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The New Perspective of IT Project Management

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Abstract: Carrying out an IT project is a complex and long-lasting activity, which involves large material, human and time resources. By analogy, the realization of an IT project can be very similar to the achievement of an investment objective. In this sense, it is easy to intuit the parallelism between them. Just as the investment objectives require a plan of realization and follow-up in terms of cost, commissioning terms and quality levels, so is the problem for the realization of an IT project. A project is based on: a set of activities, belonging to phases that interfere with each other (how?); having a common and happy ending (what?); allowing the satisfaction of an identified need or requirement (why?); through the contribution of some participants (who?); coordinated by a manager; for which there is a triple objective: the cost, the term and the quality of the resulting product (how much?, when?). The research study aims first of all to analyze the main problems that may occur in IT projects, and secondly to identify the causes that generate these problems.

Keywords: management; IT projects; organization; planning, control

JEL Classification: M15

1. Introduction

With the evolution of technology and implicitly of computers and software, more and more companies in different fields have started to use these tools in the development and management of all types of projects. An IT project is an investment over a period of time, aimed at achieving a specific goal or set of objectives. An IT project is a unique approach, which has a clear beginning and end, made in order to achieve well-established goals, respecting certain parameters related to costs, deadlines and quality. IT projects are generally associated with products and procedures that are performed for the first time or with known but modified procedures.

The objective of project planning is to ensure their realization at the pre-established deadlines and expenses. This goal is not easy to achieve and can encounter many obstacles during the project. Some of these are predictable and, with the help of the experience gained during the realization of previous projects, can be overcome, others cannot be foreseen and only the ability of the project manager can determine the overcoming of these obstacles. In this context, the project manager must have the ability

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to choose the best way to avoid and overcome obstacles and to take the necessary remedial action to meet any shortcomings.

Practice proves that without rigorous planning, complex projects cannot be realized because an estimate of costs and deadlines for the activities involved requires good preparation from the beginning. Without prior planning, we asked ourselves: how could the final deadlines be foreseen and how would it be analyzed if the project was completed on time and if it was within the planned expenditure budget? How can the necessary workforce be estimated, both numerically and in terms of training?

For all these problems the solution is to develop a well-founded plan from the beginning. Although a number of problems can occur at different stages of the project, but most often they originate in a planning inadequate. Throughout the realization and commissioning of the IT projects, there must be a permanent collaboration and collaboration between the project manager and the decision makers from the beneficiary unit. In this collaboration, the conditions and the development plan of the IT project must be determined. At the same time, before going into details about the time planning of the team's activities, the IT project manager will need to know the answer to some questions:

✓ What is the general budget available for the IT project?

✓ In what time do you want the IT project to be realized and implemented?

✓ What is the approximate date of implementation?

✓ What staff are available?

✓ What hardware and software exists within the beneficiary unit and how close is it to the one on which the IT project is intended to be implemented?

✓ Who will ensure the maintenance of the system after its commissioning?

✓ Who will be responsible from the beneficiary for the implementation of the IT project?

✓ Who are the competent persons who will participate on behalf of the beneficiary in the realization of the IT project?

The answers to these questions can be considered pre-established requirements in the IT project planning activity. The ignorance of the information or the absence of satisfactory answers will affect the elaboration and substantiation of the plan for the realization and commissioning of the project of the information system.

The establishment of the planning, monitoring and reporting methodology can also be considered as a pre-established requirement. Currently, the variant is practiced, which details only the first phases of the IT project, and for design, programming and testing it will be limited only to a sketch of the plan. Therefore, the development of software projects requires, in addition to the above requirements, the choice of the project team and the project manager, which is done by observing the requirements regarding the professional competencies necessary for the respective project. A project is organized and exists during the product / service development cycle to be realized. After its receipt, the project is considered completed if it enters the warranty period (for the external client).

Once the planning requirements are known, the project manager performs the detailed project planning. This presupposes: the detailed knowledge of the activities and respectively the establishment of their logical succession within each stage. After the inventory and the elaboration of the list of activities, the sub-activities are deduced and the logical sequence and the time assigned to each one are established.

In the following we suggest an example of the list of activities, grouped on stages of realization of the IT project.

In conclusion, the realization of a project therefore begins with the expression of the requirements and ends by obtaining an operational program. Between these milestones, the so-called software development cycle takes place, consisting of a series of periods that are called phases and that overlap in part. Activities are defined within the phases. More precisely, the life cycle means the definition of a suite of phases, of the activities performed during these phases, of the results (documents, programs) that are obtained and of the dependencies between phases.

The main purpose of the research is to identify the problems manifested throughout the life of IT projects and to identify the causes that determine these problems.

2. Literature Review

With the development of advanced technologies, information management and means of communication, an increasingly important place begins to occupy the activity of a company/ association/ institution based on IT projects (Oprean & Abdel). It is currently estimated that 50% of the activities of large companies are conducted according to the principles imposed by IT project management (Andone & Tabără, 2016). Also, public or private institutions, as well as non-governmental organizations have started various IT projects both nationally and internationally. IT projects can be realized in any field of activity such as health, economy, politics, law (Wheeler, 2011).

Traditionally, IT projects are defined as tasks with specific characteristics (Roşca, Macovei & Davidescu, 2003). IT projects can be understood as targeted tasks because they are planned, agreed and controlled in accordance with the deadlines, resources required and associated costs. According to the organization theory, IT projects can also be perceived as temporary organizational structures necessary to carry out limited-term business processes. IT projects have a specific identity, which is expressed by: specific objectives, construction, organizational structures and processes specific to IT projects (Buchmann, 2014). IT projects are implemented in the case of relatively unique processes.

The more novel the objectives and achievements, the greater the risk associated with them. Insufficient application of methodologies recognized by IT project management is one of the main causes of IT project malfunctions in any organization. Whether it is about the delay of IT projects, about the wrong choice of the technical solution, about the partial achievement of the established objectives or about the non-use of the implemented IT systems, the dysfunctions of the IT projects have major influences on the efficiency of the activity and performance.

IT project management is a relatively new approach within organizations. The last decades have been marked by the rapid growth of the use of project management as a means by which organizations achieve their goals (Wheeler, 2011). IT project management provides organizations with powerful tools to improve their planning, application and control skills, as well as how people and other resources are used.

In general, the issue of IT project management can be differentiated depending on the field in which it takes place (Oprean, Racoviţan & Oprean, 2004):

- at the level of companies, especially those in fields such as infrastructure, telecommunications, construction, show business;

- at the level of non-profit organizations, in areas such as education, health, environmental protection.

The increasing complexity of the problems posed by the projects and the rapid increase in the number of project-oriented organizations have contributed to professionalization (Airinei, Fătu & Fotache, 2017).

IT projects are of two types: external and internal. External IT projects are generally initiated as a result of a request for quotation from a client (Avornicului & Avornicului, 2016). The request for offer is materialized on a case-by-case basis through a specification or simply through a verbal request. Internal IT projects are initiated following an internal decision of the supplier, formulated by the marketing department and approved by the supplier's management. This decision is in turn constituted in a specification (Avornicului & Avornicului, 2016). An internal project may concern the development of a new program or the realization of a new version of an existing program. After establishing the specifications, the technical director must develop an offer (response to the specifications) or delegate the development of these specifications (Rusu, 2001).

The offer developer decides to break down the project into a set of basic tasks in as detailed a way as possible, grouping these tasks into phases, stages, batches - thus defining a development process variant specific to the project in question. He also checks the requirements and specifications of the project (those that appear in the specifications, in other documents provided by the client or other adjacent documentation) and identifies the project processes (Lehmann, 2018).

The necessary effort is estimated for each task and for the overall project management, according to the project estimation guide. This estimate should include the division of effort estimates into processes and stages. Usually, the bid developer organizes the list of tasks related to the project in a Grantt chart and a Pert chart (Airinei, 2007).

Sometimes the workload required to meet an important organizational goal can be so large that it is difficult to organize and accomplish in a single IT project. This may mean that the organization undertakes a program that includes several connected IT projects (Snedaker, 2006). The program is defined as a specific action carried out in order to achieve several objectives - it is a cycle or set of activities that is an integrated approach to fulfilling the missions and objectives of the organization (Păun, 2006).

3. Research Methodology

The objective of the research is to identify the problems manifested throughout the life cycle of IT projects, to identify the causes that determine these problems. In the research carried out were involved 250 managers from Romania within four organizations in the fields: medical, research, production and industries.

The research took place between December 2020 and February 2021. The research was based on the use of the questionnaire which was sent by e-mail and the size of the sample in this study was simple. The questions in the questionnaire were developed and grouped in such a way as to follow the components of an IT project management methodology:

1.Organizing IT projects;

2.IT project planning;

3.Control of IT projects;

4.Quality management;

5.Change management;

6.Configuration management.

The purpose of the questionnaire questions was to evaluate the way in which the project management components are applied and not the existence of the theoretical knowledge in the field of the interviewees.

In the socio-economic universe, the economic decision assisting problems are generated by the multi-criteria decision processes; this is why we used the maximum global utility method in the study.

The model tries to use, at maximum, in a scientific way, the informational base, and the procedures for imitating the rational mode of decision-making is, in more or less elaborate forms, the conceptual essence of the models.

The steps of the global utility method are as follows:

Step 1. We build the utilities matrix with the elements x_{ij}, i = 1,..., r and j = 1,..., n

Each matrix element is calculated for the maximum criterion with the expression:

$$x_{ij} = u_{ij} = \frac{x_{ij} - x_{i\min}}{x_{i\max} - x_{i\min}},$$

and each minimum criterion with the expression:

$$x_{ij} = u_{ij} = \frac{x_{i\max} - x_{ij}}{x_{i\max} - x_{i\min}},$$

where:

x_{ij} = value of the i indicator associated to the *j* indicator;

$x_{i\max}$ = minimum value of the i indicator;

$x_{i\min}$ = maximum value of the i indicator.

Step 2. We calculate the global utility for each project, as the sum of the products between the utility matrix elements (the column vector corresponding to the project) and the importance coefficient given for each indicator.

$$UG_j = \sum_{i=1}^{r} \alpha_i u_{ij}, where \sum_{i=1}^{r} \alpha_i = 1$$

Step 3. We choose the project to which the V_j maximum global utility corresponds.

$$\max\{UG_j\} \Rightarrow V_j \quad j = 1,...,n$$

For differentiating a decisional Vi variant (given n variants), and for selecting the best offer by simultaneously considering various assessment criteria (Cj, j = 1, ..., n) we use the maximum global utility method. Finding the best combinations of attributes (characteristic of a variant) forms the object of the multi-attribute problem.

This involves the transformation of all number values aij (expressed in the associated measure units) and qualitative characteristics in utilities uij, that is, numerical (dimensionless) values located in the range [0, 1]. The basic assumption in the correct operation of the weighted sum method is the independence of the criteria. The largest of the synthesis utilities indicates the best option.

4. Results and Discussions

The research study is based on the analysis of the main problems manifested in the implementation of IT protections. The data analysis process was approached as a system composed of five categories of problems that IT project managers face:

P1 - Problems identified in the organization of projects;

P2 - Problems identified in project planning;

P3 - Problems identified in project control;

P4 - Problems identified in quality management;

P5 - Problems identified in change and configuration management.

Table 1 presents the informational basis of the study, respectively the weight of the importance it attaches to the management of each problem.

Table 1. Share of Issues that May Influence IT Projects

CATEGORIES OF PROBLEMS	FIELD OF ACTIVITY			
	MEDICAL % (v1)	RESEARCH % (v2)	PRODUCTION % (v3)	INDUSTRIES % (v4)
P1 (c1)	16.45	22.35	27.5	12.5
P2 (c2)	10.55	15.15	11.9	23.61
P3 (c3)	8.9	13.25	9.8	10.54
P4 (c4)	23.45	16	11.82	23.55
P5 (c5)	40.65	33.25	38.98	29.8

Source: the author's own concept

The results obtained indicate that IT project management first considers P5 - Problems identified in the management of changes and configurations and, finally, P3 - Problems identified in project control (Figure 1).
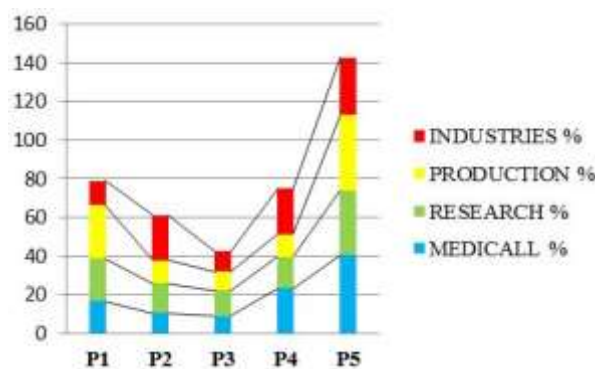

Figure 1. The Importance of the Problems in Each Field of Activity
Source: the author's own concept

The execution of the calculation algorithm implied:

Step 1 – building the unit matrix with the elements x_{ij} figure 2.

$$\begin{bmatrix} 0.26 & 0.66 & 1.00 & 0.00 \\ 1.00 & 0.65 & 0.90 & 0.00 \\ 0.00 & 1.00 & 0.21 & 0.38 \\ 0.99 & 0.36 & 0.00 & 1.00 \\ 0.00 & 0.68 & 0.15 & 1.00 \end{bmatrix}$$

Figure 2. Unit Matrix
Source: the author's own concept

Step 2 – Calculating the global utilities for each organization (Table 2):

Table 2. Results of the Global Utilities Calculation

GLOBAL UTILITY	RESULT
INDUSTRY	2.25
RESEARCH	3.34
PRODUCTION	2.26
MEDICAL	2.38

Source: the author's own concept

Step 3 - From Table no. 2 it is observed by calculating the global utilities, the highest global utility has the organization in the field of research. Therefore, following the application of the calculation algorithm of the maximum global utilities' method, it can be concluded that the research organization has best assessed the importance of the issues that can negatively influence the implementation of IT projects.

In conclusion, these problems ultimately determine the partial or total failure of IT projects by not achieving the proposed objectives or not respecting the established constraints. Each problem category has several specific elements that define it:

P1 - Problems identified in the organization of projects:

• it is not very clearly established to whom the project manager reports during the project implementation;

• the project coordinator of the beneficiary does not have the necessary training to monitor and evaluate the way in which the project management is performed by the supplier;

• the organization that provides the project or the project manager does not have the capacity to manage the implementation of complex projects;

• the products resulting from the implementation of the project are not used by the end users;

• the refusal of collaboration and acceptance of the products from the persons who use the products made within the project;

• unavailability or disinterest of the beneficiary's resources towards the project development.

P2 - Problems identified in project planning:

• the dependencies for the project are not correctly or completely identified;

- unrealistic estimation of the durations for the activities within the stage;

- the allocation of resources is defective (insufficient);

- delaying activities because resources are not available when needed.

P3 - Problems identified in project control:

- the problems that appear during the development of the projects are not identified in time and / or are not solved optimally or in due time;

- the beneficiary does not always know what the real stage of the project is, or what are the problems that the supplier is facing at a given moment;

- the project coordinator of the beneficiary does not have the appropriate institutional levers to effectively control a project;

- the services or documents to be produced are not always known or clearly identified in the contract;

- the responsibilities of the parties and the mutual dependencies are ambiguously expressed;

- acceptance methods for deliverables are not explicitly identified;

- the tests to be performed before accepting a product or service are not identified and the test results are not rigorously documented;

- responsibilities for monitoring and reporting progress are not always known;

- it is not known what is the order of priority of the contractual documents in case there are contradictions between their provisions;

- there are often disagreements with the supplier's representatives due to the different understanding of what needs to be delivered or how it should be delivered.

P4 - Problems identified in quality management:

- the deliverables made by the project do not correspond to the applicable quality standards established for the project;

- the testing process does not highlight all the non-conformities of the deliverables.

- the deliverables made by the project cannot be used by the users due to the major dysfunctions that appear immediately after entering their period of operation;

- the supplier is not able to ensure and control the quality during the project.

P5 - Problems identified in change and configuration management:

- changing the requirements of the beneficiary during the project and the impossibility of the supplier to respond to these changes effectively;

- non-integration of some subsystems or components in the final system following the implementation of some changes at their level;

- the occurrence of delays or unplanned or unapproved costs as a result of making changes to the specification of deliverables;

- delivery of products that are not functional or usable.

5. Conclusions

IT projects often drift, in the sense that they take longer than expected, and cost more than assessed. This is often the responsibility of the customer who often changes their requirements. The causes resulting from the research study, which lead to the failure of IT projects can be various:

C1 - Causes identified in the organization of projects:

1)   no project steering committee is established before its start;

2)   the IT project coordinator of the beneficiary is not always identified by the management based on the project management skills and experience; as a rule, he is elected from the IT department;

3)   there is no official nomination of the members of the beneficiary's project team, with a description of the specific role and responsibilities in the project;

4)   the departments that benefit from the IT project are not always directly involved in the project development, or are not represented in the IT project management committee;

5)   the most efficient means (tools) are not always used to present the problems encountered in the development of the IT project in order to make timely decisions by authorized persons;

6)   in most cases the supplier is not required to present in the technical offer the project management methodology that he will use during the IT project.

C2 - Causes identified in project planning:

1) not all elements that require planning are considered in the planning processes;

2)   no specific methods or tools are used in the planning;

3)   detailed planning is not always done at the beginning of the stages, when the relevant information necessary for planning is available.

C3 - Identified causes in project control:

1)   the concluded contracts do not contain sufficient details to allow an efficient control of the projects;

2)   suppliers do not include in their offers details regarding: the responsibilities of the parties and mutual dependencies, the tests to be performed, the acceptance methods for deliverables;

3)   the specifications do not always provide for the responsibilities of the parties for monitoring and reporting on progress;

4)   there is no clause in the contract that stipulates the order in which the various documents that are part of the contract will be interpreted;

5)   control modalities and tools are not always used effectively by the project coordinator of the beneficiary: progress identification meetings, problem solving meetings, control meetings with suppliers, management reporting sessions, written reports.

C4 - Identified causes in quality management:

1)   the organization of the beneficiary or supplier does not always understand what quality means in the IT project environment;

2)   the specifications do not always contain quality criteria for all deliverables of the IT project;

3)   the quality criteria that apply to the different types of deliverables (equipment, software licenses, analysis services, implementation services, training services, support and technical assistance services, technical documents, analysis documents, are not clearly established or known), reports, implementation charts);

4)   it is not required in the specifications the presentation by the bidder of the way in which it will ensure the quality of the deliverables during the development of the IT project;

5)   the suppliers do not present in the technical offers the practical way in which they will ensure and control the quality of the project deliverables, the mention of the existence of ISO certification being often the only reference to quality;

6)   total ignorance or non-application of all types of criteria based on which the testing and acceptance of deliverables is performed within IT projects.

C5 - Identified causes in change and configuration management:

1)   although it is accepted by the vast majority of respondents that the existence of a written procedure that documents exactly all the elements of a change is perfectly justified, in many cases the change control procedure is not known or is not used in IT projects;

2)   not all components of the IT project for which change management is applied are known;

3)   the authority that should approve the implementation of changes in the IT project is not clearly defined;

4)   the advantages and risks for the different approaches in implementing the changes during the life cycle of the IT project are not known.

In conclusion, one of the most important causes is insufficient planning that cannot be done well if a precise and constant definition of phases, tasks and activities is available and a method of evaluating tasks and deadlines is applied. The need to estimate costs results from the requirements of time allocation and efficient use of resources. The project estimation is done at least once before the actual start of the project, but can be repeated during the development of the project. The accuracy of the estimation varies depending on the phase in which it is made and improves over time. The solutions adopted for the evaluation of design costs depend on the way in which the management of IT projects is exercised at the company level and, as such, on the methods and tools used, on the practices, qualities and work style of the teams, last of all, the style of leading and following the projects. A precise evaluation, based on a clear methodology, pertinent and related to the planning of activities, is performed only for the next stage; for the other downstream stages only a global estimate is made. In conclusion, the evaluation will be all the better the more it is done with the project planning and the more a method of evaluation of IT projects is applied.

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