

An Empirical Study on Project Management Maturity in Human Resources^{*}

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The assessment of the Project Management Maturity (PMM) level shows the company how good it is at managing projects. This measurement can be performed in different domains of expertise. In the article, the issue of PMM in the human resources (HR) area is examined. The discussion is based on a world-wide empirical research project conducted in more than 400 companies. The study was mostly focused on the machinery industry as there is a dearth of research on project management topics in this branch of the economy. Therefore, by investigating the PMM level in the HR area, a picture of the state of project management in the machinery industry will be created. For the purposes of comparison, a study was conducted on the construction (CONS) and information technology (IT) industries which, in contradistinction, are very well recognized in the scientific literature related to project management issues. This approach will help to better contextualize and understand the results from the machinery industry. The PMM level measurement was done using the author's model which assesses maturity on a scale of one to five, where one is the lowest and five, the highest level of maturity. The results of the study revealed that there were differences between the industries in PMM levels and between Polish and foreign companies.

Keywords: Project management maturity (PMM), human resources (HR), assessment, level, machinery, construction (CONS), information technology (IT), empirical study.

Introduction

Human resource management (HRM) is of high importance for companies doing business (Becker & Huselid, 2006). People in projects are a key asset and require special attention (Adler, Heckscher, & Prusak, 2011; Spalek, 2011). The Project Management Maturity (PMM) concept is used to measure how good the company is in managing projects (Kerzner, 2004; Spalek, 2014). There are different models of assessing the level of PMM in various areas of investigation (Cooke-Davies, 2007; Crawford, 2006). However, the vast majority of them assess the PMM in each area separately, including human resources (HR) (Pemsel & Wiewiora, 2013). One notable exception is the Organizational PMM Model (OPM3[®]), which measures maturity against a comprehensive list of best practices (Ghorbanali, Khosravi, Afshari, Borzabadi, & Valipour, 2011).

The discussion in the paper is based on a world-wide empirical study conducted in three types of industries: machinery, CONS, and IT. The investigation was carried out on more than 400 global companies.

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The main focus of the study was intentionally on machinery industry companies. This was as the result of a literature review on project management related topics (Blomquist, Hallgren, Nilsson, & Soderholm, 2010; Kwak & Anbari, 2009). It revealed that there was a plethora of studies in the CONS and IT industries (Carcary, 2011; Dantes & Hasibuan, 2010; Kang, O'Brien, & Mulva, 2013; Kmiecik, Michna, & Meczynska, 2012; Pinter & Psunder, 2013; Pretorius, Steyn, & Jordaan, 2012; Spalek, 2013; Willis & Rankin, 2012), while there was a significant shortage of investigations into machinery industry companies.

Therefore, the article research question is: What is the PMM level of machinery industry companies in relation to their CONS and IT counterparts?

PMM and HR

The concept of assessing PMM was developed based on the Capability Maturity Model (CMM) which was proposed for software development purposes (Twaites, Collofello, & Zenzen, 2004). Then, building on this idea, further PMM models were developed for different purposes (Belt, Oiva-Kess, Harkonen, Mottonen, & Kess, 2009; J. Y. Lee, D. Y. Lee, & Kang, 2007; SCAMPI, 2006; Spalek, 2012). Their applications vary between industries (Khoshgoftar & Osman, 2009). Moreover, their scopes of measurement can be different (Wendler, 2012). At the moment of writing, there are several PMM models supported by various authors and by organizations (OGC, 2006; PMI, 2008). The majority of them address HRM issues very carefully. This is due to the importance of highly skilled workers in projects nowadays. Their experience, knowledge, and practical abilities are crucial for successful project execution. Therefore, it is desirable that the company possesses a system to measure the performance of project managers as part of an overall employee assessment system and operates a formal program of training and development for those taking part in projects (Kuprenas, Madjidi, & Alexander, 1999). In order to assign competent people to their projects, the company is advised to provide various career paths for individuals having different functions in projects. This should result in designating competent people to their project endeavors. Moreover, the technical skills of people involved in projects should be assessed using a formal system of measurement to ensure that the people assigned to projects have adequate competencies to fulfill their roles.

Furthermore, the development of professional project managers and team members ought to be ensured through established procedures in the company. As a result, those holding chosen positions in a project should be provided with training on project management.

By endorsing membership in communities related to project management, the company can raise the overall awareness level on the importance of exchanging knowledge between the individuals involved in projects.

As soft skills are of high importance in managing projects nowadays, project managers should be given training in them (Stevenson & Starkweather, 2010).

The result of all activities related to project managers should be an increase of their competencies in (Isik, Arditi, Dikmen, & Birgonul, 2009):

- project initialization;
- project planning;
- project execution;
- project control and monitoring;
- project conclusion;

- project communication;
- leadership;
- cognition (e.g., adequate information processing and application);
- effective project management.

Other than business related issues, project managers are well advised to be acquainted with the code of ethics (Badiru, 2009).

The most mature project management companies are recommended to continuously search for areas of improvement through the processes associated with (Andersen & Vaagaasar, 2009; Vrincut, Deac, Badea, & Raicu, 2013):

- HR allocation;
- teamwork;
- recruitment;
- staff development.

All activities undertaken by the company in the HR area are highly significant in the multi-project environment in which the implementation of project management office is strongly advised (Aubry & Hobbs, 2011; Spalek, 2012).

Research Method

The empirically grounded research on PMM was conducted using a web-based survey. The format of the questionnaire ensured the gathering of valid data from a large number of respondents (Spalek & Zdonek, 2011). The companies participating in the study were from over 20 countries, with the majority from the European Union and North America. Some of them were from the Middle East and Asia & Pacific areas. The companies were reached through direct mailing, industrial internet forums, and advertisements at trade fairs. After thoroughly analyzing all the gathered questionnaires, 447 of them qualified for further data analysis and discussion. The division into the branches is shown in Figure 1.

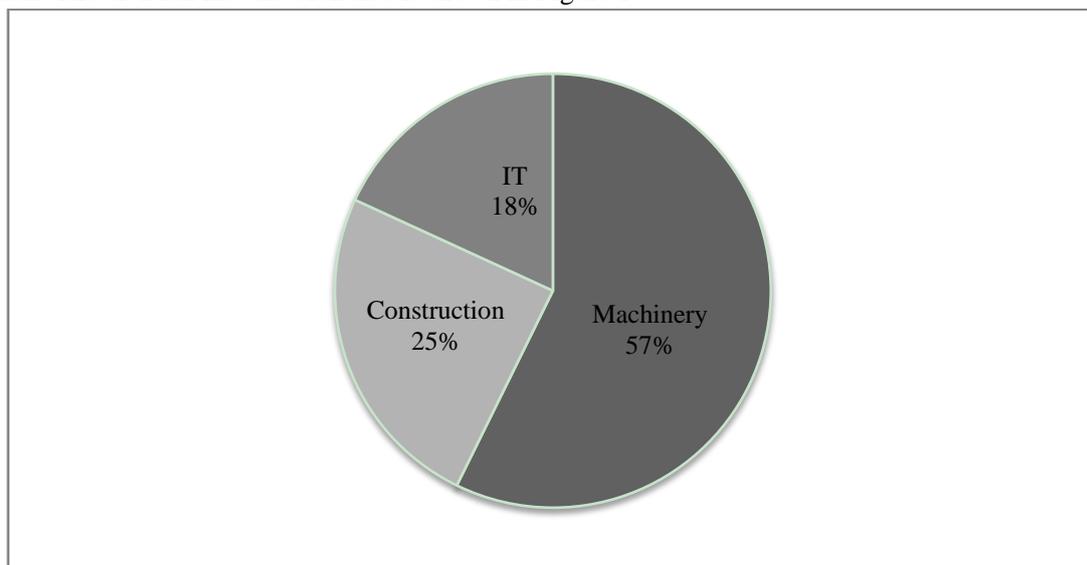


Figure 1. Companies participating in the study by industry.

The assessment of the PMM level was done using the author's model which measures maturity in the following areas:

- methods and tools;
- HR;
- project environment;
- project knowledge management.

In the model, the assessment is done in each area separately. In this article, the discussion is limited to the HR area only.

The results from the PMM assessment are on a scale of one to five, where one represents the lowest and five, the highest level of maturity. They are named accordingly: initial, standardized, appliance, system management, and self-improvement.

In order to better investigate the maturity levels, only the data from companies employing more than 49 people were chosen for further discussion. Such companies numbered 429. Slightly more than half of them were Polish companies. The final data sample, divided into industries, consisted of 126 machineries (IND), 61 CONS, and 40 IT companies.

Results and Discussion

Cronbach's Alpha tests (see Table 1) were applied to check data reliability, reaching values over 0.8.

Table 1

Reliability Statistics of Polish (POL) and Foreign (Other) Companies

Country	Cronbach's alpha
POL	0.880
OTHER	0.867

The descriptive data analysis shows that the highest dispersion of data is in foreign IT companies and is slightly lower for the POL CONS industry, while the lowest dispersion is noted for foreign CONS firms and fractionally higher for the POL IT sector. The POL and foreign machinery companies reported nearly the same, middle dispersion.

The 5th level of maturity (the highest) was reached by foreign machinery and IT companies only. The other groups reported the 3rd level as being the highest, while POL IT entities reached only the 2nd level. Each group of POL companies and foreign IT ones reported the 1st level of maturity (the lowest), while other foreign ones showed the 2nd level as being the minimum.

Detailed descriptive statistics of each group of companies are shown in Table 2.

It is remarkable that all POL IT companies reached only the 1st or 2nd level of PMM in the HR area, while above 80% of foreign ones reported the 3rd or 4th level. Moreover, nearly 10% of foreign IT firms showed the highest level of maturity. This observation shows that foreign IT companies are investing much more in the HR area than POL ones and, therefore, that can negatively impact on the competitiveness of the latter ones over time.

Above 90% of the POL machinery industry companies reported only the 1st or 2nd level maturity, while 98% of foreign ones reached the 2nd or 3rd level. The result for POL companies which reached the lowest "initial" level of maturity means that there are no project management practices at all and, in the short term, it

must be increased, otherwise it will be very hard for them to compete with foreign ones.

Table 2.

Detailed Descriptive Statistics of POL and Foreign (Other) Companies by Industry: Machinery (IND), CONS, and IT

		IND	CONS	IT
POL	Mean	1.83	1.92	1.83
	Median	2	2	2
	Std. Deviation	0.56	0.71	0.38
	Minimum	1	1	1
	Maximum	3	3	2
OTHER	Mean	2.5	2.08	3.17
	Median	2	2	3
	Std. Deviation	0.6	0.28	0.8
	Minimum	2	2	1
	Maximum	5	3	5

The biggest similarities were between POL and foreign CONS companies. In both cases more than 90% reported the 2nd and 3rd levels. This shows that in most instances, they apply project management practices; however, there is still room for improvement.

Detailed information on the frequencies of reaching each level of PMM maturity is shown in Tables 3 and 4.

Table 3

PMM Level in Foreign Companies by Industry

Industry	PMM level				
	1	2	3	4	5
Machinery	0%	53.57%	44.64%	0.00%	1.79%
Construction	0%	91.84%	8.16%	0.00%	0.00%
IT	2%	7.32%	70.73%	9.76%	9.76%

Table 4

PMM Level in POL Companies by Industry

Industry	PMM level				
	1	2	3	4	5
Machinery	23.02%	67.46%	9.52%	0.00%	0.00%
Construction	30%	49.18%	21.31%	0.00%	0.00%
IT	18%	82.50%	0.00%	0.00%	0.00%

It is remarkable that a significant number (18%-30%) POL companies reported the lowest “initial” level of PMM in the HR area which, in fact, means that in those companies, the projects are managed in a chaotic way which is far from systematic project management. The way of managing projects depends only on the abilities of individuals, which are neither checked nor controlled. Therefore, the uncertainty of such endeavors is relatively high and to put it more under their control, companies should undertake to increase their maturity first to level two and then upwards. This approach can be observed in foreign companies. In this group, no machinery or CONS company reported the 1st level of PMM maturity, and in IT, it was a negligible figure of 2%. Moreover, 8%-71% of them attained the 3rd level of maturity, with the leader in IT, which additionally

showed nearly 10% on levels four and five.

The results of the study show that, in general, the foreign companies reported the higher maturity levels in each industry; However, the biggest difference of one level was reported in IT and the lowest, in CONS ones, where it was nearly the same. Around a 1/2 maturity level was observed in the machinery industry. Moreover, there were no major differences between industries in POL companies. They reached an overall 2nd mean level of PMM maturity in HR. In foreign companies, the variety of maturity levels was greater. The most mature were from the IT branch, then machinery and finally CONS.

In both POL and foreign companies, the leaders seem to be IT; However, to a different extent. They are establishing new approaches to HRM and the other industries are following suit.

Figure 2 shows the overall differences in mean maturity level by industries in POL and foreign companies.

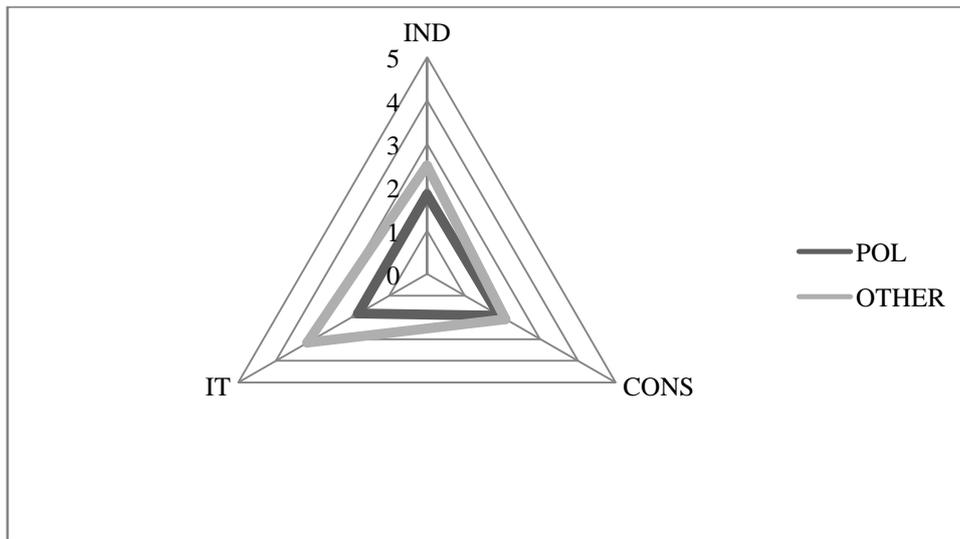


Figure 2. The overall comparison of mean maturity between POL and Foreign (Other) companies by industry: machinery, CONS, and IT.

Conclusions

The world-wide study on PMM revealed that there were differences in PMM levels in the HR area between POL and foreign companies. The mean PMM level of the latter ones was higher than that of the former. However, the biggest difference was in IT. Moreover, the comparison between industries shows that IT is a leading industry in PMM in HR. That means that in IT, especially in foreign companies, the understanding of the importance of people in projects is higher. The other branches placed a lower emphasis on staff-related issues. They probably underestimate the role of the workers in project success. For them, it is more important to invest in methods, tools, and techniques than in HR. This approach, which was adequate during the industrialization age, is no longer sufficient nowadays. Currently, success in managing projects, and therefore by the entire company, is mostly related to the skilled workers. However, their skills should not be limited to technical knowledge. The approach to HRM should go beyond the traditional, technical approach and relate to different activities, including soft skills trainings and career paths. As a result, the PMM level in the HR area will increase which will be profitable for the entire company.

References

- Adler, P., Heckscher, C., & Prusak, L. (2011). Building a collaborative enterprise. *Harvard Business Review*, 89(7-8), 94-105.
- Andersen, E. S., & Vaagaasar, A. L. (2009). Project management improvement efforts-creating project management value by uniqueness or mainstream thinking? *Project Management Journal*, 40(1), 19-27.
- Aubry, M., & Hobbs, B. (2011). A fresh look at the contribution of project management to organizational performance. *Project Management Journal*, 42(1), 3-16.
- Badiru, A. B. (2009). Project management code of ethics and professional conduct. Boca Raton, FL, USA: CRC Press, Taylor & Francis Group.
- Becker, B. E., & Huselid, M. A. (2006). Strategic human resources management: Where do we go from here? *Journal of Management*, 32(6), 898-925.
- Belt, P., Oiva-Kess, A., Harkonen, J., Mottonen, M., & Kess, P. (2009). Organisational maturity and functional performance. *International Journal of Management and Enterprise Development*, 6(2), 147-164.
- Blomquist, T., Hallgren, M., Nilsson, A., & Soderholm, A. (2010). Project-as-practice: In search of project management research that matters. *Project Management Journal*, 41(1), 5-16.
- Carcary, M. (2011). *A design science approach to development of the IT capability maturity framework (IT CMF)*. Nr Reading: Academic Conferences Ltd..
- Cooke-Davies, T. (2007). Project management maturity models. In P. W. G. Morris, & J. K. Pinto (Eds.), *Wiley guide to managing projects* (pp. 1234-1255). Hoboken, N.J., USA: John Wiley & Sons.
- Crawford, J. K. (2006). The project management maturity model. *Information Systems Management*, 23(4), 50-58.
- Dantes, G. R., & Hasibuan, Z. A. (2010). Strategical and tactical impact on ERP implementation: Case study on ERP implementation in Indonesia. Proceedings of 15th International Business Information Management Association Conference. Cairo, Egypt.
- Ghorbanali, A., Khosravi, S., Afshari, H., Borzabadi, M., & Valipour, M. (2011). Improving project management competency by using an OPM3 approach. In S. Juan (Ed.), *Economics, business and management* (pp. 166-170). Singapore: Int Assoc Computer Science & Information Technology Press-Iacsit Press.
- Isik, Z., Arditi, D., Dikmen, I., & Birgonul, M. T. (2009). Impact of corporate strengths/weaknesses on project management competencies. *International Journal of Project Management*, 27(6), 629-637.
- Kang, Y., O'Brien, W. J., & Mulva, S. P. (2013). Value of IT: Indirect impact of IT on construction project performance via Best Practices. *Automation in Construction*, 35, 383-396.
- Kerzner, H. (2004). *Project management best practices: Achieving global excellence*. Hoboken, N.J.: John Wiley & Sons.
- Khoshgoftar, M., & Osman, O. (2009). *Comparison of maturity models*. New York: IEEE.
- Kmieciak, R., Michna, A., & Meczynska, A. (2012). Innovativeness, empowerment and IT capability: Evidence from SMEs. *Industrial Management & Data Systems*, 112(5-6), 707-728.
- Kuprenas, J. A., Madjidi, F., & Alexander, A. S. (1999). A project management training program. *Journal of Management in Engineering*, 15(6), 47-55.
- Kwak, Y. H., & Anbari, F. T. (2009). Analyzing project management research: Perspectives from top management journals. *International Journal of Project Management*, 27(5), 435-446.
- Lee, J. Y., Lee, D. Y., & Kang, S. W. (2007). An overview of the business process maturity model (BPMM). *Advances in Web and Network Technologies, and Information Management*, 4537, 384-395.
- OGC. (2006). *PRINCE2 maturity model (Version 1.0)*. London, UK: Office of Government Commerce.
- Pemsel, S., & Wiewiora, A. (2013). Project management office a knowledge broker in project-based organisations. *International Journal of Project Management*, 31(1), 31-42.
- Pinter, U., & Psunder, I. (2013). Evaluating construction project success with use of the m-topsis method. *Journal of Civil Engineering and Management*, 19(1), 16-23.
- PMI. (2008). *Organizational project management maturity model (OPM3®), knowledge foundation* (2nd ed.). Newtown Square, P.A., USA: Project Management Institute.
- Pretorius, S., Steyn, H., & Jordaan, J. C. (2012). Project management maturity and project management success in the engineering and construction industries in Southern Africa. *South African Journal of Industrial Engineering*, 23(3), 1-12.
- SCAMPI. (2006). *Standard CMMI appraisal method for process improvement (SCAMPISM): Method definition document*. Retrieved from <http://www.sei.cmu.edu/library/abstracts/reports/06hb002.cfm>

- Spalek, S. (2011). *A modern approach to managing projects*. Zilina, Slovak: EDIS University Publishing House.
- Spalek, S. (2012). Reaching maturity through project-based learning. Proceedings of *the Management, Knowledge and Learning International Conference 2012*. Celje, Slovenia.
- Spalek, S. (2012). The role of project management office in the multi-project environment. *International Journal of Management and Enterprise Development*, 12(2), 172-188.
- Spalek, S. (2013). Improving industrial engineering performance through a successful project management office. *Inzinerine Ekonomika-Engineering Economics*, 24(2), 88-98.
- Spalek, S. (2014). Does investment in project management pay off? *Industrial Management & Data Systems*, 114(5).
- Spalek, S., & Zdonek, D. (2011). The issues connected with carrying out research on project management using a web-based survey approach. *Management and Production Engineering Review*, 2(1), 40-46.
- Stevenson, D. H., & Starkweather, J. A. (2010). PM critical competency index: IT execs prefer soft skills. *International Journal of Project Management*, 28(7), 663-671.
- Twaites, G., Collofello, J., & Zenzen, F. (2004). The CMMI—More than just process. Proceedings of the *Tenth ISSAT International Conference on Reliability and Quality in Design*. Las Vegas, Nevada, USA.
- Vrincut, M., Deac, V., Badea, F., & Raicu, I. (2013). Project management improvement possibilities for it projects. Proceedings of the *12th International Conference on Informatics in Economy (IE 2013), Education, Research & Business Technologies*. Bucharest, Romania.
- Wendler, R. (2012). The maturity of maturity model research: A systematic mapping study. *Information and Software Technology*, 54(12), 1317-1339.
- Willis, C. J., & Rankin, J. H. (2012). Demonstrating a linkage between construction industry maturity and performance: A case study of Guyana and New Brunswick. *Canadian Journal of Civil Engineering*, 39(5), 565-578.