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PROJECT RISK MANAGEMENT IN LARGE OIL COMPANY

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ABSTRACT
Risk is incorporated in all human activities since it is a consequence of man's inability to „see" the future. This is even more pronouced with fast technology development which one can witness in recent years. Also one can notice significant influence of globalisation leading to risk globalisation and wide spread of risk through all processes and projects, especially under conditions of world wide economic crises. Finally, enormous amount of information which should be handled in nowdays processes further increases risk in all our activities. Therefore, risk management is becoming more and more important and risk even becomes the most important criterion for decision making in complex processes. One example is large and complex oil company in a transition country, which is the focus of this paper. Namely, in this paper an investigation of all relevant factors influencing project risk management has been performed and results analysed by advanced statistical methods and presented through discussion and conclusions. It has been shown that successfull risk in a large and complex oil industry requires modern advanced methods, as used in this paper.
Keywords: Project risk management, Large oil company, Decision making process

1. INTRODUCTION
Risk management is getting increasing attention, since experience gathered in last few decades enables its adequate and comprehensive understanding and evaluation. In large companies risk management is complex process requiring quantitative and qualitative methods, [1,2], in order to increase profitability and open new business possibilities. In this process special attention should be paid to the fact that decision made in the initial phase of a high-risk project are lacking precise information about costs and time scale. Therefore, the risk analysis is needed as the frame or plan for successful risk management which would cover both the decision making and decision implementation phases. The aim of this investigation was to evaluate basic factors influencing decision making and implementation process in large oil company, as well as factors preventing scuh a process, in order to minimize or eliminate them. Toward this aim following general (GH) and individual hypotheses (IH) have been adopted:
GH1: Decision making process is based on an analysis of all risks
GH2: It is possible to identify risk faktors both in decision making and decision implementation phases.
IH1: Project features affect risk faktors both in decision making and decision implementation phases.
IH2: Company organization affects risk factors both in decision making and decision implementation phases.
IH3: Employees permanent education reduces risk both in the decision making and decision implementation phases.
IH4: Available methods and techniques of decision making process can not eliminate risk of failure in achieving goals defined by decision making process**.**

2. INVESTIGATION
Investigation has been performed in a large oil company, operating under high risk conditions, including unstable transitional period in the region, privatization and restructuring. The sample

consisted of 80 projects covering all important activities of the company. The basic aim of projects was to solve certain problem in the company, typically followed by internal and external risks due to technical, human resources, market, financial, contract, ecological and other factors. Each project has been monitored starting from the initial phase (defining phase) and following 6 month of implementation, with focus on a priori identified risks in relation with risks identified during implementation phase. Following data about projects have been monitored: financial effects, risk factors, need for resources, project type, key events, limits of expected benefits. Project data has been defined by the following scheme:

- Project type: developing, ecological or other.
- Risk level: low, low-medium, medium, medium-high, high.
- Cost: low, low-medium, medium, medium-high, high.
- Time for implementation: from 1 month up to several years, in 5 groups.
- Time to return investment: from 1 month up to several years, in 6 groups.
- Net value, in 5 groups.

In the defining phase risks have been pondered and data collected, coded, handled and interpreted. The sensitivity analysis has been applied to evaluate parameters related to a project, as well as decision making tree, technical expertise, adequate priority choice, and other methods to reduce risks, which has been anticipated in accordance with new project data obatined during implementation phase. Risks identified in defining phase concern:

- knowledge, i.e. availability of all data,
- technology,
- decision making hierarchy,
- supplier reliability,
- change of product price,
- increased investment,
- change of taxes,
- reduced selling,
- deadline break,
- failure to achieve project goals,
- external administration,
- ecology.

In the implementation phase, project realization has been monitored and following risks identified:

- knowledge, i.e. availability of all data,
- technology,
- decision making hierarchy,
- supplier reliability,
- increased investment,
- deadline break,
- law and regulation problems,
- meteorology conditions.

Kronbach's coefficient alpha has been evaluated (0.713) indicating satisfactory scale compliance, [1].

3. RESULTS

Results are here presented only in a descriptive form, whereas complete results, both numerically and graphically, are given in [1,3], separated into the following:

3.1. Decision making process - Correlations

The relation between project features and risks, evaluated by Pierson's linear correlation, is shown in Table 1.

Table 1. Correlation between time to return investment (TRI) and net project value (NPV) vs. risks

		Knowledge	Technology	Organization	Suppliers	Price change	Administration	Increased inv.	Reduct. Selling	Tax Change	Deadline break	Ecology	Result
TRI	Correlation	.077	.002	.011	-.168	-,566**	-.111	,376**	-.168	-.171	.144	.066	-,306**
NPV	Correlation	.104	-.072	.038	-.157	,243*	.188	-.162	.061	.031	-.192	-.164	.131
	N	80	80	80	80	80	80	80	80	80	80	80	80

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

3.2. Decision making process - Componental analysis

In order to evaluate basic risks identified in decision making process, 20 variables are submitted to Principal Component Analysis. Factor extraction has been performed on sample encompassing N=74 projects by using Varimax normalized factor rotation. Before applying it, the method has been verified by evaluating „Kaiser-Meyer-Olkin" indicator, being 0.675 (higher than recommended value 0.6 by Kaiser. Six extracted components have been separated, explaining 71.92% of variance of factors:

1. factor (F1) explaining 25.79% of variance, defined by: tax change, selling reduction, technology and knowledge, can be interpreted as risk due to lack of project data**.**

2. factor (F2) explaining 18.35% of variance defined by: time to return investment, company sector, price change, project type, can be interpreted as risk of project type**.**

3. factor (F3) explaining 8.56% of variance defined by: investment increase and project value, can be interpreted as investment risk.
4. factor (F4) explaining 6.81% of variance defined by: net value, ecology, deadline break and goals achievement, can be interpreted as goal risk.
5. factor (F5) explaining 6.42% of variance defined by: company organization, administration, time to implement project and supplier reliability, can be interpreted as company organization risk.
6. factor (F6) explaining 5.98% of variance defined by: existence of alternative in decision making process.

3.3. Decision implementation process - Correlations

Correlations between project features and risk during decision implementation process have been evaluated by Pierson's linear correlation and non-parameter Spearman correlation, as shown in Table 2 and explained in more details in [1, 3].

Table 2. Correlation between project features and risks

		Proc Real	Change Budzet	Prom Proj	Znanje	Technology	Organization	Suppliers	Price change	Administ.	Law	Increased inv.	Meteo cond.	Deadline break
ORG	Pirson	-,296**	.205	.010	.033	.029	.098	-.158	-,302**	-.108	.106	-.080	-,379**	-.180
Proj type	Pirson	-,352**	.085	.024	.075	-,278*	-.067	-.062	-.036	-.192	-.108	-.046	-.144	-,320**
Proj value	Pirson	.027	-.206	.034	.135	-,242*	-.013	.188	.185	-.112	-.036	,231*	,232*	-.150
TRI	Pirson	-,277*	.024	-.012	.067	-,231*	-.043	-.076	-.037	-.151	-.123	-.012	-.023	-,339**
Implem.time	Pirson	-.071	.133	-.100	.066	.202	.131	-.050	-.215	-.094	.148	-.082	-.176	-.121
NPV	Pirson	.113	-.074	,256*	,271*	.113	.016	,401**	,448**	.169	-.011	,383**	,462**	.185
PrirodaPosla Smisao	Pirson	.160	-.185	.096	.018	-.095	-.011	.206	,255*	.068	-.045	.197	,405**	.050
ProcReal	Pirson	.039	.000	.140	,301**	-,249*	-.047	,257*	,342**	.077	-.057	.109	,321**	.021
	Značaj (2-tailed)	.731	1.000	.225	.008	.029	.682	.024	.002	.505	.624	.344	.004	.855
	N	79	77	77	77	77	77	77	77	77	77	77	77	77

3.4. Principal Component Analysis in decision implementation phase

In order to evaluate basic risks in decision implementation phase, 20 variables have been submitted to Principal Component Analysis in the same way as in previous case. Value of „Kaiser-Meyer-Olkin" indicator was 0.689, proving that facotr analysis is suitable method for given data.

4. DISCUSSION AND CONCLUSIONS

Correlations in the decision making phase have been evaluated using Pearson coefficients and non-parametric Sperman analysis. Besides individual correlations, obtained by this analysis, the general conclusion is drawn that there is the difference in relationship between different risks for different tasks. Special attention has been paid to the effect of internal organization on project implementation, leading to the conclusion that its improvement reduces project implementation risk. By using the Principal Component Analysis with orthogonal (Varimax normalized) factor rotation it was also shown that those factors which are important in the decision making phase can be identified since they explain almost 3/4 of total variance in the preliminary component version. In similar way correlations are evaluated and factors important for the decision implementation process are identified. The most important conclusion of this analysis was the fact that different correlations and different factors are obtained compared to the decision making phase, emhasizing the importance of application sofisticated methods for the complex companies, like the one analysed here. Anyhow, of equal importance is the conclusion, also based on results of this investigation, that there is still no universal approach to risk management because factors like style of management, human resources, communication process, are extremely difficult to evaluate.

This investigation has proved all adopted hypotheses:

GH1 has been proved by analysis of decision making process from point of view of recognizing and evaluating possible risks, monitoring of decision implementation process, and identifying problems in this phase.

GH2 has been proved by factorial analysis which has identified main factors in both decision phases.

IH1 has been proved by factorial analysis which has shown following correlations:

- Project type and risks of product price change, supplier reliability, selling reduction and tax change.
- Project value and risks of lack of data, technology, increased investment and ecology.
- Project deadline and risks of selling reduction, deadline break, tax change and task organization.
- Project risk level and risks of knowledge, technology and project goals, as well strong negative correlation between project risk level and product price change, tax change, deadline break.

IH2 has been proved by strong correlation between company organization and deadline break due to administration, as well as between company sectors and identified risk of project failure, product price change, deadline break and project goals. Cluster analysis of company organization indicates different risks in different company sectors, which implicates possiblity to reduce this type of risk with improved organization.

IH3 has been proved by high correlation of knowledge and project deadline break. Also by using t-test it has been shown that knowledge risk was not evaluated properly when it was assumed to be the same in both decision processes.

IH4 has been proved by the result indicating that 27 projects have not achieved their goals and 80% projects had significant deadline break.

Investigation performed in this paper have shown that large componies with complex organization structure, needs sofisticated methods and techniques for project risk management.

5. REFERENCES

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