

KEYWORDS ■ project portfolio management ■ project success ■ project portfolio management maturity

IMPACT OF APPLYING Project Portfolio Management ON PROJECT SUCCESS

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■ ABSTRACT

Project portfolio management is always described as an approach or method that helps organizations to achieve their business goals and objectives. There are many books and articles concentrating on this merit of project portfolio management. Nevertheless this paper concentrates on identifying and evaluating the project portfolio management in a new aspect which seems less focused. The main aim of this research is to analyze the impact of applying project portfolio management on project success rate. It means that not only project portfolio management helps organizations to achieve their business goals and objectives, but also helps them to improve their project success rate. In this paper, project success criteria are defined and different project portfolio management processes and functions are identified. Then based on a clear survey, the impact of applying project portfolio management on project success rate is evaluated in different levels of project portfolio management maturity levels. According to research findings, there is a strong coefficient correlation between project success and project portfolio management maturity levels. In other words, increasing the maturity level of project portfolio management leads to improving project success rate.

INTRODUCTION

Nowadays project portfolio management (PPM) is considered a strategic tool for organizations to achieve their goals and objectives. Shehnar et al. (A. J. Shenhar, O. Levy, and D. Dvir, 1997) described project and project portfolio as a “powerful strategic weapon” in organizations to gain unique business advantages.

The Project Management Institute (PMI) (*The Standard for Portfolio Management, 2008a*) described project portfolio management as the “co-ordinated management of portfolio components to achieve specific organizational objectives” and concentrated on the effects of applying project portfolio management on organizations in order to achieve their strategic goals. On the one hand,

Office of Government Commerce (OGC) (Stephen Jenner, 2011) defined project portfolio management as a collection of strategic processes to prepare the most effective business balance.

Meskendel (Meskendahl, 2010) is another researcher that examined the business impact of project portfolio management and evaluated how applying project portfolio management influences the business outcomes. He believes that project portfolio management is a strategic tool that can bridge the gap between strategy formulation and implementation. He provided a general framework that links the organization strategy to the business success by using project portfolio management.

As it can be seen in the mentioned popular books and literatures, project portfolio management is generally known as a strategic tool to ensure a balance between the organization’s goals and objectives and its projects.

As mentioned before, in this article other aspects and benefits of applying project portfolio management are evaluated. A closer look at

Figure 1 shows that project portfolio management has two main relationships with other functions of the organization, including organizational strategy and objectives and management of programs and projects. The mentioned literatures and books concentrated on the first relationship and responsibility of project portfolio management.

Nevertheless, this research evaluates the impacts of applying project portfolio management on the project success and this premise examines whether there is any coefficient correlation between applying project portfolio management and project success or not.

This paper is organized as follow:

- Sections 1 and 2 contain literature

reviews on project success and project portfolio management and based on them, comprehensive project success criteria are defined and the major processes and functions of project portfolio management are identified.

- Section 3 describes the objectives and hypothesis in the research as well as the methodologies adopted. In addition this section explains the research survey and the data gathering approach.
- Sections 4 and 5 provides the survey response assessment on maturity level of project portfolio management in organizations.
- Sections 6, 7, 8 and 9 illustrate the different research results analyzing the correlation between project portfolio management maturity levels and project success, and the conclusion is the last part of this literature.

1. Literature review: Project success

Project success is always an important concept for different groups, especially for project owners because project success is a tool for organizations to obtain their goals and objectives. In other words, they measure project success to measure their business success.(A. J. Shenhar, Dvir, Levy, & Maltz, 2001)

Over the last decades different views have been considered, such as project success criteria. One of the initial and popular views on project success measurement is “Iron Triangle” defined by Oisten, in which cost, time and quality are pivotal factors for determining project success. The advocates of this idea believe that a project is success-

ful when it is under budget, ahead of schedule and has achieved acceptance criteria (Oisten, 1971). Iron Triangle has been used numerously in different project fields throughout these years, but some people believe that time, cost and quality do not cover all aspects of project success and they are mostly used in projects because their measurement is much easier than other factors (A. J. Shenhar, Levy, & Dvir, 1997). Regarding this fact that there are many measurable indicators including cost performance index (CPI) and schedule performance index (SPI) that can measure project success based on its cost and time, Iron triangle is an easy to use approach. After a while, different researchers proposed new criteria for project success measurement. According to Baker et al. (Baker, Murphy, & Fisher, 2008) the satisfaction of main project stakeholders should be considered as one of the remarkable project success criteria, thus four project stakeholders were identified, including customers, end-users, project team and developing organizations.

In addition to Baker et al., Waterbridge (Wateridge, 1998) concentrated on user satisfaction. He stated that user satisfaction is a factor that is underestimated compared to other factors but it can be important in many projects.



FIGURE 1. organizational context of portfolio management. (The Standard for Portfolio Management, 2008b).

Therefore, besides Iron triangle, fulfilling user requirement is one of the major elements of project success.

Other researchers who believe that project team satisfaction is one of the effective factors in projects success are Drew et al. (*Procaccino, Verner, Shelfer, & Gefen, 2005*). They identified some factors that can affect project team satisfaction such as teamwork enjoyment and the use of new technical skills.

On the other hand, Milis and Mercken (*Milis & Mercken, 2004*) proposed a new insight in measuring project success. They suggested that Balance Score Card (*BSC*) is a specific success factor in Information and communication Technology projects. According to their view, project success can be measured by assessing financial, customer, international business and learning factors. In addition, they proposed different measurable indicators based on each criterion. For example financial criterion can be evaluated by using different indicators such as Return on Investment (*ROI*).

After that, Aaron et al. developed a multi-dimensional map that almost encompassed all the aforementioned criteria. They identified 4 different dimensions, namely:

- **Project efficiency:** This factor is the most popular and generally accepted criterion for project success evaluation. It emphasizes meeting schedule and budget requirements and goals in projects.

- **Impact on the customer:** This issue is viewed by Aaron et al. similarly to how other researchers do, as mentioned earlier.
 - **Business success:** Projects are defined to improve the position of an organization in the business environment. Therefore project owners define projects to gain financial and business success concentrating on commercial success and creating a large market share.
 - **Preparing for the future:** Nowadays organizations seek to fulfill their customers' new requirements in order to increase the number of customers. To be unique and to meet customer satisfaction, organizations need to define projects in which customer requirements are predicted and the plan to meet customer satisfaction is predetermined.
- Table 1** shows the comparison between different views over project success criteria.
- Based on the literature review, the following factors are selected as the most important project success criteria:
- Meet time and budget;
 - Achieved project goals and objectives;
 - Customer satisfaction;
 - User satisfaction;
 - Increased market share and profit;
 - Explore new opportunities or innovations;
 - Prepare the future.

| Literatures | Project success Criteria | | | | | | | |
|------------------|--------------------------|---------------------------------------|-----------------------|-------------------|---------------------------|------------------|-----------------------------------|--------------------|
| | Meet time and budget | Achieved project goals and objectives | Customer Satisfaction | User satisfaction | Project team satisfaction | Business success | Increased market share and profit | Prepare the future |
| Olisten | ✓ | ✓ | | | | | | |
| Baker et al. | | | ✓ | ✓ | ✓ | | | |
| Waterbridge | ✓ | ✓ | | ✓ | | | | |
| Drew et al. | | | | | ✓ | | | |
| Milis and Merken | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| Aaron et al. | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |

TABLE 1. comparison of project success criteria.

2. Literature review: Project Portfolio Management (PPM)

There are different views on project portfolio management elements and functions. One of the first institutes that worked on project portfolio management is the Project management institute (*PMI*). PMI published a draft on project portfolio management in 2005 and after three years, in 2008, the second version of this standard was released. (*The Standard for Portfolio Management, 2008b*). After this publication, PMI completed the package of standards in project management environment including project management, program management and project portfolio management.

Two main knowledge areas are stated in this standard, including Portfolio governance and Portfolio risk management. Portfolio governance includes the process of component selection and balancing. According to PMI definition, the components can be portfolio, programs and projects.

In this knowledge area projects are firstly selected and funded and then monitored. Moreover, this knowledge area ensures that the selected projects are aligned with the organization's business goals and objectives.

The responsibility of Portfolio risk management is to identify, analyze and manage events that have an adverse impact on the goals and objectives of project portfolios.

In addition, PMI defines that to communicate portfolio adjustment is a key process in project portfolio management which concentrates on stakeholder management.

The Office of Government Commerce (*OGC*) (*Stephen Jenner, 2011*) published a Portfolio management guide book in 2011. Functions and processes in this book were similar to what was stated in the PMI book. OGC defined the steps of portfolio selection

process as: understanding, categorizing, prioritizing and planning the portfolio. This part is almost the same as the PMI view and can be called portfolio selection and portfolio balancing. Furthermore, OGC model includes the Portfolio risk management and stakeholder management. In addition to PMI, the OGC model has portfolio resource management, portfolio financial management and benefit management which are explained as follow:

- **Portfolio resource management:** Portfolio resource management (Stephen Jenner, 2011) uses organization resource pool and tries to plan all resources and assign them to the projects in the integrated approach. Portfolio resource management equips the organization with a resource pool in which all of resource types, including human resources, materials, financial and other resource types are recorded. According to the project priority which is determined based on the organization's goals and objectives, resources are assigned to the projects. Portfolio resource management helps organizations to find the optimal balance in resource allocation between different projects.
- **Benefit management:** Another component defined by OGC as a project portfolio management function is benefit management. Each component of the project portfolio will make a change in the organization to provide some benefits. Benefit management aims to identify, manage and achieve the benefit of the portfolio components. This function concentrates on the fact that projects should provide benefit to their stakeholders.
- **Portfolio financial management:** Portfolio financial management aligns all of the financial processes in the project portfolio management process with other financial processes in the organization (Stephen Jenner, 2011). This process covers all of the project cost management activities and coordinates these activities.

In addition to OGC and PMI, Ghasemzadeh and Archer (*Ghasemzadeh & Archer, 2000*) concentrated on the project portfolio selection or management and control of portfolio. Although their process in project port-

folio selection is different from OGC and PMI, the definition is the same.

Like OGC, Zohar Laslo (*Laslo, 2010*) also emphasized on the resource planning and scheduling of project portfolios. He described a model that helped Project portfolio managers to optimize resource allocation in different portfolio projects.

Besides PMI and OGC, some researchers have published some models to describe the elements of project portfolio management, such as Bert et al. (*Reyck et al., 2005*) which evaluated different elements of project portfolio management. They introduced nine elements, of which most can be found in OGC and PMI models but expressed differently. These similar components are financial analysis, Risk Analysis, Interdependencies, overall analysis, project selection and organization governance and portfolio optimization. The only new element that is not considered in PMI and OGC is the specific project portfolio management tool. This element describes that project portfolio management needs integrated tools for managing different aspects of the portfolio including risk, financial, resources and so on.

Kendel and Rollins (*Kendall & Rollins, 2003*) described four factor as the major elements and responsibilities of project portfolio management in their popular book:

- Project portfolio determination and balance;
 - Monitoring project planning and execution;
 - General analysis of portfolio performance;
 - Preparing comprehensive information for decision making.
- Furthermore, they considered resource portfolio management as a responsibility of project management office (*PMO*) and as a significant factor in the project portfolio management.
- The **Table 2** illustrates project portfolio management elements based on the mentioned literatures and books.
- Based on the literature review, the major processes and functions are selected as the most important elements of project portfolio management including management control, resource management, financial management, risk management, organizational governance, benefit management and stakeholder management.

3. Methodology and Hypothesis

The main aim of the research is evaluating the impact of applying project portfolio management on

| Literatures | Project Portfolio Management components | | | | | | |
|------------------------|---|---------------------|----------------------|------------------------|-----------------|---------------------------|--------------------|
| | Management and control | Resource management | Financial management | Stakeholder management | Risk management | Organizational governance | Benefit management |
| PMI | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| OGC | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Zohar Laslo | ✓ | ✓ | | | | | |
| Ghasemzadeh and Archer | ✓ | | | | | | |
| Bert et al. | ✓ | | ✓ | | ✓ | ✓ | |
| Kendel and Rollins | ✓ | ✓ | | | | ✓ | |

TABLE 2. Identifying the major processes and functions of PPM.

project success. According to literature reviews, this research has 2 major variables. The first variable is “the maturity level of project portfolio management in organizations that responded to the survey” and the second one is “the impact of project portfolio management on different project success criteria”.

As stated in section 1, there are different definitions for project success. Literature reviews have indicated that project success is defined by seven major criteria. In addition, project portfolio management, major processes and functions are identified in section 2. Based on the identified project success criteria and components of project portfolio management, the research hypotheses are defined as follows.

- Hypothesis 1: Is there any coefficient correlation between maturity level of applying project portfolio management and project success?
- This Hypothesis aggregates project success criteria and examines the correlation between project success and different maturity levels of project portfolio management.
- Hypothesis 2: Is there a coefficient correlation between maturity levels of applying project portfolio management and Meeting project time and budget requirements and goals as one of the most important project success criteria?
- Hypothesis 3: Is there a coefficient correlation between maturity levels of applying project portfolio management and obtained project goals and objectives as one of the most important project success criteria?
- Hypothesis 4: Is there a coefficient correlation between maturity levels of applying project portfolio management and customer satisfaction as one of the most important project success criteria?
- Hypothesis 5: Is there a coefficient correlation between maturity levels of applying project portfolio management and user satisfaction as one of the most important project success criteria?
- Hypothesis 6: Is there a coefficient correlation between maturity levels of applying project portfolio management and increased market share and profit as one of the most important project success criteria?

- Hypothesis 7: Is there a coefficient correlation between maturity levels of applying project portfolio management and exploring new opportunities or innovations as one of the most important project success criteria?
- Hypothesis 8: Is there a coefficient correlation between maturity levels of applying project portfolio management and preparing the future as one of the most important project success criteria?

In order to test the aforementioned hypotheses a survey is conducted in 3 sections.

In Section 1, general information from the respondents including company information, scale of projects and so on is collected.

In Section 2, some questions which reveal the maturity levels of project portfolio management in the organizations are asked.

In Section 3, for each of PPM elements such as “management and control” and “portfolio balancing”, respondents answered whether applying project portfolio management increased project success rate in each of the stated criteria or not.

An online survey was sent to more than 600 portfolio, program and project managers and other related roles such as chief executive officers (*CEO*) in project oriented organizations. In addition, the survey was distributed in the APMG showcase 2011 in Australia. 80 responses were received from different industries. The sample includes different industries including Information technology (32%), Building and construction (12%), Petroleum industry (6) % and other industries (30%).

The majority of respondents are CEO, CIO or CFO (34%) and Program or project managers (31%). In addition, other job titles (24%) and portfolio managers (11%) are the other roles of respondents in their organizations.

The sample included organizations with various numbers of projects from less than 10 projects in their portfolio (49%) to more than 50 projects (16%). There are small, medium and large organizations with different turnover costs from less than \$50 million in a year (61%) to more than \$1 billion (9%).

4. Classification on different levels of maturity in PPM

In the second part of the questionnaire, respondents answered to the questions that are related to the level of maturity in their organization. The questions are related to the different functions and processes of project portfolio management identified in section 3. The respondents answered seven questions regarding the level of managing different functions and processes of project portfolio management such as risk management, stakeholder engagement, and financial management and so on in their organization.

The questions were answered based on a five point scale ranging from 1 (*do not manage at all*) to 5 (*Always manage*).

Based on the data received, each respondent had 7 marks for different functions and processes of project portfolio management. The average of these marks is rounded in the SPSS software and the result assigned a level of maturity to the respondent organization. Therefore at the end of this stage all the organizations had a level of maturity between one and five. The distribution of respondents in different levels of maturity can be seen as follows. (*see Table 3*).

Table 4 shows the majority of respondents are in level 5 (27.5%), level 4 (27.5%) and level 2 (20%) of maturity levels.

This stage is a basis for further calculation in the next stage. There are some interesting points about the results of this section. Firstly, the most interesting part of project portfolio management for the organizations that responded to the survey is Portfolio financial management. The data indicated that financial management is mostly used in organizations that have implemented project portfolio management.

Looking more closely at **Figure 2**, it can be seen that financial management, resource management and management and control are used more than the other processes and functions. This result is reasonable because financial management, resource management and management and control are easier to use and there are many project portfolio management tools that can help an organization to apply them.

5. Correlation between different maturity levels of PPM and project success criteria

In the previous section, a maturity level between one and five was assigned to the organizations. Therefore each organization had a clear level in project portfolio management maturity.

The third part of questionnaire rated the impact of applying project portfolio management on different project success criteria in the respondent organizations based on a 5 point scale, from -2 (*Significant negative impact*) to +2 (*Significant positive impact*).

Therefore, there are two variables in the research that are related to each organization; the first one is project portfolio management maturity level ranging from 1 to 5, and the second is the impact of applying project portfolio management on project success criteria that ranged from -2 to +2. (*Yount, 2006*)

Given that the research aim is to analyze the coefficient relationship between project portfolio management levels and its impact on project success, the Spearman method was used to mathematically compute the degree of correlation between two variables. The result of the Spearman calculation method is called a correlation coefficient. R is the value of the Spearman method which usually ranges from -1.00 to +1.00. A positive coefficient indicates that two variables systemati-

cally vary in the same direction: as one variable increases, the other variable tends to increase. The important point about the Spearman method is that the R value can be interpreted. The closer coefficient is +1.00, which shows the stronger positive association. A negative coefficient indicates that two variables systematically vary in opposite directions: as one variable increases, the other variable tends to decrease. (*Yount, 2006*)

In addition to negative or positive, the R value can be interpreted as strong, moderate and weak for both positive and negative correlations (*Smarandache, 2003*).

If R **[0.8, 1]** or r **[-1, -0.8]**, it shows that there is a strong relationship.

If R (0.5, 0.8) or r (-0.8, -0.5), it shows that there is a moderate relationship.

And if R **[-0.5, 0.5]** it shows that there is a weak relationship.

As previously stated, project success is assessed by seven criteria and R is calculated for all seven criteria and project success separately.

R for Project success is calculated as a mean value of all project success criteria.

The final results for the entire hypothesis can be seen as follows.

Hypothesis 1: Is there any coefficient correlation between maturity level of project portfolio management and project success?

The following table shows the results in order to evaluate the coefficient correlation between applying project portfolio management and project success. Considering that R is 0.89 it shows that there is a positive correlation between these variables. Regarding the Strong, moderate and weak correlation definition, it can be stated that there is a strong positive coefficient correlation between project portfolio management maturity level and project success. In other words, increasing the maturity level of project portfolio management can lead to project success improvement.

According to the table, all of the success criteria have a Positive moderate or strong correlation with project portfolio management maturity levels.

Therefore it can be stated that there is a coefficient correlation between maturity levels of project portfolio management and project success.

6. The impact of applying PPM without considering level of maturities

Aggregated data indicated that applying project portfolio management in most cases (56%) has a significant positive impact on meeting project time and budget requirements as one of the project success criteria.

In addition, 36% believed that applying project portfolio management has a positive impact on meeting time and budget requirements as one of the project success criteria.

This statistics showed that almost always, more than 90%, applying project portfolio management will inevitably benefit the organizations and help them to improve their project success rate. The following diagram shows the impact of applying project portfolio management on project success. (*see Figure 3*).

After meeting project time and budget requirements, applying project portfolio management has more impact on achieving project goals and objectives. In this type of project success criteria, more than 46% of the respondents believed that applying project portfolio management has a significant positive impact on achieving project goals and objectives and 40% stated the positive impact it has on achieving project goals and objectives.

On the other hand, applying project portfolio management has the lowest impact on exploring new opportunities or innovations. In this area, 45% of the respondents believed that applying project portfolio management does not have positive impact on exploring new opportunities or innovations. Another area in which project portfolio management is not as effective is achieving user satisfaction. 38% of the respond-

ents believed that project portfolio management cannot help them to achieve user satisfaction. The following diagram illustrates the project portfolio ranking based on its impacts on different project success criteria. (see Figure 4).

To sum up, based on the respondents’ experiences, it can be clearly seen that in all project success criteria, project portfolio management has a positive impact ranging from 55 to 92.5 percent.

It shows that project portfolio management is effective in order to improve project success rate in all criteria.

7. Coefficient of determination

In addition to R that can show the correlation between two variables, the coefficient of determination is another important factor that can be interpreted to evaluate the relationship between variables. The coefficient of determination, commonly called the “r-squared” value, is calculated for maturity levels of project portfolio management and project success, which is 79.21. It means that although there are some other factors that can influence project success, applying project portfolio management is one of the most important factors. In other words, 79% of variation in “Project success” can be explained by variation in the “maturity level of project portfolio management”. It means that improving the level of maturity of project portfolio management is a reliable way to improve project success rate rather than other approaches.

8. The PPM Level of maturities and project success trend

Considering that project success criteria and project portfolio manage-

ment maturity levels have a strong or moderate positive coefficient correlation, by increasing the maturity level of PPM in organizations, its impact on the project success will consequently be improved.

The mean value of project success in each project success criteria can be seen in Table 6 and Figure 5.

9. Conclusion

Based on the research carried out and the survey conducted, which included 80 companies in different countries, such as Australia and the United States of America, the correlation between project portfolio management maturity level and its impact on project success is carefully evaluated. Before starting the evaluation, project success was defined based on the robust literature review and defined in 7 criteria. In addition, different processes and functions of project portfolio management are identified based on the analysis of the most popular and unanimously agreed references including PMI and OGC standards.

Based on the second part of the survey, the maturity level of the respondent organizations is identified and all organizations are assigned a level of maturity between 1 and 5.

In the third part of the survey, the impact of applying project portfolio management on different project success criteria is assessed and based on that, the coefficient correlation between maturity level of project portfolio management and its impact on different project success criteria are calculated.

The Spearman method is used to analyze the correlation between these variables. Based on the calculations, there is a Strong positive coefficient correlation between project success and maturity levels of project portfolio management. In other words, Organizations can improve their project success rate by applying project portfolio management and improve their PPM maturity level.

In addition, R2 (coefficient of determination) is calculated in order to analyze the relationship between PPM maturity level and its impact on project success. According to the calculations, R2 is almost 80% which shows that improving the maturity level of project portfolio management is a reliable solution in order to improve their project success rate.

This research shows that not only project portfolio management helps organizations to achieve their business goals and objectives, but it also helps them to improve their project success rate.

| Maturity level | Frequency | Percentage |
|----------------|-----------|------------|
| Level 1 | 5 | 6.2 |
| Level 2 | 16 | 20 |
| Level 3 | 15 | 18.8 |
| Level 4 | 22 | 27.5 |
| Level 5 | 22 | 27.5 |
| Total | 80 | 100 |

TABLE 3. Organizations distributed in PPM maturity levels.

| Sig | R | STD | PPM Impact Means | Count | Maturity Levels |
|-------|------|------|------------------|-------|-----------------|
| 0.001 | 0.89 | 0.17 | 0.32 | 5 | Level 1 |
| | | 0.24 | 0.51 | 16 | Level 2 |
| | | 0.23 | 0.51 | 15 | Level 3 |
| | | 0.30 | 1.22 | 22 | Level 4 |
| | | 0.25 | 1.80 | 22 | Level 5 |

TABLE 4. Correlation coefficient calculation for project success.

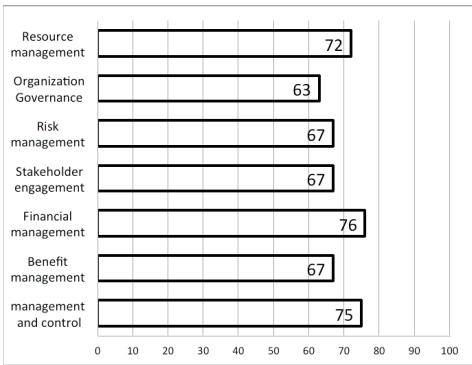


FIGURE 2. PPM processes and functions used in organizations.

| Project success criteria title | R | Type of Coefficient Correlation |
|---|------|---------------------------------|
| Meet project time and budget | 0.57 | Positive Moderate |
| Achieve project goals and objectives | 0.71 | Positive Moderate |
| Achieve customer satisfaction | 0.82 | Positive Strong |
| Achieve user satisfaction | 0.67 | Positive Moderate |
| Increase the market share and organization profit | 0.72 | Positive Moderate |
| Explore new opportunities or innovations | 0.77 | Positive Moderate |
| Make new skills and prepare for the future | 0.67 | Positive Moderate |
| Project success as a whole | 0.89 | Positive Strong |

TABLE 5. Comparison between project success criteria correlations.

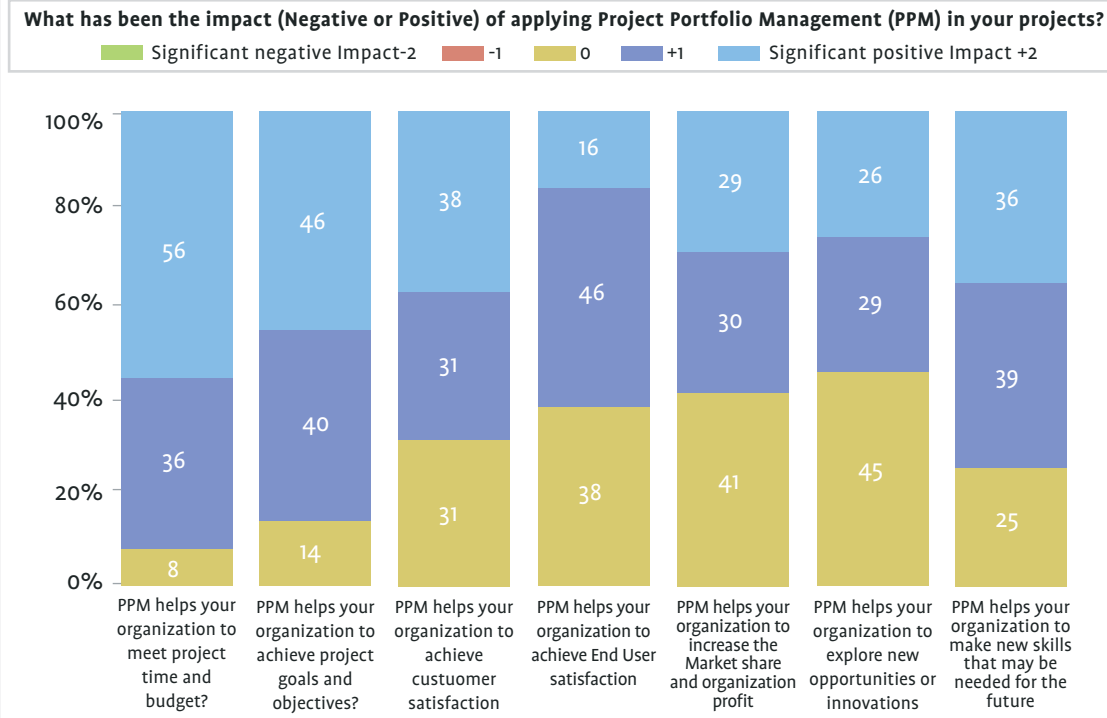


FIGURE 3. The impact of PPM on different project success criteria.

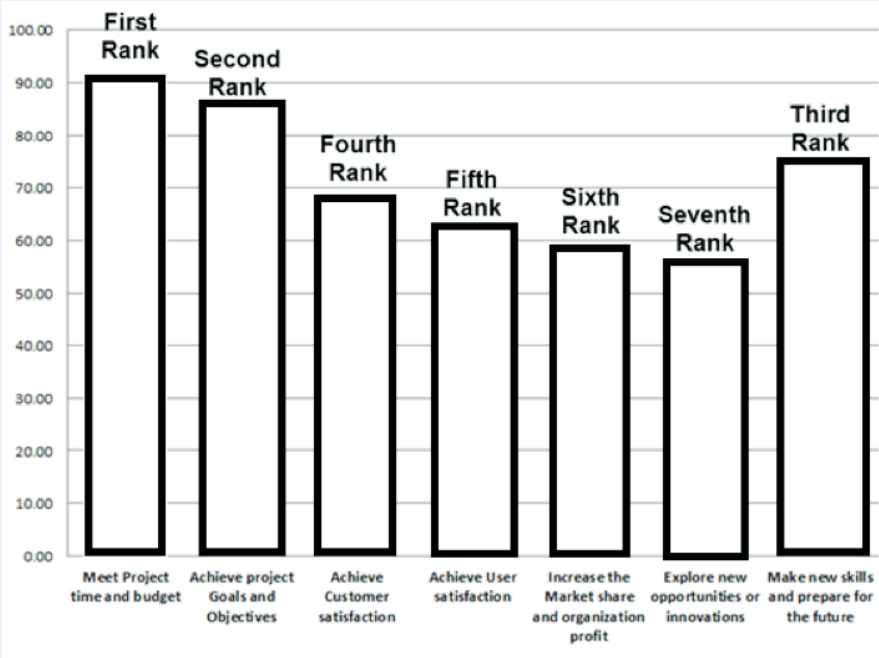


FIGURE 4. Ranking between different success criteria based on the PPM impact.

| Maturity levels | | | | | Project success criteria |
|-----------------|---------|---------|---------|---------|---|
| Level 5 | Level 4 | Level 3 | Level 2 | Level 1 | |
| 1.9 | 1.72 | 1.26 | 1.12 | 1.0 | Meet project time and budget |
| 2.0 | 1.5 | 1.2 | 0.87 | 0.60 | Achieve business goals and objectives |
| 1.90 | 1.31 | 0.46 | 0.31 | 0.00 | Achieve customer satisfaction |
| 1.31 | 1.0 | 0.4 | 0.25 | 0.00 | Achieve user satisfaction |
| 1.72 | 0.9 | 0.53 | 0.18 | 0.20 | Increase the market share and organization profit |
| 1.72 | 0.95 | 0.46 | 0.12 | 0.0 | Explore new opportunities or innovations |
| 1.86 | 1.18 | 0.8 | 0.68 | 0.0 | Helps to make new skills for the future |
| 1.77 | 1.22 | 0.73 | 0.5 | 0.31 | Total score |

TABLE 6. The Mean value for the impact of PPM on project success criteria.

Figure 5 clearly illustrates this fact as a Spider chart. As clearly seen in the diagram below, by increasing the PPM maturity level, its impact on project success is also increased.

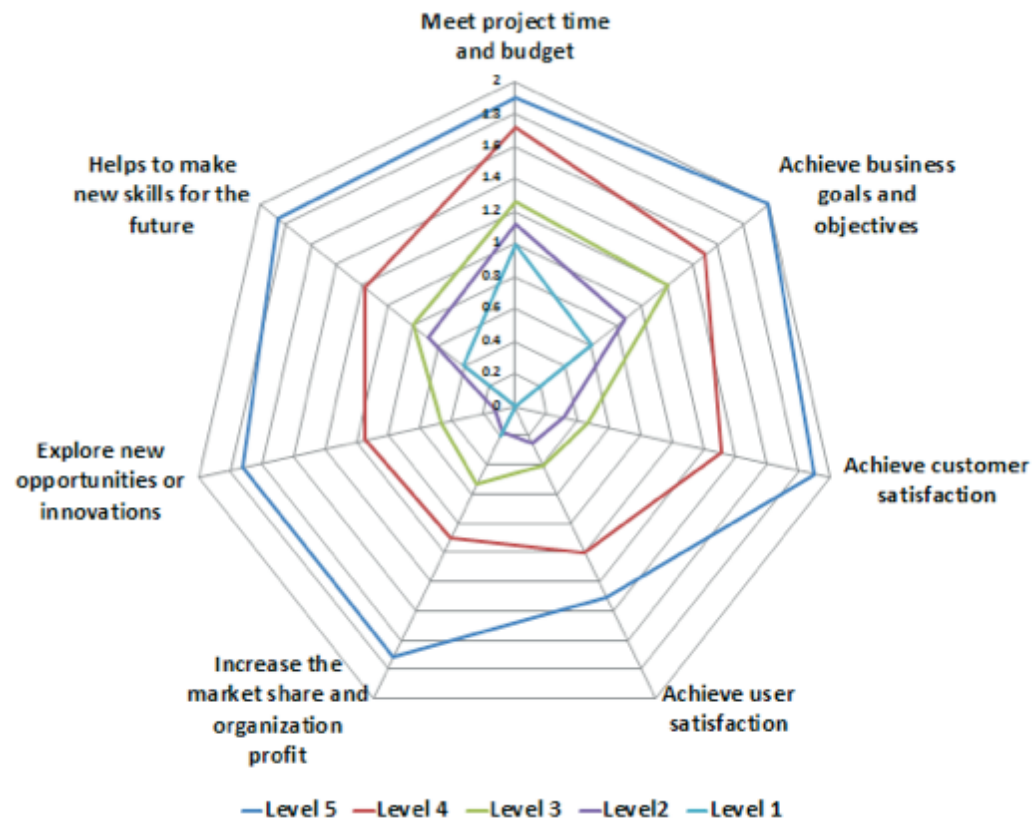


FIGURE 5. PPM impact on project success criteria in different levels of maturity.



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