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THE APPLICATION OF SCORING METHOD IN ESTIMATING RISK IMPLEMENTATION OF ERP SYSTEM

Rafik Nafkha
Department of Informatics
Warsaw University of Life Sciences – SGGW
e-mail: rafik_nafkha@sggw.pl

Abstract: Good implementation of an ERP (Enterprise Resource Planning) system differs from unsuccessful one before everything the ability of both foreseeing and reducing the amount and the size of numerous traps which appear at every stage of the life cycle project implementation. In this article, based on the results of questionnaire sent to 50 companies with different employment size, events affecting the failures of the ERP system implementation were identified and on their base a level of risk as well as additional costs related to preventive actions (reducing the probability or effects of the problem occurrence) were investigated. To evaluate the risk values of chosen ERP system implementation tasks, a spot risk assessment method was used.

Keywords: ERP implementation system, risk value, risk assessment methods, risk register, scoring risk method

INTRODUCTION

Information systems suppliers in particular ERP (Enterprise Resource Planning) systems avoid clearly in their presentations risk analysis of the system mainly for two reasons: the first is the lack of or limited knowledge regarding the risks in individual sectors of the economy, the other for reasons of sales and marketing. Risk has always aroused panic among both customers and retailers offering the system. Disclosure of threats by the supplier in the first steps of the sale may be subject to conflicts of interest. One general principle that is in force is that the risk in the first stages of the project is a forbidden word. Unfortunately, in the next stages of the system implementation, it becomes the not needed word and for its analysis is too late, it remains only mitigate the impact of rising incurred costs. This article presents, a sample list of risks for typical ERP systems

implementation and the risk assessment calculation method, that can be useful running own risk implementation analysis, especially for medium and small enterprises (MSP).

A special case of projects are the ERP implementation projects, which are subject to adjustment previously produced software to the specific conditions of the company in order to achieve certain benefits. Risks in these projects arise on each stage of the implementation of the ERP system [Khvalev E.A, 2009]. According to report (Business Software Report, Management Institute of Warsaw, 2001) and analyzing the implementation management system suppliers methodology [Nafkha 2014], the implementation of a ready system is usually implemented in five phases:

- preparation of the organization for change – work out a project organization and the rules for its implementation,
- determination the business concept - elaborate a list of business processes that will be implemented by the system,
- implementation - development of a prototype solution ,
- preparation for work in the target environment - installation, launch (test integration of the prototype, user training, data transfer , preparation of the working environment) and transmission system operation,
- start and supervise the work of the system in the real environment.

In the following article, based on the results of surveys sent to 50 companies with different structures of employment, we identified events affecting the information management system implementation failures that occur at every level in the life cycle implementation project. To identify the implementation project key risk factors, we asked both customers and experts in the field of ERP systems implementation to indicate repeated and common in their opinion, implementation failures factors. Participants in the study indicated more than 42 different problems occurring during the implementation of the ERP system. In this study only 25 of them have been identified as having a negative impact on the time, budget of the project and product conformity with the project objectives. Table 1 shows the risk critical factors ranked by the number of reported problem.

Table 1.Types and quantities of identified problems

Id	Critical risk factors	Number of reported problem
1	Lack of Top Management commitment and support	20
2	Poor project management team	19
3	Lack of Departmental cooperation	19
4	Unclear goals and objectives	18
5	Incorrect project management	18
6	Ineffective communications	17
7	Improper management of expectations	17

Id	Critical risk factors	Number of reported problem
8	Incompetent project leader	16
9	Lack of vendor or supplier support	16
10	Improper change management, risk and scope of the project	15
11	lack of knowledge of their own business processes	15
12	incorrect system selection	12
13	Analysis and data conversion	12
14	Limitation in resources	12
15	Insufficient training of end-users	10
16	Lack of new business processes familiarity	10
17	Non-acceptance of organizational structure change and business processes	10
18	Poor integration of the infrastructure systems	9
19	Poor conflict management	9
20	Using tools supplier	8
21	Ineffective project cost and time management	6
22	Lack of metrics for evaluating project efficiency and benefits	6
23	Lack of competence of ERP's consultants	5
24	Data losses	2
25	Insufficient testing phase	2

Source: own study based on survey result

PROJECT METHODOLOGIES

Risk assessment according to scoring method for risk assessment consist in the identification of risky tasks that can lead to implementation failure and give them a quantitative measure of the risk level according to an adopted scale. Tasks classified as risky are grouped into specified categories. The grouping should be made by the risk manager (executing the obligations described in the Policy and Risk Management Plan). Survey participants filling the questionnaire do not need to be familiar with risk management, it is sufficient that they present significant implementation threats in their opinion, and then the grouping and the formalization of the risk list is made by an expert in this area. In this article, the following risk categorization has been provided:

1. Organizational - subcategories include (top management, business processes, strategy, employment policy, company culture, process planning, finance, staff).

2. Project - subcategories include (project management methods, quality and implementation team, business development, project integration).
3. Technical and technological - subcategories include (system functionality, support, critical IT infrastructure,).
4. External - subcategories include (legislation, the economic situation, exchange rate, competition, lobbying …).

The most common risk categories and their weight listed on a scale of 1 to 5 are shown in Table 2

Table 2. Risk categories

Category	Weight	Sign
Technical and technological	3	T
Organizational	4	O
External	5	E
Project	4	P

Source: own study and assumptions

To carry out a comparative analysis, each problem has been prescribed a certain value on a scale of 1 (least important) to 5 (the biggest problem). The final value of each problem is the sum of all values fulfilled by various participants in the interview. Since the determination of the probability is done intuitively, the intuitive probability scheme is defined as follows:

Table 3. Scoring risk value

Range	Risk value (scoring)	Probability	Designation
1 - 4	1	0,1	very low
5 - 8	2	0,3	low
9 - 12	3	0,5	medium
13 - 16	4	0,7	high
17 - 20	5	0,9	very high

Source: own study an assumptions

Please note that there is no verifiable method that precisely determine the risk probability. Therefore, it was decided only to determine the range within which the probability is located. In table 2 the allocation for each risk category weight values was entirely subjectively. In one publication [Frączkowski, 2003] weight constitute a general validity assessment of evaluated risk regarding the entire project. According to this way of thinking weights can be implemented for revaluation (normalization) the risks in each category and then the whole project. To calculate risk values for each category before and after preventive actions (in order to minimize the risk value), in his book, Frączkowski uses the following formulas:

Non-standardized risk value (before preventative action):

$$R_x = \frac{\sum_v R_v}{n} \tag{1}$$

Standardized risk value (after preventative action):

$$R_{zn\_x} = \frac{R_x W_x}{W_{avr}} \tag{2}$$

Non-standardized risk total value:

$$R_{total} = \frac{\sum_x R_x}{k} \tag{3}$$

Standardized risk total value:

$$R_{zm\_total} = \frac{\sum_x R_{zm\_x}}{k} \tag{4}$$

where:
n - number of tasks belonging to given category,
R_v – task risk value belonging to given category,
K - number of categories,
W_x - category risk weight,
R_{avr} - average weight value calculated from the formula

$$R_{avr} = \frac{\sum_x W_x}{k}$$

After summing up indicated scores and assigning ratings to each risk factor, it is necessary to evaluate its effects in order to apply any simplest strategies for its elimination or restriction by adding an appropriate cost estimation (to handle emerging problems) to estimated schedule "margin of safety".

APPLICATION OF SCORING RISK ASSESSMENT METHOD ON THE EXAMPLE OF SAP SPRINT SYSTEM IMPLEMENTATION

The scope and cost of the proposed example is specified using SAP Business All-in-One the Configurator (http://www.sap.com/solution/sme/software/erp/all-in-one/buy/rds.html), enabling the calculation of the predicted and the estimated SAP Business All-in-One rapid deployment solution price including hardware, software and system implementation (without software maintenance cost).

SAP Business All-in-One is a complex, integrated ERP solution, prepared by SAP partners for medium-sized companies. Implementation scope for a typical enterprise SMEs (Small and medium-sized enterprises) adopted in this example includes the following areas:

- activities related to logistics process in terms of sales, distribution and invoicing including , offer to the customer, customer contract, customer order, sales, refunds and claims adjustment.

- Activities related to process of ensuring supply including: warehouse management, purchase offer, a supply contract, batch management, stock transfer, inventory and purchase settlement.
- Financial Accounting and Management which includes: general ledger, accounts receivable and suppliers, liquidity management, accounting and reporting of fixed assets for finance.

The following assumptions and cost estimation are adopted: total number of employees 100, number of users 20, licenses cost 214 200 PLN, services 300 000 PLN, total solution cost 584 200 PLN. After working out an implementation timetable, which established the duration and the resources assigned to the project tasks, the next step focus on tasks identification that are risky during their implementation and then assign each of them to adopted in table 3, range of risk allocation. According to ASAP (Accelerated SAP methodology for implementation) [Nafkha, 2014], the road map is composed of five well-known consecutive phases and includes within the following tasks:

- Project Preparation **(P)** – some important milestones that need to be accomplished for this stage include: identifying clear project objectives, architect an efficient decision-making process, creating an environment suitable for change and re-engineering, building a qualified and capable project team.
- Business Blueprint **(B)** - to help extract pertinent information about the company that is necessary for implementation. Information like future business processes and business requirements are essential in this stage.
- Realization **(R)** - With the completion of the business in phase 2, "functional" experts are now ready to begin configuring SAP. The Realization phase is broken into two parts: Baseline configuration based on the information provided in the blueprint document and Fine-tuning the system to meet all business and process requirements necessary to fit company special needs. Fine tuning usually deals with the exceptions that are not covered in baseline configuration
- Final Preparation **(F)** - this stage also concentrates on the fine tuning of the configuration before Go-live and more importantly, the migration of data from old system or systems to SAP. Workload testing (including peak volume, daily load, and other forms of stress testing), and integration or functional testing are conducted to ensure the accuracy of data and the stability of SAP system
- Go-Live and support (L) - The Go-live milestone is itself is easy to achieve.

Examples of risky tasks for the adopted implementation are shown in Table 4.

Table 4 Types and risk values of selected tasks in different project implementation phases

Id	Tasks	Cat	Critical risk factor	Risk Value	Project phase				
					P	B	R	F	L
1	Strategic Analysis	O	Unclear goals and objectives, lack of Top Management commitment and support.	5	X	X	X	X	X
2	Preliminary project plan	O	Unclear goals and objectives, lack of Top Management commitment and support.	5	X				
3	Pre-implementation analysis including modeling	P	Incompetent project leader, lack of Departmental cooperation, lack of knowledge of their own business processes.	4		X			
4	License purchase	Z	Delay of license delivery.	1			X		
5	Needed shopping and infrastructure preparation	Z	Lack of co-operation with supplier, delay of devices delivery.	3			X		
6	Installation and Technical Configuration	T	Poor integration of the infrastructure systems.	3			X		
7	Installation and functional configuration – Logistics	T	Lack of dedicated resources, module is not in time.	3			X	X	
8	Installation and functional configuration - Materials Management	T	Lack of dedicated resources, module is not in time.	3			X	X	
9	Installation and functional configuration- Financial Accounting and Management	T	Lack of dedicated resources, module is not in time.	3			X	X	
10	Business processes modifying according to accepted company needs.	P	Non-acceptance of organizational structure change and business processes, lack of new business processes familiarity.	3		X	X	X	
11	Administrators training	T	Delay in training, lack of competent trainers.	1				X	
12	Training users with regard to purchased modules	T	Insufficient training of end-users.	3				X	
13	Data migration	T	Lack of prepared appropriate forms, lack of supplier tools for data conversion , loss of data.	2				X	
14	Data input	T	System not ready yet, lack of data prepared.	2				X	
15	System performance testing	T	System not ready yet, ineffective project time management, lack of metrics for evaluating project efficiency and benefits.	1				X	
16	system testing in terms of system functionality including interfaces	T	System not ready yet, lack of all functionality system testing.	1				X	
17	Technical support during system startup	T	Lack of supplier support , lack of competence of ERP's project team fine-tunes.	4					X

Source: own study and calculation

The risk analysis purpose is to determine the quantitative value and identified risks impact on the project implementation. Data are collected in a risk register updated with score risk value and measurable financial and non-financial consequences reducing identified risks. Table 5 shows risks and costs of introducing preventive actions of individual project tasks.

Table 5. Risk and costs of introducing preventive actions

Id	Preventive actions	Cost	Risk value	Effects after introducing preventive actions
1	• All stakeholders identification • Kick-off.	- 5 000	3	Defined the purpose and scope of the project. Top Management commitment and support.
2	Internal training, coaching	1 000	3	Clear goal and Project purpose. Top Management commitment and support.
3	• High power decision for PM • External consultants support • Process modeling training	- 3 000 2 000	3	A competent project manager. Knowledge of business process modeling techniques.
4	Collecting supplier references	-	1	License in time.
5	• Collecting supplier references • Early orders and transfers in time.	- -	3	Devices in time.
6	• Additional technologies testing before implementation work.	-	3	Familiarity with new technologies and easier solution selection.
7	• Determine the necessary time dedicated for project implementation • Provide separate room.	- -	3	A dedicated project team. Module provided in time.
8	• Determine the necessary time dedicated for project implementation • Provide separate room	- -	3	A dedicated project team. Module provided in time.
9	• Determine the necessary time dedicated for project implementation • Provide separate room	- -	3	A dedicated project team. Module provided in time.
10	• Collecting supplier references • Client management support and co-operation with supplier .	- -	3	Business processes adopted to company needed.
11	References and trainers certificates		1	Training on time and meets the user’s needs.

Id	Preventive actions	Cost	Risk value	Effects after introducing preventive actions
12	• References and trainers certificates • Additional targeted training	- 1 000	3	Training on time and meets the user's needs.
13	• Collecting supplier references • Request data migration methodology	- -	2	Data migration in time.
14	Determine the necessary time dedicated to preparation and data input	-	2	Data input in time.
15	Making simulation tests	-	1	Right performance testing in time.
16	Functionality testing in particular phases of the project	-	1	Functionality testing in time.
17	• Collecting supplier references • Request additional consultancy or support	- 2 000	3	Contract technical support.

Source: own study and calculation

A summary of measured key risk indicators shows table 6. The proposed preventive actions reduce the non-standardized risk - in case of acceptance a risk reduction cost at level 6000 PLN. (which represent only 2% of the whole implementation budget). In this case the risk probability is reduced to one level less from 3.22 to 2.97. The standardized risk value after preventive actions (formula 4) is reduced from 3.19 to 2.94. In case of acceptance risk reduction cost 14 000 PLN which increases the implementation budget by 4.67%, then the risk probability is reduced from 3.22 to 2.72 and for standardized risk value after preventive actions from 3.19 to 2.69.

Tabel 6. Estimated risk indicators for the implemented case

Nr	Risk indicators	Cost = 6 000 PLN	Cost = 14 000 PLN
1	Non-standardized project risk	3,22	3,22
2	Standardized project risk value	3,19	3,19
3	Risk value after preventive actions	2,97	2,72
4	Standardized risk value after preventive actions	2,94	2,69

Source: own study and calculation

According to risk management theory [Korczowski, 2009], the risk owner decides how to deal with risk. If the threats reduction cost does not exceed 5% total implementation budget, which represent in most cases an acceptable risk level, the project is realized without any corrections. In the adopted example, additional cost of 14 000 PLN. reduces the ERP system implementation failure probability by 2

levels and increases the system implementation budget by approximately 4.67% of total implementation budget. In another case, decision of selecting an appropriate scenario to deal with the risk value belongs to the steering committee.

SUMMARY

Successful management systems implementation is dependent on many factors related both to the type of activities carried out by company, and the way of managing project in particular the selection and use of risk management methods. There are no verifiable methods that will accurately determine system implementation failure or success probability, but we can determine the interval in which the success/failure probability of each task is located. Risk assessment according to scoring method for risk assessment consist in the identification of risky tasks that can lead to implementation failure. For such risky tasks, a set of key factors that have directly influence on project failure are selected. Next for each problem a range of risk value was adopted. Since the determination of the implementation risk probability takes place intuitively, based on the experiences and statements of specialists risk values are determined on the basis of indicated key factors number related to given implementation tasks execution. Subsequently, and after assigning each task to one of set categories (organizational, project, technical or technological, external), risk indicators before and after preventive actions were calculated.

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