

TRIZ ACTIVITIES IN SAMSUNG ELECTRONICS

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ABSTRACT: Samsung Electronics is the world's leading producer of semiconductors, TFT-LCD, CDMA mobile phones, monitors and HDTV. It consists of six main business units: Corporate Technology Operations, Digital Media Business, Telecommunication Network Business, Digital Appliance Business, Semiconductor Business and LCD Business. Samsung Electronics has been able to retain its market leadership position with a constant emphasis placed on innovation. For the past three years, Samsung Electronics has been in the world's top ten in U.S. patents. In Samsung Electronics, TRIZ has been acted as an innovation methodology more aggressively than any other companies in the world. And in 2003, the company could save approximately \$150 million and produced 52 patents by applying the TRIZ technique to 67 R&D projects. In this paper, TRIZ activities in Samsung Electronics are shown in terms of human power, process and production. This paper could be a good reference to any companies which desire to introduce and spread TRIZ efficiently.

1. INTRODUCTION

According to our experiences in TRIZ applications to the project, TRIZ produced many effective results. However, since it takes long time to learn and utilize TRIZ from field, the great concern has to be taken for developing and implementing the TRIZ propagation strategies. Only by taking the right people and process, we can get the right output. In this paper, we would like to describe what we have done to propagate and utilize TRIZ in Samsung Electronics in terms of human power, process and production.

2. TRIZ IN SAMSUNG ELECTRONICS

TRIZ promotion team in Samsung Electronics has been organized in the end of 2001 and has been making an extensive progress. In 2003, TRIZ helped us to save around \$150 million and to apply 52 patents by conducting 67 TRIZ projects. We think TRIZ in Samsung is placed at the end of infant stage in S-curve and moving to development stage. Before explanation about TRIZ in Samsung Electronics, we will introduce Samsung Electronics.

Samsung Electronics is the world's leading producer of advanced semiconductors, TFT-LCD, CDMA mobile phones, monitors, HDTV and others. Samsung Electronics consists of six main business units: Corporate Technology Operations, Digital Media Business, Telecommunication Network Business, Digital Appliance Business, Semiconductor Business and LCD Business.

The main products of business unit; Memory chips, TFT-LCD, CDMA mobile phones, monitors, HDTV rank No. 1 market share in the world.

Total sales for 2003 amounted to \$40 billion and net income reached \$7 billion.

Samsung Electronics has been able to retain its market leadership position with a constant emphasis placed on innovation. For the past three years, Samsung Electronics has been in the world's top ten in U.S. patents. We would like to explain main backgrounds which could have something to do with TRIZ propagation in Samsung Electronics. In spite of huge sales and profit in business, Samsung Electronics has a sense of crisis that we have been a fast follower and we can not survive anymore in this position. Instead of leading the industry by developing innovative products, we have followed fast what the leading companies had developed. Top management pointed out this and asked employee not to be a fast follower, but to be an innovative leader. To be an innovative and inventive leader in business, TRIZ is an adequate methodology. For the product development in Samsung Electronics TRIZ is applied in the solving of engineering problem, reduction of cost and development period, the design for avoidance of patents and product planning through technology evolution. In the annual TRIZ conference in Samsung Electronics, executives, engineers, researchers recognized the value of TRIZ.

3. HUMAN POWER

When the company wants to achieve the innovation, the first thing is who is in charge of the innovation. That is more important in case of the methodology like TRIZ which takes a long time to understand. In Samsung Electronics, TRIZ team consists of the invited TRIZ experts and the inside employees. Invited TRIZ experts from Russia, Belarus, and Ukraine are highly experienced in TRIZ projects and training. Most of the inside employees are engineers who have at least three-year engineering experiences and are interested in TRIZ. Figure 1 shows the role of each group in TRIZ implementation process.

3.1. Invited TRIZ Experts

Samsung Electronics invited TRIZ experts, who have more than ten-year TRIZ experiences and specialty in different engineering fields. To conduct the engineering projects and obtain effective results, specialty in other engineering is very important. The dashed-line boxes in Figure 1 show what invited TRIZ experts have done so far in Samsung. First of all, they helped to prepare training a group of inside employees. This group of inside employees formed a TRIZ study group. Other direction TRIZ experts made the best practice of TRIZ project with a large success. After this stage, Invited TRIZ experts performed the joint TRIZ projects with inside employees. In addition to joint TRIZ project, they were also involved in training inside employees. One of our goals is to let a lot of inside employees conduct TRIZ projects by themselves.

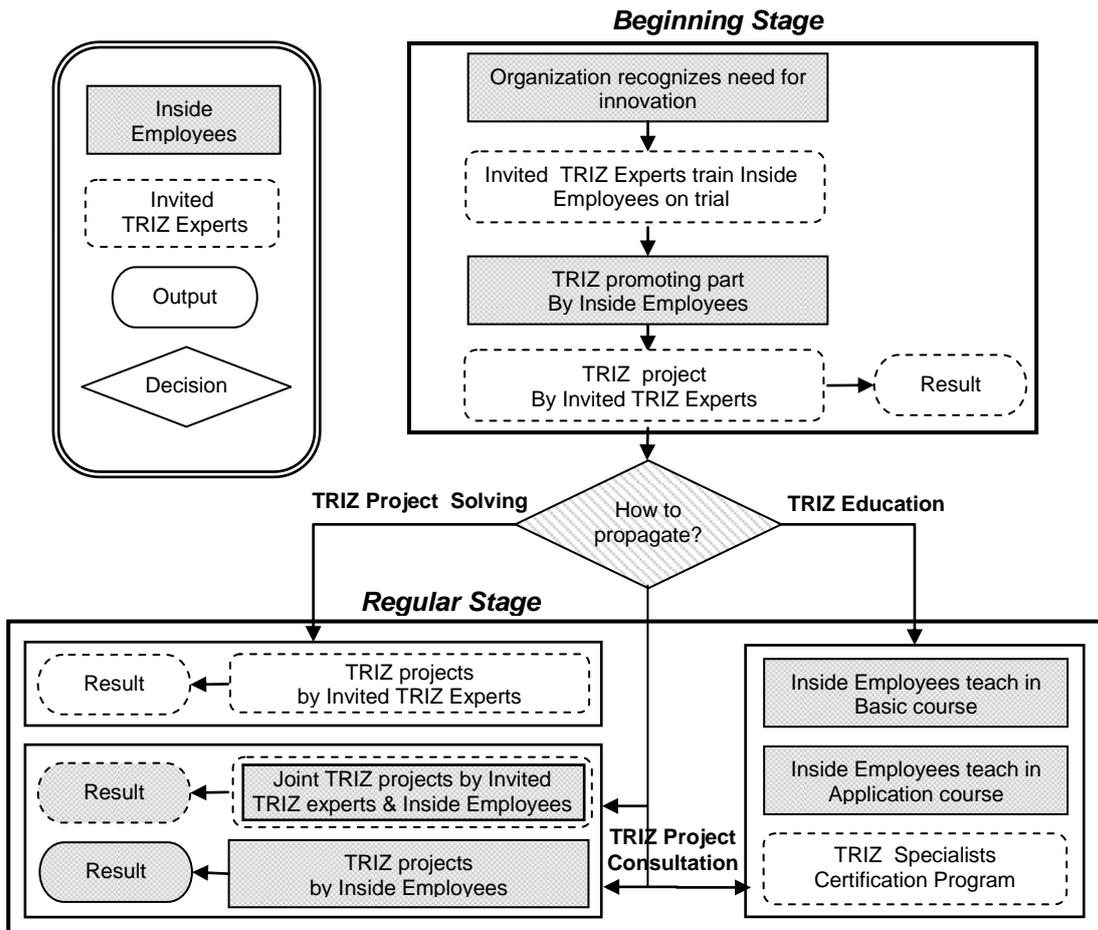


Figure 1. Flow Chart for TRIZ implementation in Samsung TRIZ Association

3.2. Inside Innovation Master (TRIZ Specialist, Level 1, 2, 3)

Since TRIZ is a methodology which needs a lot of time to learn and apply, it is necessary to train inside employees through the well-organized training courses with the hand-on activity. There is a big contradiction of TRIZ application in industry between the time needed to learn TRIZ and the time which the management can wait the results. The gray boxes in Figure 1 show what inside employees have done so far. We recognized the need for TRIZ activities and formed TRIZ study group after the training. Inside employees are now in charge of the basic and application TRIZ courses, and invited TRIZ experts teach the certificate course. Invited TRIZ experts coach the project of the applicant and evaluate the project results. The educational result of STA (Samsung TRIZ Association) is certified by MATRIZ. The inside (TRIZ specialist, level 1, 2, 3) innovation masters discipline other employees and conduct TRIZ projects with the help of invited TRIZ experts. Samsung Electronics are at the stage, "TRIZ projects by inside employee" in Figure 1. From 2002 Samsung Electronics TRIZ conference is held every year. The President of Samsung Electronics and many executives attend the conference to encourage the activity of STA and TRIZ specialists. From this conference the STA and TRIZ specialist in Samsung Electronics read papers on the subject that produce good results.

4. PROCESS

As in Figure 1, after deciding to utilize TRIZ, we had to do three main works such as TRIZ project, education and consultation. We would like to discuss the processes which we are in doing TRIZ project solving, education and consultation.

4.1. TRIZ Project Process

In spite of the notice in ARIZ 85C that “as a rule, improving the solving of one problem renders the solving of other problems more difficult...”, lots of arguments about TRIZ problem solving process are going on in TRIZ conference; how to improve ARIZ, how to make ARIZ more simple and practical and how to combine TRIZ problem solving process with other methodologies such as Six Sigma, Value Engineering. We also are trying to set up Samsung TRIZ project process based on our experience. While building Samsung TRIZ project process, we came across another contradiction between the standard process for convenience and accessibility and the flexible process for boundless creative thinking. Although ARIZ is a great process for problem solving, we needed to organize TRIZ project process for more effective project management. We classified Samsung TRIZ project process into five stages: define, analyze, generate, evaluate, and verify as shown in Figure 2. The “define” is the stage where we can use ISQ (Inventive Situation Questionnaire) to clarify problem situation. We can use ARIZ and some TRIZ tools mostly in “analyze” and “generate” stage and somewhat in “evaluate concepts” stage with the help of CAI tool. “Verify” stage is included to manage TRIZ projects to the point of practical application.

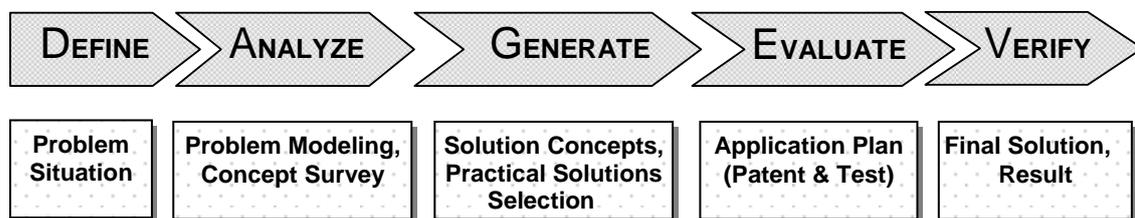


Figure 2. Samsung TRIZ Project Process

4.2. Education Process

Samsung Electronics has well-organized TRIZ training programs and stages courses including basic, application and certificate courses. In every course, we are focusing on training employees instead of lecturing them. Forty-hour basic course consists of TRIZ concepts part and ARIZ training part. The main objective of this course is to interest the student in learning more about TRIZ. More than fifty percent of students became eager to take application course. Another forty-hour application course consists of TRIZ-based CAI tool training and some more about ARIZ with hands-on task. In certificate course, students have to solve two practical tasks using TRIZ besides sixty four-hour class. In this stage, students work together with invited TRIZ experts or get some advice from them. This part is called consultation stage.

4.3. Consultation Process

Inside employees carry out the actual problems of the field with the help of invited TRIZ experts. Such kind of cooperation is realized as consultations, joint problem analysis, development new design concepts with graphical and text materials and public presentations of the getting results on the internal Samsung TRIZ workshop. Educational TRIZ workshop is carried out twice or three times per week and participants discuss report materials. TRIZ methodical board which was built for evaluation system estimates results of the presented reports with the usage. By that process “Best Practice” projects are determined and the best practices are presented in the final annual TRIZ conference. Also the levels of all projects are estimated and employees get corresponding level of TRIZ Specialist. As a rule, trained inside employees are conferred the second level TRIZ Specialist of International TRIZ Association.

Along with general success we will say about some difficulties and application tasks for TRIZ in the company.

First of all, TRIZ application presupposes the possession of the broad knowledge, understanding of many different scientific areas (physics, chemistry, engineering sciences, economics, management) and practical experience. At the same time best solutions for the specific practical problem are impossible without the deep professional knowledge from that concrete applied area.

The solution of core contradiction “Wide and General Knowledge-Narrow and Deep Knowledge” takes additional expenses of the time and human resources.

For that reason, in Samsung Electronics TRIZ specialists solve some practical problems with problem-oriented specialists. Pure TRIZ experience is not enough for getting successful solution in some high-technology industrial areas. Because it requires special and intimate knowledge in the specific field. That is the reason why we said that prior selection of the right people and process is the most important step in the beginning stage of each R&D TRIZ project.

4.4. TRIZ with SIX SIGMA Process

Six Sigma became a main innovation tool in Samsung. Top management is fully supporting Six Sigma and almost Samsung employees are taking Six Sigma courses. Fortunately, Six Sigma people began to think that TRIZ can make up for the weak points of Six Sigma process; While Six Sigma goes for finding the best trade-off solutions, TRIZ goes for overcoming contradiction. In many problems Six Sigma helped to find the factor of problem but Six Sigma couldn't answer “And How” in many problems. For promoting the synergy, Samsung Electronics recognized the need of TRIZ for the compensation of Six Sigma. Figure 3 shows TRIZ with Six Sigma Process in Samsung Electronics.

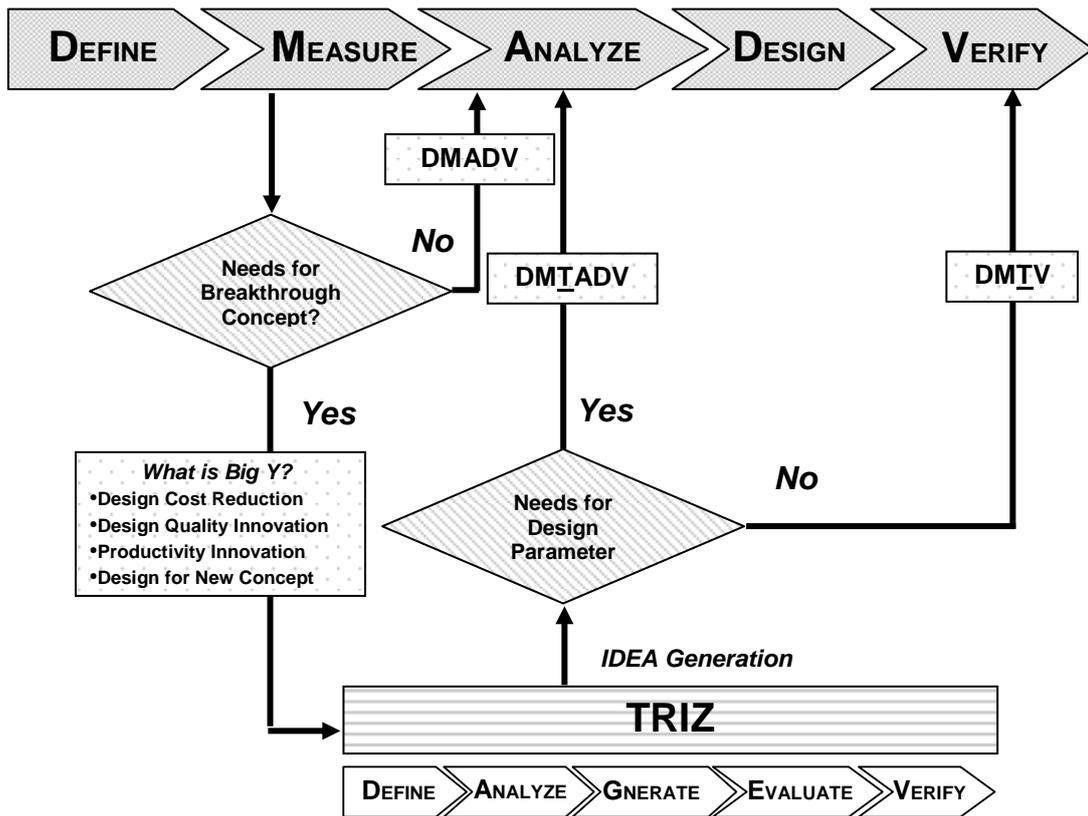


Figure 3. TRIZ with Six Sigma Process

5. PRODUCTION

By the people and the process mentioned above, the following products have been obtained. To maintain its existence in competitive business environment, methodologies have to prove its financial effectiveness repeatedly. Short period production is economical savings from TRIZ projects by invited TRIZ experts and long period production has to be economical savings from TRIZ projects by inside employees.

5.1. Short period production

Short period production is important to keep up performing of methodology. The projects about process improvement, cost reduction and patent avoidance have been conducted by invited TRIZ experts in the first place. From the small successes in TRIZ project by invited TRIZ experts, we were able to obtain substantial economical savings and convince company employees to take TRIZ education.

5.2. Long period production

Long period production has to be inside TRIZ experts. Once we obtain well-trained inside TRIZ experts, they can apply TRIZ by themselves and make much more economic contributions. We can also expand TRIZ application to the field of software problem solving, new product concept generation and forecasting.

6. CONCLUSION

Samsung Electronics has made successful establishment of TRIZ application in R&D field. And we will try to make expansive development in various fields. Experienced invited TRIZ experts contributed to the successful first step by conducting TRIZ projects and training inside employees. The processes of TRIZ project and education have been developed our internal capability. The next step, inside TRIZ experts of Samsung Electronics will play an important role in various fields. The combination of Six Sigma process and TRIZ is in progress and it is making good effects in many fields.

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