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„PROJECT-FACTOR-DECISION" DECISIVE FACTORS IN IT PROJECTS AND THEIR IMPACT ON ITS SUCCESS

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The aim of this article is to indicate the need for a deepening, systematizing and codifying of the theoretical and practical knowledge on IT project management, in the area of management decision-making processes. The scope of decisions made by managers is constantly on the increase. Project managers make decisions not only within the classic triangle of constraints, which consists of a schedule, a budget and the project scope, but also in reference to a number of other problems which occur during project execution. The observed need to identify and define all the factors which are present in projects results in the identification of a finite set of variables for decision-making and for the decisions themselves and, finally, in determining their mutual correlation.

Keywords: IT project management, decision-making processes, organization maturity

1. Introduction

Project management is one of the major challenges of the modern economy. Organizations which form the core of the economy dynamically change their structure and thus imply changes both in management processes and structures. One element of these changes is the development of modern, rapidly-changing (following market requirements) products, which is different from the current approach. As part of these changes, traditional organizational structures are replaced by dedicated project teams. With the growing significance of projects for

organizations, project management becomes an important issue as well. This issue is particularly visible in the IT industry, where complex (difficult to pre-define), and unique projects with a high development risk are often carried out by dispersed (difficult to manage) project teams [2].

Results of studies published by consulting companies show that more than half of IT projects fail due to budget or schedule overruns [1]. It has also been indicated that one of the main causes of project failures are the mistakes of project managers. These errors are the result of badly implemented project management processes, which in the case of IT projects amounts to bad decisions in such areas as mismatching IT project management methods to the specific nature of the projects, selecting team members, and building a relationship with the client in an IT project [8].

The authors' interest in the subject comes from the fact that the scope of decisions made by managers is constantly increasing. Project managers make decisions not only in the classic triangle of constraints, which consists of a schedule, a budget and the project scope (Figure 1).

During the implementation of projects, a number of other problems occur, including human resources issues connected with the construction (and later management) of project teams, decisions regarding communication with the client and the method of conducting business analyses, as well as decisions which stem from the changing nature so typical of IT projects (not only in reference to requirements but also conditions, e.g. technological, in which the project is run).

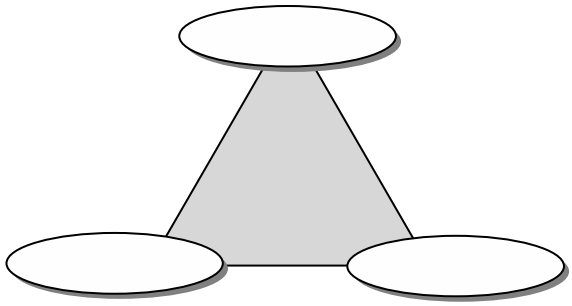

Figure 1. Triangle of boundary conditions in an IT project
Source: own study based on [1]

The need to identify and define all the factors present in projects would enable a more detailed description of the field of project management. It could also initiate the search for key factors to ensure the success of projects. Therefore, the authors' goal is to deepen, systematize and codify the theoretical and practical knowledge on IT project management in the area of management decision-making.

2. Successful decisions - success of an IT project

2.1. A new Triangle of Constraints in IT projects

As was mentioned before, the primary criterion for the success of an IT project is its completion within the conventional project constraints understood as project completion within the following framework [1]:

- a fixed schedule,
- an adopted budget,
- in the full established scope

This does not mean, however, that the decisions of managers refer to only these three areas. The classic triangle of constraints is created in consequence of previous actions and decisions made by the project manager. The project scope is generally determined on the basis of interviews with the client, the schedule is determined by the assessment of the resource potential of the company implementing the IT project (the supplier), the budget is usually the result of the assessed workload of the project team on the part of the supplier and client's financial capabilities. Hence, it can be concluded that before the project manager makes any decisions regarding the realization of the project in terms of the classic triangle of constraints, a number of prior decisions are made regarding the client or the team.

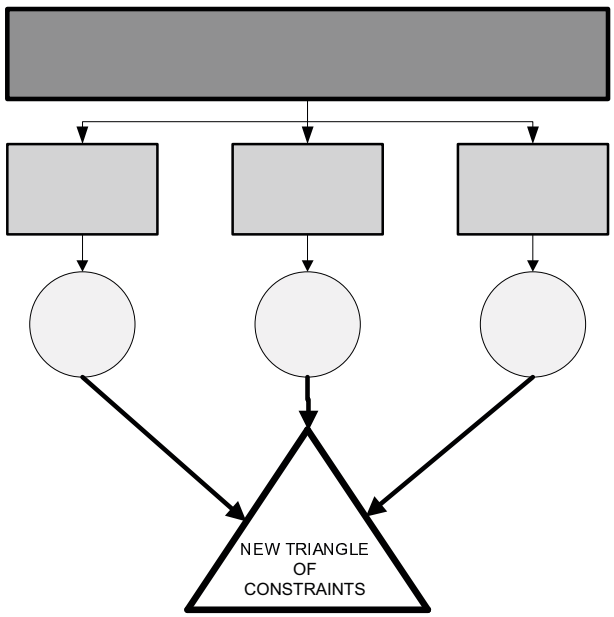

Figure 2. Decision-making areas as a new Triangle of Constraints in an IT project

In view of the best practices contained in project management methods (such as RUP or SCRUM) and the need to complement the classic triangle of constraints with an additional set of decision variables, the authors observed three project areas which must be analyzed before the project is initiated.

These areas could be described as a category of decision-making problems (hereinafter referred to as decision-making areas), which managers' decisions refer to. They include:

- the client and client maturity,
- the project team and project team maturity,
- the volatility and organization of the information necessary for project completion (project entropy).

The new Triangle of Constraints is shown in Figure 2.

2.2. Client Maturity - awareness of own needs

The first of these areas includes processes carried out with the participation of the client in IT projects. The client is usually (but not always) the main recipient of the product resulting from the IT project. The decomposition of project management methods (performed by the authors for creating an adaptive approach to project management) [5, 6] has allowed the extraction of those best management practices which apply only to project managers. A fragment of the decomposition of one of the project management methods, focusing on customer relationship management, is shown in Table 1.

Table 1. Decomposition of the RUP method for management decisions

BEST PRACTICE	JUSTIFICATION
Defining the products of labour as input/output to/from a job.	This allows the manager to communicate the client's expectations regarding the realization of a specific task to the team.
Defining precise project roles.	This allows the manager to organize the team for the specific actions. Contacts with the client are entrusted to a single person (Business Analyst).
The use of high-level models.	This allows the manager to present the product of an IT project in a way which is more understandable to the client.

Other project management methods also include recommendations related to the presence of the client. In many cases, it is even recommended to include the client in the manufacturing and management processes (*Scrum, XP Programming*), which implies certain decisions to be made by project managers. This perception of the project, where it is necessary to assess client maturity and to decide on the client's place in the project, requires a thorough knowledge of the client. The task of managers is therefore to make certain decisions in order to build a suitable relationship with the client and to establish a suitable place for the client within the project. Lack of knowledge about the specific nature of the client may lead to the wrong decisions regarding the project realization method. In the case when an immature client frequently changes the requirements, the project manager should make certain decisions in order to make the manufacturing processes more flexible, namely seek to use agile methods. Such decisions will, however, only be possible after a thorough analysis of all the factors involving a client which imply volatility. Hence the necessity suggested by the authors to form a complete set of factors under which managers make decisions that relate to both the client and further project work [7].

2.3. Supplier team maturity – proper progress of work

Another area of decision-making processes discussed widely in all project management methods are the team processes of the supplier organization. It is the supplier team, under the supervision of a project manager, that is responsible for the proper progress of work, for how and when certain work is carried out. Therefore, it seems reasonable that before the project is initiated the project manager should properly recognize the potential for the realization of the project by his team. This diagnosis should be done with regard to project competence, but also in terms of the competences for group work. Such an analysis allows the project manager to correctly allocate an appropriate role to each participant in the project.

The proper allocation of roles increases work efficiency. It should also be taken into account that decisions about the selection of project management methods or the selection of best practices have to depend on the state of the supplier team. In addition, the awareness of one's own maturity level helps to match best practices relating to team management. Thus, it seems necessary to define a set of possible parameters (factors) describing the team so that the manager could make correct decisions regarding the mechanisms of motivation and the allocation of tasks.

2.4. Project entropy – aiming at order

The third area of decision-making processes is associated with decisions of project managers in reference to the level of information in the carried out IT project, as well as those about the assessment of the complexity of the project, the volatility of requirements and the uncertainty of achieving the end product. In the case of most IT projects realized in the incremental way, requirements change over time, and the final product is not precisely defined, thus defining tasks and manufacturing processes is difficult. Insufficient knowledge about the state of the project implies that the uncertainty of managers hinders planning decisions (short and long-term). Project managers having an incomplete (inadequate) level of information in an IT project should adapt best practices to the current state of the project. It was decided, therefore, that information problems in projects will be measured according to their level of order, called project negentropy.

2.5. The problem of maturity in the context of scientific research

The groups of management problems presented in the previous chapter were identified during research conducted by the Department of Information Technology Management, operating at the Technical University of Gdansk since 2006. The team's previous research on management problems in IT projects has led to the improvement of activities associated with the selection and application of project management methods (such as RUP, SCRUM, PRINCE2, etc.) and to a systemic approach to project management, taking into account the above problem areas (on the basis of such concepts as CMMI or enterprise architecture).

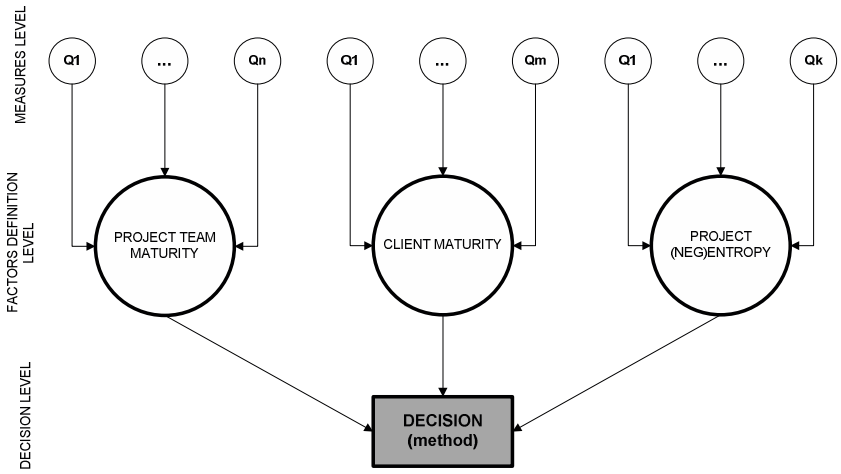

Figure 3. The direction of research on maturity in IT projects

The current state of research on a complete solution which would take the issue of maturity into account forces the refinement of some of its aspects. It is a natural step then to extract (decompose) the three main areas of decision-making (client, team, entropy) into single, defined and named factors implying key decisions in projects. The strength (weight) of each of the separate implications should also be determined.

3. Decision-making factors vs. Project decisions

3.1. The impact of decision-making factors on the catalogue of decisions

It should be noted that each of the described decision-making areas consists of a number of minor factors which directly or indirectly influence future project decisions. Hence, creating a complete (full) set of decision-making factors would allow for the structuring of knowledge in project decision-making.

Such a set can be created by the decomposition (causal analysis) of indicated decision-making problems to smaller (individual) factors.

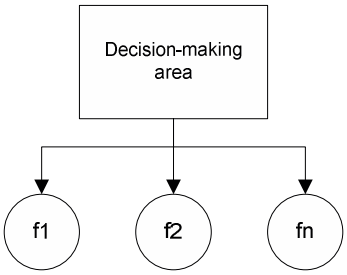

Figure 4. Decomposition of decision-making areas to a list of decision-making factors

Defining the decision-making factors and the correlation between them and the project decisions, as well as an investigation of the impact of these factors on the success of the project would primarily help to increase the awareness of the decision-making mechanisms occurring in the project and would allow project managers to extend their knowledge of project management [9].

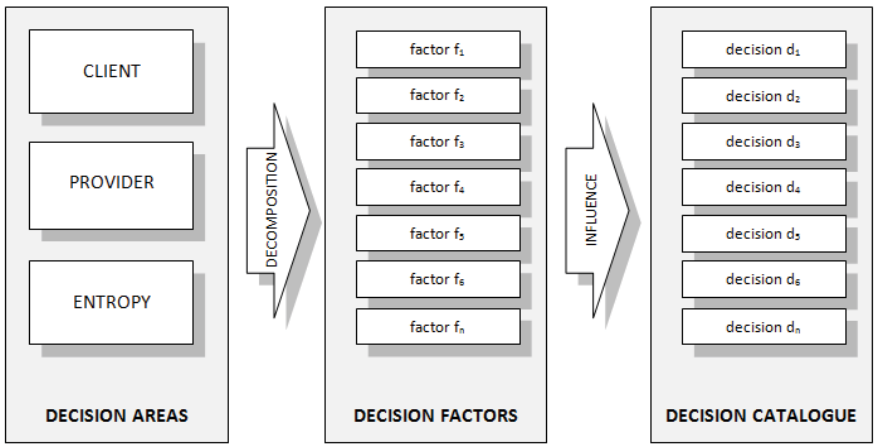

Figure 5. Relationship between decision-making areas, list of decision-making factors and their impact on the need to make certain project decisions

On the basis of the authors' experience, the following can be argued:

- There is a finite set of factors which are important from the point of view of the three previously-mentioned groups of decision-making problems (the maturity of the client and supplier and project entropy).
- Decision-making in projects depends to various degrees (correlation) on these factors.

At this stage it can be concluded that the results of this part of the study will constitute a two-dimensional matrix, which is shown in the table 2, as an example.

Table 2. Examples of correlations between decision-making factors and the identified project decisions

	$\mathbf{f_1}$	$\mathbf{f_2}$	$\mathbf{f_n}$
$\mathbf{d_1}$	0,4	0,01	0,03
$\mathbf{d_2}$	0,1	0,9	0
$\mathbf{d_3}$	0	0	0,4

Note: f_n – decision-making factor, d_n – project decision

The values in the above table have been introduced for demonstrative purposes, as at this stage there is still no research to estimate the strength of the relationship between decisions and project factors. Nonetheless, on the basis of the authors' own experience and previous research, examples of factors from various

categories can be presented (e.g., personal, technological, organizational) as well as project decisions to show how different they may be in terms of the force of mutual influence.

Examples of factors (f_n):

- Regarding the client and client maturity:
  - (total/partial) lack of experience in running projects with a particular client,
  - lack of (any/some) technical competence related (directly/indirectly) to the project field;
- Regarding the supplier and supplier maturity:
  - the arrival of a new team member (on the client side/inside the manufacturing team) (before/during/before the completion of) the project,
  - (sudden/increasing) conflict in the team (between two members/among many members) which (disorganizes/hinders/completely prevents) work;
- Regarding project negentropy:
  - change (broadening/reduction) of (key/less significant) requirements by the client,
  - equipment failure (workstation/server).

Examples of project decisions (d_n):

- To employ an additional member of the team (as an analyst/programmer/etc.),
- To (shorten/lengthen) work cycles,
- To realize (the recognition/purchase of) the CASE tools,
- To obtain (free/commercial) software to support the team in the processes of (application development/documentation generation/obtaining requirements / etc.),
- To add (using own resources/buying an external service) a new (necessary/useful) functionality to the existing software,
- To replace a team member (to hire a new person/to select from those available), who (temporarily/long-term/forever) ceased to be available (due to illness/ dismissal/etc.),
- To change the methodology of the current project (for one less/more flexible).

4. Project managed with awareness

Every IT project has its own individual character. The experience gained by the authors, however, allows the conclusion that it is possible to specify the significant common parts which allow for generalization. On the basis of detailed knowledge, the plan is to obtain reasonable results for the average IT project.

The results of the proposed solution may be important for the development of project management issues in the following areas:

- The implementation of the proposed project, allowing the definition of all the decision-making factors, increases the awareness of project managers to suggest possible actions (activities) in the course of projects.
- The development of a catalogue of decisions will enable better planning/management of IT projects.
- Drawing the managers' attention to informal aspects (i.e., other than the formal arrangements concerning the budget, schedule, and scope), namely: client or project team maturity. Thus, new boundary conditions are created (a new triangle of constraints) in the framework of which the project manager functions (in particular, making decisions).
- Gaining the ability to diagnose the causes of failed projects and to analyze the success of projects completed in accordance with the objectives.
- Gaining the ability to predict the effects of activities undertaken by the project manager in the given project conditions.

The proposed approach to project management goes beyond the traditional perception of this area, as it indicates additional aspects beyond the focus on jobs, financial issues and schedule.

Despite the qualitative aspects of an IT project and those which are difficult to measure, the authors attempt the fully quantitative approach – with the aim to quantify (select and grant measures to) all the relevant factors in IT projects. These studies are intended to expand the environment of project decision-making by increasing the awareness of decision-making factors and the correlations between them. At this stage it is obviously difficult to speak of any measurable results of a possible implementation of the developed solution. Nonetheless, it could be concluded that using the results of this study may directly or indirectly lead to a reduction in project risk, thus reducing the costs of failed projects and may also constitute the basis for reinforcing IT project simulation environments.

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