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SOCIO-TECHNICAL TOOLBOX IN ORGANIZATIONAL PRACTICE

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Ludmila Malinová[1], Peter Bednar[2]

[1]University of Economics in Prague

Department of System Analysis

ludmila.malinova@vse.cz

[2]University of Portsmouth, UK

School of Computing

peter.bednar@port.ac.uk

ABSTRACT

The paper is related to problematics of specific methodologies which are trying to comply with the social factor. System thinking - the particular discipline of system theory - has a number of methodologies which are evolving from the sixties. The organizational environment is still quickly changing and the necessity to adapt that methodologies is crucial. The paper shows one of the approach, which seems to be very useful in nowadays organizational analysis. IT is adaptable to both sides as social and technological factor. The Socio-Technical toolbox which is related to Contextual System Inquiry, which forces both sides to adapt a specific situation in organization. One side is the analyst who is applying the tools and the other side is the organization as its individuals and their intentions and needs in context of particular organization. This methodology seems to be very beneficial to both sides and could help to deal with unstable environment of the organization. The author Antonin Rosicky had a specific viewpoint on the problematic of system thinking and organizational change within social systems. Therefore, the paper contains several of his comments and ideas to support the importance of the Sociotechnical toolbox.

KEY WORDS

System methodologies, toolbox, systemic approach, socio-technical toolbox, system thinking.

CONTEXT

The paper is focusing on the topic of Information system design respecting the specificity of man. On the one hand, we have information about soft system methodologies and on the other hand, there are exact models and technologies. The era of complex systems with the label "information society" or "global world" is still actual. The complex systems create many problems, which are unpredictable and both managers and employees have to deal with them on a regular basis. Historically there have been three approaches how to solve this problem. First is a technocratic point of view; the believe is that everything will be solved by technologies. The second approach, the soft system methodologies, deal with social factor in organizations. The last approach is the combination of both and is looking for synergies by using soft system methods and using ICT. (Rosický, 2001)

In such a complex system as organization is, we have to take into account both of them. Both for managers and for employees it could be hard to understand and be able to use both soft and hard skills. Despite, it is a necessity to be successful in our competitive environment.

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There are several methodologies and toolboxes which help to combine the knowledge of both of them. For example Soft system methodology, Client Led Design, ETHICS or Socio-technical toolbox.

INTRODUCTION

The necessity of specific toolbox as a recipe for making changes in organizations is unexceptional. Toolbox indicates a structured system of methods and tools, which lead skilled user to make better changes in particular organization. Important is, that we have to concentrate on the context of the organization and any kind of tools cannot help us while we are not trying to understand the business of organization, the corporate culture and knowledge and skills of their employees. (Bateson, 1991; Bednar and Welch, 2014)

OVERVIEW OF EVOLUTION IN THE AREA OF SYSTEM THINKING

System Dynamics (SD) – founded in 1965 by J.W Forrester. Methodology for mathematical modeling of behavior in organizations. SD deals with complex problems using flows and stocks in particular parts of system and its relationships. (Mildeová, 2008)

Soft System Methodology (SSM) – founded in 1969 by P. Checkland. The methodology related to soft problems in process modeling and organizational practice. The methodology helps to define problems, prepare model of that situation and define possible changes. (Checkland, 1999)

Viable Systems Model (VSM) – founded in 1972 by S. Beer. (Beer, 1972). A cybernetic view of systems, which are recursive and can be modeled by cybernetic description due to level of system hierarchy. (Beer, 1982)

Critical Systems Heuristics (CSH) – founded in 1983 by W. Ulrich. Methodology related to systems boundary questions which leads to identifying of invalid judgements in organizations than it was expected. (Ulrich, 2005)

Client Led Design (CLD)– founded in 1993 by F. Stowell. Methodology focused on systemic and contextual problem analysis of clients and employees in organizations. It also includes a toolbox and techniques for problem definition. (Stowell; West, 1994)

ETHICS – founded in 1995 by E. Mumford. The methodology suggested that problems related with implementation of information systems are not only due to technology, but more often due to social factor in organizations. (Mumford, 1996)

Contextual Systems Inquiry – e.g. Socio-Technical toolbox founded in 2014 by Bednar, Sadok and Shiderova. The contextual system inquiry is complex from the agents' point of view. Socio-technical analysis is based on know-how of employees and also their desires of heart not only skills and knowledge. (Bednar and Welch, 2014; Bednar, Sadok, Shiderova, 2014)

SOCIO-TECHNICAL TOOLBOX

The socio-technical toolbox was developed by the great system scientist Peter Bednar, who combined methods and techniques from another socio-technical methodologies. The final toolbox was proven by practice in different type of organizations. The toolbox was used by more than 200 organizations with different type of business and size of the organization. (Bednar, Sadok, Shiderova, 2014). The relevance of used methods is great thanks to possibilities of contextual inquiry. The set of methods which will be used really depends only on the system analyst and of course mainly on the organization needs.

AREAS

The toolbox is divided into 8 different system areas. In the toolbox, there are available 27 analytical tools and more than 30 templates for organization analysis. The areas of toolbox are consistent to realize complex system analysis. Areas of toolbox as follows (Bednar; Sadok, 2015):

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1) **System change analysis** – definition of problem situations in work system, organizational needs and future benefits of reorganization of work system. It consist of boundary analysis and analyzing current and future system. Used methods for example are brainstorming, mind maps, holistic Multi-Criteria Benefit Analysis, Interaction Analysis, Analysis of System Sustainability etc.

   Rosicky published several papers on the topic of problem definition in an organization. The definition of problem is moreover than only task, open question or some difficulty. It contains all mentioned situations, but it´s closely linked to human knowledge and intentions. If we are talking about a problem, it is the difference between the actual and required state. The searching for a problem solution is crucial. If we have found a solution than we are talking about the definite task and if the solution works, we can use it repeatedly for similar situations. (Rosicky, 2009)

2) **System Structure Definition –** this area helps to identify key objectives, tasks and information needs. The most important is analysis of information needs. There are defined 4 categories of information: operating information, co-ordination information, development information, control information. The outcome analysis is Coordination of Objectives-Tasks-Information Needs, which provides the picture of the system structure.

3) **System Purpose –** defined by efficiency needs in specific organizations. It is the weak point of the system, where problems can arise. It is connected with knowledge, psychological tendencies of employees or managers, IS and Cyber-Security problems, etc. Used analysis are e.g. Analyzing of Efficiency Needs, Job Satisfaction Needs, Knowledge & Psychological Contract, Support and Control & Task Contract, etc.

   Rosicky also used to work with the terms "intentionality" and "abstraction", which were connected to the human knowledge and his understanding of the world. Or the organization where the man is working. The biggest problem is the distinction between the human knowledge and organizational knowledge. When talking about knowing, it´s all the time connected with a particular human. In an organization, knowledge is based in an active system, that is built as the sum of all employees' knowledge. The organization uses fragments of human knowledge as procedures, processes, rules, practices, workflows, models, etc. The mix of used methods constitutes the organizational system in particular levels. (Rosicky, 2003)

4) **System Perspectives –** finding of possible future changes in the next five years. The changes are related to technologies, regulatory, economical, social and organizational issues. There is used future analysis of the desired parts.

   The perspective of the system is influenced by employee's fluctuation, intentions, contentment, complexity of processes and self-organization. (Rosický, 2007) Rosicky also often accented the Bloom taxonomy with three defined categories of knowing in organization: **Cognitive**, linked to natural language; **Psycho-motor** representing physical abilities and skills and **Affective**, that is connected to human values and attitudes. There are possibilities to find the links between e. g. communication and reflex movements. We can often face the problem that employees are not able to define the information needs. They are used to use tools for handling information (with at least some knowledge embedded) and they are losing their own perspective upon the information they get or need. (Rosicky, 2011)

5) **System Priorities –** setting of specific efficiency and job satisfaction needs and also social goals. The aim is to find a possible redesign of work-flow and usage of available technologies. One part is the awareness of specific wishes and priorities of all group incorporated to changes of new work system. There are also external needs and goals such as suppliers and customers. Used methods are Specification, Resolutions and Conclusion of Socio-Technical Goals.

   There is a problem with the distinction betwen grouping of people in the organization. Due to social cybernetics (cybernetics of second order), each human is system – observer, who works as individual. In the analysis we are usually not able to adapt to priorities and wishes of all individuals and by grouping them, we are still losing some information. The question is, if this information is also that important, while it's connected only to one person. If there are so many individual

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requirements, it is possible, that in the organization something could be ignored for a specific purpose. (Rosický, 2009)

6) **Desirable System –** this area helps with designing of new work system from the organizational and technological point of view. It shows new possibilities of organizing the human activity system to achieve the defined efficiency and satisfaction of involved participants of organization. The technological part shows possible changes on the side of software, hardware and user interfaces. Important is to find solutions in social systems and only limited solution in technologies, which is basically connected with higher financial investments. The main method is Analysis of Objectives to be achieved by organization to fulfill Efficiency & Social Goals.

   Thanks to globalization, we have been affected by a certain limitation due to standardization of processes and also technologies. The information system (as the whole) comprises communication, information, knowledge, relationships, technologies etc. To fulfill the business requirements we need only part of the whole. The rest has been embedded in an informal information system, that is also very important. The formal and informal information system should be balanced in order to have content and satisfied employees and customers. (Rosický, 2004)

7) **System Action –** list of particular changes to be done to fulfill the requirements of the area of Desirable System. There is important analysis of Organizational and Technical Possibilities.

   Possibilities and capacities of the system are in direct link with the humans in organization and also the technologies used. We could prepare brilliant analysis of the system as whole with the detailed analysis of wishes and ideas of employees and the technology possibilities, but if we are thinking about the implementation, there will be probably many problems. The first line of problems are managers who have their own perspectives and the second are the employees within their complex environment. Every change needs to be approved by management line, the employees' line should understand and be confident with the change and of course it must work with for customers and their requirements. (Rosický, 2009)

8) **System for Evaluation and Engagement –** implementation of changes brings some problems, e.g. we are not able to say if the new work system will fulfill our requirements for social and technological requirement unless it is fully implemented. Also the implementation itself could bring out some new problems that could be omitted. There are several analyses which help with the final process of evaluation, e.g. Implementation Diagnosis, Benefit Management Objectives and Plan, Evaluation and Self Reflective Element, etc.

UTILIZATION

The range of utilization of the toolbox is wide. As the toolbox provides complex system analysis, it is possible to use it in organizations with less than 5 employees and also in corporate organizations with more than 200 employees. The result will differ due to needs of organization and of course while we take into account the social factor it could quickly change in one year, one month or maybe in one week. The results are also dependent on the role of the system analyst. In the end, the system analyst is the person who picks the methods and templates to use and also if we do the same analysis with two different people, we would probably get different results. This toolbox is independent of the business sector. The organizations involved in research (Bednar, Sadok, Shiderova, 2014) agreed, that the analysis helped them to understand better their business from the operational and strategic point of view.

CONCLUSION

In such a type of an analysis the critical thinking about the problems and used methods has its valid point. The problem with the individual knowledge is not only the issue of standardized organizational information systems, but also with the amount of shared data and information helping to growing uncertainty. The human activity is still evolving and the system approach has one of the main goals to facilitate the human activities to increase efficiency of such activities. (Rosicky, 2001)

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Each area has its own methods, questions and aims to claim. The toolbox is prepared for the analyst to go into organization and start with the system analysis. The structure is intuitive and provides a description and advices. Within the toolbox, there are available some templates to fill in to go through the desired area. It´s not strictly established what the particular sequence of the used methods is, because it could differ from organization to organization. This is the role of the good system analyst to think about the organization and use methods to gain the best from the organizational system and also from social and technological factor. (Bednar; Sadok, 2015) Thanks to application of socio-technical toolbox it is obvious, that the socio-technical practice is still very important and that the methodologies used before (such as ETHICS by Mumford or Soft System Methodologies by Checkland) are still important. Nevertheless, we need to do some changes and update our very fast changing and complex environment. (Bednar, Sadok, Shiderova, 2014).

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