Target Invention사의 혁신과 교육에 대한 접근

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The Target Invention approach to innovation

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Abstract

TRIZ is very popular in Korea. There are many efforts, time, money spent for studying TRIZ at Universities, companies and communities. However, the main criteria of the result of TRIZ activity (big amount of skilled solvers of inventive problems) is growing not quickly enough. Why the situation appears? I am working in Korean TRIZ very long time – almost from beginning TRIZ implementation and until last days. Among other I cooperated with companies of Samsung group (SAIT and Samsung SDI), POSCO, Ajou and KUTE Universities. I would like to present my point of view on situation with TRIZ in Korea.

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However, the main criteria of the result of TRIZ activity (big amount of skilled solvers of inventive problems) is growing not quickly enough. Why the situation appears?

I am working in Korean TRIZ very long time – almost from beginning and until last days. Among other I cooperated with companies of Samsung group (SAIT and Samsung SDI), POSCO, Ajou and KUTE Universities. I would like to present my point of view on situation with TRIZ in Korea.

First of all what kind of main reason of the situation what education and implementation of TRIZ are not enough effective. They could be three possible reasons:

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1. We teach the wrong people.
2. We give incorrect knowledge.
3. Learning of TRIZ is built incorrectly.

What kind of reason is main one?

In my opinion, two first reasons are mistaken.

While my work at the Korean companies I found the Korean specialists are very qualified, good educated and have experience in them area of activity. They take the TRIZ education effectively.

The second reason is opinion the TRIZ is wrong, incorrect method, is absolutely mistaken. Some examples of successful implementation of TRIZ for solving inventive problems showed high effectiveness of the method. Of course, it the implementation of TRIZ provided correctly and systematically. The good example is experience of TRIZ activity of Samsung, where work of TRIZ teams give many billions of economic effect [1].

In my opinion, the main reason is not exact approach to studying of TRIZ.

First, subject of the learning is not correct: people learn "TRIZ in generally", while the correct subject should be "how to solve problem with using TRIZ and other methods". The goal of such education is knowledge about TRIZ, but correct goal should be skills in inventive problem solving.

Therefore, the TRIZ education is directed to increasing mental creativity in generally, the logical part of problem solving process is not studied enough.

Finally, ratio of time between the theoretical part and practice of problem solving is extremely broken (Fig. 1). Theoretical part of teaching, lectures takes 80-90% of teaching time. The most of teachers consider the training in problem solving as something secondary, optional. Such an approach absolutely differs from an approach of studying TRIZ in Altshuller's era. We have been taught differently. The main part of time was dedicated to solving of training and real inventive problems. The time for lectures held 20-40 percent of all time of training. In the strong training lies the secret of why Russian specialists have good skills of solving inventive problems.

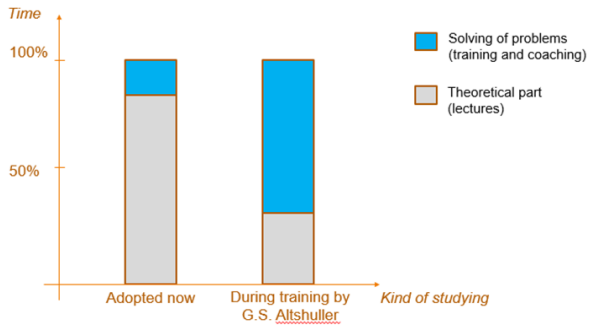

Fig. 1. Distribution of time of studying TRIZ

So why cannot we teach and Korean specialists by such a manner?

It seems to me, that the place and tasks of TRIZ in the innovation process is understudied not correctly.

Any innovation company is intermediary between a production company and a market (Fig.2). The innovation company takes a request from a market, processes it and gives to Production Company some proposal about changing of the existing product and producing the new one. The mission of Innovation Company is not only to give information, but to prepare the idea of new product, from patents – till ready design documentation. The innovator should to find necessary invention and prepare it as proposal to Production Company.

The weak point here is following, the random character of the existing and new inventions. Very often, the innovator finds instead new idea empty place in the invention field. The first, obvious way to improve the situation is increasing amount of the inventions, trial to close the "invention field" uniformly. On the basis, nowadays approach to TRIZ directed to increasing amount of the invention.

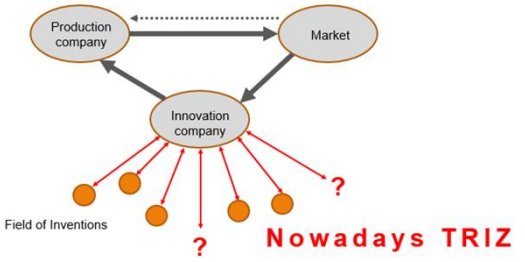

Fig. 2. Random field of inventions for innovation process

What we need for increasing amount of invention? Of course, first it is increasing creativity of inventors, engineers. If analyze nowadays practice of integration of TRIZ into the innovative process, it is easy to understand that the main use of TRIZ is increasing creativity company specialists. The main criteria of TRIZ effectiveness in this case is amount of generated ideas, "inventions for inventions".

Moreover, mosty the TRIZ studying is directed to increasing mental creativity, the logical part of problem solving is studied not enough.

The generating big amount of inventions has big problem – huge consumption of mental and nervous energy of inventors. The result in this case is highly questionable, maybe they will find necessary idea, to resolve problem company or created new product, maybe no.

However, if we want to make innovation process effective and competitive, it is necessary to change the TRIZ use from random producing inventions and new ideas to directed generating ideas, solving inventive problems in accordance with needs of the innovative process (Fig. 3).

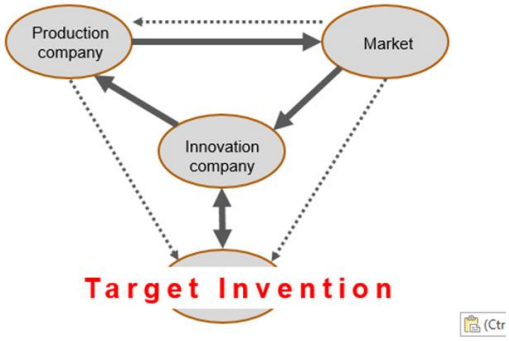

Fig.3. Target Invention approach

Such an approach, which we call “target inventing” gives big advantages and lets to accelerate generation of new effective ideas, creating new products, eliminating failures of technological process and solving business problems. An invention company should work by orders; there is no time free invention now.

Thus, the most important question is to teach inventive problem solving formulated at the request of the innovation process, manufacture and market. It requires not only knowledge of TRIZ, but also skill of inventive problem solving.

It should be change general approach to TRIZ education and implementation. The point of gravity should be replaced onto practical work with inventive problems.

Main principles organization teaching inventive problem solving should be following.

First, the teaching of has to be changed from program-oriented style into practice-oriented. The principle of teaching should be work with a coach, namely solving of invention problems (training and real problems of the students).

Such approach requires minimal amount of the students and individual work with every student. Very important for such kind of teaching is providing of effective communication between students and teacher. If the coach is from Russia, the studying should be done with help of professional Russian-Korean interpreter.

Rational distribution of the training time showed at Fig. 4.

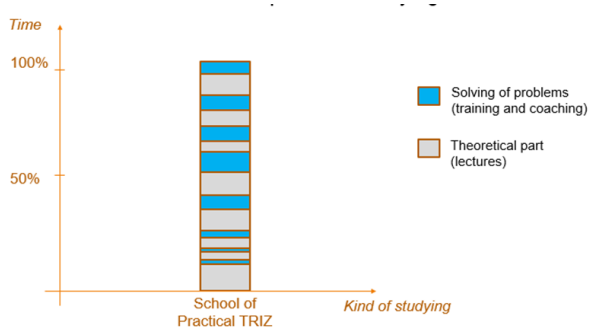

Fig. 4. Rational distribution of teaching time

It possible to say you propose increasing of amount of the problem for solving during teaching. Not only, does simply increasing the number of tasks for students could not gives the desired effect. It needs a unified approach to solving the problem and the appropriate tools, particularly effective and easy-to-use algorithm. The point is that dealing with a problem requires a consistent application of various TRIZ tools. To ensure adequate work, a solver needs an algorithm for the entire problem-solving process. Such an algorithm should specify when and wherefore each of the tools should be used. That is, separate TRIZ tools (and, accordingly, software modules) should be integrated into a single logic structure.

At first sight, such a structure is represented by ARIZ 85C [2]. Yet the attempts to solve some problems by carefully following the ARIZ logic are blocked by a number of its peculiar features, such as:

- Not all the classical TRIZ tools found their niche in ARIZ 85B, not to mention new, effective tools which appeared after the creation of the classical ARIZ 1985 version.
- There is a violation of logic in ARIZ. In particular, step 4 violates the logic sequence of actions; the definitions of a physical contradiction and an operational zone are contradictive; the bond between the repeated uses of the system of standards is weak. More detailed information about these and other problems with the ARIZ logic is in publications [3, 4].
- The levels of detail of the steps are very different. Some aspects of the solving process are well elaborated while others are given in the form of general recommendations.
- The language and methodological approaches of ARIZ are very unusual. Only an advanced TRIZ-solver can deal with ARIZ, which is expressly stipulated in the introduction to this algorithm [5]. It means that an ordinary user will not be able to use ARIZ effectively and adjustment of the software to such a user will entail a considerable alteration of the algorithm.

All these disadvantages can be eliminated, but ARIZ 85 has a fatal flaw, what is important for studying and applying the algorithm. ARIZ has only one level of difficulty – maximal. This is very detail described problem solving process. Such its properties generates big problem for students during studying the algorithm.

In our opinion the algorithm, along with a high efficiency must be developable structure. That the algorithm have to be presented in different versions - from the simplest, gradually become more complex, and so - to the most complex variant. It should be something looks like concentrically structure of problem solving process (Fig. 5).

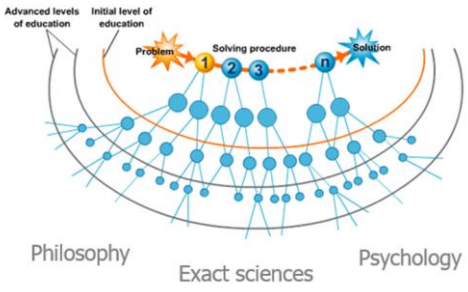

Fig. 5. Concentrically structure of problem solving process

Based on these positions we have developed some

approaches and algorithms of TRIZ-OTSM implementation. Such an algorithm called The Algorithm of Improving Problem Situations (AIPS) was developed and repeatedly tested in production projects [6]. The algorithm organizes in a system all existing TRIZ tools and some original ones [7].

The algorithm AIPS (Algorithm of Improving Problem Situations) has a set of advantages in comparison with other TRIZ algorithms. Its structure is fractal, which provides several variants of the same algorithm – from maximally simple till maximally extended. The developable algorithm gives ability to save mental efforts and use choose the most appropriate variant of the algorithm for solving a simple or difficult problem.

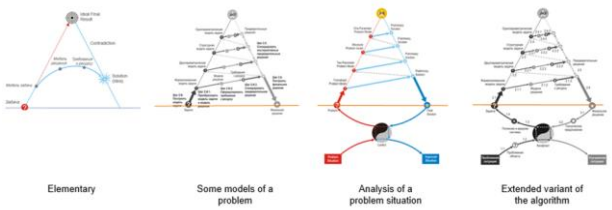

Fig.6. Variants of the developable algorithm AIPS

One more advantage is easy studying the algorithm, because we start teaching from the simple algorithm variant and gradually move to more complex one. Such an approach gives good results, because students investigate the algorithm without hurrying, from simple to complex.

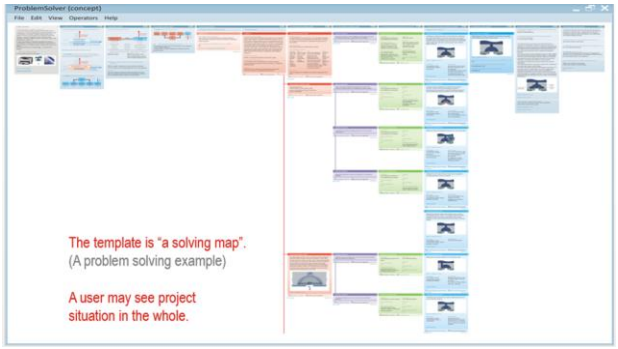

Fig. 7. Software Solving Mill

For implementation of AIPS for solving real production problem, we have developed the software product "Solving Mill". The Solving Mill is designed to support solving non-trivial problems from analyzing a problem situation to checking effectiveness of the solution [8].

Practical implementation showed high effectiveness such method of TRIZ education and training.

Conclusions.

1. Studying and implementation of TRIZ are accepted in Korea, systematical and correct implementation TRIZ gives good result for company.
2. The effectiveness of TRIZ could be increase a lot, if clarify the goal of TRIZ education. The goal of nowadays education is knowledge about TRIZ, but correct goal should be skills in inventive problem solving.
3. It needs to change style of TRIZ education: to give minimal time for lectures and most of time – for practical training of the students.
4. It needs a unified approach to solving the problem and the appropriate tools, particularly effective and easy-to-use algorithm. The algorithm, along with a high efficiency should have to be presented in different versions - from the simplest until the most complex variant.
5. It is reasonable to use software programs for providing TRIZ studying and implementation.

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