

# A TRIZ Approach to Business Management Formulation - A Case of HRMS Industry

Hsuan-Tzu Hsu, Bai-Shiang Tsai and Kuen-Tai Chen

**Abstract**—This study implements TRIZ to propose innovative approaches for resolving conflicts in a HRMS company case. Conflict-resolving approaches are proposed in response to four aspects: Operations, Human resources management, Marketing and Sales, Technology Development. The results show that the introduction of cloud computing systems can solve existing problems for the company.

TRIZ has long been widely applied to solve engineering problems. However, a few studies and practical usages were proposed systematically in management manners. TRIZ introduction of a corporate management is feasible. This study introduces 39 TRIZ management parameters for approaching the meanings of the original 39 TRIZ engineering parameters, broadening the TRIZ applications in management areas as well. The results show that when an enterprise product life-cycle is close to a weak period, the company in question must find new technology to replace existing products. The cloud computing model would be a great choice. The results of a questionnaire showed that a large number of companies are not satisfied with their current systems. These companies can be considered as potential customers, in order to enhance market share.

**Keyword**—Contradiction Matrix, Innovation Management, Market segmentation analysis, TRIZ

## I. INTRODUCTION

Theories of Invention Problem Solving have been transferred from Russian into English and become a new trend of creation worldwide. Genrich Altshuller originated an ideal of TRIZ during the Soviet-era, 1946 specifically, inventing and using TRIZ with his students and working partners over the next 50 years. Genrich Altshuller observed a large number of patents (there were 40 cases) and discovered that their problems could be tracked, after which one could extend relating basic theories and principles, those being Contradiction Matrix, Substance- Field analysis, 39 Engineering parameters and 40 Innovation rules. Through these theories and principles, we can solve the contradictory R&D process on the technical and even the physical level. This is a new way which involves having plenty of enterprises imported and has brilliant achievements.

The contribution of TRIZ to engineering is obvious to all, but it is rarely used in Integration of innovation management. JI-HAO, YE (2008) applied it to Management level and turned 39 engineering parameters and 40 innovation rules into management parameters which were used to solve

problems at the enterprise management level which they were facing.

In this case, it doesn't seem that this option is not available, but rather that enterprises would import TRIZ but can't since they lack related knowledge. Enterprise Innovation Management is like engineering management, which is also facing contradictory problems. If people are able to use this system successfully, they can find a lot of solving directions and logics. JI-HAO, YE (2008) applied 39 TRIZ management parameters to R&D project management in order to find the contradiction and proposed the solving programs and advise successfully.

In this case, company A is facing problems relating to its market share and technological growth. If they import the principles of innovation and invention, they can solve their problems effectively. As well as finding the factor of the problems, they can also find the right direction for solving the problem from among 40 inventive principles and thus lead enterprise to find modes of problem solving.

## II. RESEARCH METHOD

### A. TRIZ Integration of innovation theory

TRIZ was a method within theory which was generalized by the Soviet-era scholar Althshuller. He his partner spent 50 years studying about 400,000 projects, discovering that the improvements, changes in technology and the system of innovation and creation relating to each project are in the process of generating, growing, maturing and fading away, in such a regular way that they can be followed. If people take these regularities into account, they can design and predict the trends of products in the future. Under Althshuller's leadership there were dozens of research institutes, universities and enterprises organizing the research teams of TRIZ and analyzing almost 2,500,000 high standard invention projects, then summarizing different kinds of regularly modes among technology and solving a lot of the innovations and rules of contradiction in technology and physics. They did this as well as building theoretical systems which combined with algorithms and solving technological problems and realizing innovative developments. That is TRIZ in a nutshell. Within traditional TRIZ, there are the application tools of contradiction matrix tables, ideal rules, the substances - field analysis, ARIZ, etc (ZHEN-MIN, WU, 2007). There are two standard choices on the demand of the innovation. One of them is the technology which is in a different area. The other offers the profit of low cost. In TRIZ the innovation theory is the basic tool, but there are a lot of restrictions, such as lacking the appropriate frame or useful searching engine. The main challenge is on the chosen creation and recognizes the same at the problems. That's because they occur in different industries and record different

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technologies. On a basic level, classical TRIZ innovation theory is recognized as a process which makes similar connections. To offer useful experience and thoughts for inventors in the future, we need to connect thousands of structure modes and make it become a network. On the other hand, knowledge in people's brains is still obtained information which can be effectively transformed and produce new data and transform knowledge into valuable resources. TRIZ innovation can use the resources and apply the knowledge to resource management (Ziotin B., Znsman A., 1999)

In the recent years, a lot of domestic scholars have imported TRIZ into different technology areas. Winkless & Mann (2001) imported food innovation and used the character of the food industry to transform the TRIZ innovation parameter into a new parameter which belongs to the food industry and build 40 innovation invention principles of the food industry. Ruchti & Livotov (2001) imported management innovations and considered how managers have to make decisions within a short time concerning quality. Therefore they should make the appropriate decisions from a large amount of information in a short amount of time. It would be successful if they had a fine thinking mode and frame. In this case, after importing TRIZ, one would want to build an innovation principle of the business solving and management including the standard resolution procedures of TRIZ business and management problems. After this it would be advisable to propose 12 innovation principles of solving business and the conflicts of management. In addition to this, Savransky (2000) proposed three levels of TRIZ development in the future. Class 1 is the level of effective area (general technology and specific engineering area), Class 2 is the approach level (through the conclusion of generalizing theories and completing projects or other technological researches.) and Class 3 is the content. (Theoretical results and the research of the applicability projects)

Ji-HAO, YE (2007) indicated the little conflicts between the enterprises which may cause the disconnect. If one manages the conflicts correctly, we can turn the conflicts into the dynamics of innovation and even turn the liabilities into the property and concerned TRIZ can solve the engineering problems. If we can transform the parameters, give it the definition of management and coordinate with the TRIZ innovation invention principle which focuses on the enterprise management and conflict management then a breakthrough can be made. Ji-HAO, YE (2008) transformed TRIZ's 39 engineering parameters into management and imported the conflict contradiction when the project planned and expanded TRIZ the development and expansion of management area. First, Ye suggested to define the problems and focus on the enterprise problems to find out the management parameters and deterioration parameters and imported 39 management parameters to find the solution. At last, one will get the direction of corresponding problems of 40 innovation management invention principles and from what we got to find the solving ways. If it can't provide the effective project, we also get the developing direction for thinking and suggesting.

### III. RESEARCH PROCESS

Our focus here is on the company-HAI-FA, which conducts Market interval analysis. Due to current market conditions, they realize what problems they are facing. They also understand how to import TRIZ into the level of enterprise applications which is according to the literature, in which Ji-HAO, YE (2008) proposed TRIZ of management innovation principles as the main framework.

After determining the research methods, it is crucial to start to collect the literature which will form the basis for aiming at the related content and the results proposed by the scholars. It is also important to find the impractical key factors and import TRIZ innovation theory and analyze through the obtained data problems.

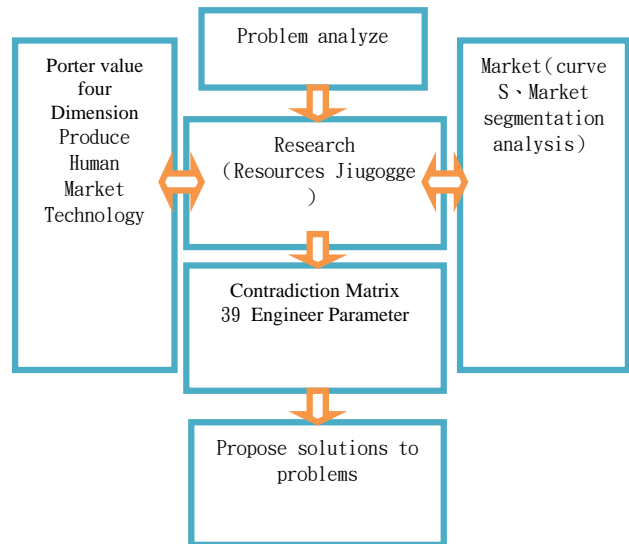


Fig. 1. research frame

### IV. PROBLEM ANALYSIS

#### A. Project Company Introduction

U.G. Ltd. (later referred to as the project company in the following article) was established in 1997. It specializes in designing application systems that integrate software with hardware, with the government itself being their major customer. Through the project company's abundant experience they set up complete service models, including establishing and installing the system, setting the operation procedures, education training, limited warranty, debugging, and inquiries, to offer the users comprehensive support facilities. The sole operating items for the project company in its earliest stages were equipment sales and computer hardware/software integration. It also successfully developed the human resource management system in 2002, which was first adopted by the Personnel Administration of Executive Yuan, and was certified by the Research, Development and Evaluation Commission (RDEC) the same year in July. Starting 2003, the project company focused on the field of human resource management systems and administrative procedures. With the government being the primary aspect, the project company researched the faculty member information management system and database (pemis2000).

It also became familiar with the operation procedures and related regulations in government institutions as well as the different hardware/software requirements in order to assist them in lowering implementation costs, thus completing an entire management solution under the premise of efficiency. The Human resource management system that the project company researched and developed was officially adopted by RDEC as the public version in July, 2009, and was promoted to government institutions throughout the country in 2010. To ensure proper online institution operations, the company expanded and reformed its customer service center, and further established the second generation operation system, including registration, customer service website, and calling record system, hence improving the quality and efficiency of support functions to satisfy consumers' needs.

#### *B. Business Generals*

Digitalized information and software applications are the basis for implementing e-government. Simplification of operation procedures and increased efficiency are concrete measures that the government takes to enforce "six conservation projects." The government firstly recommends human resource management systems in order to actualize paper-free offices, a decrease in human negligence, enhanced management, a shortened official documentation process, and reassured data integrity as well as search immediacy and fairness in job.

The government started advocating an electronic human resource management system in 2000. Because there has been a growing need for such management products among various institutions, initially there were 16 manufacturers entering the market competition. However, only 2 major companies along with a few other software firms specializing in customization survived after 10 years. Among these surviving companies, our project company specializes in the needs of government institutions, and is in the leading position, whereas the manufacturer that comes second is more occupied with other businesses, and their cases affiliated with the government are almost few enough to be counted on one hand. Their primary customers are in the private sector, and they survive by customizing software. HRMS is merely a part of their sales. Therefore, our project company is far ahead when it comes to governmental cases. Besides, one third of the managerial institutions that had already implemented our project company's HRMS (PLMEW) by 2009, and many other agencies have already implemented them.

#### *C. Main Problems with the Project Company*

This project company specializes to meet the needs of governmental institutions and is in a leading position. The company in second place deals with more detailed and complex business, thereby handling fewer government-related cases. In 2009 RDEC asked this company to research and develop its human resource management system and incorporate this system as an administration system of commonality, which can be applied nationwide. Later on other branches intend to add RDEC computerized system. If a transformation system is intended, agencies of computer-based operation will incline to adopt an administration system of that commonality. Thus, there will no longer be new contracts for other related companies, and

the currently upheld contracts will likely be reduced every year. This will cause the company's income to be insufficient to sustain normal working conditions, which in the end will lead to the abortion of such product line. If the company manages to make the best of this opportunity, its business scale will gain development.

#### *D. Problem Analysis*

Project companies have devoted to developing HRMS for quite some time and have gained compliments from many users. The government arduously recommends the systems developed by that company to other institutions and groups. But government groups purchase via an open bidding process which is in place within each agency. Plus, because the budgets of each agency decrease according to various levels, some branches have limited budgets. Thus, in order to understand the needs of target customers, we still need to understand the industry and niche of the project company. Just like it says in Art of War by Sun Tzu, knowing your enemy is the first step to winning. Business is just like a battlefield. We should see how much power we've got before engaging the enemy. First we utilize MPFFM to understand the structure of the project company. MPFFM was proposed by Michael Porter in 1980. It's a tool which analyzes the structure of such companies and their competitors. Porter thinks that there are 5 factors which affect the competitiveness of industries: the threat of new comers, alternative products or labor threats, the bargaining ability of consumers, the negotiating ability of the suppliers, and the competitiveness of current companies. These 5 types of analysis can help one to understand the company's ability to compete and gain profit.

### V. USING TRIZ TO SOLVE MANAGEMENT

#### *A. Curve S*

Our focus here is on the Time and Attendance system, which makes us realize the life cycle of HRMS is that of the company's demands to research and develop. This realization has allowed us to figure out the current emerging Cloud system and growing integration platform. Due to the fact that there are a lot of emerging systems, with paper being the basis of just one of them, one which consumes too much human resources and makes long working hours, few people now wish to use paper systems. As such HRMS is coming to maturity. For HRMS, this emerging integration platform system is more useful for substitutes, while the intergrading system function is more useful for enterprises. It is not only better at checking on work attendance and salaries but also more effective in terms of the official documents of the enterprises.

#### *B. Resources Jiugongge analysis*

In the system of resources limited analysis, we analyze HRMS through Jiugongge analysis of the resources and also based on the different thinking to classify. There is a super system, subsystem past, present and future level to think according to the present main system HRMS's past main system which as paper, used Super system as human beings. And sub system as human beings. The whole thinking logic is that human beings through pens to record on paper. Now, the main system is HRMS, Super system is the computer and

subsystem is the keyboard. In future, the main system could be the Internet, while the super system would be Cloud Mode, with the Subsystem being the voice.

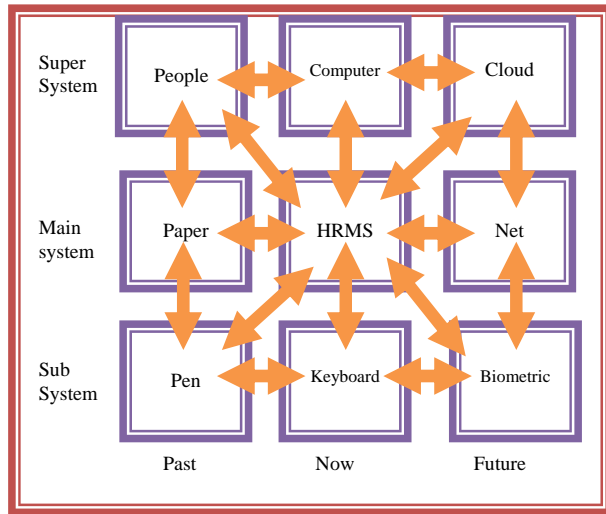


Fig. 2 Resources Jiugongge

*C. Contradiction Matrix Of Management Parameter Dimension of Process*

According to the process of TRIZ problem solving which was proposed by JING-HONG, YE (2008) we assume a company wants to raise credibility and visibility but, especially within a limited situation, how do they solve this kind of question? Because of the projects or instructions, the company has to reform for raising credibility and visibility. In this case we can discover the parameters which should be improved are 12 enterprise imagination or goodwill. And the parameters which will deteriorate are 22 cost loss or waste. Compared with the improved and deteriorating parameters, we can get the improved direction of 40 invention principle. After comparing with them, the inventive direction is 14 Spherodization thinking. Thus we can think about the direction of Spherodization and find out the solving program and suggestion in this way.

TABLE I  
Process of Parameter matrix

Deteriorating management parameter	19 lost or wasted cost
Needed improved management parameter	
39enterprise imagination and reputation	14

Management creation principle 14 Spherodization:

Show the differences between the product and other competitors, which makes customers impressed and achieve the special impression in customers mind by word of mouth. Therefore we can achieve the publicity, saves marketing, costs and attracts other customers' attention.

*Dimension of Manufacturing*

There is an indispensable importance about Time and attendance system for the government. However, it is not cheap to establish such a system; it's not affordable for the

small number of the units. As such, we have to try to change the cost and approach of the software establishment. The management parameters which need to be improved are 10 new operation mechanisms which intend to upgrade function in order to increase attractiveness. The main purpose is a hope to either change the way that lot product manufacturing is carried out or to generate new technology which is competition-oriented or to improve the present building mode or even reduce costs. However, we must consider the technical level before generating a new mechanism of operation. A new mechanism of operation may produce a completely different mode with the technology which is the company good at which is worsen parameter S is 32 the

TABLE II  
Manufacturing of Parameter matrix

Deteriorating management parameter	32 technology of maturity and understanding
Needed improved management parameter	
10 new operation mechanism	15,37,18,1

Turn the chosen parameter into TRIZ 39 management parameter contradiction matrix and we can get the thinking direction of 40 management innovation principles. Table II shows the innovation principle direction is 13 the opposite direction, 14 increasing curvature or Spherodization, 10 the beforehand or preparation action and 7 Nested structure which are solving programs we got.

technology (maturity and understanding) different

*Dimension of marketing*

This company devoted in time and attendance system development and long-term cooperating with government and having wide market in government departments and units. However, it has increasingly improved system which government department and units only own and don't spread it to the industry market and organizational unit. For this, there seems a lot of lacking in marketing market. This company lacks the external marketing channels and the view of market area.

TABLE III  
marketing of Parameter matrix

Deteriorating management parameter	16 spend time for strategic planning and operations
Needed improved management parameter	
8 the range of the enterprise occupied	35,34,38

Management creation principle 14 Spherodization:

Show the differences between the product and other competitors, which makes customers impressed and achieve the special impression in customers mind by word of mouth. Therefore we can achieve the publicity, saves marketing, costs and attracts other customers' attention.

*Dimensions of human resources*

There are three departments in the company, namely: the Department of Management, which is responsible for financial Operations Management; the Engineering Department, responsible for any computer software system developed; and the project Department, which is responsible

for system products promotion and introduction, as well as operation of the project as a whole and control, so that the project runs smoothly. The company's organization is too flat, and the division of work within the organization is not detailed. On top of these issues, the number of employees is too small, while the seniority of staff is generally too low. There is only a focus on personnel time and attendance system, while those in question lack related experience in education and training which makes organizational structure incomplete.

TABLE V  
Human resources of Parameter matrix

Deteriorating management parameter	4 the way of the communication the whole enterprise
Needed improved management parameter	
12 a part of organization frame of the enterprise	13,14,10,7

Management creation principle 14 Spherodization:  
The table above shows the differences between the product and other competitors, which impresses customers and brings about a special impression in customers' minds through word of mouth. Therefore we can achieve publicity, save on marketing costs and attract other customers'

*Technical development dimension*

The company has outstanding performance and achievements in electronic form, but the company only specializes in those two aspects without any integrated system or other relevant experience in system development. One can ascertain the desire to improve the management of the parameters in the above discussion of the problems for the maturity of the technology and understanding of the degree.

TABLE IV  
Technical of Parameter matrix

Deteriorating management parameter	32 Costs for the amount of change
Needed improved management parameter	
32 The maturity of the technology and the degree of understanding	27,1,12,24

Selected parameters into TRIZ 39 management parameters contradictions matrix, the direction of thinking of the 40 principles of management innovation can be obtained. As shown above, the resulting innovation principles are "27 runs out and abandon it", "1 divided", "12 balance potential", "24 buffer" solution

VI. CONCLUSION

- 1) For a project of production and execution, the most important stage is that of planning and assessment. We must understand the importance and the direction of the target problems so that we can analyze and improve precisely. In this study, the problems faced by the company Hyflux can be divided into four dimensions combining the TRIZ Contradiction Matrix to study, which makes it easy to find the key of successful factor. For the problems faced by the company, we proposed the cloud system, which could be built out of the production dimensions which would be helpful for the company. The cloud system not only reduces costs for customers but also expands the market of the enterprise. This paper also evaluates the cost required to build a cloud system and comes to the conclusion that it is not a heavy burden for the company. At the technical level, the company has sufficient expertise and technology to bear this proposal. Furthermore, dimensions in the technical development of the paper assess the pros and cons of building a cloud system. After this, the different number of affordable cost also offers two options for the company reference.

TABLE VI  
The principles of innovation and invention of summary items

suggestion items	Dimensions	Improving key elements	programs
1	Manufacturing	Cloud system	The HRMS system lifecycle is mature according to what the S-curve analysis can find. And the resources Jiugongge cloud can be taken for future mode, with the cost table being built according to the cloud mode. Building the cost table allows us to know the whole cost of building the cloud system. For the company, there are not too many obstructions on the technical level or in terms of equipment.
2	Manufacturing	Hidden customers	In market segmentation analysis, we found that there are lots of users who don't use the HRMS system. There are also plenty of users who have high satisfaction with the system. Both of them could be regarded as potential customers and we could have an interview with them which would increase the market share effectively.
3	Marketing	Trial software	According to the solving project of the principles of innovation and invention and abandonment after use, we can turn the software into the trial one which offers limited function for the users to remain familiar with the operation so that we can let users experience the convenience and rapidity of the HRMS system or using the quality to decrease the cost. We suggest that the units should be purchased together or the products sold at a low price which could promote market share and sales for promoting the whole profit.
4	Technological development	Focus on R & D	The company has currently been on track so that we can focus on the R&D expenses. They should increase funds once a year or month to the R & D Department. And in the analysis of S curve, we discovered there are some products in the mature stage. If we can develop a new form for new products which can change the company's enterprise focus and the balance of the existing market and future market demand. Thus the benefits of new products might be many as opposed to those of existing products

Program 1 offers rapid recovery of costs but leaves consumers with higher costs to pay. Meanwhile, Program 2 makes it so customers don't need to bear the burden of high costs. However, in this case, the enterprise will be exposed to a higher risk which can be solved with contracts.

- 2) Market segmentation analysis provides more consumers with morphological information which can enable one to understand electronic time and attendance systems that have a very high importance for the government. However, a lack of funds or the presence of non-professional computer staff results in the loss of much of the market. The other hand, we can find out the currently used units which possess a high ratio of dissatisfied consumers and the customers who never used but have a willingness to do so. All of them are potential customers. It is advisable for the company to focus on them in visits and marketing. This would be most helpful for the enterprise.
- 3) Currently, TRIZ imports management which is the developing stage. There are not too many theses or studies for solving contradiction conflicts. This study involves a discussion by a scholar who is good at TRIZ and management, as well as quotes from TRIZ's 39 management parameters and the 40 innovation invention principles provided by JI-HAO, YE. Also included are a number of projects for the solution of contradiction conflicts, these are also offered for referencing to the enterprise. This research used S curve, market segmentation analysis, resources Jiugongge, etc. Diversification helps one to escape the logic of thinking and find solutions that are more diversified and innovative.

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