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Web-based project management influence on project portfolio managers' technical competencies

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Abstract

This paper investigates the impact of the project management modules usage in web based environment and technical competencies of project portfolio managers. Recent studies indicate a large number of project managers' competencies. This study has aim to introduce project portfolio managers' competencies in terms of web based project management tools. A key contribution of this analysis refers to the correlation of project portfolio managers' technical competencies and critical success factors from organizational and project perspective. Standard modules in a web-based project management tools are: resource and project center module, financial management module, time and task management module, collaboration module, risk and issue module, business intelligence and reporting module, portfolio selection and analytics module (strategy module). According to IPMA Competence Baseline, each module has a set of characteristics that represents specific technical competences for project portfolio managers. The research was conducted among 51 project portfolio managers in 51 different organizations from profit, nonprofit and public sector. Data collection instrument was online questionnaire that would provide findings on 4 major segments: 1.technical competencies from an organizational standpoint of view; 2.technical competencies from project standpoint of view, 3.success factors from organizational, project and personal standpoint of view; 4.web based project management modules application. This paper has both theoretical and practical influence on contemporary project management field of knowledge.

Keywords: project portfolio managers, technical competences, web-based project management tools

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1. Introduction

In the last decade the effects of globalization had major implications on information technology. Organizations face the growing needs of the market, and in line with new trends tend to adjust their business approaches. Project management research has shown increased focus on linking competencies and information technologies. From one point of view, the rapid development of mobile technology has an increasing influence on project management approaches. From the other point of view, more sophisticated IT tools help project managers to effectively capture information in all meridians throughout the world.

The term competence derived from Latin, and means jurisdiction, the scope of authority of an institution or person, recognized ability, expertise. "Competences for project management can be defined as a grouping together of the knowledge, aptitudes, attitudes, and behaviors that are needed to carry out a piece of work" (Boyatzis, 1982). Westera (2001) argued that competence is formed from the results of learning, either the individuals' or the organization's. Guerrero & De los Ríos (2012) suggest learning model and competences certification in the project management scope that includes five essential components. Today, in theory and practice, project portfolio management captures the increasing importance. The main idea of this paper is to show the relationship of project portfolio managers' competences and web based project management tools and approaches.

2. Project portfolio management and web based project management approach

Current literature highlights the importance of project portfolio management in evaluating, prioritizing, and selecting projects in line with strategic goals and strategy. Portfolio theory was first introduced by Markowitz (1952) in the area of financial investments as a mechanism for reducing risk. Cooper, Edgett, & Kleinschmidt (1997) describe portfolio management as a dynamic decision making process whereby a list of active projects in the business is constantly updated and revised.

Web-based project management and collaboration tools are the top choice of hundreds of entrepreneurs and thousands of small and medium size businesses. "Web based project management systems are designed to manage and store project information that are used in web-based applications" (Adamsoo, 2010). Palacios-Marqués, Cortes-Grao, & Lobato Carral (2012) emphasize that the project manager must modify the existing key competencies (Pedagogical, Management, Technical and Social competencies) and to develop new ones based on knowledge management to be successful in managing web 2.0 e-learning project. Omidvar et al. (2011) line up core technical competency elements for IT project managers: Implementation, Scheduling, Stakeholder management, Hand over and close out, Information and reporting, Scope management, Change control, Requirement management, Earned value management, Method and procedures.

Web based project management tools integrate knowledge management issues with collaboration tools, focusing on the relationship between employees, project portfolio managers, different stakeholders and top management. Some of the enterprise project management solutions help organizations to effectively manage project portfolios using following modules: Demand Management, Portfolio Selection and Analytics, Resource Management , Schedule Management, Financial Management, Time and Task Management, Team Collaboration, Issues and Risk Management, Business Intelligence and Reporting, Program Management (Enterprise Project Management Solution Guide, 2009). Each module has a set of characteristics that influence on technical project portfolio managers competences (See table 1). Ghasemzadeh & Archer (2000) analyzed difficulties associated with project portfolio selection result from several factors: As first there are multiple and often conflicting objectives and some of the objectives may be qualitative; as second uncertainty and risk can affect projects and the selected portfolio may need to be balanced in terms of important factors, such as risk and time to completion; as third some projects may be interdependent.

Table 1. Web based project management modules characteristics

Web based project management modules	Characteristics
1. Demand Management	• Integrates project proposals, portfolio analysis, and project management • Captures all work proposals in one place • Guides the proposals through a multistage governance process • Helps users make decisions about which proposals to approve • Tracks progress on project execution until the work is completed
2. Portfolio Selection and Analytics	• Define, communicate, and prioritize business strategy • Score and assess competing requests from multiple dimensions • Run what-if analysis optimization scenarios under various budgetary constraints • Compare and contrast portfolios and gain insight through advanced analysis such as Efficient Frontier modeling • Assess capacity and adjust project schedules to maximize resource utilization across the planning horizon • Run and model headcount scenarios
3. Resource Management	• Consistent definition of resources - resource pool • Assess resource availability across multiple projects - resource capacity • Ability to “drill down” to view resource utilization
4. Schedule Management	• Create and update schedules from the desktop or online • Effectively control and analyze schedules • Easily communicate schedule information
5. Financial Management	• Standardizing cost and benefit estimates • Project accounting and change management • Financial visibility and insights • Integration with LOB (line of business) systems
6. Time and Task Management	• Time capture and project progress reporting • Report working and nonworking time • Capture projects, operations, and administrative time • Recurring time periods • Integrate with LOB systems
7. Team Collaboration	• Provide a central location for team collaboration • Effectively manage a variety of content • Simplify and enhance team communication
8. Issues and Risk Management	• Define a standard way to assess risk for new initiatives • Standardize project risk collection and management • Establish proper issue resolution and escalation
9. Business Intelligence and Reporting	• Standard metrics for measuring performance • Create Reports and Build Powerful Dashboards • Create Sophisticated Reports
10. Program Management	• Capture, Prioritize, and Select Programs • Clarifying program and project controls to improve efficiency • Program Delivery

3. Project portfolio manager competencies

Crawford (2005) suggest different perceptions and expectations of project management competence between project managers and their supervisors, senior management. His integrated model of competence identifying components of the overall construct consist competences in two areas: performance based inference of competence (the ability to perform activities within the occupational area to the level of performance expected in employment) and attribute based inference of competence (the knowledge and understanding, skills and abilities that person bring to a job; the core personality characteristics underlying a person's capability to do a job). Patanakul (2013) emphasize the competencies of multiple-project managers in terms of multitasking and multi-team management were found to contribute to following dimensions of effectiveness: project performance and the learning of project managers. Martinsuo & Lehtonen (2007) analyzed 279 firms and find out that project management efficiency is positively related to portfolio management efficiency.

Also Patanakul (2013) indicates that project manager assignment and sufficient resource allocation contribute to improved project performance; and management of the interdependence between projects contributes to project manager learning. Ortiz-Marcos, et al. (2013) find out that the most highly scored performance competences are those related to the definition and management of the scope, integration management, and communication management, if adequate coordination and decision making are to be achieved at every project stage. Edvardsson, et al. (2013) in their research highlighted an interaction effect between integrated development teams and customer co-creation, which means that project managers should focus on individual competencies on the development team and how they interact with customers throughout the new service development process.

In the context of project management there are several international standards. The Project Management Institute (PMI) standard, Project Manager Competency Development Framework (2007), establishes three competence areas for a project manager: knowledge, performance, and personal. The standards are divided in nine areas of project management knowledge: integration, scope, time, cost, quality, human resource, communication, risk, and procurement management. Personal competences are divided into five areas: results-oriented, customer-oriented, impact and influence, management capability, and personal efficiency. The International Project Management Association (IPMA) defines 46 competence elements, covering the technical competence for project management - 20 elements, the professional behaviour of project management personnel - 15 elements and the relations with the context of the projects, programmes and portfolios - 11 elements (ICB: IPMA Competence Baseline, 2006). The Australian Institute of Project Management (AIPM) (2008) has developed a competence standard for project management, drawn up in collaboration with the private sector under the supervision of the Australian National Training Authority (ANTA). This model classifies competences into the same nine Knowledge Areas as what is defined in PMI standard. The Engineering Advancement Association of Japan (ENAA) and the Project Management Competency Centre (PMCC) published a Project Program and Management Standard called P2M. As they noted "there is need for capability to effectively solve complex problems and manage projects and programs to promote value creation activities" (A Guidebook for Project and Program Management for Enterprise Innovation - P2M, 2001).

4. Research

The research was conducted among 51 project portfolio managers in 51 different organizations from profit, nonprofit and public sector, and focus was on technical competencies according to IPMA Competence Baseline 3.0. Data collection instrument was online questionnaire that would provide findings on 4 major segments: 1.technical competencies from an organizational standpoint of view; 2.technical competencies from project standpoint of view, 3.success factors from organizational, project and personal standpoint of view; 4.web based project management modules application. IPMA Competence Baseline 3.0 identify 20 technical competences: Project management success, Interested parties, Project requirements and objectives, Risk and opportunity, Quality, Project organization, Teamwork, Problem resolution, Project structures, Scope and deliverables, Time & project phases, Resources, Cost & finance, Procurement & contract, Changes, Control & reports, Information & documentation, Communication, Start-up, Close-out.

According to IPMA Competence Baseline 3.0 - technical competences and Web based project management tools the key hypothesis are:

1st Hypothesis: "The usage of web-based project management tools has a positive impact on project portfolio management success"
2nd Hypothesis: "The usage of web-based project management tools has a positive impact on technical competences of project portfolio managers"

4.1. Methodology

Data collection tool was questionnaire consisted of both independent and dependent variables. Independent variables were personal data of respondents: information about sex, work experience, education and position in organizational hierarchy. Dependent variables were data related to web module in organizations, obtained from the questionnaire consisted of 19 questions that offered answers evaluation from 1 (without influence) to 5 (very high influence). Representative sample consisted of 51 project managers from companies in various sectors – profit, nonprofit and public sector. Respondents were project managers of the projects of various complexities in term of size (total investment), communication complexity (the number of the people that are actively involved in the project, geographical/temporal distribution of the project activities and cultural distribution of the project team), project risks (low, medium or high), development methodology (based on lifecycle model) and their responsibilities and authorities dependent of position in organizational hierarchy.

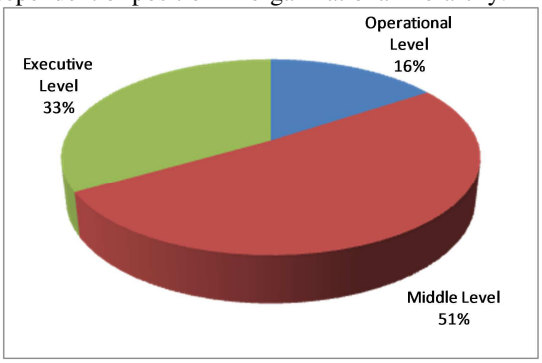

Figure 1. The percentage of respondents on each management level

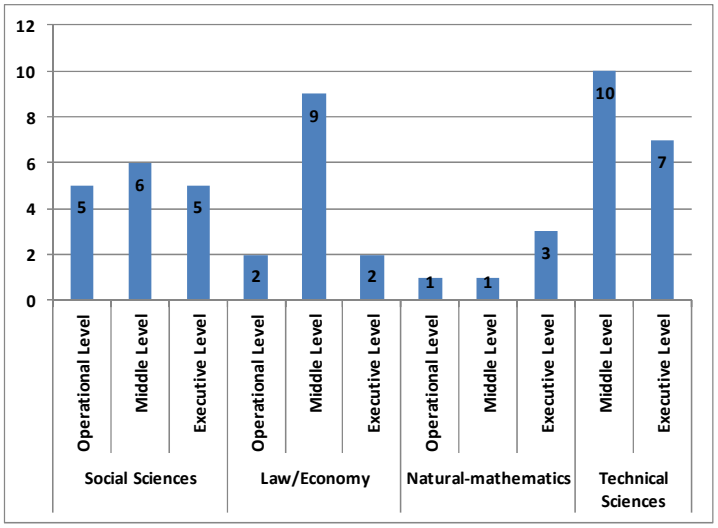

Figure 2. Field of study by management levels

Structure of respondent's position in organizational hierarchy was the following: 33% from executive management level, 16% from operational management level and 51% from middle management level (see Figure 1). The total number of middle level managers is the same as the total number of managers who are in other two management levels together. Furthermore, by proceeding our statistical analysis on the field of study by management levels in the sample, we can notice that the largest number of respondents on the middle management level is from the field of Law/Economy and Technical Sciences. The lowest number of participants is from the field of natural-mathematics.

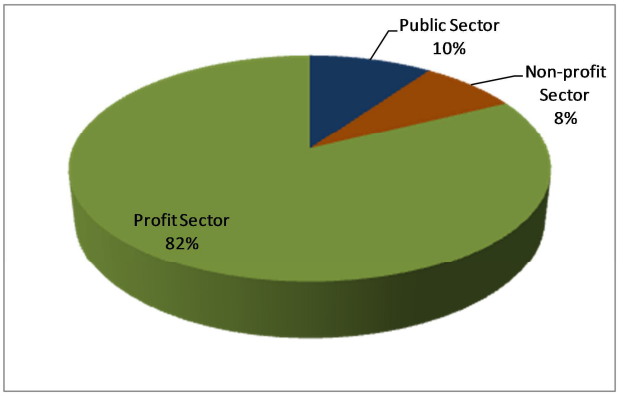

Figure 3. The percentage of respondents for each sector

The analysis includes participant from three sectors. The total number of participants from profit sector is the largest group in sample structure. The other two sectors have almost the same percentage of participants in the sample.

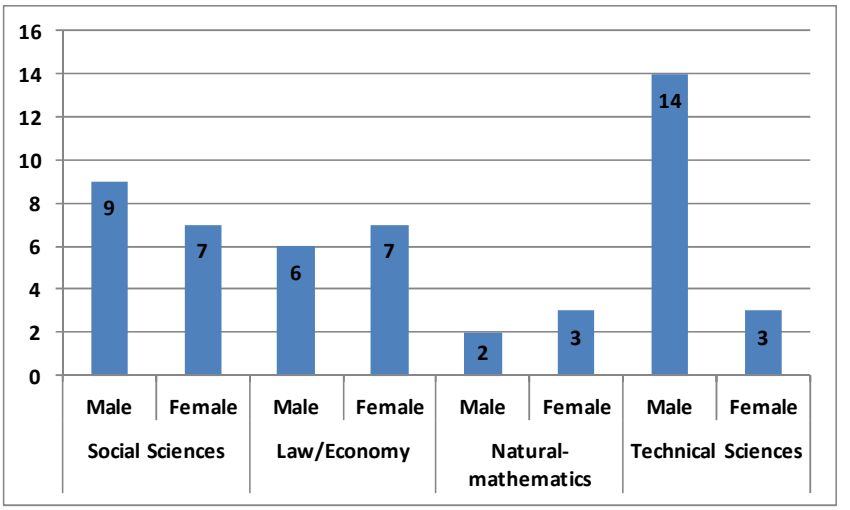

Figure 4. Field of study by gender

Figure 4. show that the total number of respondents with background in technical sciences is greater than the total number of respondents with background in other fields. The number of male respondents in the field of technical sciences and social sciences is considerably larger than female respondents in the same fields. Furthermore, the total number of female respondents is slightly greater in Law/Economy and natural-mathematics.

4.2. Findings and discussion

Testing first hypothesis "The usage of web-based project management tools has a positive impact on project portfolio management success" showed positive impact of all modules on project management success (total average value is 3.63). Financial Management module is the highest ranked with score of 3.94, and the lowest is Portfolio Selection and Analytics module with score of 3.24. Beside the average value for Portfolio Selection Analytics module, only Business Intelligence module also has the average value below the total average value of all modules. Portfolio Selection and Analytics and Business Intelligence and Reporting modules have the highest standard deviation.

Table 2. Influences of the project management web modules on project management success

Project Management Modules	Average	Standard Deviation	Variance
[Project and Resource Center]	3.705882353	0.782153889	0.611764706
[Time and Schedule Management]	3.784313725	1.006254948	1.01254902
[Financial Management]	3.941176471	0.759256602	0.576470588
[Business Intelligence and Reporting]	3.294117647	1.188177052	1.411764706
[Collaboration]	3.784313725	0.878947677	0.77254902
[Portfolio Selection and Analytics]	3.235294118	1.193117518	1.423529412
[Risk Management]	3.647058824	0.867721831	0.752941176

Total Average	**3.62745098**
Total Standard Deviation	**0.264281917**
Total Variance	**0.069844931**

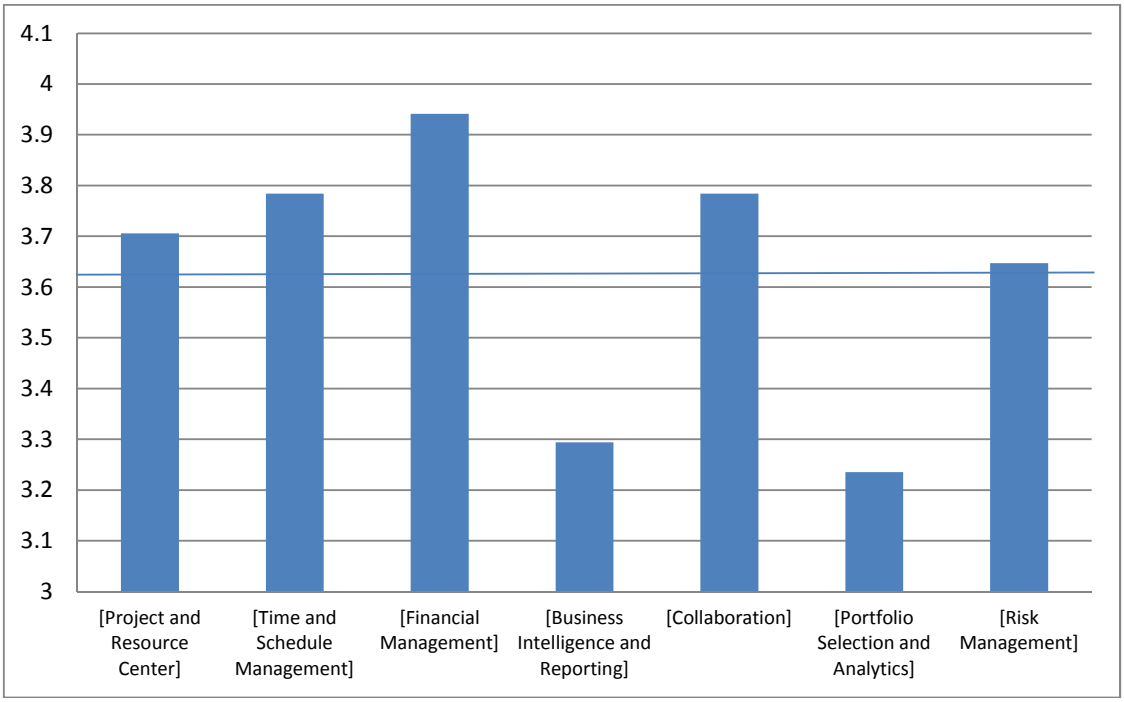

Figure 5. Influences of the following web modules on project management success

Testing second hypothesis "The usage of web-based project management tools has a positive impact on technical competences of project portfolio managers" showed positive influence of web based project management tools on technical competencies (total average of the web tools influence on technical aspects of project management is 3.72). Some modules are more affected according to the sample - Resource Management with score of 4.29 and Financial Management with score of 4.26. Respondents' assessment showed that Information and Documentation had the lowest value with score of 3.08. Also, Information and Documentation has a highest standard deviation with score of 1,39.

Table 3. The influence of web tools on the technical aspects of project management

Technical competences	Average	Standard Deviation	Variance
[Teamwork]	3.96078431	0.598691383	0.35843137
[Solving problems]	4.07843137	0.913085697	0.83372549
[Defining project structure]	3.70588235	0.922910996	0.85176471
[Project scope and results]	3.47058824	0.966497619	0.93411765
[Project time and schedule assessment]	3.52941176	1.064949598	1.13411765
[Resource Management]	4.29411765	0.609725107	0.37176471
[Financial Management]	4.25490196	0.594748258	0.35372549
[Procurement and Contracts]	3.41176471	1.061630267	1.12705882
[Change Management]	4.01960784	0.812162449	0.65960784
[Project initialization and Project closure]	3.1372549	1.095803045	1.20078431
[Information and Documentation]	3.07843137	1.397757307	1.95372549

Total Average	**3.72192513**
Total Standard Deviation	**0.42858441**
Total Variance	**0.1836846**

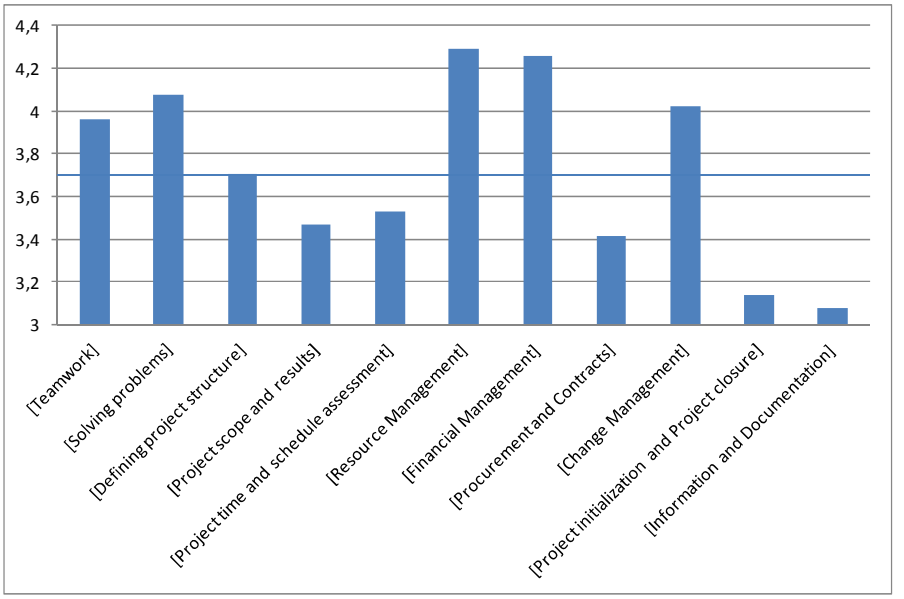

Figure 6. The influence of web tools on the technical aspects of project management

Project portfolio managers are familiar with critical success factors. Their responses show that most of them always consider success factors during the project implementation phase. The correlation between critical success factors and web modules influence on project management success by sectors is positive with correlation coefficient score of 0,7 (See Table 4. and Table 5).

Table 4. The average value of responses regarding to the Influence of the various web modules on project management success by sectors

Influences of the various web modules on project management success:	Public Sector	Non-profit Sector	Profit Sector
[Project and Resource Center]	3.2	3.75	3.76
[Time and Schedule Management]	4.2	3.5	3.76
[Financial Management]	4	3.25	4
[Business Intelligence and Reporting]	2.4	4	3.33
[Collaboration]	3.4	3.75	3.83
[Portfolio Selection and Analytics]	3.6	3.75	3.14
[Risk Management]	3.4	3.75	3.67

Table 5. Correlation between the average value of critical success factors and the average value of influences of the various web modules on project management success

	How often are critical success factors defined in the projects via web platform?	Influences of the various web modules on project management success
Public Sector	4	3.46
Non-profit Sector	4.25	3.68
Profit Sector	4.64	3.64
	Correlation Coefficient	**0.7**

5. Conclusion

In today's business environment, development of project portfolio management has a bigger influence on different business areas in organization. Effective portfolio management is essential for the new product development. Creating a balance between priorities and available resources, the desire and opportunity, short-term and long-term goals, specific methods and techniques, project portfolio managers seeks to make the right decision. In last two decades project portfolio management is gaining in importance, and therefore the competence of project portfolio managers is more crucial for organizations. The research that is presented in this paper referred to the 51 project portfolio managers from 51 different organizations from profit, nonprofit and public sector. Results showed positive correlation and impact between web based project management tools and project portfolio managers' technical competences. Potential benefits from this research are divided in three segments. The first emphasizes the proper selection and training of project portfolio managers; second emphasizes better understanding of all business areas in the company, and third highlights better project portfolio analysis and strategy implementation.

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