



AN EXPLORATORY STUDY OF THE ASSOCIATION OF PROJECT SUCCESS WITH PROJECT CHARACTERISTICS AND ORGANIZATION MATURITY

Rao Aamir Khan, University of Kassel, Germany¹;
Konrad Spang, University of Kassel, Germany

Abstract: Project success has always been an important issue in project management research. There have been pervasive research studies on this topic as well as on exploration of factors affecting project success. The objective of this research study is to identify and ascertain which of the project's attributes affect project success. The study also recognizes the role of organization maturity in achieving the success. Data sample is collected through interviews and self administered questionnaires. Using a sample of 71 project managers and other higher management officials, correlation studies are done. The correlation is investigated between project characteristics and organization maturity with project success. The Pearson Bivariate Correlation method is used to test the significance of the correlation. In order to perform the correlation analysis the SPSS version 20 is used. The results revealed significant negative correlation between project success and higher risks. A negative relation is also found for the higher complexity level and long duration of the project. No significant relation is found between project success and project budget, technicality involved and prior knowledge of the potential risks. On the other hand the organizational maturity is found to have a significant positive relationship with project success.

This study identifies the importance of project related factors and organization maturity for achieving project success. It is suggested that the organizations should address the project related factors during the planning phase of their project. They should focus on reducing the following three things: a) the complexity involved in the project, b) the potential risks in the project and c) the overall duration of the project. It is also found that the standardization and optimization of the processes increase the maturity level of the organization which in turn increases their success.

Key words: *project success, project management, organization maturity*

JEL code: M10

¹ Corresponding author – e-mail address: rakhana@uni-kassel.de, telephone: +49 561 804 4675



New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

1. Introduction

Projects are temporary organizations and involve uncertainties. There is no one standard definition of project neither in literature nor in practice. PMI (PMBOK 2004) defines project as a “temporary endeavor undertaken to create a unique product, service, or result”. Turner (1999) defined a project as “An endeavor in which human, material and financial resources are organized in a novel way, to undertake a unique scope of work, of given specification, within constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objective”. Because projects are not exactly the same and no project use exactly the same approach, it is always challenging in every project to achieve success.

Success generally refers to the accomplishment of the tasks through an effective and efficient way. It is quite subjective and therefore can have a different meaning for different people. Freeman and Beale (1992) provide an interesting example in this context: “An architect may consider success in terms of aesthetic appearance, an engineer in terms of technical competence, an accountant in terms of dollars spent under budget, a human resources manager in terms of employee satisfaction. Chief executive officers rate their success in stock market.” This nature of project success requires managers to use many measures of success. Lim and Muhammad (1999) clarified the scale of project success by providing two different points of view, macro-level success and micro-level success. Macro-level success is generally related to the end product. Usually the end users and other project beneficiaries come across the macro viewpoint of project success. Micro-level success is related to traditional iron triangle and considers, whether the project is completed on time, within allocated budget and according to the specifications. Other researchers (De wit 1988; Cooke-Davies 2002) presented the macro and micro point of views as project success and project management success respectively. Project success is measured against the overall objective of the project. Project management success is measured against cost, time and quality, which are widespread and traditional measures of performance. Baccarini (1999) shape this concept into product success and project management success. Product success deals with the effects of the projects final product and the objectives of the project.

Success or failure of a project depends on a number of factors. The study of project management literature reveals that factors influencing project success have been of great interest for researchers. Various studies covering different positive or negative aspects of influencing factors have been conducted by researchers, academicians, consultants and industry practitioners. The objectives of these studies were to find the ways to achieve higher project success rate and help project managers in accomplishing their tasks. The studies were done by targeting different types and size of projects. The focus of the present study is on project attributes like project complexity, project duration, project risks, project technicality and organization maturity. The study assesses the strength of the relationship between these variables and project success.

The main objectives of the study are outlined below:

- 1) To through light, on the importance of project characteristics and organization maturity for devising project management strategy.
- 2) To perform correlation study to identify and ascertain the nature and significance of the relationship of the project characteristics and organization maturity with project success.
- 3) To determine the role of project characteristics and organization maturity in achieving project success.

2. Project Characteristics

Factors which have the ability to influence the success are of prime importance for the researchers. The main motive behind that is to help project managers to accomplish project success, as discussed



New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

above. These are the critical success factors which can influence the performance of the projects. Project attributes constitute one of the essential dimensions which affects project performance (Belesi and Tukul 1996; Assaf and Al-Hejji 2006; Ozorhon et al. 2007; Khan and Spang 2011). Project characteristics have long been overlooked in the literature. In this study project characteristics e.g. project complexity, project duration, project risks, project technicalities and organization maturity are studied.

2.1. Project Complexity

Projects have different complexity levels and with the passage of time it is becoming more and more complex. This is mainly because of operational interdependencies, diversity of inputs and outputs, and different tasks to produce end product of a project (Baccarini 1996; Azim et al. 2010). In a globalized project environment, multidisciplinary and multicultural teams work together to accomplish project objectives. There is a need to manage unexpected consequences of the actions because of growing volatility and complexity. The new ways of planning, organizing, managing and executing project management methodologies are needed (Thomas and Mengal 2008). It is important to understand project complexity and its influence on project success. Task complexity (complexity of achieving certain task) is not the only reason of project complexity; the product of the project can itself be complex (Hanisch and Wald 2011). Simple projects with no technical proficiency prerequisite can be successfully completed with regular work force having lower technical skills. On the other hand, complex projects require excellent skills level and effective management. The normal systems developed for simple projects have been found to be inappropriate for complex projects (Morris and Hough 1987).

2.2. Project Duration

Tukul and Rome (1998) found that long duration projects have negative influence on project success. They found in their study that the projects with more than 100 activities are not completed on time. Penalties are usually imposed on the organizations if they fail to complete the project on time. For example, Airbus industry paid heavy penalties to the airlines, when they were not able to deliver their newly developed aircraft Airbus A-380 on time. This has not only affected the company in monetary terms but also damaged the goodwill of the company. Therefore it is important to consider the duration of the project especially where the completion on time is the main criterion to evaluate project success.

2.3. Project Risks

Risk is a function of the likelihood of something happening and the degree of losing which arises from a situation or activity. PMBoK defined risk as “an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective” (PMI, 2004). Project risk is any event that may possibly interfere with the successful completion of the project. Risks that is difficult to manage, likely to affect negatively in terms of cost, time, quality and performance (Anderson and Terp, 2006). Generally megaprojects involve a large number of interrelated activities, more stakeholders and more funds are invested and therefore it is expected that the amount of risk will be high. Risk management is considered as a very important area of project management. This is mainly because a project is temporary, unique, and involves uncertainties which expose it to large number of risks. Risk management is particularly important in the planning phase of a project (Zwikael and Ahn, 2010). The objective of risk management is to maximize the potential of success and minimize the probability of future losses (Anderson and Terp,



New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

2006). Zwikael and Ahan (2010) found in their study, where the organizations pay little or no attention to project risk planning, the level of risk is negatively correlated to project success.

2.4. Project Technicality

Many organizations invest in technology to improve organizational performance and to gain competitive advantage (Anantatmula 2008). Projects with high technical specifications require exceptional technical competence and knowledge on complex issues. Innovative and urgent projects which are technically complex are very difficult to manage. They can only be managed successfully with provision of top management support, project manager authority and good communication (Lechler and Grace 2007). Technical knowledge can help in streamlining and standardizing project management processes. Organizations should develop technology systems to meet specific project technological needs.

3. Organization Maturity

Maturity models are used for assessment of the maturity level of an organization. Their origin can be found in the field of total quality management (Cooke-Davies, 2004). Oxford Advance Learner Dictionary (2011) defines maturity as “the quality of thinking and behaving in a sensible, adult manner” or “The state of being fully grown or developed”. This implies that the mature organizations behave in a sensible way to deal with the difficulties. They are better placed in executing their project management processes compared to less mature organizations. Maturity models are widely accepted by the bodies of the project management knowledge (PMI, IPMA), however the evidence of the extent of use and impact of the models is very limited (Brooks and Clark 2009). Pricewaterhouse Coopers (2004) conducted a survey in 30 countries from 200 respondents. They concluded that the higher an organization’s project management maturity is, the greater is the positive impact on overall project performance. Projects become more efficient and effective with the higher maturity levels in an organization. This eventually leads to project success. Higher maturity levels in an organization also provide a competitive advantage in the marketplace. The association of the project management maturity with the organization culture may lead to higher performance (Yazici 2009).

Project management maturity models offer a uniform approach for measuring the maturity level of an organization. They also offer guidelines for improvements (Wheatley, 2007). Project management maturity is a very important component of long term strategic planning. It helps to identify gaps in resources and quality. It also determines the ways to reduce these gaps (Kerzner, 2005). Maturity models provide an approach for continuous improvement in many areas of business (Brooks and Clark 2009). Other researchers (Grant & Pennypacker, 2006; Jugdev & Thomas, 2002; Mullaly, 2006) demonstrate their apprehension regarding a lack of evidence about project management maturity contribution towards organizational success. But there is no evidence that project management maturity provides a competitive advantage to the organization (Mullaly, 2006). These studies unveil the need for further research in project management maturity and exploring its relation with project success.

4. Research methodology

The quantitative method as a research approach is adopted. In order to investigate the influence of project characteristics and organizational maturity on project success, field survey study is conducted. Data is collected through self administered questionnaires and face to face interviews. The data is



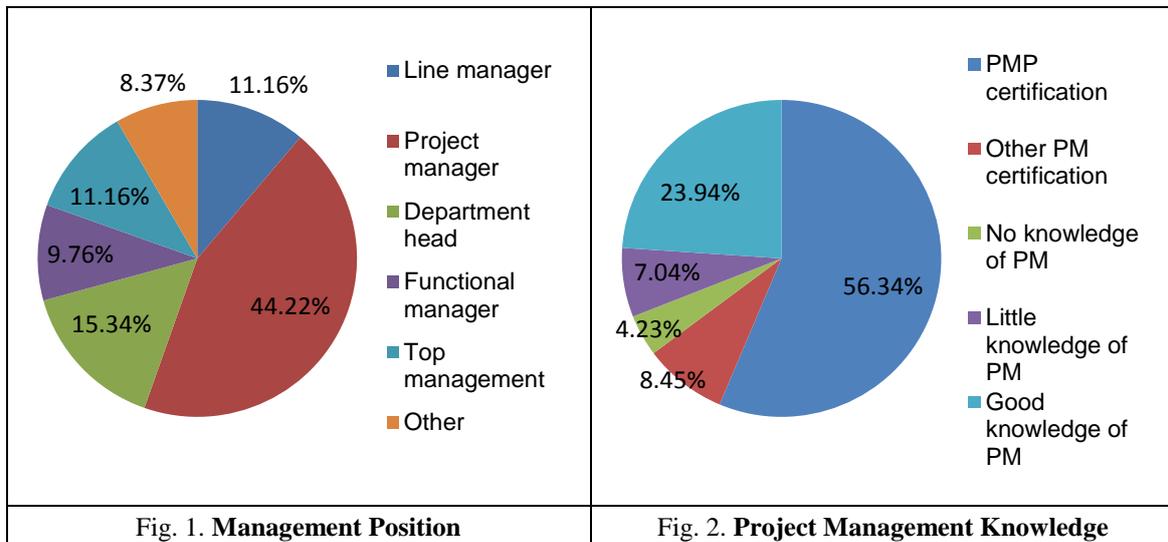
New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

analysed and results are compiled based on the responses from 71 project managers and other higher management officials.

Information about the project characteristics e.g. project duration, budget, technicality, complexity level, and risk level, is acquired directly from the respondents. To obtain information regarding the maturity level of the organization, Capability Maturity Model is used. Five levels of maturity i.e. “initiation”, “repeatable”, “defined”, “managed” and “optimized” were introduced in the questionnaire with brief descriptions. The main purpose of presenting the description of the maturity levels is to provide guidance to the respondents in selecting relevant maturity level. Project success is measured by using the traditional criteria of time, cost and scope, because these have been widely recognized as the three primary goals of project success (Meng 2011). In addition, customer satisfaction (Dvir, 2005, Thomas and Fernandez, 2008) is used as success measure. Customer satisfaction is gaining appreciation by the researchers as an important criterion for measuring success. Average success is used as a fifth indicator to measure success, whereby the average success refers to the delivery of project on time, within budget, according to the specifications and customer satisfaction in the average over all projects (Lechler and Dvir 2010).

Most of the respondents were project managers (43%), department head (15%), functional managers (10%) and other top management officials (11%) in projects (see figure 1). The majority of the respondents were PMP certified (56%). Some hold other project management certification (8%). Almost 24% of the respondents had good knowledge of project management without any project management certification. Only about 11% of the respondents had little or no knowledge about project management (see figure 2).



A correlation study was done to investigate the relation of project characteristics and organization maturity with project success. The Pearson Bivariate Correlation method is used to test the nature and significance of the relation. SPSS version 20 is used to perform the correlation analysis.

5. Research results and discussion

To summaries our findings, correlations among the project characteristics, organization maturity and project success are shown in the table 1. The pearson coefficient ranges from +0.486 to -0.376. These



New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

findings highlight a significant negative relation between project duration and project success (correlation coefficient of -0.276 at significance level of 0.05). As discussed above, long duration projects generally involve a large number of activities. Most of these activities are interdependent which causes delay in the projects. Negative relation is also found between budget of a project and its success; however the relation is not significant (correlation coefficient of -0.075). Project complexity has also shown a significant negative relation with project success (correlation coefficient of -0.363 at significance level of 0.01). This means the higher the complexity level in a project is, the more difficult is to achieve success in the project. For example, consider the diversity in the stakeholder motivation and objectives. The alignment of the impetus and purpose of different project stakeholders with the common project goal is challenging. This leads to the complexity in the social context (Hanisch and Wald 2011) and causes difficulties for the project manager in achieving project success.

Table 1

Correlation matrix

		Success	Project duration	Project budget	Complexity level	Risk level	Technicality level	Risk knowledge	Maturity level
Success	Pearson Correlation Sig. (2-tailed)	1	-0.276* 0.020	-0.075 0.537	-0.363** 0.002	-0.376** 0.001	-0.104 0.388	0.147 0.222	0.486** 0.000
Project duration	Pearson Correlation Sig. (2-tailed)	-0.276* 0.020	1	0.258* 0.030	0.206 0.085	0.106 0.381	-0.136 0.258	-0.035 0.773	-0.109 0.365
Project budget	Pearson Correlation Sig. (2-tailed)	-0.075 0.537	0.258 0.030	1	0.087 0.472	-0.003 0.978	0.069 0.569	0.042 0.730	0.014 0.909
Complexity level	Pearson Correlation Sig. (2-tailed)	-0.363** 0.002	0.206 0.085	0.087 0.472	1	0.529** 0.000	0.368** 0.002	-0.311* 0.008	-0.382** 0.001
Risk level	Pearson Correlation Sig. (2-tailed)	-0.376** 0.001	0.106 0.381	-0.003 0.978	0.529** 0.000	1	0.229 0.054	-0.110 0.360	-0.464** 0.000
Technicality level	Pearson Correlation Sig. (2-tailed)	-0.104 0.388	-0.136 0.258	0.069 0.569	0.368** 0.002	0.229 0.054	1	-0.165 -0.165	-0.367** -0.002
Risk knowledge	Pearson Correlation Sig. (2-tailed)	0.147 0.222	-0.035 0.773	0.042 0.730	-0.311** 0.008	-0.110 0.360	-0.165 0.169	1	0.206 0.084
Maturity level	Pearson Correlation Sig. (2-tailed)	0.486** 0.000	-0.109 0.365	0.014 0.909	-0.382** 0.001	-0.464** 0.000	-0.367** 0.002	0.206 0.084	1

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

The highest negative correlation is found between higher level of project risk and project success (correlation coefficient of -0.376 at significance level of 0.01). This indicates that effective risk management is one of the most important factors for achieving project success. Effective risk management employs a process to identify, evaluate, monitor, and finally control risks. In a recent study, Bakker et al. (2011) demonstrate that some of the project risk management actions may be able to decrease uncertainty. This is mainly because of the increased predictability of the stakeholder's behavior. Risk management planning efforts are effective only when the level of project risk is medium to high (Zwikael and Ahn 2010). Effective risk management can help to reduce the negative impact on project success. The results of the study also show that the prior knowledge of risk has a positive relation with project success (correlation coefficient of +0.147, not significant). The managers who have good knowledge about the nature of the anticipated potential risk will be able to manage it successfully. They will be able to utilize the available information regarding risk. However this is not always convincing.



New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

Information regarding a particular risk does not automatically mean that this information is used for managing those risks (Kutsch and Hall 2005). Bakker et al. (2010) indicated that the knowledge of risks alone is not enough to contribute to project success. Technicalities involved in the project show no significant relationship with project success. The correlation coefficient found in the study expresses slightly negative relation with project success (correlation coefficient of -0.104).

Maturity level of an organization is found to have positive relationship with project success (correlation coefficient of +0.486 at significance level of 0.00). The finding is consistent and aligned with the results of Yazici (2009). Yazici found a significant relationship between project management maturity and business performance. He presented that the outcome of the higher maturity level is “savings” for the organization in terms of time, cost and quality. This provides competitive advantage to the organization and facilitates to increase the market share (Yazici, 2009). It is suggested that the organizations should continue investing in project management maturity to improve their maturity levels. Organizations with higher maturity levels execute advanced risk management planning therefore they are capable of dealing with the risks (Zwikael and Ahn 2010). Organizations should focus on achieving higher maturity level by consistently reviewing their existing processes. They should develop standardized processes to deal with the similar situation. They should continuously update and improve their processes to cope with the new situations. They should consistently improve their processes.

6. Conclusions and recommendations

The aim of this research is to examine and to investigate the correlation of project characteristics and organization maturity with project success. The amount and the significance of the relation are also studied. Findings of the study are aligned with the results of the previous research in this topic. The study recognizes that project characteristics influence the performance of a project. The study identifies the role of project characteristics and organization maturity for achieving project success. It is suggested that the organizations should consider project characteristics during the initiation or planning phase of their projects. Project management methodologies should be adapted based on the type, complexity and duration of the project. The organizations should reduce the project complexity by clarifying the objectives, separating the project into smaller parts and minimizing task interdependencies. They should reduce the potential risks in the projects by mitigating the risks and try to shorten the overall duration of the project in order to avoid uncertainties. The standardization and optimization of the project management processes increase the maturity level of the organization which in turn increases project success.

From a practical standpoint, the findings illuminate the areas which need special attention and support for successful completion of a project. The results have practical implications for the project managers especially when managing big, risky and complex project.

Bibliography

- Anantatmula, V. S., 2008. The Role of Technology in Project Management Performance Model. *Project Management Journal*, 39(1), pp. 34-48.
- Andersen, K., & Terp, A., 2006. Risk Management. In T.J. Andersen (Ed.), *Perspectives on Strategic Risk Management* (pp. 27-45). Copenhagen Business School Press.
- Assaf, S. A., Al-Hejji, S., 2006. Causes of Delay in Large Construction Projects. *International Journal of Project Management*, 24(4), pp. 349-357.
- Azim, S., Gale, A., Wright, T., Kirkham, R., Khan, A., Alam, M., 2010. The importance of soft skills in complex projects. *International Journal of Managing Projects in Business*, 3(3), pp. 387-401.



New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

- Baccarini, D., 1996. The Concept of Project Complexity- A Review. *International Journal of Project Management*, 14(4), pp. 201-204.
- Baccarini, D., 1999. The Logical Framework Method for Defining Project Success. *Project Management Journal*, 30(4), pp. 25-32.
- Bakker, K., Boonstra, A., Wortmann, H., 2011. Risk Management Affecting IS/IT Project Success Through Communicative Action. *Project Management Journal*, 42 (3), pp. 75-90.
- Belassi, W., Tukel, O. I., 1996. A New Framework for Determining Critical Success/Failure Factors in Projects. *International Journal of Project Management*, 14(3), pp. 141-151.
- Brookes, N., Clark, A., 2009. Using Maturity Models to Improve Project Management Practice, *POMS 20th annual conference*, Orlando, Florida, USA.
- Cook-Davies, T., 2002. The Real Success Factors in Projects. *International Journal of Project Management*, 20 (3), pp. 185-190.
- Cooke-Davies, T. J. 2004. Measurement of Organizational Maturity. In D. P. Slevin, D. I. Cleland, & J. K. Pinto (Eds.), Newtown Square, PA: Project Management Institute, *Innovations – Project Management Research*, 2004, pp. 211-228.
- Dvir, D., 2005. Transferring Projects to Their Final Users: The Effect of Planning and Preparations for Commissioning on Project Success. *International Journal of Project Management*, 23, pp. 257-265.
- Freeman, M., Beale, P., 1992. Measuring Project Success. *Project Management Journal*, 23 pp. 8-17.
- Grant, K., Pennypacker, J., 2006. Project Management Maturity: An Assessment of Project Management Capabilities Among and Between Selected Industries. *IEEE, Transactions on Engineering and Management*, 53(1), pp. 59-68.
- Hanisch, B., Wald, A., 2011. A Project Management Research Framework Integrating Multiple Theoretical Perspectives and Influencing Factors. *Project Management Journal*, 42(3), pp. 4-22.
- Jugdev, K., Thomas, J., 2002. Project Management Maturity Models: The Silver Bullets of Competitive Advantage?. *Project Management Journal*, 33(4), pp. 4-14.
- Kerzner, H., 2005. *Using The Project Management Maturity Model* (2nd ed.). Hoboken, NJ: Wiley.
- Khan, R. A., Spang, K., 2011. Critical Success Factors in International Projects. *The 6th IEEE, IDAACS*, Prague.
- Kutsch, E., Hall, M., 2005. Intervening Conditions on the Management of Project Risk: Dealing With Uncertainty in Information Technology Projects. *International Journal of Project Management*, 23, pp. 591-599.
- Lechler, T., Dvir, D., 2010. An Alternative Taxonomy of Project Management Structures: Linking of Project Management Structures and Project Success. *IEEE Transactions on Engineering and Management*, 57(2), pp. 198-210.
- Lechler, T., Grace E., 2007. Successful Management of Highly Innovative and Urgent Projects: Analyzing Project Management Practices to Reveal Strategic Directions. *Management of Engineering and Technology*, Portland International Center for Management of Engineering and Technology, Portland, Oregon, USA.
- Lim, C.S., Mohamed, M. Z., 1999. Criteria of Project Success: An Exploratory Re-examination. *International Journal of Project Management*, 17 (4), pp.243-248.
- Meng, X., 2012. The Effect of Relationship Management on Project Performance in Construction. *International Journal of Project Management*, 30(2), pp. 188-198.
- Morris, P., W.G, Hough, G. H., 1987. *The Anatomy of Major Projects*, John Wiley
- Mullaly, M., 2006. Longitudinal Analysis of Project Management Maturity. *Project Management Journal*, 36(3), pp. 62-73.
- Ozorhon, B., Arditi, D., Dikmen, I., Birgonul, M., 2007. Effect of Host Country and Project Conditions In International Construction Joint Ventures, *International Journal of Project Management*, 25(8) pp. 799-806.



New Challenges of Economic and Business Development – 2013

May 9 - 11, 2013, Riga, University of Latvia

- Project Management Institute, 2004. *A Guide to The Project Management Body of Knowledge (PMBOK® guide)*, Third Edition. Newtown Square, PA.
- Thomas, G., Fernandez, W., 2008. Success in IT projects: A Matter of Definition?. *International Journal of Project Management*, 26 (7), pp. 733-742.
- Thomas, J., Mengel, T., 2008. Preparing Project Managers to Deal With The Complexity – Advanced Project Management Education. *International Journal of Project Management*, 26 (3), pp. 304-315.
- Tukel, O., Rome, W., 1998. Analysis of the Characteristics of Projects in Diverse Industries. *Journal of Operation Management*, 16 (1), pp. 43-61.
- Turner, J. R., 1999. *The Handbook of Project Based Management*, McGrawHill.
- Wheatley, M., 2007. Maturity Matters. *PM Network*, pp 48-53.
- Yazici, H. J., 2009. The Role of Project Management Maturity and Organizational Culture in Perceived Performance. *Project Management Journal*, 40(3), pp. 14-33.
- Zwikael, O., Ahn, M., 2010. The Effectiveness of Risk Management: An Analysis of Project Risk Planning Across Industries and Countries. *Risk Analysis*, 31(1), pp. 25-37.