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Efficiency and Effectiveness of Management in Project Oriented Organizations: The Role of Information Technology in the Organizations

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INTRODUCTION

The complexity of management requires the application of relevant tools that enable the making of relevant decisions. The tool that enables management in the conditions of high complexity of the solved solutions is IT. Measurement of the "clear" efficiency of the application of IT in management is practically impossible. IT must exist, must be applied in order to realize the tasks faced by an organization. To this extent the paper of Carry (2004) is worth recommendation. The technical and technological progress in IT contributed to the very high level of the latter. Therefore we consider that in the comprehensive systems created or managed by us we should analyze the whole complexity of tasks. In that, one of the important elements, however not the only one, is IT. IT is treated by us as an infrastructure of the contemporary system of management.

In this paper we wish to assess such complexity, basing on the analysis of the two following criteria: effectiveness and efficiency. The relations between the criteria are the following: effectiveness as a measure of the realization of the basic task is superior, while the efficiency is supplementary. The efficiency criterion is applied when there are many possible alternative actions. The analysis of the relation of expenditures and the effects enables the choice of such alternative action that would be the most favorable in such situation [Abascal (2003)].

The objective of the research was to find the recommendation for applying the relevant organizational structure for the effective solution of a problem of the high scale of complexity, plus the recommendations to apply the relevant management methods and techniques, as well as IT systems in projects to achieve the required efficiency.

\OBJECT ORIENTED AND PROJECT ORIENTED ORGANIZATIONS: COMPARATIVE ANALYSIS

The object of the analysis is the comparison of the functioning of an object oriented organization – a traditional one, and a project oriented organization. Based on the subject-related literature, the analysis of own experience and specialized research on the realization of projects in both object and project related organizations the research hypotheses may be verified.

We think that for the solution of the complex problems transformation of an object oriented organization into a new type, flexible and problem oriented organization is necessary. An organization fulfilling the flexibility conditions is often called a project oriented organization in subject-related literature [Gereis (2000)]. Contrary to the latter ones, the traditional, hierarchic organizations are organized based on objects [Brickley (2003)]. Their structure is rigid and hardly flexible. Therefore the literature criticizes them as organizations that cannot catch up with the changes taking place.

The master of metaphor, P. Drucker (1988), wrote that a symphonic orchestra should be the model for a modern organization. And, as the professional musicians in an orchestra, the professional employees of an organization work under the supervision of a conductor. This is a classical object – hierarchy approach. Each musician is a narrow-specialized performer, having a precisely indicated place in a team. They are only to play what the conductor shows to them. It has not been foreseen that when changes shall take place or when the drummer shall be ill, a gap will occur. A French horn player will not play for the drummer. An orchestra plays in stable conditions, unless the light goes out and the musicians will be devoid of the hints how to play the best the particular fragment of the score.

Therefore, a modern organization, for example the one described by Mintzberg (1999) or Robbins and De Cenzo (2001) or J. Brickley (2003) must be flexible and adjust to the constantly changing situation. Such organization is constantly transformed. A project oriented organization requires the application of the principles of reengineering or x-reengineering. However, such an organization requires the supportive infrastructure that is built based on IT [Hammer (1995), Grochowski (2000), Attaran (2004)]. Staying in the sphere of a metaphor, we think that a more suitable one shall the metaphor of Hammer (1996). He writes that the contemporary organization is like a football team. The team plays in a constantly changing situation. The organization of a football team and the structure of its management is similar to an organization and the structure of a project oriented company. Therefore, we consider that the contemporary organization must be mobile and intelligent in order to be competitive, and it must use IT for the realization of its objectives.

HYPOTHESES AND RESEARCH METHOD

The research made was aimed at justification of the following hypotheses:

Hypothesis 1: The functioning of a project oriented organization requires the choice from a set of adequate IT tools, so as to fulfill the criteria of effectiveness and efficiency. The choice of IT tools should be subjected to the management system and bring added value to a business.

Hypothesis 2: Simple problems and managing of routine procedures do not require a project oriented organization, while along with the growing complexity of the problems the necessity of changing an organization into a project oriented one is also growing.

Table 1. Map of the Researched Problems

Problem complexity / Management system	Repeatable, routine tasks, e.g. implementation of a database software	Tasks of average complexity and size, e.g. designing of a data warehouse		Tasks of large complexity and size, e.g. ERP I or ERP II class systems
		Small number of projects	Large number of project	
Traditional (linear and block-linear structures)	x	x		
Hybrid (matrix structure)			x	
Project oriented (mobile structures)				x

"x" means what management system is applied for the particular class of problem complexity

Operation in a global market in which customers require solutions that are innovative, atypical and adjusted to the individual needs, as well as simultaneous realization of many undertakings in a short time, would be impossible without accepting project orientation. Such a change is not at all cheap and easy – the transformation requires high expenditures and the change in the employees' way of thinking and operation.

A graphical representation of a management system is the applied organizational structure. We assume that in practice we deal most often with three structures reflecting the management system, namely:

- the traditional structure – represented by linear and block structures,
- the hybrid structure – transitory or matrix structure,
- the project structure – where the structure changes in time, and the time depends on the length of a project realization period.

An organization realizes various tasks. The tasks are of varied complexity. They may be simple and routine ones or very complicated and unique. Such individual tasks are named projects and their management – project management. In order to manage projects various methods and techniques are applied, e.g. ones presented in the monographs of Wysocki & Mc Gary (2003) or Maylor (2003).

We may construct the following problem matrix – see Figure 1.

The research made by us was aimed at filling out of the presented matrix. At the cross-sections of the particular lines and columns the recommendations will be given as to what management system should be applied for a solution of a problem of the particular complexity (Hypothesis 2) and what IT solutions should be used (Hypothesis 1). Also at the cross-sections of the lines and columns recommendations will be provided as to the methods and techniques that fulfill the accepted assessment criteria. The choice criterion is the fulfillment of the effectiveness and efficiency conditions.

The effectiveness has been measured as a success of a project realization. It has been assumed that success is a situation when none of the three discriminants, such as the scope of the project, the realization period and the costs, has been exceeded by more than 10%, compared to the planned values [Kisielnicki (2004)]. The efficiency has been measured with the following methods: ROI for individual projects and ROI for the whole organization. Also for the assessment of the effectiveness and efficiency of a company operation, the comprehensive assessment model developed by the European Foundation for Quality Management – EFQM [http://www.efqm.org] was used. The research has been based on the example of a company having a project oriented organization (Transsystem S.A.).

A project oriented company (shortly POC) was defined, among others, by Gareis [Gareis (2000), pages 709 – 721] with the use of the following features: "management by projects" is assumed as an organizational strategy, temporary organization is being created for the realization of comprehensive processes, a portfolio of various type projects is managed, a specific organizational structure for the realization of the integration function is present, project culture is present, company sees itself as a project oriented one, the "new management paradigm" is applied (engagement of employees, process orientation, team work, customer orientation, network relations with customers and suppliers).

PRESENTATION OF THE OBJECT OF THE RESEARCH

The researched example company named Transsystem is a medium sized producer of technological transport systems for automotive industry. Operation in the global market, in which the customers require innovative and atypical solutions, adjusted to their individual needs, or the realization of many undertakings in a short timeframe, would not be possible if Transsystem would not turn to project orientation. The very turn to project orientation was the source of the company's success.

The successes were visible, among others, in the growth of sales in 2001 (namely the year of the company's transformation) by more than 80%, with 96% share of exports. They created 500 new workplaces and renewed the production, management and IT infrastructure. The growth that began with a project has continued in 2003 and 2004. Over 50 projects in 20 countries around the world, on five continents, are being realized for automotive companies of nearly all makes. The turnover has grown by further 80%.

Further stages of the organizational development were related to the application of the adequate management methods supported with growingly developed IT systems.

Application of the systems resulted from the internal needs but also from the expectations of customers in the automotive industry who more and more often required the application of the modern systems of designing, communication and management of jointly realized projects. On the one hand, the number of project tasks was growing and, on the other hand, the projects were more and more technically and organizationally advanced. Without the creation of the adequate conditions for the realization of the projects, the achieved company development would not be possible. The conditions comprised, among others: the organizational structure, the systematics of processes and the management support IT systems.

The project orientation is reflected in the organizational structure of Transsystem (comprising the steering committee, project management office, management representative for projects), the principles of realization of projects included in the project management manual, in a number of standards simplifying the work of the project teams and the management of the company, as well as in the project culture.

The dynamic flow of events in the company, according to the business logics, are better presented in the process flow chart.

The basic process of Transsystem has been built based on the R&M guidelines (Reliability and Maintainability) [Society of Automotive Engineers (1999)], developed for the American automotive industry. The model is applied through the quality management system QS 9000 TES binding at Transsystem.

IT AND ITS ROLE IN A PROJECT ORIENTED ORGANIZATION MANAGEMENT

An important role in a project oriented company is played by IT application, based on Internet or intranet. The Management Information System (MIS) operates in the intranet structure.

On top of the presentation of data on the whole company, MIS provides information on the projects and the individual processes. It is an important tool supporting the management of the company as refers to the projects: comparative analyses to the preceding settlement periods, economic value added (EVA), portfolio analyses, trends analyses, project assessments on a scale, resource planning, plus the traditional financial analyses (ROI, cash flows and costing).

At the level of an individual project, MIS enables the ROI analysis, profitability analysis, the analyses of deadlines, costs and departures from the assumed budgets and margins, among others. While the access through the Internet enables the communication of all interested parties within the projects and company business processes.

The specifics of project nature tasks require the application of relevant management methods, so as to strengthen the factors deciding on the success of the projects. Such methods are, for example, the methods applied in the modern quality assurance systems: Advanced Product Quality Planning (APQP), Failure Mode and Effect Analysis (FMEA) [Majorny, Kassebohm (1994), page 194] for individual projects and methods at the level of the whole company: Balanced Scorecard (BSC) [Kaplan, Norton, 2001] and the model developed by the European Foundation for Quality Management (EFQM). The former methods are applied in risk assessment and risk management already from the moment of the realization beginning. While BSC is applied for the adjustment of the project objectives to the superior objectives of the company, and EFQM model – for the assessment of the effectiveness and efficiency of the whole company functioning.

RESEARCH RESULTS AND ASSESSMENT OF TRANSSYSTEM

The objective of the research, as mentioned in item 1 was to find the relevant organizational structure for the problem to be solved by an organization, as well as recommendation to apply the relevant methods and techniques, as well as IT technologies for projects of various complexity. The research has been carried out at Transsystem SA.

Choice of a Relevant Organizational Structure for Solving of the Relevant Problem

Based on the research carried among project managers of Transsystem, the recommendations for the application of a relevant type of organization, depending on the complexity of the project, risk and strategic importance for the company have been developed. Score calculation is presented in Table 2.

Table 2. Assessment Template for the Complexity and Risk of Projects

No.	Assessment element	Complexity score	Risk score
1	Project	1-5	1-5
2	Deadlines	1-4	1-4
3	Equipment installation	1-4	1-4
4	Production	1-5	1-5
5	Project scope	1-4	1-4
6	Finance	1-4	1-4
7	Project value	1-4	1-4
8	Customer	1-5	1-5
	Total – I P		
	Strategic project importance	Technical development	Customer relations
		0-1	0-1
	Total – II P		

a/ If for **I** Σ P • 20 or for **II** Σ P • 1 => Complex project realized within a project organization.

b/ If for **I** 9 < Σ P < 20 or for **II** Σ P = 0 => Project of average complexity realized within a hybrid organization.

c/ If for **I** Σ P • 9 or for **II** Σ P = 0 => Simple project realized within a traditional organization.

Choice of Management Methods and Techniques Plus IT Systems for Projects

Based on the above project classification, the recommendations for the application of the relevant IT systems supporting the respective management methods and techniques applied in a project oriented company have been developed (Table 3).

SUMMARY

Based both on theoretical considerations presented in part one and the Transsystem example we were able to prove that in the management of the realization of a complex project the management methods oriented on projects must be applied. However, it must be remembered that the functioning of a project oriented company requires the choice of the relevant management methods related to IT. The choice of IT should be subordinated to the applied management system and bring about of the business value of the particular organization. Simple problems and management of routine procedures do not require a project oriented organization. However, along with the complexity of the problems the necessity of transformation into a project oriented organization is growing.

The presented results of the company before and after transformation into a project oriented company, both in the form of economic and market data: growth of sales and profit of over 80% and the assessment based on EFQM model from 615.9 points in 2001 to 785 points in 2002, enable to accept the hypothesis on the necessity of adjusting the form of the organization to the tasks that the organization is to fulfill, namely to transform the company into a project oriented one; plus the necessity to accept the relevant structure and systematics of processes and IT infrastructure.

An inseparable element that not only supports a company but also is necessary for its functioning due to the variety of management methods and techniques, the importance of communication, the supervision of multiple projects and relevant reporting, is the application of adequately adjusted IT systems. As the result of the research carried out in Transsystem, we may recommend the application of the relevant IT systems for a project oriented company.

As an extension of the current research and the analysis of the research it would be advisable in future to research the changes in the application of management methods and IT systems in a long timeframe of company operation, plus to carry out the research at a larger number of project oriented companies in various sectors.

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Table 3. Recommendations for the Application of the Relevant Management Methods and Techniques, plus IT Systems for Different Projects of Varied Complexity (Source: Transsystem SA).

No.	Management method, technique	IT System	Function	Project recommendation
1	R&M Systematics	Microsoft Visio	Visualization of processes	Complex
		MIS	Calculation of process ratios and their presentation	
		Intranet	Intra-company communication	
2	BSC	Core Strategy	Decomposition of the strategy in to 4 platform objectives: customers, finance, employees, processes. Presentation of cause and effect relations between the elements in the form of a strategy map.	All
		MIS	Visualization of objectives Calculation of ratios and their presentation	
		Intranet	Presentation of objectives and ratios	
3	Portfolio	Special software for portfolio analysis	Choice of projects for the company's objectives Managing of a group of projects Weighing of projects	Simple and average complexity
4	Benchmarking	Special software	Comparison with the leading companies	Complex
5	Target Costing	Financial and accounting programs	Supervision over project and product costs	Complex
6	QFD	Special software	Provision of functions that the customers expect	Complex
7	Design support software Virtual product models	AutoCad Microstation Proinżynier Inventor Robot Prosteel Catia	Design support 3D specifications Visualization of dynamic flows of products Simulations Specifications based on the virtual product model	Complex
9	Project scheduling, critical path	Microsoft Project	Deadlines calculation Critical path calculation	All
9	FMEA	Special software	Risk analysis and prevention	Complex
10	APQP	Special software	Advanced quality planning, risk analysis, requirements analysis	Complex
11	SPC	Statistical software: SPCC	Failure statistical analysis	Company level
12	EFQM model	Software developed by the European Foundation for Quality Management	General company assessment and management excellence	Company level
13	Claim management	Financial and accounting software, reporting e-mail	Claims referring to the project activities that have not been included in contract specification	All
14	Communication	E-mail, telephone communication,	Reporting Informing on the status of projects and important matters	All

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