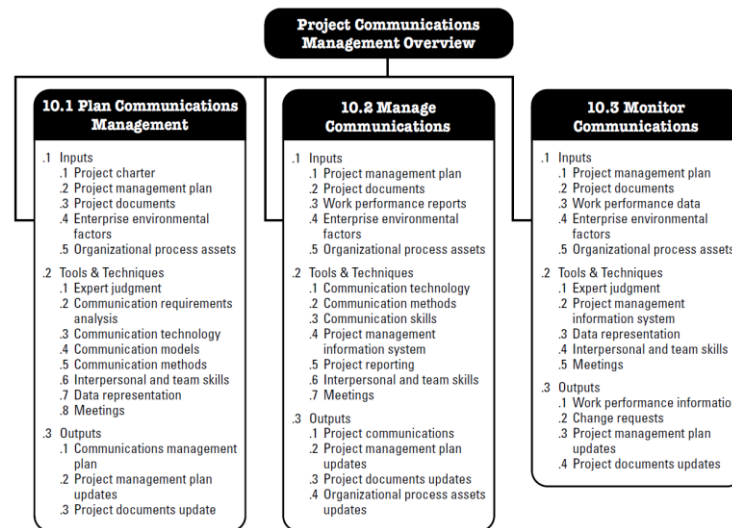


Figure 2.8 Project Communications Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.360

## 2.2.8 Project Risk Management

Project Risk Management's aim is to comprehend projects' risk level and minimize possible risks to bring about negative events. Project risk management is a continuous process beginning from planning phase to project end. Project Risk Management overview is illustrated in Figure 2.9. The processes under Project Risk Area are as the following (KPMG, 2014; PMBOK, 2018):

- **Plan Risk Management:** It is a sub plan of project management plan. It defines risks categorization, identification, and mitigation.
- **Identify Risks:** Major risks are identified and a risk register list is created. Risk register list should include risk type, probability, impact, risk level, responses, and action owner.
- **Perform Qualitative Risk Analysis:** Upon risks are identified, the risks are classified into categories. The project team assigns priority level such as low, medium, and high level.

- **Perform Quantitative Risk Analysis:** When risks are assigned to priority level, the highest value is chosen according to its impact.
- **Plan Risk Responses:** In this process, the responses for risk are determined so that project team get ready for possible events.
- **Implement Risk Responses:** The risk responses identified in plan risk responses process are carried out.
- **Monitor Risks:** Risks are monitored at regular times during project and their status are updated according to taken actions.

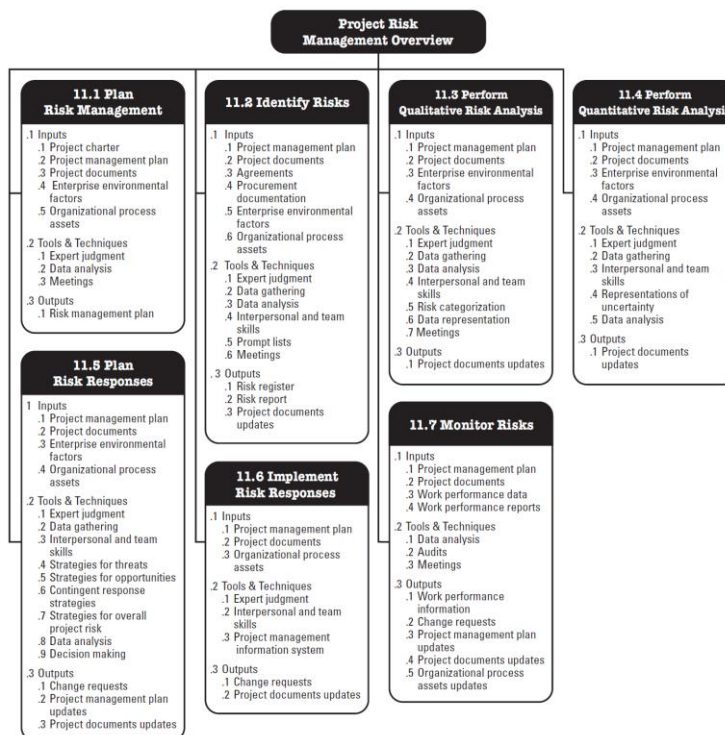


Figure 2.9 Project Risk Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.396

## 2.2.9 Project Procurement Management

Procurement management includes obtaining goods, services, or employee from outside in order to fulfill project's needs. Project Procurement Management overview is illustrated in Figure 2.10. The processes under Project Procurement Area are as the following (Jainendrakumar, 2015; PMBOK, 2018):

- **Plan Procurement Management:** This is process is one of the sub-plans of project management plan. It defines the needs of project and how to acquire them from outside. Make or buy analysis is made.
- **Conduct Procurements:** The vendors are identified and the most appropriate one is hired. The type of contract is set.
- **Control Procurements:** This process is gone parallel with execution. The vendors are controlled and managed.

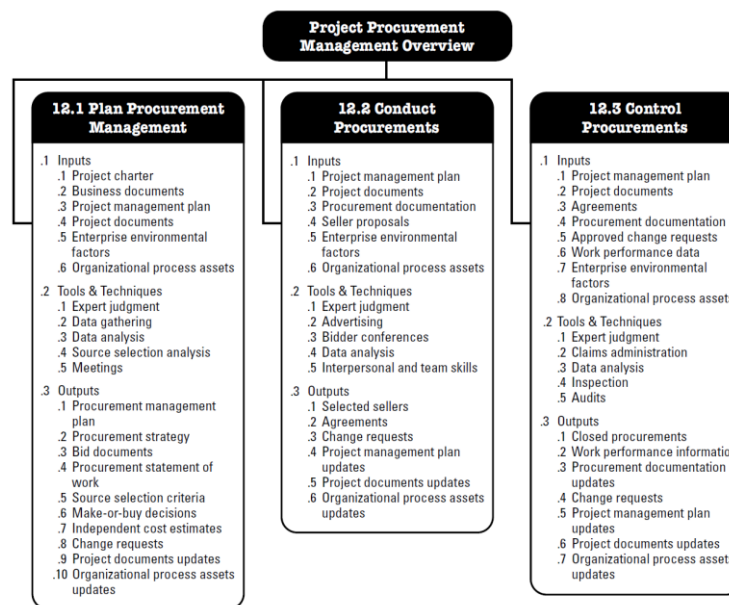


Figure 2.10 Project Procurement Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.460

### 2.2.10 Project Stakeholder Management

One of the most important part of project management is Stakeholder Management. This means choosing the right people, groups according to their impact or to be impacted level. Project Stakeholder Management overview is illustrated in Figure 2.11. The processes under Project Stakeholder Area are as the following (Jainendrakumar, 2015; PMBOK, 2018):

- **Identify Stakeholders:** In this process people impacted by project are identified and listed. In order to do this, some techniques like stakeholder analysis, expert judgment, and meeting are conducted.
- **Plan Stakeholder Engagement:** The Stakeholder Management Plan is one of the sub-plans of project management plan. In this process engagements strategies with stakeholders are identified.

- **Manage Stakeholder Engagement:** In this process project manager communicates and work with stakeholders.
- **Monitor Stakeholder Engagement:** The relationship between all stakeholders is controlled. Therefore, the efficiency and effectiveness are increased.

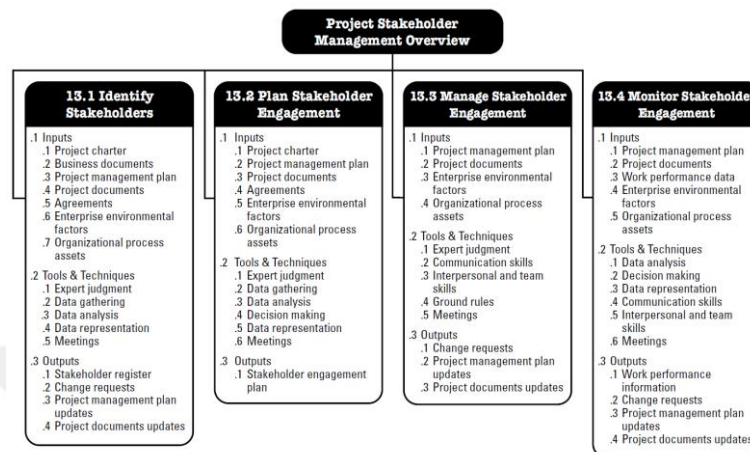


Figure 2.11 Project Stakeholder Management Overview

Source: A Guide to the Project Management Body of Knowledge Sixth Edition, 2018, p.504

## 2.3 Definition of Program and Program Management

Project Management Institute (2018) defines program as “A group of related Projects, subprograms, and program activities that are managed in a coordinated way to obtain benefits not available from managing them individually” (p.11). Programs are grouped under portfolios and composed of projects, programs, and other works. Programs provide executing organizations’ strategies and achieving business or organizational goals (Milosevic, Martinelli & Waddell, 2007, p.8).

Program management is identifying and planning of benefits, identification and controlling the relations between projects. It is strategic in nature. It provides two important attributes. The first attribute is that program management means sub Project management and the second attribute is that post deployment management can be done. Program management is cross project and multi-disciplined. Programs produce several products and services and it ends with the user ownership. Maturity in Program management covers project management of a set of multiple projects. Standardizing program managing depends on standardizing Project management processes (Dragan et al., 2007).

## 2.4 Definition of Portfolio and Portfolio Management

According to Project Management Institute (2018) “A portfolio is a set of programs, projects and operations to achieve strategic goals” (p.11). In the Figure 2.12 the relation between portfolio, program, and project is given. Organizations can have various portfolios to address different goals and strategies. Portfolio Management provides guidance for organizational investment decisions, prioritizing value adding projects. It also balances conflicting demands between projects and programs.

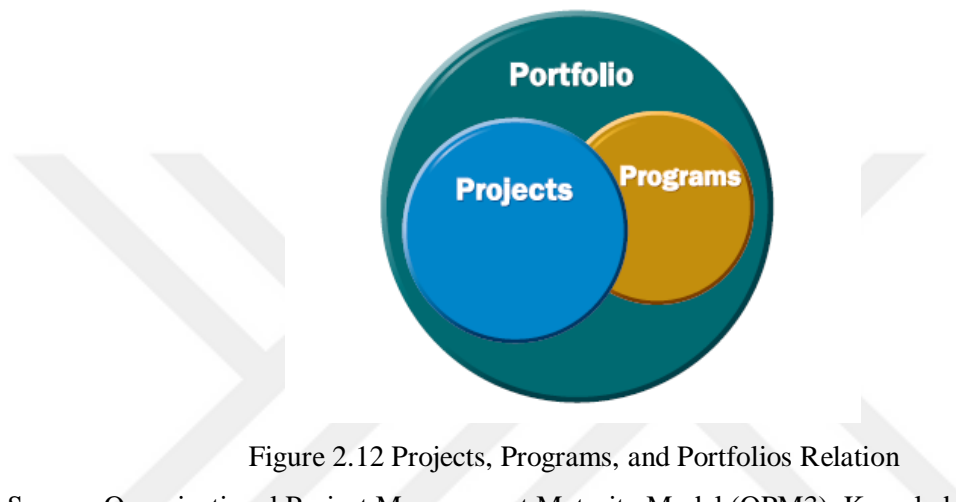


Figure 2.12 Projects, Programs, and Portfolios Relation

Source: Organizational Project Management Maturity Model (OPM3), Knowledge Foundation. Third Edition, p.4

Organizations focus on completing projects in time, budget and desired quality. As a result, every now and then strategies can be forgotten. However, the important point is giving importance on organization’s goals and strategies and making changes on projects if needed. This can be only valid if strategies are defined clearly and making projects and strategies compatible. The most appropriate method is project portfolio management in order to achieve that (Rad & Levin, 2006).

Project portfolio management is focused on project selection. Strategic positioning impacts strategic formulation and its application directly (Meskendahl, 2010). Portfolio managers can encounter with many problems during project selection, monitor and controlling processes.

In general, the main problems are as the following (Kendall & Rollins, 2003):

- Active project surplus
- Not value-added projects

- Not strategically compliance projects
- Unstable portfolio

According to Wysocki (2011), lifecycle the following strategies shown in the Figure 2.13. should be followed in order to solve these problems:

- Establish: Strategies should be defined.
- Evaluate: The compliance of projects with portfolio should be evaluated.
- Prioritize: Projects should be prioritized:
- Select: Value added projects should be chosen to establish a stable portfolio
- Manage: Chosen projects are managed, tracked and measured.

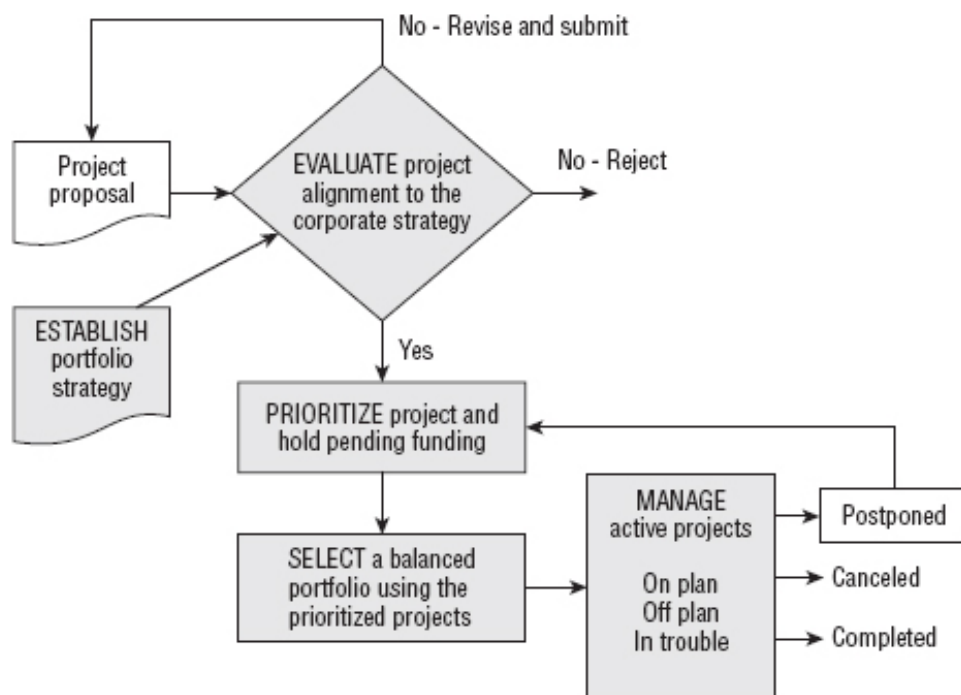


Figure 2.13 Project Portfolio Life Cycle

Source: Effective Project Management, Fifth Edition, 2009, p.537

Small organizations are generally limit themselves to a single portfolio, whereas large organizations track multiple portfolios divided according to divisions and business units in the organization. Executing organizational processes with success has a great impact on program management process. Maturity in Portfolio management covers standardizing program and project management processes (Andersen & Jessen, 2003).

## 2.5 Project Management Office (PMO)

The industry has been changing by time. While it alters in time, much more challenges have been occurred. This situation drives organizations to challenge themselves for improvement in order for them to survive and compete with rivals. There are various contexts for organizations to change and develop. The most important means of developing and surviving in a competitive environment is establishing a Project Management Office (PMO) entity. Since 1990s, Project Management Office term has become so crucial and common in project management that many organizations are eager to establish in to improve and sustain (Aubry et al 2010).

Dai and Wells (2004) noted that in spite organizations' adopting project management process in organizations, many projects fail on account of poor project performance. The main way to solve this problem is establishing a project management office. The Project Management Office can be defined as an organizational unit in order to support project managers, project teams and functional management in the organization to implement project management concepts, tools, and techniques (Dai & Wells, 2004).

According to PMI PMBOK Guide (2013), "PMO is a management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques." PMO can refer to (Portfolio, Program, or Project) management office and can be defined as "an organizational body assigned with various responsibilities related to the centralized and coordinated management of those projects under its domain." (PMI OPM3 Knowledge Foundation, 2013). The responsibilities of PMO are supporting functional teams as well as managing projects directly. (PMBOK, 2013).

In order to stay consistent and aligned between the projects and programs, a Project Management Office can take a delegated role (PMI OPM3, 2013). Based on PMBOK Guide 2013, a PMO's primary function is to support project managers in various ways. The examples of that supports are developing project management documents such as project policies, procedures, and templates, coaching, training. Managing resource pool and balance them to be used in all projects (PMBOK Guide, 2013).

According to surveys, made to different organizations about the benefits of Project Management Offices, the value of having a Project Management Office are as listed below (Gorshkova, 2011):

- 42% of the attendants responded that existence of PMO is questioned in their organizations (Hobbs et al, 2007).
- 60% of attendants responded that the value adding of PMO is argued by the senior management, project/program managers, or customers (ESI International, 2011).

There are different types of PMO shown in Table 2.2. Duties and roles in the organization differ from each other and each type of PMO serve the needs of organization.

Table 2.2 Types Of PMO Structures

PMO Type	PMO Role	PMO Deliverables	PMO Service	PMO Degree of Control
<b>Supportive</b>	Consultative	<ul style="list-style-type: none"> <li>• Templates</li> <li>• Best practices</li> <li>• Training</li> <li>• Access to information</li> <li>• Lessons learned from other projects</li> </ul>	Project repository	Low
<b>Controlling</b>	Controlling	<ul style="list-style-type: none"> <li>• Provide support</li> <li>• Require compliance (PM frameworks or methodologies)</li> <li>• Using specific templates such as forms and tools, or conformance to governance</li> </ul>	Project Controls	Moderate
<b>Directive</b>	Directing	<ul style="list-style-type: none"> <li>• Directions of projects</li> </ul>	Directing project controls	High

## 2.6 Organizational Structures

Organizations have many different forms to drive and achieve their strategic goals. In order to realize that organizations choose the best structure fitting their culture and environmental factors. Different type of organization offers different way of performing the activities. There are basis structure forms like functional, matrix, and projectized organizational structures. Matrix organizations are divided into three sub forms (Nahod & Radujkovic, 2007).

Each form has its own characteristics and the main elements to design an organization are centralization, differentiation, integration, specialization, formalization (Fassoula, 2004).



In project management perspective, different types of organizations are specified as the following;

- **Functional Organization:** Functional manager has full authority, whereas Project manager's authority is little or none. Motivation of the people who work in the project is low because the project is not paying appropriate attention.
- **Weak Matrix Organization:** Functional manager has almost full authority, whereas Project manager's authority is low.
- **Balanced Matrix Organization:** Budget using and decision-making works are shared between the functional manager and the project manager.
- **Strong Matrix Organization:** Project manager is assigned by PMO and resources are controlled by Project manager. Project manager has more authority than the functional manager.
- **Projectized Organization:** Project manager has full authority, whereas functional manager has very limited authority.

Balanced matrix organizations are the most common type among organizational structures. In scope of this thesis balanced matrix organizations are analyzed. (Bobera, 2008; Project Management Institute, 2018).

## **2.7 Defining The Project Manager's Role**

A project manager coordinates activities between different functional teams. Also, a project manager is an integrator of the following activities (Kerzner, 2009; Cabanis-Brewin et al., 2008):

- Determines project goals and priorities with Steering Committee
- Developing a project plan
- Executing the plan
- Making changes on project plan
- Responsible for one or more projects
- Analyzing risks and making contingency plans for mitigating action

Project managers have a great deal of responsibilities however they have little authority.

Because of the fact that they have not enough authority, they have to negotiate on resources with unit managers. A project manager works as a bridge and provide communication between the following entities:

- Among the project team
- Between the project team and the functional business units
- Between the project team and senior management level
- Between the project team and the customer or supplier

In order to become a successful project manager, management skills and technical skills should be obtained. Becoming a manager requires deep learning on soft skills such as human psychology, interpersonal relations, and communication. A project manager needs to be strongly communicative and have developed interpersonal skills. He or she should be familiar with operational processes of each line of company and have enough technical knowledge. According to PMI, talents and main responsibilities of a project manager is shown in In the Figure 2.14.



Figure 2.14 PMI Talent Triangle

Source: The PMI Talent Triangle, 2015, p.1

As a career path project manager can be awarded based on their level as “Senior Project Manager” in years. A project manager can be thought as a general manager and he or she is expected to have knowledge about overall operation and processes of the organization. Project Management field is appropriate for general manager candidates who is willing and able to be get on top management positions. This is the reason why project management discipline is seen as training for future top managers. (Kerzner, 2009; Cabanis-Brewin, 2008).

## **2.8 Defining The Functional Manager's Role**

In an matrix based organizations functional managers and project managers are not the same person. There are three main responsibilities of functional managers as the following:

- Defining how task will be done
- Provide resources to accomplish the objective of projects
- Responsible for the deliverables

The project manager has the right for requesting staff for projects, however the final decisions are made with the unit managers. Functional managers have as the following problems about staff reconciliation:

- Unlimited staff and work requests
- Predetermined deadlines
- High priority requests
- Limited number of resources
- Alters in the project plan
- Personnel turnover

Functional managers should not give commitment on specific staff's availability for projects. They should give commitment on achieving project goals such as project schedule, project budget, and project performance. On condition that the project manager is not satisfied with the staff given, the project manager can demand another staff from functional managers. In particular in matrix organizations project management is based on sharing authority and responsibility between project managers and functional manager (Kerzner, 2009).

## **2.9 Defining The Functional Employee's Role**

When the functional managers give commitment on deliverables for projects, the assigned resources becomes responsible to achieve them. In many organizations the assigned employees work for different projects simultaneously. This situation can be hard to report to their functional manager one by one. In particular, projects require technical knowledge, such as R&D project are harder to track and report. The functional employees are assigned to accomplish the following activities during working on projects (Kerzner, 2009):

- Taking responsibility for completing assigned deliverables according project's constraints
- Completing the tasks within schedule
- Informing both project manager and functional manager about project's status and updates
- Bringing problems to discuss
- Sharing information among project team

### **2.10 Defining The Executive's Role**

Project management environment brings about new roles for every position in an organization. Like other positions, executives are also responsible for new duties and expectations as the following:

- Ensuring the project goals are aligned with the organization's goals
- Developing criteria for project selection in organization
- Conflict resolution among project steering committee members
- Prioritizing of projects
- Project sponsorship

Executives are needed at project initiation and planning processes. On the other hand, executives can solve conflicts occurred during execution process of projects (Ireland, 2006; Kerzner, 2009)

### **2.11 Project Management Performance Measurement Methods**

In the beginning of years of project management, project managers had difficulty in determining project status and measuring project performance. The important point was that whether project managers monitor costs or manage costs. This need led to birth of Earned Value Management (EVM), which is a methodology and a set of calculations to measure quantitative project performance indices.

Time and cost are the measurable aspects of projects and they describe the success of projects. In order to calculate time and cost performance, planned and actual values are needed and there are two types of performance measurement indices, which are variance and performance index (Hazır, Eryılmaz & Hafizoğlu, 2014).

Cost and schedule control are illustrated with better project management performance. Cost and schedule performance indices generally indicate project performance; however it is needed to be operationally defined to be more adopted in practice (Chang, 2001). Effective cost and schedule control system requirements include the following (Kerzner, 2009):

- Overall display of project status
- Identifying problems earlier
- Overall planning of the work
- Good time, budget and resource estimation
- Clear scope with an apparent task
- Re-estimation of time and budget in order to complete remaining work
- Comparing actual progress and planned cost and budget

The EVMS prevents earlier warning mechanism to identify problems. It measures the current situation of projects by looking variances of time and cost indexes. Doing so, this system provides a project manager important information so that she or he can take precautions and take necessary corrective actions. EVMS is used from the beginning of the project to final.

### **2.11.1 Variance**

Time performance is associated with schedule in project management and time performance is named as Schedule Variance (SV), whereas cost performance is named as Cost Variance (CV).

#### **2.11.1.1 Schedule Variance**

Schedule Variance (SV) shows time performance of a project expressed as the difference between earned value and planned value. SV is formulated like in the Equation 2.1.

Equation 2.1

$$\text{Schedule Variance} = \text{Earned Value} - \text{Planned Value}$$

#### **2.11.1.2 Cost Variance**

Cost Variance (CV) shows cost performance of a project expressed as the difference between earned value and actual cost. CV is formulated like in the Equation 2.2.

Equation 2.2

$$\text{Cost Variance} = \text{Earned Value} - \text{Actual Cost}$$

### 2.11.2 Performance Indices

Time performance is associated with schedule in project management and time performance is named as Schedule Performance Index (SPI), whereas cost performance is named as Cost Performance Index (CPI).

#### 2.11.2.1 Schedule Performance Index

Schedule Performance Index (SPI) shows time performance of a project expressed as the dividing earned value by planned value. SPI is formulated like in the Equation 2.3.

Equation 2.3

$$\text{Schedule Performance Index (SPI)} = \frac{\text{Earned Value (EV)}}{\text{Planned Value (PV)}}$$

#### 2.11.2.2 Cost Performance Index

Cost Performance Index (CPI) shows cost performance of a project expressed as the dividing earned value by actual cost. CPI is formulated like in the Equation 2.4.

Equation 2.4

$$\text{Cost Performance Index (CPI)} = \frac{\text{Earned Value (EV)}}{\text{Actual Cost (AC)}}$$

### 2.12 Maturity Concept and Definition

Organizations need improvement techniques to sustain and compete in dynamic business environment. Hence, to obtain their objectives, organizations should assess its organizational management performance by evaluating, measuring, standardizing, and conducting improvement processes. Accomplishing these steps, the organization can assess its project management performance maturity.

A maturity is defined as “an amalgam of education, ability, confidence and willingness to take responsibility.” (Lester, 2006). According to Kerzner, maturity is the fifth phase of the life-cycle phases for project management maturity, which are: “Embryonic Phase, Executive Management Acceptance Phase, Line Management Acceptance Phase, and Maturity Phase” (Kerzner, 2009).

In the PMI OPM3 model, there are four phases which are Birth or Startup, Growth, Mature Operation, and Decline or evolution. (PMI OPM3, 2013). PMI OPM3 defines the maturity “through the existence of best practices” in which a best practice is “an optimal way currently recognized by industry to achieve a stated goal or objective” (PMI, 2003).

The project management maturity indicates the level of an organization showing how it fits to project management performance and rules. In addition, project management maturity is the progressive development of an organization (Ibbs and Kwak, 2000).

The maturity is an indicator for organization’s performance and efficiency. According to Pennypacker studies, 30% of mature organizations showed more than 25% improvement compared to less mature organizations. It is mentioned that there is no 100% matured organization in the world which has achieved the highest level of maturity and process developments and no one can (Andersen & Jessen, 2003). Organizations desiring high level of maturity require implementation of effective and suitable standard methodologies and processes (Kerzner, 2009). The process requires the implementation of structured approach, known as “Maturity Model” (Andersen & Jessen, 2003).

### **2.13 Project Management Maturity Models**

Maturity models can be described as a set of plans aiming long term and continuous organizational development of human resources, processes and technology in order to improve their performance. Organizational Project Management Maturity Model (OPM3), The Portfolio, Program, & Project Management Maturity Model (P3M3), and Capability Maturity Model Integration (CMMI) are some of the most recognized maturity models. Different project management maturity models and their sources are given in Table 2.3. Maturity models are aligned with project management bodies of knowledge in general (Judgev & Thomas, 2002; Levin & Skulmoski, 2000).

All these maturity models are based on total quality management steps. The step of quality management are defining, measuring, analyzing, improving and controlling. For information technology organizations and departments Capability Maturity Model Integration (CMMI) developed by Software Engineering Institute is accepted as ideal (Farrokh & Mansur, 2013; Kerzney, 2001). Different project management maturity models are used to meet different sectors needs so each model is applied by different organization types (Montero, 2013). It indicates that each Project Management Maturity Model is different from each other and not applicable for all companies.

Table 2.3 Maturity Models and Their Sources

<b>Maturity Model</b>	<b>Source</b>
Organizational Project Management	PMI, USA
Project Framework	ESI
Project Maturity Model (PM2)	Interthink, Canada
PRINCE2 Maturity Model (P2MM)	CCTA, UK
Project Management Maturity Model	PM Solutions, USA
Project Management Maturity Model	The Program Management Group,
Project Management Maturity Model	APMG, UK
SW-CMM, SE-CMM, P-CMM, CMMI	SEI, US
Unified Project Management	IIL, US

Maturity model describes a five-level named Initial – Repeatable – Defined – Managed – Optimized.

1. **Level-Initial:** At this level, processes are uncertain, and an organization does not have defined processes. The most faced problems are overtime, communication, weak management practices, quality and costs. Practices are sacrificed in order to track the schedule. Other departments and management in organization do not have knowledge of methods, project managers continue applying traditional project management techniques and new approaches are not comprehended. Team becomes slightly more productive and moral increases; therefore, team members desire to inform new techniques to others, on the other hand, there may be contradiction with managers (Kaur, 2014; Mahmood, 2015).
2. **Level-Repeatable:** Approaches become to spread over teams and teams become familiar with terminology and roles, this level can be supported by trainings. Although it is not so accurate to measure efficiency and effective use of approaches, project activities are planned and followed (Kaur, 2014; Mahmood, 2015).
3. **Level-Defined:** Processes are a lot better and attentively defined and understood. The main focus points are customer satisfaction, project deadline and budget. Organization gives importance on process definition and use of process (Kaur, 2014; Mahmood, 2015).



4. **Level-Managed:** This level focuses on team management, simplicity, risk assessment and process performance. A managed process is planned, and their performances are managed against the plan. Predictability is improved (Kaur, 2014; Mahmood, 2015).
5. **Level-Optimized:** Companies focus on this continuous improvement and logic behind practices are considered to be applied for all projects (Kaur, 2014; Mahmood, 2015).

## **2.14 Organizational Project Maturity Model (OPM3)**

There are some different elements of OPM3 to understand this model and its benefits. In this section definition and benefits of OPM3 are given in detail.

### **2.14.1 OPM3 Concept**

Organizational Project Maturity Model (OPM3) provides application of project management disciplines on organizational level. This can help professionals assess their current situation in project management and where they stand in relation to the standards. The OPM3 has global standards and it is applicable for all types of companies and sectors (PM Solutions Study, 2014; MacFadyen 2012).

Maturity progress in OPM3 includes different dimensions, which represent standardizing, measuring, controlling, and improving. Another dimension is associated with these domains: Projects, Programs and Portfolios in management level. A process in OPM3 can be applied on three domains as seen in the Figure 2.15 (Souza & Gomes, 2015; Schilter, 2001).

When an organization adapts OPM3, they obtain increased insight into their project management operations. There are many benefits like, increasing customer satisfaction, obtaining higher quality, improving employee morale, successful budget and scope management (Project Strategy Consulting Group, 2013).

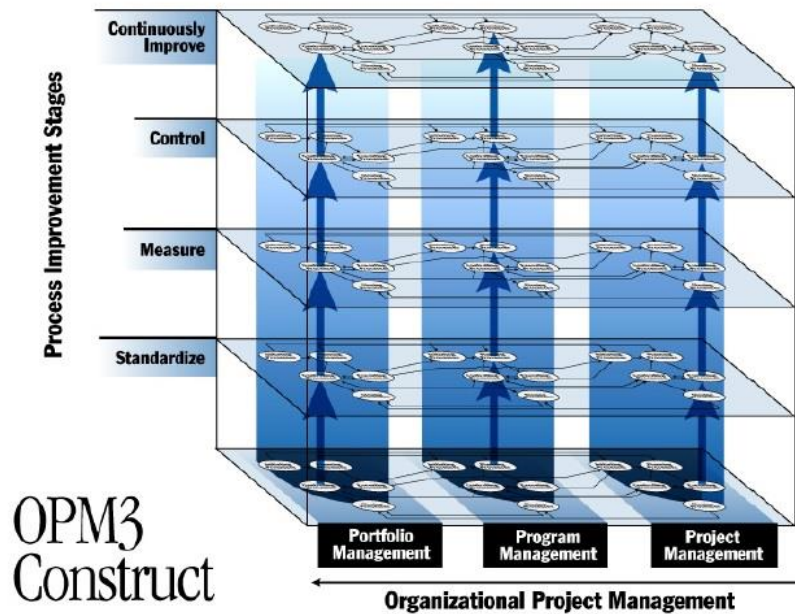


Figure 2.15 OPM3 Construct Scheme

Source: Organizational Project Management Maturity Model (OPM3), Knowledge Foundation. Third Edition, p.28

OPM3 construct has four improvement stages. It starts with standardizing the processes, which means that structured processes are adopted, secondly measuring the processes is important to evaluate the performance by gathering data, thirdly controlling processes provides control mechanism for developed performance, at the end of the stages continuously improvement provides optimization and sustainability of the processes (Silva et al., 2014).

### 2.14.2 OPM3 Benefits

OPM3 application supports organizations significantly in order for them to increase their efficiency in project management field. There are some key benefits of OPM3 benefits as in the following (PMI OPM3, 2013):

- Applying generally accepted and globally proven OPM practices
- Supporting organizations project management maturity evaluation
- Developing a framework to determine organization's maturity level compared to OPM3 Practices
- Deliver projects predictably and reliably
- Improving project management performance

- Increasing productivity
- Decreasing internal and external costs
- Improving customer satisfaction and customer relationship
- Providing market share
- Ensuring that organization conducting correct projects

### 2.14.3 OPM3 Cycle

OPM3 consists of three elements, which are knowledge, assessment and improvement. In the Figure 2.16 relation between elements are given. The knowledge element brings about descriptive information. The assessment element enables determination about current location of the organization in project management maturity. The improvement element takes assessment results and use them to increase the organization's project management maturity (Al-Maghraby, 2012).



Figure 2.16 Elements of OPM3 Standard

Source: Organizational Project Management Maturity Model (OPM3), Knowledge Foundation. Third Edition, p.8

In the Knowledge element, users become proficient about OPM3 and they are familiar with the standards and best practices. In the Assessment element, the organization assesses where they stand in a scope of OPM3 standards and makes a gap analysis. In the Improvement element, organization decides to move ahead in order to accomplish and apply OPM3 standards (Project Management Institute, 2003; Bourne, 2006).

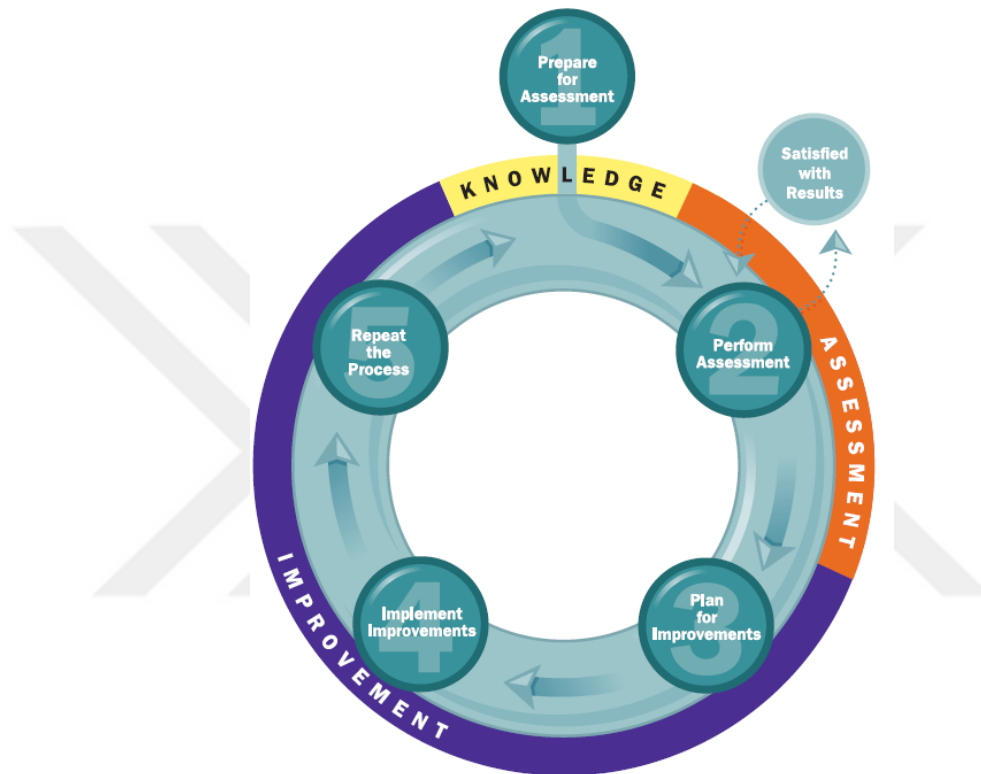


Figure 2.17 The OPM3 Cycle

Source: Organizational Project Management Maturity Model (OPM3), Knowledge Foundation. Third Edition, p.9

OPM3 has a cycle to define processes, which is given in the Figure 2.17.

**Step One:** Prepare for Assessment: Learn and understand the value of system when best practices are implemented. The scope of assessment should be considered (Ghorbanali et al., 2010).

**Step Two:** Perform Assessment: Organization's ability of project management is compared with best practices and strengths and weaknesses are identified (Ghorbanali et al., 2010).

**Step Three: Plan for Improvement:** Project management areas are prioritized by developing weaknesses and improving strengths (Ghorbanali et al., 2010).

**Step Four: Implement Improvements:** Required organizational dedication to implement improvements (Ghorbanali et al., 2010).

**Step Five: Repeat the Process:** Verification and validation of improvement are needed. Strengths and weaknesses will be evaluated (Ghorbanali et al., 2010).

#### 2.14.4 OPM3 Components

OPM3 methodology consists of four components. In the Figure 2.18 those components and relation between them are given. These components can be applied on process groups by applying each specific best practice which fits with each process group (Project Management Institute, 2003).

**Best Practices:** In order to apply improvement on maturity Best Practices can be applied. Best Practices are advised and optimized methods to achieve companies' goals. Best Practices are implemented through implement improvements stage. There are about 600 best practices defined by PMI (Fahrenkrog et al., 2003).

**Capability:** A step of applying best practices on a required domain area and they are prerequisite (Fahrenkrog et al., 2003).

**Outcome:** Tangible or intangible results, which can be obtained after applying capability (Fahrenkrog et al., 2003).

**Key Performance Index (KPI):** A metric to be used for measuring the results of applying best practices and provides the way in order to measure outcomes (Fahrenkrog et al., 2003).



Figure 2.18 OPM3 Components

Source: Organizational Project Management Maturity Model (OPM3), Knowledge Foundation. Third Edition, p.16

There are four improvement stages of OPM3 method recognized by PMI:

- Standardization
- Measurement
- Control
- Improvement

The stages are continuous stages which can be obtained by completing the previous stage. There are also some other best practices for implementing improvement stages of OPM3 method, which are called Organizational Enablers (OEs).

#### **2.14.5 Organizational Enablers (OEs) Best Practices**

Organizational Enablers are best practices to use Best Practices (PMI OPM3, 2013). The PMI reported that maturity at organizational level is increased when Best Practices are used. The PMI OPM3, 2013 categorizes the Organizational Enablers as the following:

- Sponsorship
- Governance
- Benchmarking
- Strategic Alignment
- Organizational Project Management Policy and Vision
- Organizational Project Management Techniques
- Organizational Project Management Methodology
- Organizational Project Management Practices
- Organizational Project Management Communities
- Resource Allocation
- Project Success Criteria
- Project Management Metrics
- Organizational Structure
- Management Systems
- Project Management Training
- Competency Management
- Individual Performance Appraisals

- Knowledge Management and Project Management Information System (PMIS)

#### **2.14.6 OPM3 Maturity Assessment Tools**

There are two different tools developed by PMI in order to assess current state of maturity of an organization and afterwards in order to use the results obtained to improve the organization's maturity stage:

- Self-Assessment Module (SAM) or (OPM3 Online)
- OPM3 ProductSuite

##### **2.14.6.1 Self-Assessment Module (SAM) / OPM3 Online**

As the PMI developed OPM3 standard in 2003, PMI also provided the Self-Assessment Module (SAM). Firstly, the application was given with a CD accompanying the book of "OPM3 Knowledge Foundation First Edition". Later on, by the Internet was getting wider, it was provided as online. The application consists of 150 Yes / No questions. When OPM3 standard had been emerged in the earlier, the Self-Assessment Module (SAM), was used by many organizations so as to assess OPM3. Although it was popular at first, the SAM (OPM3 Online) was no more used because of the fact that there were some problems, as Schlichter (2001) mentioned below:

- Users had to answer mixed 150 questions. The questions were not focused on specific fields.
- The answers could be only Yes or No. If the user needed to give answer in a free text, there was no possibility.

As a result of the fact that the application was not efficient enough, the second assessment tool was developed in 2005, known as OPM3 Product Suite (Schlichter, 2001).

##### **2.14.6.2 OPM3 Product Suite Assessment Tool**

Det Norske Veritas a Norwegian Company developed the OPM3 Product Suite. It provides three elements as the following;

- Certification
- Tools
- Services

OPM3 ProductSuite is a combination of advanced tools which achieve the compatibility of Maturity Standard's to assess organizations' standards (Schlichter J., 2001). The OPM3 ProductSuite includes 488 Best Practices. In every domain, there are different processes with a specific number. Moreover, each process requires 15 Capability-Outcomes, in which all together producing (1,530) Capability-Outcome statement.





### **3. RESEARCH METHOD AND DATA COLLECTION**

Survey was made in order to collect data for testing the hypotheses. Afterwards, the results of survey were interpreted academically. Making literature research the results of survey and literature sources were compared.

#### **3.1 Summary of Survey**

In order to understand opinions of different companies about Organizational Project Management Maturity Model, a survey was made. The survey included 23 questions and shared by project management professionals among different companies from different sectors. The survey showed generality of use of Organizational Project Management Maturity Model (OPM3) in different sectors and how much the companies using OPM3 technique reduce time and cost in their projects. 449 employees from different sectors answered the survey questions. In this study two hypotheses had been tested and hypotheses are like the following.

- Project time performance is measured by Schedule Variance.
  - H1: There is a significant difference in project time performance between project management maturity methods which are OPM3 and others.
- Project cost performance is measured by Cost Variance.
  - H1: There is a significant difference in project cost performance between project management maturity methods which are OPM3 and others.

#### **3.2 Survey**

The survey includes 4 sections and 23 questions in total. The survey questions were originated from various trustable and well-known research company, as well PMI. The list of surveys is like as the following:

- PWC - Insights and Trends: Current Portfolio, Programme, and Project Management Practices survey made in 2012.
- PM Solutions Research – The State of the Project Management Office (PMO) survey made in 2016.
- KPMG – Project Management Survey made in 2017.
- Clarizen - Project Management Survey made in 2015.

The questions can be divided into three categories, which are demographic questions, supporter questions, and key questions. Demographic questions are nominal questions, supporter questions are Likert type questions, and the questions about OPM3 benefits are Ratio scale questions. Demographic questions were asked to understand the general profile of participants and collect information about their gender, age, education, sector, and job title. Supporter questions were not asked to test the hypothesis in direct but asked to understand general project management knowledge level of project management professionals and how they differ from each other. Key questions were asked to test the hypothesis in direct and provided the main required data.

- The first section includes 5 questions, which are about participants' personal information.
- The second section includes 5 questions, which are about general project management.
- The third section includes 6 questions, which are about organizational project management maturity level information.
- The fourth section includes 7 questions, which are about PMI's Organizational Project Management Maturity Model (OPM3). This section can be viewed only by the participant who answered that their company has applied OPM3 technique before.

### **3.3 Sampling Method**

In this research while obtaining the sample, Snowball sampling method is used. Snowball sampling is a kind of sampling which survey respondents forward the survey to other potential respondents. In this thesis project management professionals recruits other project management professionals who they get in touch with each other within their network (Sedgwick, 2013). Because of the fact that the survey focuses on project management questions specifically, the survey participant group for this thesis was chosen from project management professionals who are involved actively in project management area in their organizations.

In order to determine the sample size, firstly the number of population is determined. Since the survey was sent to project management professionals, the number of active project management professionals was researched. In PMI Today Magazine, published in September 2017, PMI reported that there were 791,448 active project

management professionals worldwide (PMI, 2017). According to the Morgan's Table, showed in the Table 3.1, because population size, which is showed with the letter "N", is 791,448, sample size, which is showed with the letter "S" should be 384 people at least.

Table 3.1 Table For Determining Sample Size Of A Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size  
"S" is sample size.

Source: Krejcie, R.V. & Morgan, D.W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30, 607-610

### 3.4 Data Analysis Results

In this section, the answers of demographic and key questions are discussed. There are different question types such as demographic, profession, and specific. The details are discussed in the sub sections.

#### 3.4.1 Questions and Answers

Survey questions and answers are discussed in the following sub parts of this section.

##### 3.4.1.1 Gender

213 of 449 participants are female, whereas 236 of 449 participants are male. The Table 3.1 shows the results and the Figure 3.2 the graph demonstrates percentages.

Table 3.2 Gender of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	213	47,4	47,4	47,4
	Male	236	52,6	52,6	100,0
	Total	449	100,0	100,0	

### 3.4.1.2 Age

Age intervals are used to obtain data. The results show that the highest number of participants are between 35-44 years old, whereas the lowest number of participants are between 55-65 years old. The Table 3.3 shows the results.

Table 3.3 Age Interval of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-34	60	13,4	13,4	13,4
	35-44	215	47,9	47,9	61,2
	45-54	143	31,8	31,8	93,1
	55-65	31	6,9	6,9	100,0
	Total	449	100,0	100,0	

### 3.4.1.3 Education

The results show that the highest number of participants have Bachelor's Degree, whereas the lowest number of participants have Doctorate Degree the Table 3.4 shows the results.

Table 3.4 Education Level of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor's Degree	349	77,7	77,7	77,7
	Doctorate Degree	7	1,6	1,6	79,3
	Master's Degree	93	20,7	20,7	100,0
	Total	449	100,0	100,0	

### 3.4.1.4 Sector

The results show that the highest number of participants are among Information Technologies (IT), Insurance and Finance sectors respectively. The Table 3.5 shows the results. In the Table 3.6 cross table is given between sectors.

Table 3.5 Sectors of Participants

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Advertising	1	,2	,2	,2
Automotive	2	,4	,4	,7
Banking	16	3,6	3,6	4,2
Chemistry	1	,2	,2	4,5
Construction	1	,2	,2	4,7
Consultancy	62	13,8	13,8	18,5
Defence Industry	3	,7	,7	19,2
Education	3	,7	,7	19,8
Energy	3	,7	,7	20,5
Finance	30	6,7	6,7	27,2
Food	3	,7	,7	27,8
Health	18	4,0	4,0	31,8
Insurance	51	11,4	11,4	43,2
IT	196	43,7	43,7	86,9
Logistics	31	6,9	6,9	93,8
Production	16	3,6	3,6	97,3
R&D	1	,2	,2	97,6
Retail	2	,4	,4	98,0
Security	1	,2	,2	98,2
System Automation	1	,2	,2	98,4
Telecommunication	3	,7	,7	99,1
Textile	3	,7	,7	99,8
Tourism	1	,2	,2	100,0
Total	449	100,0	100,0	

Table 3.6 Cross Table Between Sector and Technique

		Technique		Total
		OPM	Other	
Sector	Advertising	1	0	1
	Automotive	2	0	2
	Banking	4	12	16
	Chemistry	1	0	1
	Construction	1	0	1
	Consultancy	51	11	62
	Defence Industry	1	2	3
	Education	3	0	3
	Energy	3	0	3
	Finance	30	0	30
	Food	3	0	3
	Health	11	7	18
	Insurance	44	7	51
	IT	181	15	196
	Logistics	24	7	31
	Production	9	7	16
	R&D	1	0	1
	Retail	2	0	2
	Security	1	0	1
	System Automation	1	0	1
	Telecommunication	3	0	3
	Textile	3	0	3
	Tourism	1	0	1
Total		381	68	449

### 3.4.1.5 Job Title

The results show that the highest number of participants are among IT, Insurance and Finance sectors respectively. The Table 3.7 shows the results.

Table 3.7 Job Title of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asistant Manager	34	7,6	7,6	7,6
	Department Manager	19	4,2	4,2	11,8
	Executive	3	,7	,7	12,5
	Manager	370	82,4	82,4	94,9
	Specialist	12	2,7	2,7	97,6
	Supervisor	11	2,4	2,4	100,0
Total		449	100,0	100,0	

### 3.4.1.6 Method

The result shows which method participants use in their companies for project management. The table 3.8. shows the results.

Table 3.8 Method Used by of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CMMI	33	7,3	7,3	7,3
	ISO 21500	6	1,3	1,3	8,7
	PMI	408	90,9	90,9	99,6
	PRINCE	2	,4	,4	100,0
	Total	449	100,0	100,0	

### 3.4.1.7 Technique

The result shows that 381 of participants, who stated that they use PMI method in their companies, use OPM3 technique. The Table 3.9 shows the results.

Table 3.9 Technique Used by of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	OPM	381	84,9	84,9	84,9
	Other	68	15,1	15,1	100,0
	Total	449	100,0	100,0	

### 3.4.2 Interpretation of Survey Results

Statistics tool SPSS version 22 was used in order to interpret survey results. Collected data was imported into the application and variables were defined.

Firstly, it is required to test if the data is distributed normally or not. In order to test that Normality Test was used in SPSS. Kolmogorov – Smirnov Test was used to test normal distribution. In SPSS tool bar that menu was chosen: Analyze - Non-Parametric Tests - Sample K-S. Cost and Time data are variables to test. In the Figure 3.1 chosen SPSS menu is explained.

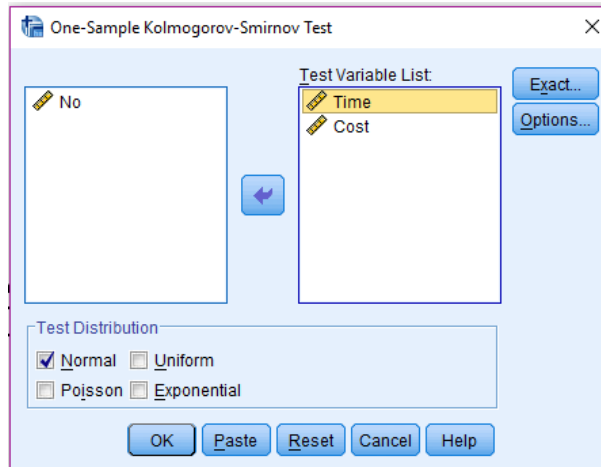


Figure 3.1 Kolmogorov – Smirnov Test in SPSS

After analyzing the data, SPSS gave the result below in the Table 3.10 and Table 3.11. According to the results, since sig. for cost and time is smaller than 0,05, and then it means cost and time data are not normally distributed.

Table 3.10 One-Sample Kolmogorov-Smirnov Test for Cost

		Cost
N		449
Normal Parameters <sup>a,b</sup>	Mean	11,7394
	Std. Deviation	7,27283
Most Extreme Differences	Absolute	,157
	Positive	,157
	Negative	-,115
Test Statistic		,157
Asymp. Sig. (2-tailed)		,000 <sup>c</sup>

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.

Table 3.11 One-Sample Kolmogorov-Smirnov Test for Time

		Time
N		449
Normal Parameters <sup>a,b</sup>	Mean	8,7372
	Std. Deviation	3,44763
Most Extreme Differences	Absolute	,275
	Positive	,204
	Negative	-,275
Test Statistic		,275
Asymp. Sig. (2-tailed)		,000 <sup>c</sup>

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.



In order to detail the normality test Skewness and Kurtosis values are examined. According to the rule, if the Skewness and Kurtosis values are between -1 and +1, then the data can be assumed as normally distributed. As seen in the Table 3.12, Skewness of cost is 0,88 and Kurtosis 0,31. Since they are between 1 and +1, the cost is accepted as normally distributed. Skewness of time is -0,173 and Kurtosis -0,992. Since they are between 1 and +1, the time is accepted as normally distributed.

Table 3.12 Descriptives Results For Time and Cost

		Statistic	Std. Error	
Cost	Mean	11,7461	,34300	
	95% Confidence Interval for Mean	Lower Bound	11,0720	
		Upper Bound	12,4202	
	5% Trimmed Mean	11,2179		
	Median	10,0000		
	Variance	52,824		
	Std. Deviation	7,26800		
	Minimum	3,00		
	Maximum	30,00		
	Range	27,00		
	Interquartile Range	11,50		
	Skewness	,882	,115	
	Kurtosis	,309	,230	
Time	Mean	8,7439	,16250	
	95% Confidence Interval for Mean	Lower Bound	8,4245	
		Upper Bound	9,0632	
	5% Trimmed Mean	8,7165		
	Median	10,0000		
	Variance	11,856		
	Std. Deviation	3,44327		
	Minimum	3,00		
	Maximum	20,00		
	Range	17,00		
	Interquartile Range	6,00		
	Skewness	-,173	,115	
	Kurtosis	-,992	,230	

The second step of the data analysis is analyzing hypotheses. Because of the fact that there are different techniques to measure project management maturity, Independent T-Test method was chosen to test data and show the difference. In the study, the difference between Technique and Time / Cost was analyzed.

In SPSS menu, Analyze tab was chosen, then Compare Means was chosen to reach Independent Sample T-Test. The program gave the results below in the Table 3.13 and 3.14.

Firstly, used technique and time performance was tested. In the Independent Samples Test Table Sig is 0,000, which means  $p < 0,05$ . This means that, the hypotheses below are accepted and there is difference between using OPM3 and other techniques on project time performance.

- H1: There is a significant difference in project time performance between project management maturity methods which are OPM3 and others.

Table 3.13 T - Test for Time

	Technique	N	Mean	Std. Deviation	Std. Error Mean
Time	OPM	381	9,4436	3,25174	,16659
	Other	68	4,8235	,96105	,11654

Table 3.14 Levene's Test for Time

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Time	Equal variances assumed	55,290	,000	11,616	447	,000	4,62004	,39772	3,83841	5,40167
	Equal variances not assumed			22,724	357,418	,000	4,62004	,20331	4,22020	5,01988

Secondly, used technique and cost performance was tested. In the Independent Samples Test Table Sig is 0,000, which means  $p < 0,05$ . This means that, the hypotheses below are accepted and there is difference between using OPM3 and other techniques on project cost performance. In the Table 3.15 and 3.16 the results are given.

- H1: There is a significant difference in project cost performance between project management maturity methods which are OPM3 and others.

Table 3.15 T - Test for Cost

	Technique	N	Mean	Std. Deviation	Std. Error Mean
Cost	OPM	381	13,0892	7,08686	,36307
	Other	68	4,2206	,78883	,09566

Table 3.16 Levene's Test for Cost

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Cost	Equal variances assumed	94,356	,000	10,299	447	,000	8,86865	,86114	7,17627	10,56103
	Equal variances not assumed			23,621	423,028	,000	8,86865	,37546	8,13065	9,60665

#### 4. CONCLUSION

In today's competitive environment cost and time management are getting more important than before. Developments in the global economy have altered the balance between customer and supplier. By changing customer demands, all organizations need to be more agile to meet customers' expectations in a quicker and cheaper way, since customers have more alternatives (Teece, 2010).

Today's business dynamics are ended up with creating new management methods. One of the most powerful trends is certainly project management. Project management will be always in demand because using its application can provide countless benefits on business outputs. However, one of the most crucial factors to get the best results and see benefits is managing projects in a right way.

Since the number of balanced matrix structured companies are wider than other structures and moreover since it is more difficult to manage business in such kind of organizations, managing projects in an effective way becomes more important for balanced matrix organizations. From the view of project management perspective, the main problem in balanced matrix organizations is that there is a mixed structure, which makes management decisions harder. Business units and project management professionals divide management power equally, however, project managers cannot make their decisions on their own even in the most required times. In that type of organizations managing a project in an effective way provides simpler and easier process flow.

Effective project management can be understood by measuring how mature the organization is about project management. Maturity can be provided by developing project management business work flows, process flows, establishing documents, rules and policies. In order to do that all improvement endeavors should be adopted by the entire organization, people or business units cannot reach desired success by applying them on their own. There are various ways to improve organizational project management maturity. However, rules and methods which are accepted globally should be chosen.

OPM3, offered by international Project Management Institute, is certainly the most used and preferred technique. Organizational Project Management Maturity (OPM3) provides improvement areas in project, program and portfolio as well.

OPM3 Cycle shows the steps to become more mature in project management. OPM3 components are drivers to achieve improvement. Firstly, best practices, which are proposed by Project Management Institute, should be applied, then capability, which shows the gaps between the certain level and desired level, is used. So as to measure the success key performance, indicators should be set and calculated.

Projects' performance can be determined with two important performance indexes, one of which is time and the other is cost. Time performance, which is also called by Schedule performance, shows how well projects are planned and duration is used. On the other hand, cost performance shows how much you make a budget for that project and how well budgets of projects are planned and used. In literature those performances are measured by Cost Performance Index (CPI) and Schedule Performance Index (SPI). These indices have their own formulas.

The survey made within this thesis showed that balanced matrix organizations use OPM3 method and owing to using it they achieve cost and time efficiency. Documents were reviewed about OPM3 in order to find results to be used for comparing survey results. In order for that, firstly Project Management Institute's research results were reviewed. The Vice President of PMI Hong Kong Chapter, Kevin Chui published a report about Project Management Maturity. According to this research if a balanced matrix organization use Organizational Project Management Maturity Model, project management in that company becomes more mature and it also affects projects' schedule and cost performances. The results show that more mature companies, which use OPM3, have a Schedule Performance Index (SPI) improvement by %8 and Cost Performance Index (CPI) improvement by %11 (Chui, 2005). In this thesis, survey results and statistical analysis show that Organizational Project Management Maturity Model (OPM3) provides Schedule Performance Index (SPI) improvement by %8,74 and Cost Performance Index (CPI) improvement by %11,75.

As a result, we can verify that using OPM3 provides time and cost project performance efficiency and using OPM3 technique in project management domain is inevitably suggested. In particular, balanced matrix organizations can change their business processes and moreover they can develop their organizational structure. In this study, the constraints were organization type. In the future, this study will be expanded to all organization types and compare the difference.

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## **RESUME**

I was born in 1987 in Istanbul. I graduated from Dođuř University, Industrial Engineering department in 2011. Since 2011, I have been working in project management field and played Project Manager role in logistics, consultancy, and insurance sectors respectively. I have been working at Aksigorta, which is one of the leading insurance companies in Turkey, since July 2016.

As of September 2015, I have been Project Management Professional (PMP) certified. Managing more than 20 projects in my career, I gained a great deal of knowledge and experience in project management field by applying different project management methods like Waterfall and Agile. Besides managing projects, I personally had a chance to participate organizational project management maturity development process in one of the companies I worked.