

Project management: a case of fixed price IS/IT projects. Analysis of projects by project scopes¹

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Abstract: The paper provides an overview of major issues of IS/IT projects. Attention will be focused on projects that are implemented under a contract for a specified amount of work and fixed price. The main purpose of the paper is to analyse the project parameters in terms of the types of projects, and to confirm, or refuse, a statement related to this. There is some evidence from the portfolio of projects that have been implemented by the international companies providing IT services. Regarding the localisation, CEE region was selected for our research. The outputs of the paper should be a contribution to managing IS/IT projects in IT service delivery organizations and for the support of innovative thinking about project management generally.

Keywords: project management, fixed price project, IT service, project parameters, statistics methods

1. Introduction

Effective management of information technologies is necessarily based on the regulatory and supervisory principles, which are set by the owners and senior management of companies. Owners and senior management need these mechanisms, because of the opportunity to influence the direction of investment in technologies and to verify their effective support of key business processes. For correct setting of these principles and mechanisms, it is necessary to have IT strategy, which supports company's needs to reduce operating costs, direct investments to long-term plans and allow rapid changes in business processes (Doucek, Novotný, 2007). The final IT strategy should tie the IT environment with the overall vision of the organization. Therefore the strategy becomes a means for both senior and line management. It helps them correctly perceive links between the strategic needs of the organization and direction of corresponding applications and technologies. Properly established IT strategic plan also includes the necessary degree of flexibility in order to provide a quick and flexible reply to the current needs (Calder, 2005), (Voříšek, Feuerlicht, 2005). The implementation of IT strategic plan is usually realized by the coordinated projects.

Successful project management and the achievement of objectives substantially affect proper planning. If the frame of the project in scope, time and costs is not properly defined, then it is very probable that the project will end in failure.

It is necessary to realize project constraints before the start of every project. Each project is limited in multiple layers. It is mainly so called triple-constrain (Rosenau, 2003):

- Time – project schedule and milestones;
- Budget – financial, human and material resources;
- Scope – project scope with defined outputs in required quality.

All decisions related to the project must respect and take into account these constraints. These project constraints are the basis for our analysis of project parameters. The article focuses on the following parameters: project duration, project size, margin, labour costs, licence costs, other costs, reserves and request changes. The relationship and the values of these parameters (mutually unbalanced) can be one of the reasons of IT project problems and failure of the IT projects (The Standish Group, 2009).

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Thus, this research is an attempt to bring new knowledge towards the improvement of the methodology for managing fixed-price projects. The main purpose of the paper is 1/ to become familiar with selected areas of project management, which is the theoretical background of our research and explain the specifics of fixed-price projects; 2/ define subject of exploration, which are IT projects in service delivery organization; 3/ specify subject of research: the project parameters in relation to the types of projects, and to confirm, or refuse, the statement related to this, 4/ provide recommendations for managing IS/IT projects in the IT service delivery organization, and generalize results of a case study on project management theory. The path for reaching this goal is to carry out an analysis of fixed-price project parameters at the IT service delivery organization.

The analysed sample includes nearly one hundred projects which were completed by a company in the years 2009 - 2011. (Collecting projects were excluded from the sample of projects due to accounting. These projects collect small orders and could distort the results of the analysis, and both international projects due to the fact that they had been opened because of the country borders accounting between organisations in the group). Projects were implemented in the vast majority of cases in the Czech Republic.

The research methodology proceeds from examination and sample of fixed-price projects with the aid of basic descriptive statistics and correlation-analysis outputs, and verification of a statement. The statement that will be verified is based on the necessity of examining the project parameters relative to the types of projects and run: "Subject of the project clearly affects the parameters of the project." The underlying assumption, which can be considered as proven by examining in (Král, Mildeová, 2012), is the statement: "Because of the interdependency dimensions of the triple constraint, one parameter affects - to a greater or lesser extent - one or more other project parameters".

Software MS Excel and SPSS were used for our calculations, and also other statistical packets according (Řezanková, Húsek, 2002) were considered.

The project duration was explored in (Král, Mildeová, 2012), and it was proved that it is the most important parameter in the analysis of the relationships between the project parameters of fixed-price projects.

Financial project reports have been used as a primary data source for data analysis, which are created regularly every month until the end of the project.

The paper continues in the analysis from (Král, Mildeová, 2012), and develops them in other contexts.

2. Theoretical background from IS/IT project management

2.1 Project and project management

Before we will go to the selected case study and the analysis, it is necessary to explain the basic terms and how they are perceived in the paper, because they acquire varying scales in theory and managerial practice.

Project

In this paper the project is understood as a time-limited set of activities, which is created by using a clearly defined output, whether it is a product, service, document, process optimization or other unique output. The target state should be clearly defined when planning the project. Many methodologies were developed to achieve the target state in the last half century that provides systematic guidance for the successful achievement of project objectives. (The project may be incorrectly interchanged with the program. Program is a group of related projects that are managed together and coordinated in order to achieve the benefits (Rosenau, 2003)).

Portfolio

The portfolio consists of a set of projects (programs) that are grouped so that management *is* more effective.

Project management

Project management is a discipline that is through a set of activities aiming to achieve predetermined objectives of the project. The fulfilment of these goals must be achieved within the constraints of the project. Our approach to project management is based on the PMBOK and PRINCE2 project

methodologies and it is indebted to these internationally recognized methodologies (Project Management Institute, 2008), (Bartoška et al., 2011).

Project manager

These developed methodologies and software tools facilitate monitoring of important factors, but their potential use depends on the project manager, who plays a key role for the successful conduct and completion of the project.

Project phase

Dividing the project into structured phases enables easier management, planning and control of assigned projects: each project during its life cycle goes through phases. Phase of the project can be seen as closely linked blocks of activities that usually follow each other and each project is limited in time, i.e., there is a clearly defined beginning and end of the project.

Planning

Larger and more complex projects require rough planning of the project and detailed planning of its current parts.

Project success

Assessing the success of the project is probably the most important, whether it was successfully completed or not. Other criteria are the quality of the results, the time and costs. Naturally, these processes should be evaluated subject to multiple criteria using both cost and benefit criteria. A project manager should appropriately and correctly works with such criteria (Beinlich, 2010). There are currently many projects at substantial reserves. There are considerable reserves in case of many projects.

2.2 Fixed-price project

Project price

An important area in the planning of the project is to determine its cost. Costs have a major impact on the effectiveness of project management and deciding whether it is advantageous or under what conditions it is convenient to implement the project. As we have shown in (Král, Mildeová, 2012), the project price should be viewed from two completely different points-of-view - that of project supplier and that of project sponsor. When the supplier of solution is an external company, then the price of the solution is the key to the success of its business. Customers usually perceive the project price as one of the main factors for the evaluation of proposals, though it should be evaluated rather ROI (Return On Investments).

For pricing it is necessary to know whether to have a fixed price or cost price project (Rosenau, 2003). The cost price projects have a very low risk from the perspective of the supplier of the project, and therefore the supplier is not forced to control costs. This factor is redeemed by inability to increase profits through improving supplier's activities on the project, because hours worked and materials used can be invoiced. The precision of suppliers' cost estimates is crucial for successful project implementation in case of fixed price projects. During implementation, the supplier shall place great emphasis on the control of the incurred costs. Since it is a fixed price for the project, the supplier is motivated for the earliest delivery of the output, which can reduce costs and increase its profits.

The subject of our research is to show the supplier's perspective on a fixed-price.

3. Case study: the IT service delivery organization

3.1 Research subject and the analysed sample

The company provides a wide range of IT services, therefore the subject of projects that are included in the analysis are very diverse. These are all services related to SAP, including outsourcing (total of 10% of the projects in analysed sample), integration projects, which include systems implementation, data migration, development and testing of applications (48% of projects), consulting services, including preparation of analyses, studies and other services (13% of projects), and support & maintenance services (29% of projects).

The largest projects are in the field of system integration. Their average size is about 2 to 3 times greater than the other completed projects. The overall average size of the projects ranges in the tens

of millions of crowns, which are initially closed contracts (approximately two thirds) and change requests received one-third.

As it is shown in Table 1, Integration projects are the largest. Their average size is approximately two to three times larger than other types of projects. Then support & maintenance projects follow.

Table 1. Project size of particular project types

Type	Projects size
Integration projects	65,44 %
Consulting projects	5,86 %
SAP projects	5,64 %
Support & maintenance projects	23,05 %
Analysed sample	100,00 %

Projects were implemented in five industries. It is the telecommunications sector (Telco) - 37% of the projects from the analysed sample, the financial sector (FS) - 38% of the projects, energy, government and the transport sector (in this case it was mainly administration). In this analysis energy, government and transportation projects are together under the label "I&A – Industries & Administration" (25% of projects).

Analysed projects by project scopes with business sectors are shown in Table 1 and 2. There is evidence that all business sectors have the largest representation of projects in the field of system integration. Support & maintenance services are also an important focus of implementation in the telecommunications and financial sectors.

Table 2. Projects by business sectors/project scopes

Business sectors/ Project scopes	Integration Projects	Consulting services	SAP	S&M services	TOTAL
FS	16	5	3	13	37
Telco	20	1	0	16	37
I&A	10	7	7	0	24
TOTAL	46	13	10	29	98

3.2 Research object – project parameters

Eight parameters like in (Král, Mildeová, 2012) have been used that characterize the implementation of each project with regard to the triple constraint:

Triple constrain Time / parameter Project duration

Project duration - The project duration (in months) is determined by the beginning date and day when deliverables are accepted by the customer.

Triple constrain Budget / parameters Project size, Margin, Labour costs, Licences costs and Other costs

Project size - Project size (in CZK) is determined by final contract price, which is agreed upon by both customer and contractor.

Margin – The project profit is expressed by the margin (in percentage of the project size). The margin is one of the most closely-monitored financial parameters.

Labour costs – Labour costs (in CZK) are determined by the costs of individual employees who are involved in the project.

Licences costs – Licences costs (in CZK) include the costs for all types of licences (such as software and maintenance licences).

Other costs – Other costs (in CZK) include the costs of purchasing necessary equipment, materials (e.g. hardware), all project subcontractors, travel costs, etc.

Reserves – The reserves (in CZK) are the money allocated to cover the potential impact of unexpected problems. They are drawn upon only when a risk exceeds a 90% threshold probability, which indicates that the risk has become a problem.

Triple constrain Time / parameter Scope

Change requests – Change requests (in number) implies that during the project there may be some changes and amendments to the requirements of the customer or the supplier. If these requirements are accepted by both parties (the customer and the supplier), then it usually leads to modification of schedule, budget, or both.

Note: The success of all projects is assessed positively from IT service delivery organization point of view. All projects were taken over by sponsor and paid. (All projects in this analysis were authorized by the customer.)

3.3 Results

The research of relationships between the project parameters, made by the authors, brought interesting results that need further investigation. This analysis is focused on the project parameters and the types of projects with an emphasis on project duration, which was emerged as the most important parameter in the analysis of the relationships among the project parameters of fixed-price projects. (The authors are limited in the way of the analysis and publication of data by trade secrets that must be respected.)

3.3.1 Analysis of project duration

The average duration of projects is 450 days in case of monitored projects. The project duration exceeded its deadlines in an average of 64 days in case of monitored projects. An exception is SAP projects, which were the only projects completed in an average of six days earlier. The increase in the average project duration of 64 days does not necessarily mean failure time schedule. The reason is the customer's change requests which are accepted by supplier.

In case of relationship of project costs and project duration, projects completed over/during two years exhibit a steep increase of all project costs. The authors consider that the explanatory reason is connected with project management and may be the presenting difficulties of planning for and managing these projects, and the associated high cost of all necessary management, as well. The relationship between project duration and project cost it can be seen from the course of the curves in Figure 1.

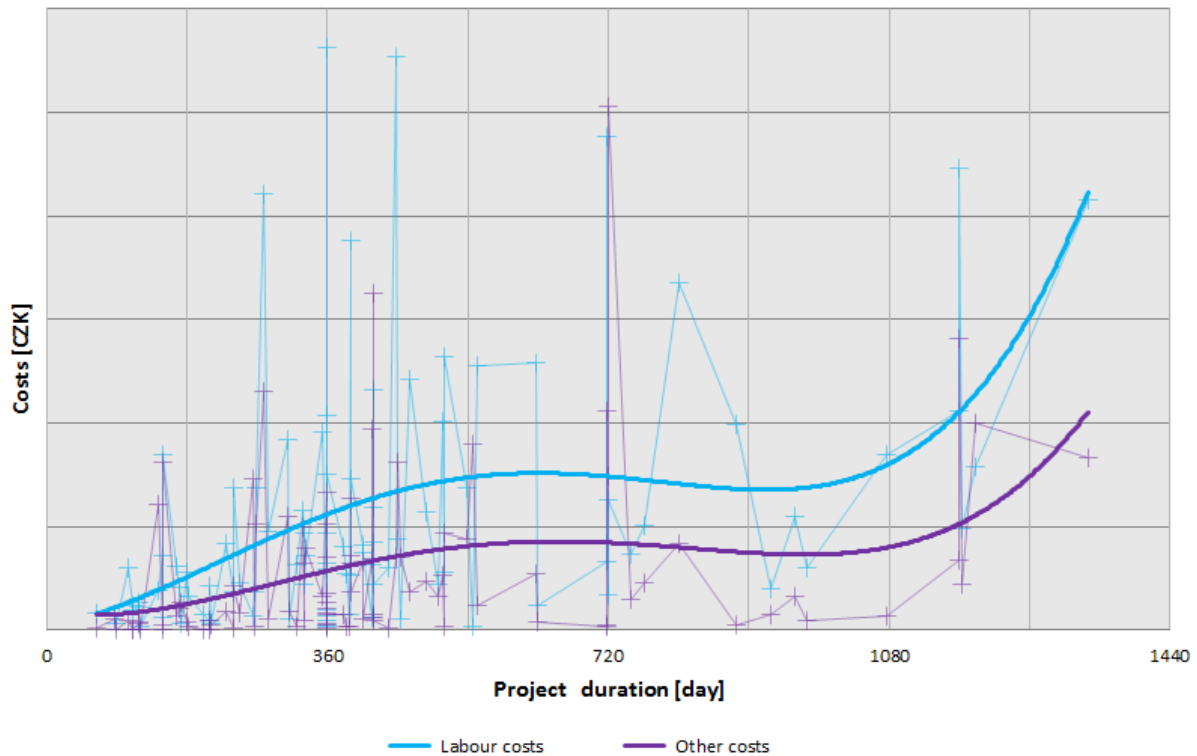


Figure 1. Relationship of project costs and project duration

The company operates its largest projects in the areas of system integration and providing the support and maintenance of the systems. Maintenance and support projects are not extensive, but it takes many years and thus gaining in volume. Consulting and SAP projects reach half volumes compared to these projects. The overall average project size is approximately represented by two thirds of initially closed contract on-third of change requests. Change requests affect the size of most projects, providing maintenance and customer support systems. In these cases, the agreed contract is usually doubled during the implementation (see Table 3).

Table 3. Project and change requests size of particular project types

Type	Original project size	Change request size
Integration projects	73,03 %	26,97 %
Consulting projects	57,90 %	42,04 %
SAP projects	72,50 %	27,50 %
Support & maintenance projects	50,96 %	49,04 %
Total	66,97 %	33,02 %

In case of relationship of project duration and project margin on all types of projects (according to subject) is about the same percentage of the total value of the contract.

For the depiction of relationship of project margin and project duration (see Fig.2), it is typical that the identified margin decrease that occurs when the whole project duration exceeds two years. The project management costs increase in the case of large projects. The reasons were found in (Chlapek, 2005) as following: if there are delays, then a decrease of margins is caused by additional costs; the organisation accepts a lower margin in order to employ specialists for a long period; the organisation (or the market) accepts a lower margin while contracting a long-term specialist company for the project.

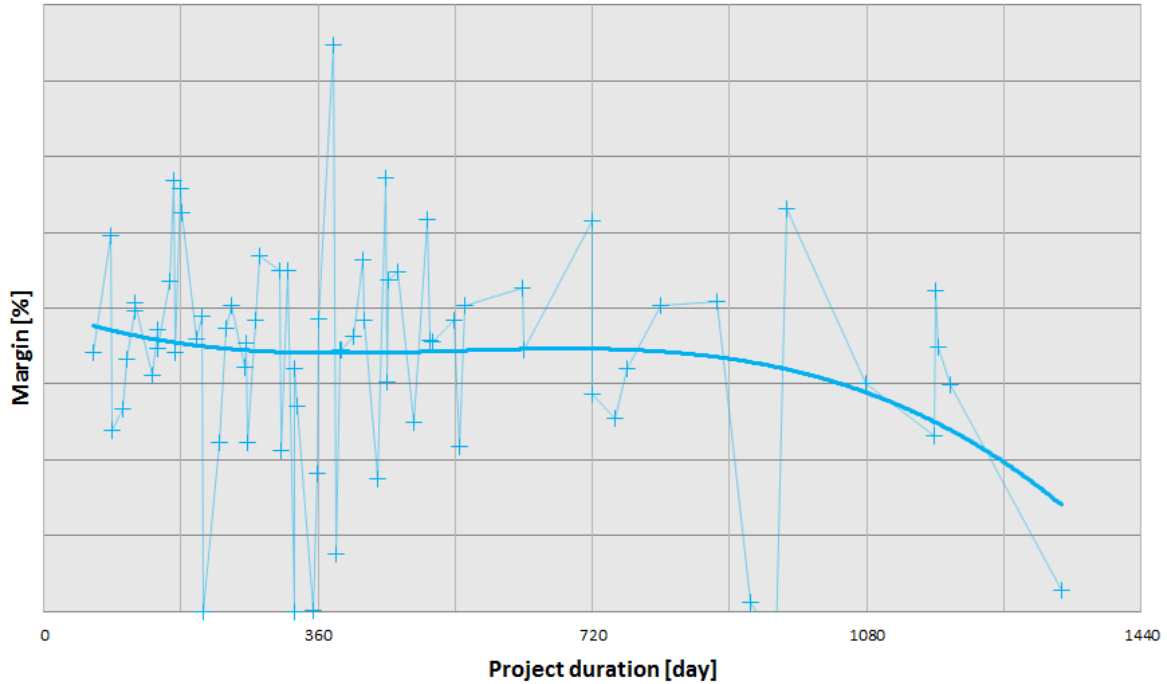


Figure 5. Relationship of project margin and project duration

The project margin is on the average slightly different. All SAP projects are implemented within a year and a half, and the resulting margin is always higher than originally planned. The margin of integration projects have identical course, although not as steep as SAP projects. With increasing length of projects decreases their value margin. The margin of integration projects is lower than expected after a time period of/surpassing about three years.

3.3.2 Correlation analysis according project types

Correlation analysis according to the project types (see Tab. 5) in comparison with the correlation matrix of the relationships among the project parameters for the entire portfolio in Table 4 provides significant information.

Table 4. Correlation matrix according to whole project portfolio. Source (Král, Mildeová, 2012)

All projects	Duration	Contingency	Margin	Labour costs	Other costs	Licences costs	Project size
Change requests	0,331	-0,032	0,054	0,418	0,216	0,476	0,379
Duration		0,004	-0,161	0,595	0,553	0,351	0,583
Provisions		0,243	-0,001	-0,051	-0,044	-0,020	-0,052
Contingency			-0,232	-0,032	-0,057	-0,037	-0,052
Margin				0,040	-0,130	-0,044	-0,085
Labour costs					0,787	0,639	0,954
Other costs						0,563	0,900
Licences costs							0,677

Table 5. Correlation matrix according to project types

S&M projects	Duration	Reserves	Margin	Labour costs	Other costs	Licences costs	Project size
Change requests	0,189	-0,093	-0,086	0,746	0,176	0,798	0,719
Duration		-0,042	0,219	0,348	0,250	-0,082	0,339
Contingency			-0,446	0,318	-0,210	-0,046	0,009
Margin				-0,111	-0,177	-0,067	0,021
Labour costs					0,295	0,539	0,909
Other costs						0,007	0,998
Licences costs							0,719

Based on Table 5, it can be said that there are significant differences of relationships between the project parameters of particular project types.

Integration projects	Duration	Reserves	Margin	Labour costs	Other costs	Licences costs	Project size
Change requests	0,319	-	0,134	0,400	0,250	0,153	0,345
Duration		-	-0,321	0,648	0,628	0,647	0,636
Contingency			0,000	0,000	0,000	0,000	-0,487
Margin				-0,048	-0,127	-0,046	-0,101
Labour costs					0,827	0,830	0,098
Other costs						0,249	0,997
Licences costs							0,240
Consulting projects	Duration	Reserves	Margin	Labour costs	Other costs	Licences costs	Project size
Change requests	0,797	-	0,171	0,745	0,300	0,723	0,761
Duration		0,043	-0,097	0,921	0,384	0,485	0,888
Contingency			-0,098	-0,300	-0,148	-0,083	0,376
Margin				-0,272	-0,781	0,350	-0,399
Labour costs					0,492	0,555	0,966
Other costs						-0,186	0,884
Licences costs							0,825
SAP projects	Duration	Reserves	Margin	Labour costs	Other costs	Licences costs	Project size
Change requests	0,681	0,926	-0,566	0,816	0,682	-0,032	0,736
Duration		0,547	-0,396	0,823	0,911	0,189	0,895
Contingency			-0,640	0,807	-0,640	-0,111	0,838
Margin				-0,405	-0,395	-0,272	-0,375
Labour costs					0,814	-0,028	0,949
Other costs						0,414	0,996
Licences costs							0,655

Project duration / Change requests

The relationship between project duration and change request, which was not statistically significant in analysed portfolio as a whole, shows relatively strong status at SAP and Consulting projects.

Project duration / Reserves

Relationship between project duration and contingency was not demonstrated in the analysis of the portfolio as a whole. The medium correlation exists in case of SAP projects when analysing the type of project.

Project duration / Margin

There is some evidence that a negative relationship between project duration and positive margin in case of integration and SAP projects against weaker dependence within support projects. A weak negative dependence is demonstrated in the total portfolio.

Project duration / Project size

Correlation demonstrated in the overall portfolio is only moderate, although logically we expected strong results. If we analyse this relationship by the type of project, it is evident a strong dependence in SAP and consulting projects, moderately strong at integration projects and only weaker in case of support projects. After a closer look at the relationship between project duration and project size it can be seen from the course of the curves in Figure 3.

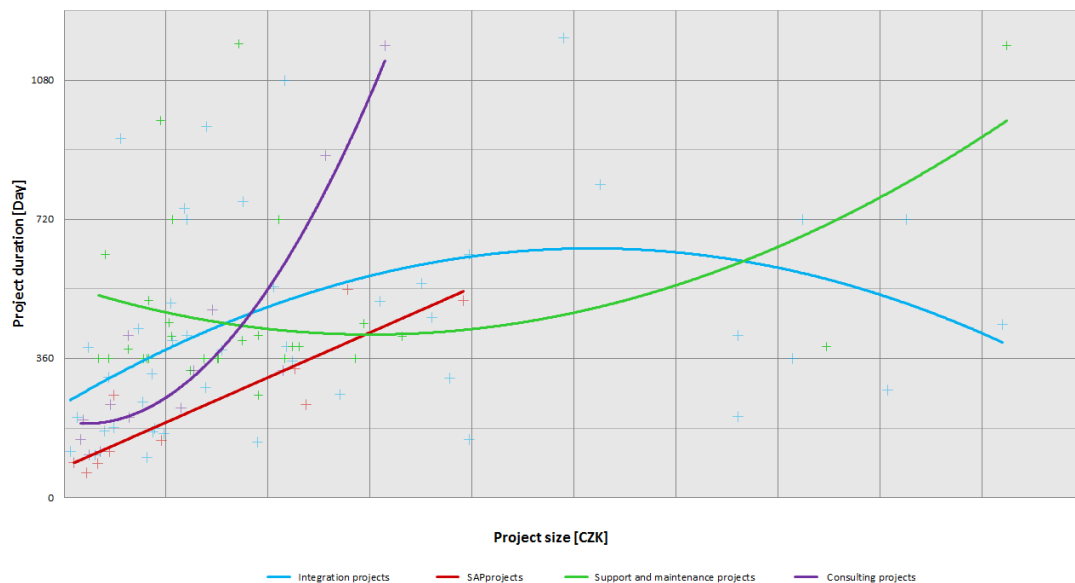


Figure 3. Relationship of project duration and project size

Project duration / Labour cost

When analysing the relationship between project duration and labour cost in the overall portfolio, there is a moderate dependence. Within individual categories of projects it is worth noticing significantly strong dependence of the Consulting projects versus weak dependence in Support projects. But it is necessary to take into account not only the results of correlation analysis, but to also look at the problem systematically and to look at the course costs during the project phases.

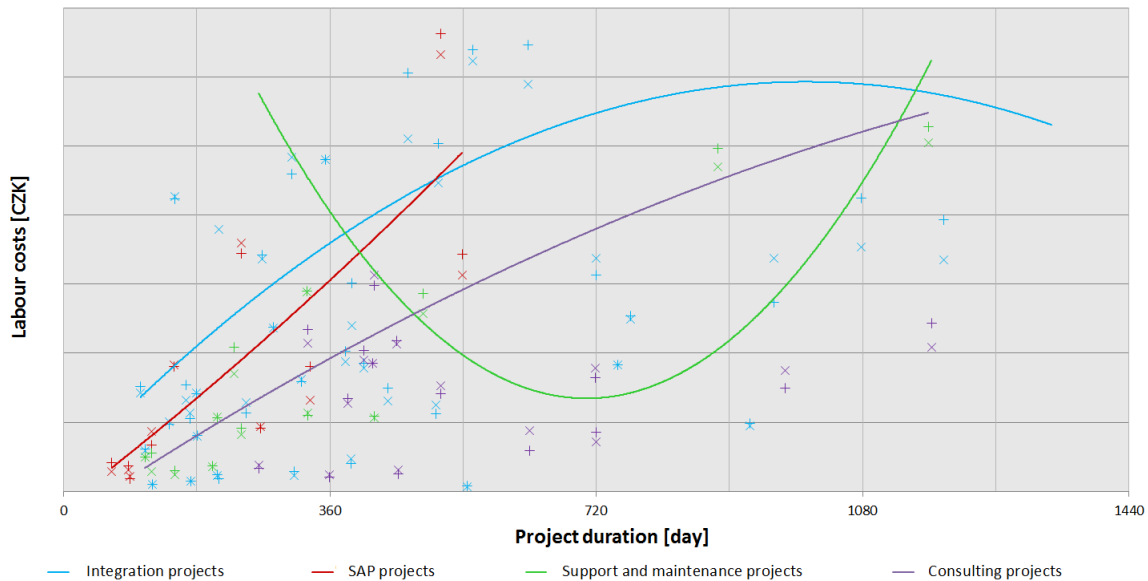


Figure 4. Relationship of project duration and labour cost

Other relations

Although we are primarily focused on project duration, it should be briefly mentioned that there is one other interesting connection that can warn the company about outdated methodology or bring new knowledge for effective project management.

Notice the relationship between the reserves and the other parameters of the project. Correlation dependencies are very different. Together with other facts, such as the no use of reserves for integration projects, and a surprisingly high use of the reserves in providing advisory / consulting services, where output is not clearly measurable and project team may adjust the detail level of analysis, studies, etc., it leads to contemplation whether the local methodology is properly set up for rewards and the establishment of acceptance criteria. Analysis of the project size and other parameters also brings unexpected results. In total portfolio, a strong correlation between size and project labour cost and other costs can be observed. There is almost no correlation between the project size and the labour costs and licenses cost is very weak in case of the integration projects.

Furthermore, there is no correlation between the project size and margin. Respectively there is a very weak negative correlation in the total portfolio. Considerable negative correlation is shown in case of SAP and consulting projects. Finally, if there is almost no correlation in the total portfolio between the project size and margin, then these results are very variable for each type of projects.

4. Conclusions

The aim of the paper was to bring new knowledge in project management and especially towards the improvement of the methodology for managing fixed-price projects. The research was based on the analysed sample and could be considered as representative in case of business sector variety and variety of IT areas. Project parameters and project types were the basic categories for investigation. Verification of the statement that was set and the basic descriptive statistics with the correlation analysis were used as a main researched method in this paper. The paper builds on (Král, Mildeová, 2012). The more deep analysis to keep more robust results in this text.

Analysis of project duration and project size relationship shows that the relationship is strongly dependent on project type. Furthermore, it was proved that projects completed across two years exhibit a steep increase of all project costs when the relationship of project size and project duration were researched. In contrast, project margins decrease with increasing length of the project durations. This is evident after two years of the project durations.

The statement that we set as an introduction as "Subject of the project clearly affects the parameters of the project." can be considered to be confirmed by our examination. Submitting project duration in relation to this statement to detailed analysis has been proved as correct. The project duration proved to be a key parameter. Recommendations for managing IS / IT projects in the IT service delivery

organization, which in our view can also be generalized for project management theory, can be formulated as increased emphasis on monitoring time. Successful project management is dependent mainly on good time management. Time management is interlinked with the correct division into stages - projects should be divided into easily measurable and achievable sections. These phases should be continuously reviewed and current status to the original plan should be compared, because of the influence of new circumstances. From the perspective of our research, continuous monitoring can be recommended, because of the course of mutual relations of all project parameters during project implementation. Given that we have demonstrated that the subject of the project clearly influences the parameters of the project. The project scope should be a crucial factor for the selection of projects to the strategic decision making in IT service delivery organization.

Planning and estimating the method and the effect of change requests are then further areas that should be examined in detail and they will be therefore the subject of our future research.

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