

Application of a Confrontation Matrix in Project Teams Quality Management

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Abstract

This paper presents the results of experiments aimed at the application of a confrontation matrix in management of socio-technical systems. It also presents the results of the research focused on seeking new opportunities of the theory systems, system applications and specific methods in work of specialist teams. It shows one of the output – innovative application of confrontation matrix. This application is suitable for use in a company sphere to select a strategy, and also for the management of internal and external company relations. Another important utilization is in the area of analysis and evaluation of system characteristics, especially relations in socio-technical systems.

Keywords: project team quality; optimization methods; confrontation matrix; computer application; socio-technical systems.

1. Introduction

To manage and direct systems, industries, processes, projects and working teams as well as interest groups strategically, it is necessary to use effective managerial methods. In practice the SWOT method is very frequently used (Sedlačková and Buchta, 2006; Kerkovský and Vykypěl, 2006; Kolkman, 2010; Zavadskas et al., 2011; Osita et al., 2014; Shakerian et al., 2016; Šterbová et al., 2016; Thamrin et al., 2017) or its alternative TOWS, as a universally used tool, method or technique which maps and analyses a particular phenomenon, process, project or organization. Lind (2015, p. 116) claims that the aim of the SWOT analysis is to define possible appropriate activities which may have a positive impact on strategic and operative situations. It is appropriate to use the method especially at the beginning of the process of planning, proposal or decision making, to identify the strategic position of organizations, groups of specialists or individuals. It allows selection of the adequate basic strategy. To use the above mentioned method effectively a tool was determined in the last period (Jenčo and Lysá 2018). At the same time an application form was developed in the software environment which is well known and easily accessible for specialists and employees. Vyhnaľ (2016, p. 10) pointed out that “a manager must be able to systematically classify information and that deduction is used at the right time”. Dirgová (2011, p. 36) states that “in each organization we look for approaches, the best forms of management, communication and motivation”.

A proper tool for system’s strategies analysis and synthesis is the confrontation matrix. It is often used as an extended part of the SWOT method. It suitably supports and completes the determination and direction of a sought basic strategy of a company or any other organization. The matrix methods are also used in other areas. In terms of quality and performance evaluation of the special algorithms, Rojček et al. (2017) used the training matrix.

Processing of a confrontation matrix, as well as discussion about the matrix with interested parties, offers ways for the improvement of a system, organization, processes, single activity and group of specialists. Obtained information may lead to effective strategic decisions in an organization. The application of a confrontation matrix often shows new lines of thinking and new points of view. The usual result is knowing the most important weaknesses and strengths of the whole system, project or process. The principle of confrontation is expressed by the matrix (Figure 1).

	Strengths (S)	Weaknesses (W)	
Opportunities (O)	O-S confrontation	O-W confrontation	+
Threats (T)	T-S confrontation	T-W confrontation	-
	+	-	

Figure 1. Principle of confrontation matrix

Source: Dudinská et al., 2009, p. 97

A confrontation matrix is often used by companies and production companies to firstly consider and review individual dimensions. After designing a confrontation matrix, it is possible to evaluate the interaction between internal and external dimensions. The aim of this step is to connect trends in the field and in a company (Nijssen and Frambach, 2001). A confrontation matrix compares mutual bidirectional connections between internal and external factors. Connections of selected internal factors (strengths and weaknesses) are compared to external factors (threats and opportunities).

In their books (Dudinska, Budaj and Budajová, 2009), or (Nijssen and Frambach, 2001) the authors applied the matrix so that they realized its evaluation by manual counting of entered signs minus, zero or plus. Whereby 0 means no influence, - (minus) means moderate negative influence, - - (minus minus) strong negative influence, + (plus) means moderate positive influence and + + (plus plus) strong positive influence. The

above mentioned solution, utilizing the signs plus and minus, is suitable for manual processing, whereby the matrix and its elements are drawn on the paper.

A certain type of confrontation was also used by Baranovskaya et al. (2016) in an adjacency matrix to determine the existence and character and links or connections between strategic areas in an organization. Some sources, e.g. (Ferrell and Hartline, 2011), use numerical evaluation. Another source (www.expertprogrammanagement.com), points at the utilization of higher numerical values -5, -3, -1, 1, 3, and 5, or only of values composed of positive numbers, e.g. from 0 to 9 (Figure 2). The meaning of confrontation reviewing remains the same.

		Opportunities				Threats			
		O1	O2	O3	O4	T1	T2	T3	T4
Strengths	S1	8	3	6		3	3	2	
	S2	3		5		3	5	1	2
	S3		5			3	4		3
	S4	3	4		3			3	2
Weaknesses	W1		2		6	3	3	2	1
	W2	4	3	2		3	3	2	2
	W3		1	4	9	3		8	5
	W4			1					3

Figure 2. One of the types of confrontation matrix

Source: Confrontation matrix. Available at:

<http://www.expertprogrammanagement.com/wp-content/uploads/2011/08/>

The paper presents an extension of the method utilization concept as well as an innovative real application of a confrontation matrix. Improved application will enable the creation and comparison of a confrontation matrix in the process of strategy determination. This step will improve the total process of managers' decision making.

2. Methods

The aim of this project was to verify the possibilities of system application methods and their improvement to support work in organizations. The challenge was to create an application and adapt it for use in the field of quality systems. The application of the numerical evaluation of relations among confronted factors can be used. The main aims for the suggested software application for a confrontation matrix was predicted speed, effectiveness and exactness of obtained results. To utilize commonly available software environment to make work with methods more effective can be used.

The next aim was a proposal and verification of a confrontation matrix to be used in a system of human resources quality. The submitted study focuses on opportunities to verify a confrontation matrix in two specific situations:

1. Application and improvement of a confrontation matrix in a company.
2. Application of a confrontation matrix in IT teams of organizations.

In the first situation the external and internal factors which influence the current market position of a company will be confronted. Factors will be adopted from SWOT analysis, which was carried out by the company to determine its strategy or to define its current market position. A specific pair of factors consists of one internal and one external factor. The coefficient of confronted factors pairs will be expressed by numerical evaluation in a determined range. Relations between factors pairs will be gradually assessed and recorded in the matrix. Consequently, horizontal and vertical sums of assessment will be calculated. Conclusions for managers will result from maximums and minimums found in columns and lines. The basic procedure concerning the research procedure is shown in Figure 3.

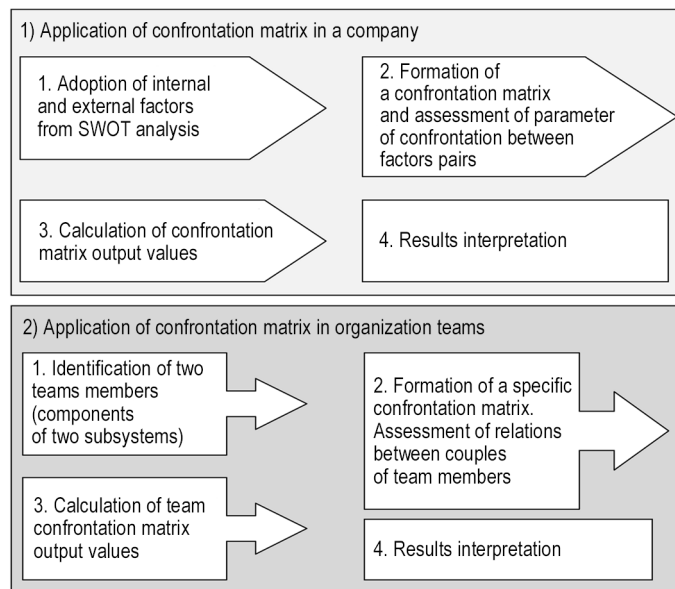


Figure 3. Project solution procedure

Source: own processing

In the second situation the verification of confrontation matrix principles to assess a system of relations in a social-technical system will be carried out. It is anticipated that there are system dynamics which specifically influence relations among members and their orientation towards the achievement of targets.

Relations among people in individual teams (subsystems) will be assessed. An assessment of the relationship of individual team members with other individuals will be recorded in confrontation matrix lines. The sum of assessments at horizontal level presents a view of individuals (system components) on a total system, respectively on individual subsystems.

The sum of assessments at vertical level presents a system view, respectively a subsystem view of individuals of the team. It is a summary view of the whole system on an individual system component. It presents a total team assessment by each individual. Based on summary assessments it will be possible to draw conclusions for the managing of working teams.

In the presented solution it was suitable to use a numerical evaluation of relations between factors or system elements. Next it was necessary to use available software applications which will speed up and will automatize the utilization of the presented method.

It was a must to follow ethical dimensions when factors, but first of all particular members of working teams were confronted. Budaj et al. (2015) pointed out that "all paths, in long-term perspective, bring success to a company only if they are managed primarily by an ethical dimension".

3. Results

This part presents two solutions. One solution for the application of a confrontation matrix in a company and the second one the application of the matrix in computer programmer teams.

3.1. Solution for application of a confrontation matrix in a company

A new solution which is automated and numerical was proposed (Figure 4). It uses the environment of a package of software office applications of Microsoft Office. It is possible to also use other proper software.

The range of values can be entered in an optional scale, e.g. -2 to 2 (it means values -2, -1, 0, +1, +2). This range of values may be operationally modified due to the scale of the applied

	Strengths (S)					Weaknesses (W)					Σ	
	Market knowledge	Quality management	Staff sufficiency	Quality of goods and services	Company image	Lack of resources	Outdated technology	Lack of stocks analysis	Business partners relations	Poor marketing		
Opportunities (O)	1	2	3	4	5	1	2	3	4	5		
Expansion of market space	1	2	1	1	2	1	-1	1	0	-1	1	7
Additional services demand	2	1	1	0	1	0	-1	1	-2	-1	1	1
Foreign marketing activities	3	1	2	1	2	1	2	1	-1	-1	1	9
Arrival of new customers	4	1	2	1	1	1	-1	1	0	-1	1	6
Demand from a new business net	5	1	2	1	0	1	0	-1	1	0	2	7
Threats (T)												
Entry of new competitors	1	-2	1	1	1	0	0	1	-2	1	1	2
Current competition	2	0	0	0	-1	0	0	-1	0	0	0	-2
Purchasing power	3	1	1	1	0	1	0	-1	0	0	1	4
Changes in legislation	4	1	1	1	-2	1	1	0	-1	1	1	4
Increase in prices of raw materials	5	-1	1	-1	1	0	-2	0	-2	0	-1	-5
Σ		5	12	6	5	6	-2	2	-7	-2	8	

max
min

Figure 4. Confrontation matrix – principal of suggested application
Source: own processing

criteria or the problem solved. Software is able to calculate the above mentioned values, find a maximum and minimum, and also set up and present suitable graphic results.

In the suggested process of evaluation, the situations are distinguished by entering positive or negative numbers, which mean: 0 = no influence, 1 = positive influence, 2 = strong influence, -1 = negative influence and -2 = strong negative influence.

Results interpretation

As a result, maximum of summaries of confrontation evaluations in sectors strengths and opportunities is interpreted. The line or column of evaluations with maximum summary presents a factor with maximum internal strength (so in a particular IT company it means something on which they can maximally rely on) or the biggest external opportunity of this company (the factor out of the company which they should catch and utilize for the account of the organization). The presented matrix (Figure 4) indicates that the company should rely on its own high quality management. In its managerial activities it should use foreign marketing campaigns properly since they

increase interest in the products of their own company.

The second part of the result interpretation is the minimum found in sectors weaknesses and threats. The factor with the lowest value presents the main weakness of the company (something what must be preferentially and immediately improved inside the company), or the biggest threat from the external environment (the factor which must be preferentially eliminated). In the above case the company has to analyse its supplies and at the same time find a way to compensate consequences of raw materials price rises.

3.2 Application of a confrontation matrix in teams of computer programmers

A confrontation matrix may be used in the evaluation of system characteristics and quality of working teams of a company or any other groups in different organizations. The basic principles of confrontation matrix utilization remain the same.

Instead of criteria S, W, O, T, for the evaluation of organization strategy the names of team members (name of IT

	Prek	Drabe	Miho	Lynee	Jeger	Vyso	Jass	Bukov	SUM	The element's perception of the system		
Prek		-5	-2	6	-2	-4	-1	-4	-12	min	-1	-11
Drabe	-6		3	7	7	3	1	3	18		4	14
Miho	4	7		6	1	3	1	4	26	max	17	9
Lynee	4	4	4		7	5	2	5	31		12	19
Jeger	4	6	3	8		8	5	7	41	max	21	20
Vyso	1	-3	-6	5	9		8	5	19		min	-3
Jass	-2	2	-1	3	5	5		4	16	2		14
Bukov	-3	3	2	8	6	6	3		25		10	15
SUM	2	14	3	43	33	26	19	24		SUM	62	102
										The system's perception of the element		
	2	6	5	19	13	7	3	8	63			
	0	8	-2	24	20	19	16	16	101			

Figure 5. Confrontation matrix in two project teams
Source: own processing

specialists, programmers and designers) and an evaluation of their relationship to other team members are entered into the confrontation matrix in the suggested solution. Also evaluations of their performance or other important indicators can be entered.

Numerical evaluations, in the selected or entered scope (e.g. -10; +10), enable one to qualify a certain dimension of relationship among the system elements (IT specialists). The entered scope of numerical evaluation allows one to express negative relationship (-10; -1), a neutral relationship (0), and positive relationship (+1; +10). In this way a modified confrontation matrix can be evaluated in the upper diagonal triangle or in both diagonal triangles with the same values. The third option is to evaluate it in two diagonal triangles with a differentiation of relationship between the elements. The third option creates an opportunity to review relationship between system elements in a more objective way.

In the figure 5 an example of a double-side confrontation of elements within two relatively independent systems is shown.

This is a confrontation of two teams of computer programmers – subsystems within an organization. The factor which was evaluated was the expectation of individual elements for co-operation with other elements in a common project. The evaluations of the relations and expectations of co-operation between individual team members were entered into the confrontation matrix. After calculating parameters, the results indicate recommendations of which IT specialist would be the most suitable to co-ordinate the teams working on the common project.

4. Discussion

Parameters in a confrontation matrix were calculated for a real case from practice. The results indicated recommendations of which IT specialist would be the most suitable to co-ordinate project teams. In this particular case the IT specialist chosen to co-ordinate the project will probably be Lynee (31 points) in the team No. 1 and Jeger (41 points) in team No. 2. The specialist Prek (-11 points) may become problematic, or alternatively others due to the number of points they got.

Other results of the suggested confrontation matrix are the values of the proposed parameters “The element’s perception of the system” and “The system’s perception of the element”.

The parameter “The element’s perception of the system” indicates that when looking into the own system (team) the most critical are the specialists Prek (point value -1) and Janss (point value 14). On the contrary Miho (17 points) and Vyso (22 points) are helpful.

On the other hand, when looking at neighbouring system (evaluation of the parameter “The element’s perception of the system”) the most critical are Prek (-14 points) and Vyso (-3 points). Acceptable are Lynee (19) and Jeger (21). Introduced supporting parameters also confirm that the selection of common project co-ordinators – the specialists Lynee and Jeger – was correct.

The second parameter “The system’s perception of the element” expresses how the particular element is perceived by own team (sub-system) and how the same element is perceived by a neighbouring team.

The results from the confrontation matrix show that in own teams, the IT specialist Lynee (19 points) in the first team and Jeger (20) and Vyso (19) from the second team achieve the highest professional and personal credits. In the neighbouring team the most respectable are specialists Lynee (24) and Jeger (13). This result confirms the proper selection of the specialists Lynee and Jeger as co-ordinators. A good alternative for co-ordinator in the second team is Vyso.

Parameters and implications obtained in this way must be reviewed again in the form of formal or informal interviews. In order to complete and extend analysis before a decision other system methods and procedures may also be used. System look at this problem will be even more complex.

5. Conclusion

The paper presents the results of research aimed at finding new possibilities of using the theory of systems, system applications and specific methods that use a computer. It presents new approaches and procedures in using confrontation matrixes. It draws attention to the fact that nowadays the information potential of a confrontation matrix is not utilized sufficiently. It points out opportunities to use a confrontation matrix for strategic analysis of companies as well as for obtaining information to help manage research teams or working groups. The application of a confrontation matrix may be effective in the area of CRM, SRM and ERM (Customer Relationship Management, Supplier Relationship Management and Employee Relationship Management).

Innovative application of a confrontation matrix principles in organization teams is unique. A new element is the proposal of a real application of a confrontation matrix in the software environment which is available or accessible to managerial staff. This application uses numeric evaluations of individual selected factors confrontation. It relates with the already published advanced application of the SWOT technique. Both techniques can create a mutually connected supporting system for managerial decision making.

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