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PROJECT MANAGEMENT AND RESOURCE ALLOCATION OPTIMIZATION IN CONDITIONS CHARACTERIZED BY RISK

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Rezumat: *Cunoștințele legate de management de proiect este necesar dar nu suficient pentru succesul unui proiect. Riscul implicat de fiecare activitate a unui proiect și asimilat utilizării unei resurse în cadrul acesteia poate transforma un proiect de real succes într-un eșec total. Managementul riscului reprezintă una dintre cele mai importante componente ale managementului de proiect. Dezvoltarea și implementarea de software reprezintă domeniul de referință pentru nașterea și aprofundarea interesului în gestionarea proiectelor. În cadrul proiectului MSPREV – Automobile Dacia Renault am urmărit identificarea și tratarea factorilor de risc precum și optimizarea alocării resurselor în condiții de risc, dat fiind specificul proiectului.*

Abstract: *Project management represents the transformation of a vision into reality. The vision is a future state which put into practice will help up improve the company's performance, solve a problem or exploit an opportunity for a higher profit. Project management is a structured process through which we can deliver successfully this future state. Risks have a great impact on costs thus making the risk analysis and resource allocation optimization a must. There are positive risks and negative risks - some of which will be accepted as normal and usually have a low cost associated or, on the other hand, there are inevitable risks which shall have to be dealt with through contingency plans.*

Keywords: risk, project management, planning, resources, optimization

1. Introduction

The development of Project Management as a discipline is connected to the innovation process. In this process we can input as a prototype any component of the company's structure and activity: from resources to processes and final product, post-sale services or the feed-back process. The last fifty years have been characterized by a rising tendency of emergence chance. The success of project based development strategy comes from the fact that projects can deliver change in a more rapid and flexible way that cannot be done through a routine activity. Projects are efficient in supplying change, but are an inefficient way of running a continuous production activity. This is the reason for which as soon as change is delivered the project must be abandoned for the routine activity. From software development projects to investment projects and social projects, the tools for managing projects can be applied in every activity.

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2. Theory on project management

"A project can thus be defined in terms of its distinctive characteristics - a project is a temporary endeavour undertaken to create a unique product or service. Temporary means that every project has a definite beginning and a definite end. Unique means that the product or service."[1]

Projects have to be planned. An early step in planning is the gathering of information about the environment in which an organization operates (the market, the economy, the technology and the legislative and regulatory climate). Next you should define the mission statement of the project. The mission statement should be a brief description of what the group (which could be the entire organization or some part of it) believes it has been organized to do. Ideally, a single sentence should encapsulate what the group believes it exists to do. But more than a mission statement is required in order to identify what the objectives of the organization are.

Projects are created as a response to a certain change arising from the company's environment. Strategic planning sets the direction and route for an organization at a macro level. The result of this activity is, in the end, projects because projects are one of the major ways in which an organization can effect change. The role of the project is to move from a starting place to the end point defined by strategic plans as a goal for the organization. Change can also be prompted from within the organization. A bright idea from a member of staff that appears to offer the organization something valuable (more diversity, new income, improved ability to survive, a need amongst customers or users hitherto unperceived, improved quality of product or service) can develop into a project to realize that idea.

Identifying the need for change, stating the project goal and analysing the environment components in order to define the project's objectives can be made with the help of some tools. One of the commonest analytical tools is SWOT analysis (SWOT is an acronym for Strengths, Weaknesses, Opportunities, Threats). The organization's strengths, weaknesses, opportunities and threats will be documented, investigated, and discussed. Some objectives will necessarily be concerned with improving an existing situation, procedure, process or product in order to address a weakness; in other words, they will be concerned with reducing or eliminating problems In order to do so effectively, the problem has to be investigated thoroughly to determine whether or not the problem is serious and whether it is worth tackling. There are two commonly used tools for this purpose, Pareto analysis and cause and effect diagrams.[2]

There are a number of techniques for determining the project's objectives like brainstorming or nominal group technique. Both brainstorming and the nominal group technique result in a ranked list of objectives. The group can then classify

their organizational objectives using affinity diagrams - drawing connecting lines between different objectives that in some way are related. A thick line can be used to indicate a strong affinity, and a thin line a weaker affinity. This helps to group related objectives together. Once these affinities have been identified, objectives can be classified under descriptive headings. The objectives should be analysed in the terms of cost per objective.

The estimate is the document showing the costs of carrying out a project; it plays a central role in budgeting and cost control. To prepare an estimate it is necessary to prepare a work breakdown structure (WBS), a product breakdown structure, statements of work and deliverables and a cost breakdown structure. The WBS is a hierarchical, top-down view of the work to be carried out. A product breakdown structure is a tool for dealing with complex, multi-component machinery or equipment.

A cost breakdown structure can be assembled once other information from the WBS, statements of work and product breakdown structure are available. One part of planning involves risk assessment and risk management planning. Risk assessment: identifies risks; analyses these in terms of their impact on performance, cost, schedule and quality; estimates the probability of the risk occurring during the execution of the project (the project's exposure); prioritizes the risks according to exposure, effect and problems associated with compounding risks; enables management to monitor risk factors and take action during the execution of the project.

One technique of risk assessment starts with an examination of the WBS using a checklist to help identify the risks. The next step is to assess each risk for its probability and likely impact on the project. The outcome will be a list or register of the risks ranked according to their significance. [3]

Risks identified in the risk analysis should be tackled in the following order: high-impact and high-probability risks; high-impact and lower-probability risks; lower-impact and high-probability risks. Low-impact and low-probability risks are probably not worth expending much effort on. The manager can then look at these high-impact or high-probability risks one by one to determine whether there are ways either to reduce the impact if the risk occurs or to reduce the probability of the risk occurring, or both. For each risk to be managed, the project manager needs to identify what cost effective countermeasures can be applied. These may need to be specified in great detail, depending upon the complexity of the countermeasures.

Possible countermeasures are: avoiding the risk reducing the risk (likelihood or impact); transferring the risk to others (insurance); contingency plans (to be implemented should the risk occur); accepting the risk (just monitor the situation). [4]

3. Results of the applied theory on the "MSPREV Project" for Automobile Dacia – Group Renault

Using the beforehand mentioned theoretical tools and the Microsoft Project software I assessed the risks in the planning phase and at the beginning of the development phase for the "MSPREV Project".

MSPREV is an acronym for Payroll Prevision, a process automated through a SAP–ERP module designed to process data and make analysis based on formulas developed by the HR and CdG (Contrôlé de Gestion – Management Control) departments. The implementation of the software at Dacia is being made through a project based on the previous development of the module in partnership with SAP Romania.

The software is meant to help Management Control (MC) to develop a better HR budget, to reduce costs and improve the free cash flow. The project has 17 activities and a maximum of 12 month period for implementation and launch in use.

The budget allocated to the project is 200.000 Euro representing the acquisition of software, training and bonuses for the members of the project team.

Because the control of the results was important the team was split in two groups with representatives of Human Resources and Management Control departments: the HR team has 3 members (one form Automobile Works, one from Motor Works and the other from HR Purchases Department – in charge with the global payroll strategy); the CdG team has 11 members (2 from Automobile Works, 2 from Motor Works, 2 from Logistics, 4 from Tertiary and 1 global CdG analyst – in charge with the supervising of the other controllers' activity).

The project requirements are: acquisition of the software in its finalized stage at the deadline, modifying the payroll module for data filtering, hypothesis selection as conditions for the program reports, elaborating budget scenarios in connection with the free cash flow, employee training, software deployment and launch. The main activities of the project are: software acquisition, software deployment, training, budgeting and payroll re-prevision, identifying solutions for improving the free cash flow, project management.

In the planning phase we can have only estimates of the financial and time costs involved in the activities. Any risk that occurs on an activity can have a negative impact on costs. For the MSPREV project the areas that present a high importance for the project's success are: human resources costs, information technology systems and activity deadlines.

An estimate has associated risks. Below are some of the risk factors, their impact and ways to counteract them:

Table 1. Risk factors identified and measures to counteract

No.	*Factors*	*Influence*	*Measures*
1.	Time and cost estimates	medium	Permanent project status monitoring and evaluation of the estimates coherency.
2.	Project management	high	WBS, team decision policy
3.	Cost control	small to medium	Cost re-evaluation in the project development phase
4.	Input data quality	high	Data comparison, use of statistical data and analysis, hypothesis testing

The accuracy and precision of estimates has is acceptable, being simultaneous realized by different persons, which have an important previous experience in this field. The input and output data has been previously used and tested onto an Excel Visual Basic automated solution. Though for the upload to the SAP module the data had to be gathered form the shared server partitions used until the project starting point.

4. Discussion on the results of the study

Below there is a list of the risks identified on each of the project's activities from the Work Breakdown Structure:

Table 2. Identified risks and risk evaluation

No.	*Element*	*Technical and financial Risks*	*Probability (1 to 5)*	*Impact (1 to 5)*	*Grade of exposure*
1.	Defining the requirements	Lack of experience	2	-5	2 × (-5)=-10
2.	Specification List elaboration	Leaving out important specifications	2	-5	2 × (-5)=-10
3.	SAP module development	Delay in error correction	1	-3	1 × (-3) =-3
4.	SAP final product	Delay in the development phase of the module	1	-3	1 × (-3) =-3
5.	Software delivery	Delay form the deadline	1	-3	1 × (-3) =-3
6.	Server upload	Lack of collaboration form DSI (Direction of Informational Systems)	1	-3	1 × (-3) =-3
7.	Licenses delivery	Delay in delivery and errors on licenses	1	-3	1 × (-3) =-3
8.	User interface installation	Software installation problems	1	-3	1 × (-3) =-3
9.	Distribution of the user manual	Delays and translation problems	2	-2	2 × (-2) =-4
10.	Database upload	Lack of consistency in information and upload errors	2	-4	2 × (-4) =-8

11.	Training	Trainer with little experience	2	-3	2 × (-3) =-6
12.	Calculation and simulation of payroll budget forecasts	Lack of input data, insufficient human resources for testing, errors in hypothesis	1 2 2	-3 -2 -4	1 × (-3) =-3 2 × (-2) =-4 2 × (-4) =-8
13.	Calculation and analysis of payroll budget gaps	Lack of input data, insufficient human resources for testing, errors in hypothesis	1 2 2	-3 -2 -4	1 × (-3) =-3 2 × (-2) =-4 2 × (-4) =-8
14.	Error correction and reporting	Delays, better results than expected	3 3	-3 3	3 × (-3) =-9 3 × 3 =9
15.	Project management	Errors in planning, insufficient coordination and activity monitoring	2 2 2	-4 -4 -3	2 × (-4) =-8 2 × (-4) =-8 2 × (-3) =-6

Observation: -/+1 represents a minimum impact while -/+5 represents maximum impact (negative/positive)

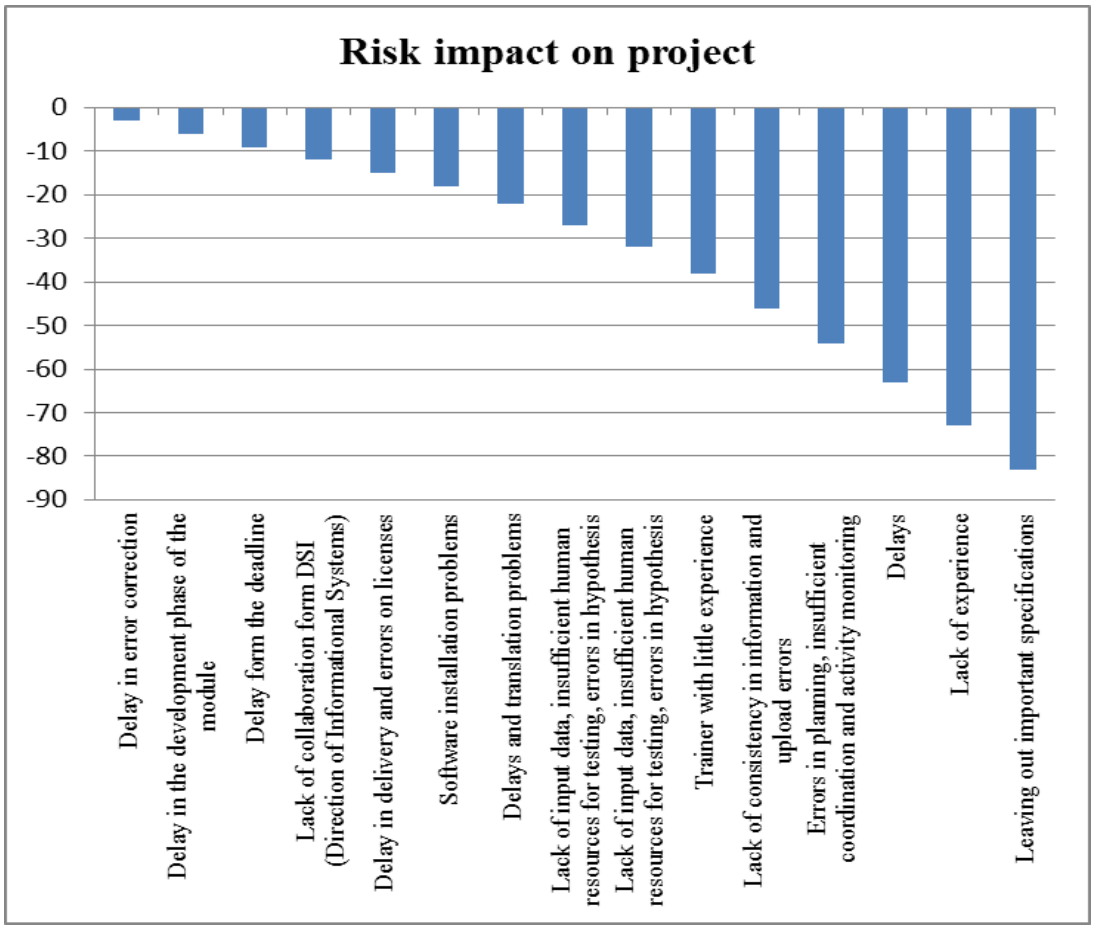

Fig. 1 Grade of exposure to risk.

I have identified the risks that can alter the results of the project, most of them being negative. The highest negative grade of exposure comes from the activities of requirement definition and specification list elaboration. An error in the development of these activities can increase the costs, delay the finish of the project, or even conduct to project failure.

Negative risks have also been identified for the delay in payroll budgeting, prevision and error reporting; as well as in other activities such as insufficient monitoring, bad planning or overall project management. The grade of exposure is medium and the frequency of apparitions is low.

At the other end, we have an element of positive risk – obtaining better results than expected which means an increase in the free cash flow.

Conclusions

Project management has much to do with identifying and managing the risks a project may face. It can be unsettling for those who are used to solving problems once they have arisen rather than working in advance to prevent the problem arising. This is the essential difference between risk management and "issue" management and is central to the introduction of a project-based culture.

Projects, by their definition, are unique entities. Therefore, they exhibit risk. Project risk management is a critical part of project planning. The purpose of risk management is to make the project more resilient to external or internal events that might or might not occur. The net result of risk management is a catalogue of identified risks, their response plans, and contingency time and money to affect those responses. After consulting with the project sponsor or senior management, the project manager usually adjusts the WBS to incorporate certain tasks, to reduce either the impact or the probability based on management's risk tolerance.

As more becomes known about the project, the level at which risks are identified and articulated should become more detailed. One or two people may have to create a high-level examination of a project's risk, but it is sensible to consult more widely when developing a more detailed risk register. This helps to make sure that specific risks are identified and are considered from an appropriate range of perspectives. This calls for a risk workshop involving people from all parts of the project. No one should be excluded as the objective is to turn "unknown unknowns" into "known unknowns". Participants should be given a clear introduction and background from the project's sponsor. The project manager usually sets up the session, but if the project manager wishes to take part, an external, impartial organiser should be used. The project manager should provide any relevant documents, including project management documents and reports on lessons learned from previous projects. It is helpful to highlight areas in which risks may be identified, such as: funding; timing; scope of requirements; customer

expectations; supplier capabilities; roles and responsibilities; technology; methods; politics. Participants write down as many risks as they think relevant on "reminder" notes. It is also helpful if they describe mitigation, but this can be included later. The way in which detailed risks are articulated matters a great deal. A risk should be articulated as a combination of cause and effect. Many such notes should be produced during the risk workshop. When participants have had time to identify and articulate as many risks as they can, it should be possible to qualify them.

The beforehand mentioned method of identifying risks helped the MSPREV Project's manager to identify risks connected with the allocation of resources, like the human resources or database and information resources, of which the success of the project depended upon.

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