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Procedia Economics and Finance 30 (2015) 522 – 530

Procedia Economics and Finance

www.elsevier.com/locate/procedia

3rd Economics & Finance Conference, Rome, Italy, April 14-17, 2015 and 4th Economics & Finance Conference, London, UK, August 25-28, 2015

Improving project management performance through capability maturity measurement

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Abstract

Nowadays, more and more organisations change their organisational culture towards project orientation. There is a big challenge for each organisation to continually improve its project management processes to increase quality of outputs and satisfaction of customers. Measuring project management implementation maturity can assist in this effort by providing a valuable framework for performance improvement. In this article, we aim to provide results of the research performed in the ICT sector in Slovakia using a standardised methodology. Results of the research show that typically, ICT companies in Slovakia have a standardised project management methodology in place and try to improve their project management processes. However, there is quite a big space for improving their attitude towards continual improvement. In the article, factors of insufficient performance in several areas are being analysed and solutions are being proposed to minimise their impact on project and company outputs. Finally, a framework enabling continual improvement of project management performance through capability maturity measurement is introduced.

Peer-review under responsibility of IISES-International Institute for Social and Economics Sciences.

Keywords: Capability maturity; ICT sector; Project; Project management; Project management methodologies

1. Introduction

Over the past few years, many organisations have adopted a project-oriented approach both for external delivery processes and internal control processes. This decision has positive impacts on the organisation, as it systemises the work being delivered. Continuously, more and more activities are classified as projects to deliver project outputs. In this sense, a project can be defined as a temporary organisation, containing sources (people, budget, tools, etc.), existing over a specific time period with the objective to deliver project outputs. There are many potential advantages

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Peer-review under responsibility of IISES-International Institute for Social and Economics Sciences.
doi:10.1016/S2212-5671(15)01264-2

for both organisation and its customers, if work is being organised this way. However, there are many potential risks and problems that can occur if projects are not systematically managed with the use of a project management framework. The aim of this article is to introduce possible measures for improving project management performance of companies in the ICT sector. This will be achieved by determining the level of maturity of project management processes within these organisations and by identifying determinants affecting the performance. To measure the maturity, the capability maturity model (CMM) will be applied. Primary data will be collected using the in-depth interviews with top managers or board members of 25 selected ICT companies operating in the Slovak market. Based on the methodology of CMM, maturity level of project management processes in ICT companies in Slovakia will be determined and aggregated. Furthermore, determinants of the current performance level will be analysed, impacts evaluated and possible deficiencies will be identified that prevent companies from further improvement of their project management performance.

2. Systematic approach to project management

If managed systematically, projects are very beneficial for both (or more) sides involved in the project. Many organisations transformed even their internal operations into projects, because of many benefits for the organisation, its effectiveness and its employees. We can identify the most important benefits of changing the attitude and organisation culture towards project-oriented as following:

- Systemisation of operations – by creating projects, internal processes are systemised, and a better overview exists of what is being done and what is required to get things accomplished. This system can be further enhanced by introducing a programme management into the organisation.
- Optimised risk management – potential risks are identified and with risk management I place, as a part of project management, the risks are addressed and their negative impacts are being eliminated or at least minimised.
- Increased quality of outputs – projects are designed to deliver outputs. This organisation of work helps people to deliver high value in shortened timeframe, compared to other approaches to production management. In project management methodologies, product is a synonym of quality and thus, the management and team members are concentrated on persisting and improving the quality of their work. Implementing the concept of Project Management Excellence Model (PEM) As Szalajko et al. note (2014), this instrument that employs the critical knowledge gained from Total Quality Management, is applicable for continuous improving in quality of process and project outputs.
- Improved human resources management – the organisation will be able to detect, which people are involved in projects and how they perform. Usually, agile project management methodologies can speed up this identification and project teams tend to stabilise only with the use of those members, who are able to work hard and are team players as well. Thus, the decisions regarding HR are simplified and established on quantified data. HR managers are able to determine, who is crucial for the company, who is replaceable or how to distribute bonuses.
- Creation of motivating work culture – projects, if managed carefully, tend to stimulate people, who work on them. Interesting is the fact that even people, who are not part of a project team, can usually feel the improved organisation culture. It is not rare that these people request their supervisors to include them into a project as well. Projects are motivating, because people get in touch closely, have deadlines and thus, their work is more intense, and there are more tangible results produced compared to a traditional work stereotype.

On the other hand, projects can be problematic, if the organisation and its employees lack knowledge regarding project management implementation guidelines. There are many project managers on the labour market, however, not each of them has the required knowledge and experience to handle with the most demanding projects. Because of this, many organisation face serious problems with their projects. A study from McKinsey and the University of Oxford showed that 17 percent of large IT projects go so badly that they can threaten the very existence of the company and, on average, large IT projects run 45 percent over budget and 7 percent over time, while delivering 56 percent less value than predicted (Bloch – Blumberg – Laartz, 2012). This study was performed on a sample of 5400 large scale IT project with budgets over $15M). Another study performed by Geneca on a sample of 600 people involved in

software development projects showed that fuzzy business objectives, out-of-sync stakeholders, and excessive rework mean that 75% of project participants lack confidence that their projects will succeed and 78% of respondents reported that the business is usually or always out of sync with project requirements (Geneca, 2011).
We can identify three majour groups of problems with projects:

- Low quality and benefits – each project is implemented because of its benefits. They can include both financial and non-financial positive impacts for various groups (clients, suppliers, final users, country, inhabitants, investors and other stakeholders). Failing to deliver benefits is a reasonable problem for each project, because if this happens, the projects loses its sense.
- Increased costs – many projects require additional funding. The problem is that almost each second project ended with a project overrun. In project management methodologies, there is a number of tools that can be implemented to hinder this problem. If applied correctly, costs can be kept in line with the plan.
- Broken schedule – projects tend to last longer than expected. Despite the fact that according to McKinsey study the overrun was only by 7% in average, in other studies, this problem is assessed as a major and often occurring problem. For example according to Okoro (2015), more than 90% of projects finish late. This could look surprising if we know that each project timing includes a padding or reserve from the very beginning.

All of these problems can be overcome, if an appropriate project management methodology (or their combination) is applied systematically in the organisation (Miklosik, 2014). Because of this fact, in our research we have aimed at identifying, how companies tend to perform in this area. We have selected companies from the ICT sector. The reason for this selection is the fact that these companies are working with projects usually from the very beginning of their existence. In the ICT sector, projects are created to develop a software solution, create an infrastructure for the customer, implement an internal management system, etc. Thus, a higher maturity compared to another industry sample can be expected in this case.

3. Project management maturity model

Maturity of a process defines the way how the process fulfils its aims and helps the company to deliver outputs as required. There are five levels that can be used for determining the state of each process. They are listed in table 1.

Table 1. Five maturity levels

Process Level	Description
1: Initial	Processes at this level are typically undocumented and in a state of dynamic change, tending to be driven in an ad hoc, uncontrolled, and reactive manner by users or events. This provides a chaotic and unstable environment. Success is likely to depend on individual efforts, and is not considered to be repeatable, because processes would not be sufficiently defined and documented to allow them to be replicated.
2: Repeatable	Some of the processes are repeatable, possibly with consistent results. Process discipline is unlikely to be rigorous, but where it exists it may help to ensure that existing processes are maintained during times of stress.
3: Defined	There are sets of defined and documented standard processes established and subject to some degree of improvement over time. These standard processes are in place (i.e. they are the AS-IS processes) and used to establish consistency of process performance across the organisation.
4: Managed	Using process metrics, management can effectively control the AS-IS process (e.g., for software development). In particular, management can identify ways to adjust and adapt the process to particular projects without measurable losses of quality or deviations from specifications. Process Capability is established from this level.

5: Optimising	The focus is on continually improving process performance through both incremental and innovative technological changes/improvements.

Source: Processed by the author based on Pasian (2014)

Measuring the capability of project management processes in an organisation is not a trivial assignment. In each organisation, processes are deployed differently and there are various project management methodologies in place with a different state of implementation. Nevertheless, there are several common characteristics for each maturity level that need to be observed and analysed. If these prerequisites are fulfilled, the organisation can be labelled using this maturity level. There are a few variations of the maturity model that are suitable for measuring project management processes. A very interesting approach was presented by Killen and Hunt, who studied evolution and changes in the project portfolio management with the use of a multiple-case study. They introduced a capability maturity model is proposed to assist in the development of robust PPM capabilities that will continue to evolve and stay relevant in dynamic environments (Killen – Hunt, 2013). Pasian studied the non-process factors influencing project management capability. Multiple non-process factors are attributed to a mature project management capability responsible for undefined projects. They include "human factors" such as trust, attitude, motivation and attitude, along with increased customer involvement and a more adaptable organisational environment (Pasian, 2014). Pennypacker and Grant published an industry benchmark adopting the well-known PM Solutions Project Management Maturity Model (Grant – Pennypacker, 2006). We have decided to use this model in our research to enable comparability of results with this study and possibly with future scientific studies as well.

PM Solutions Project Management Maturity is based on a two dimensional framework. The first dimension (vertical) reflects key areas of project management addressed and the second dimension (horizontal) represents the level of maturity. Key process areas include (PM Solutions, 2013): Project integration management, scope management, time management, cost management, quality management, human resource management, communications management, risk management, procurement management and stakeholder management. Vertical levels of project management maturity are characterised as following (Pennypacker, 2001):

1. Initial Process: Although there is a recognition that there are project management processes, there are not established practices or standards, and individual project managers are not held to specific accountability by any process standards. Documentation is loose and ad hoc. Management understands the definition of a project, that there are accepted processes, and is aware of the need for project management. Metrics are informally collected on an ad hoc basis.
2. Structured Process and Standards: Many project management processes exist in the organisation, but they are not considered an organisational standard. Documentation exists on these basic processes. Management supports the implementation of project management, but there is neither consistent understanding, involvement, nor organisational mandate to comply for all projects.
3. Organisational Standards and Institutionalized Process: All project management processes are in place and established as organisational standards. These processes involve the clients as active and integral members of the project team. Nearly all projects use these processes with minimal
4. Managed Process: Projects are managed with consideration to how the project performed in the past and what is expected for the future. Management uses efficiency and effectiveness metrics to make decisions regarding the project and understands the impacts on other projects. All projects, changes, and issues are evaluated based upon metrics from cost estimates, base-line estimates, and earned value. Project information is integrated with other corporate systems to optimized business decisions.
5. Optimising Process: Processes are in place and actively used to improve project management activities. Lessons learned are regularly examined and used to improve project management processes, standards, and documentation. Management and the organisation are not only focused on effectively managing projects but also on continuous improvement. The metrics collected during execution are used to understand the performance of not only a project but also for making organisational management decisions for the future.

4. Determining maturity of processes and improving performance of project management

In our research, we have performed in-depth interviews with representatives of 25 ICT companies operating in the Slovak Republic. All sizes of companies have been included in the research as following: micro-entities (0-10 employees): 8%, small companies (11-50 workers): 60%, medium-sized enterprises (51-250 employees): 24% and large companies (251+ employees): 8%. The research was realized in January and February 2014 and results were analysed and processed consequently. Within the deep interviews with top managers, we asked them a set of questions that helped us to investigate and identify the state of project management processes maturity in their company. The following methodology was applied: Firstly, we asked the managers to state their attitude to main project management topics and their interpretation regarding the business of their company. Secondly, they were required to characterise the situation regarding project management implementation in the company using their own words. After processing the results from this part of the in-depth interviews, we were able to summarise the following statements that reflect the state of implementation of project management processes in these companies:

- Most of the companies have a standardised project management methodology in place.
- Each manager thinks that they are doing everything for identifying shortcomings in project management and their removal in time.
- Each manager was able to identify several projects that experienced serious problems and included many escalations in communication and project progress.
- None of the managers is completely satisfied with performance of their projects.

Based on these results, we analysed the factors that determine the project performance and are connected with project management processes. There were some crucial shortcomings identified that prevent improval of processes in general and are closely connected to people/employees and their communication. These findings are in line with some recent research studies from various sectors that confirmed that most problems with project management are connected to communication problems, decision making, distribution of information, emotional factors, trust, intelligence and various other human affected issues (Cacamis – El Asmar, 2014; Lau – Rowlinson, 2009; Sethia – Pillai, 2014; Vierlinger, 2012; Yawanarajah et al., 2008). The most apparent deficiencies indicated in the ICT sector include:

1. The loyalty of project team members to the project is not sufficient. To increase the loyalty we recommend trying to implement one or more of the available agile project management methodologies. Scrum, for example, is resolving this issue by intensifying the cooperation amongst all team members to deliver the project (and sprint) outputs.
2. Project managers are not maintaining an optimal working relationship with functional managers / department heads. Here, potential conflicts arise, because functional managers are heads to employees that are members of project team. These relationships need to be improved by involving department heads into project management processes, project planning meetings and project management strategies creation as well.
3. Insufficient alignment of project teams with the organisation's strategic plan. Here, top management has to utilise their leading role as the body creating and disseminating the strategy amongst company employees. Project managers and team members have to be aware of their importance for company growth and position within the company strategy.

As a third step in the qualitative research, we discussed the 10 knowledge areas from the project management capability model with each manager to determine, if this process is defined and applied in the company or at which level. Each of the key process areas was analysed deeply to evaluate how this process is handled in the company, who is responsible for this process, which criteria are in place to measure its performance, if the continual improvement process is set up etc. After processing the information from this part of the in-depth interviews, we analysed the results and proposed the final categorisation regarding the level of project management maturity in ICT companies in Slovakia. Results of are depicted at Fig. 1.

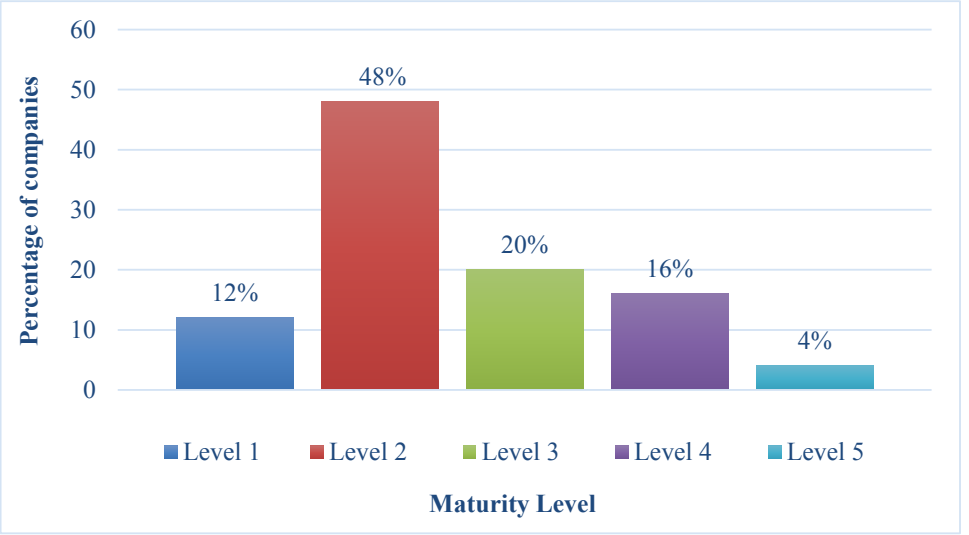

Fig. 1. Maturity level of project management processes in ICT companies in Slovakia

Main findings that were identified in the process of analysing the state of maturity of project management processes include the following:

- Most of the companies were aware of the capability maturity model and how it can be used in the organisation, however, only 16% of the companies tried to implement measures systematically to increase the overall maturity level of their project management.
- Quite big disparities could be seen in the application of knowledge areas in companies. In some knowledge areas, processes could be determined as optimising, while some others were merely defined.
- Despite quite positive results of assessing the maturity levels, there are apparent reserves in the approach of top management of these companies. We identified several areas in each company, which can be quite easily and quickly improved.

Moreover, using the described methodology enabled us to compare results with the previously mentioned study of Grant and Pennypacker (2006). We can conclude that results from our research are quite similar to the study from 2006, which was performed on companies from various industries. It confirms that ICT companies in Slovakia perform similarly to those analysed by Grant and Pennypacker. Here, potential reserves for future improvement are identified, because in the ICT sector in can be expected that the performance would be higher compared to the cross-industry average. Performance of ICT companies is strictly dependent on the project performance, because majority of them is providing services (consultancy, development, delivery) instead of manufacturing of goods. On the other hand, our results are in line with the research performed by Cooke-Davies and Arzymanow (2003), who determined the maturity level score of companies in the telecommunications industry as 3.46 (the highest score 4.69 was in petrochemical industry). As the fourth part of our research, we discussed the state regarding the key factors influencing success of project management efforts with top managers. Here, the final ranking of factors according to research of Lee and Anderson (2006) was applied. We used the Likert scale to determine how the managers agree or disagree with the respective statement. The scale was used as following: 1 – completely disagree, 2 – partially disagree, 3 – neutral, 4 – partially agree and 5 – absolutely agree. The aim of this initiative was to determine, which factors are considered as the most important determinants of project management performance in the ICT companies. Results are listed in table 2.

Table 2. Performance regarding TOP 13 key success indicators of project management

ID	Factor	Mean
1	Top management support (e.g. CIO support) of PM processes	4.20
2	A clear definition of success for the project team (critical success factors)	3.88
3	Top management driving implementation of PM processes as an organisational objective	4.60
4	Getting the right executive sponsor for the project	3.20
5	A clear understanding of each team member's role in a project	3.28
6	A project portfolio management process in place to prioritize projects	3.56
7	Project Managers maintaining good working relationship with functional managers / department heads	2.64
8	An organisation with a defined strategy	2.84
9	Loyalty of project team members to the project	2.20
10	A project portfolio governance process to manage the progression of projects within the portfolio	3.20
11	An understanding by the project manager of organisational politics and the power structure of the organisation	3.68
12	Role of project manager clearly delineated from functional managers / department heads	2.88
13	The alignment of project teams with the organisation's strategic plan.	2.76

Results have confirmed the importance of the TOP factors identified, however some of them proved to have different weight in the ICT sector. The three most important factors included:

1. Top management driving implementation of PM processes as an organisational objective (4.60). Here, the managers interviewed confirmed that this positive approach towards project orientation and its support creates definitely a framework for project success. However, efforts in driving internal projects and their inclusion in organisational objectives is highly required.
2. Top management support (e.g. CIO support) of PM processes (4.20). Adequate support of top managers was identified from several departments. As the most common deficiency, the inadequate support from the financial director (CFO) was identified that decreases project efficiency because of late or missing reports or priority/execution of payments connected to the project.
3. A clear definition of success for the project team (critical success factors) (3.88). This factor is determining the motivation of project team reasonably. From the discussion it was apparent that project managers and project teams often lack precise definition and measurement of CSFs in their projects.

Finally, based on the research results and knowledge from the area of process and performance optimisation, we have constructed a model/framework for continual improvement of project management performance with the use of capability maturity measurement. This model is perceived as a continuous cycle of subsequent steps, which shall be repeated periodically in time. It is visualised at Figure 2. If applied, it will create the framework enabling systematic approach to continual improvement of project management processes. It can be recommended to carry out the cycle two times per year. However, the decision depends on more factors and can be adjusted according to preferences of top management and board members, type of industry, character of company and its products or the overall state of project management processes in the organisation.

Fig. 2. Model for continual improvement of project management processes

5. Conclusion

Our research has proven that companies are aware of the importance of a systematic approach to project management. Typically, ICT companies in Slovakia have a standardised project management methodology in place and try to improve their project management processes.

Results of determining the overall level of capability of project management processes show that majority of companies performs on the level 2 (48%). In general, the distribution of maturity levels is satisfying, however, there is a great space for future improvements. Moving to higher maturity levels enables the company to gain more benefits from its projects, to deliver high quality outputs and to satisfy its customers and improve the efficiency internal processes as well. To optimise the project management performance and initiate the long-term continual improvement, the proposed framework for continual improvement based on periodic assessment of capability maturity shall be applied. It is hoped that more and more companies will be aware of this fact and try to work on the improvement of their project management processes systematically.

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