To: Dr. Oleg Abramov, The Academic Secretary of the TRIZ Master Certification Council of MATRIZ

Date: *August 14, 2020*
Place: *Enschede, The Netherlands*
Subject: *Scientific Adviser Review*

Scientific Adviser Review:

Dissertation of Anton Kozhemyako, "***Features of TRIZ Applications for Solving Organizational and Management Problems: Schematization of an Inventive Situation and Working with Contradictions***"

Relevance

The topic of applying TRIZ, its principles and tools in non-technical areas, specifically in business and management, has been receiving special attention during recent years. Similar to technical innovation, innovation in business and management has been playing ever increasing role at both multinational companies to survive competition on a global scale as well as for all other types and sizes of business organizations, including start-ups in order to be capable of achieving results as fast as possible with the use of as least resources as possible. It is exactly where TRIZ can be of considerable help.
Nevertheless, as became evident from numerous cases and studies reported, the direct use of TRIZ tools developed for engineering domains in business and management areas is not effective enough. Although main philosophy and key principles of TRIZ appear to be valid to innovatively improve all sorts of artificial systems, there are certain differences in various domains which require adaptation of specific principles and tools. In addition, there are many gaps to bridge in order to create an effective TRIZ-based framework and a relevant toolset to be successfully used in the domains of business and management.
Research presented in the dissertation by A. Kozhemyako addresses several important issues which tend to create obstacles while adapting TRIZ to business and management.

Goals of Research

The main goals of this research were exploring several issues which complicate adaptation of TRIZ for innovative business and management problem solving:

1. Improve formal analysis of ill-defined inventive situations emerging in business and management areas with the use of a method of Schematization in order to identify specific disadvantages and extract relevant problems to solve.
2. Develop a roadmap of applying Schematization to problems extraction.
3. Bridge gaps between problem models obtained with Schematization and specific TRIZ tools.
4. Improvement of identification of Operational Zone in inventive problems specific to business and management.

Main Results

To challenge the abovementioned issues, the following results of research were presented:

1. The use of an approach of Schematization improves extracting and structuring and inventive situations emerging in business and management environments.
   Such improvement is needed since in general, inventive situations in non-technical areas which include social components have a much higher degree of fuzziness and uncertainty than inventive situations in the engineering areas. It creates considerable difficulties and increases complexity of initial analysis.
   The method proposed is claimed to reduce time for communication during analysis while providing inclusion of all necessary critical information and at the same time avoiding overcomplication of a model of an initial inventive situation.

2. While in technical problems identification of components and borders of the Operational Zone usually does not create difficulties due to dealing with specific clearly defined physical interactions between material objects within limited physical spaces, in business and management problems, the situation is more challenging. Often, the objects that are engaged to contradictions can be either immaterial or distributed throughout a system and its environment, or they can have a complex internal composition, parts of which may not be separated from the whole.
   To improve a process of identification and outlining the Operational Zone for business and management problems, the author proposes to include all three types of objects participating in a conflict to the Operational Zone: a product, a tool as well as the environment where the conflict occurs. Identification of a set of resources influencing the product and a tool (Factors of Impact) can better identify components and borders of the Operational Zone and furthermore, can be used to solve a problem.
   Such approach enables tools of TRIZ which use the concept of the Operational Zone for non-technical problem, for example, adaptations of ARIZ to be used more effectively.

Novelty

1. Regarding the issue of Schematization:
   a. The author explains limits of application of non-TRIZ and TRIZ tools for formalizing problem extraction in business and management: SMART, SWAT and PEST Analyses, Business Process Modeling, System Operator, Function Analysis.
   b. Introduction of a framework of Schematization to analyze inventive situations emerging in business and management environments. It helps considering a model of an inventive situation from a dimension which is not well clarified in other analytical TRIZ tools: management hierarchy layers. It helps bringing more structured content to better explore management-related challenges and include more types of relationships than, for example by using TRIZ-based Function Analysis which can be considered as a TRIZ method most close to Schematization.
   c. Schematization is assumed to simplify analysis of complex initial inventive situations specific to the areas of business and management.

d. Models obtained with the use of Schematization are relatively simple while providing sufficient information content to identify problems.
e. In addition to introducing Schematization as a modeling framework, a roadmap of extracting problems from a model presented by Schematization is proposed.
f. The author presents comparative analysis of Schematization and TRIZ tools for initial problem Analysis: Function Analysis, Cause and Effect Chain Analysis. The results of the analysis are supposed to identify situations when it is preferable to use Schematization rather than other methods.

2. Regarding the issue of Operational Zone:
    a. The approach used to identify the Operational Zone suggests expanding the traditional approach to definition of the Operational Zone presented in TRIZ. The new approach suggests using a model of a problem presented as a contradiction selected, which includes a tool, a product, and their environment as a part of the Operational zone. All components of the Operational Zone are later explored to extract specific resources for further problem solving.
    b. The new approach to defining Operational zone identifies "Factors of Impact" which are involved to a problem under investigation rather than just substance-field resources that are used in technical TRIZ. These Factors of Impact are later used as resources to help solving the problem.

Practical Value of Results

The dissertation provides a number of examples which illustrate practical applicability of the methods and solutions introduced for each of the two issues above mentioned. The author also claims that the methods suggested were successfully used in over 30 real-life projects performed for a number of different organizations and for training of 350 working professionals. Some of the cases were presented in both the author's dissertation and the author's books.
Based on the author's claims, the most important practical advantages of the methods proposed are a) saving time for problem analysis and solving and b) better clarification of an inventive problem during analytical stage.

Critique

1. Regarding the issue of Schematization:
    a. Although the use of Schematization to improve analysis of inventive situations seems to be promising for defining and decomposing inventive situations in business and management environments, the approach still needs to be further elaborated to be presented as a tool with clear rules and guidelines.
    b. Some concepts used in schematization need to be defined in more details, for example, such as "Aggregated Object" and "Specific Object".
    c. Rules of definition of hierarchy layers shall be clarified.
    d. It would be interesting to explore if Schematization and TRIZ-Based Function Analysis or some their parts could be integrated. At the moment, the link is explored rather vaguely.

e. It is advised to the author to deeper compare benefits and drawbacks of Schematization with Soft Systems Methodology (SSM) which have been developing since 1980s and focuses on divergent views about the definition of "soft" problems similarly as it is done in Schematization. (*P. Checkland and J. Scholes, "Soft systems methodology in action: a 30-year retrospective." Chichester, UK Wiley, 1999*).

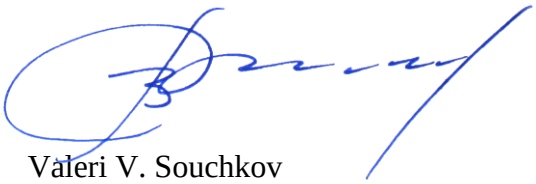
2. Regarding the issue of Operational Zone:
   a. It seems like in some business or management problems, the Operational Zone might become too large and include too many subsystems and components of supersystem. It can considerably increase a list of resources and complicate further finding the most ideal solution. More examples are expected in order to observe how the approach to identify the Operational Zone presented works in different problems and situations.
   b. Classification of possible Factors of Impact in the Operational Zone are required.
   c. A more specific set of requirements and criteria are needed to properly and correctly identify the Operational Zone for business and management problems.

It must be noted that while the abovementioned statements can be treated as disadvantages, they do not diminish the scope and the value of the research conducted and indicate its current state of the art, and therefore can be considered as directions of further studies.

Recommendation

In general, the research performed, and the dissertation presented demonstrate sufficient level of the candidate and match the requirements provided by the MATRIZ TRIZ Master Certification Council. In addition, TRIZ for Business and Management is rapidly growing area of application of TRIZ beyond engineering and TRIZ community requires competent specialists who can support and maintain further development of this direction. As a conclusion, I recommend to the MATRIZ TRIZ Master Certification Council to consider conferring the rank of TRIZ Master on Mr. Anton Kozhemyako in accordance with the Article 5 of Appendix 3 of the MATRIZ Multi-Stage TRIZ Certification Regulations (Level 5, TRIZ Master).

Sincerely,



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