

# A Study on the Improvement of Production of the Manufacturing Industries

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**Abstract** This study objectively examines materials related to factory rationalization of D Corp., a regionally based enterprise. One reason that previous factory rationalizations have not been all that effective is that each firm has not used strategies specially designed for it. Despite the fact that each firm has a different culture, and different human and physical resources, the application of rationalization without any modifications has produced many problems. In order to stabilize the production system and reduce the capacity of the factory, D Corp. changed the basic 5 S's and stimulated the factory atmosphere through computer education. Rationalization stabilized and standardized the factory, and organized the physical resources and each area of the factory according to their place in the process of production. It also made improvements that verified the party responsible for the flow of the complex production system, and simplified analysis, supervision of production, and ex post management. We think that the successful example of D Corp. can serve as a real, tangible model for small and medium regionally-based firms to follow.

## 1. Introduction

All Korean firms are facing problems these days due to the worsening economic conditions. In particular, because of low growth forecasts for this year and large-scale unemployment, maintaining corporate survival will be of great importance. It is true that high wages, one of the factors contributing to the loss of corporate competitiveness, are moderating to some extent due to high unemployment, which has been caused by the legalization of mass layoffs. However, it is also true that labor productivity is falling compared to that of economic competitors.

As has already been indicated in several reports, if we look at statistics for the industrial sector as a whole, Korea's level of productivity is only fifty to seventy percent that of industrialized nations such as Japan and the United States.

In order to improve external competitiveness under these conditions, firms must develop specialized products or produce new, customer-oriented products, and open new markets or reduce internal costs. Otherwise, looking at the recent condition of the Korean economy, it will not be easy to invest in an uncertain future.

Rather than this, we think it is wiser to search for changes through lowering internal costs. Instead of maintaining the previous structure of cost of production plus profit equals sales price, we think that decisively introducing the concept of market price less cost of production equals profit will expand corporate profits by lowering production costs.

By analyzing the process of factory rationalization of D. Corp., a manufacturer located in Wonju, Kangwon Province, who overcame these difficult problems, this study searches for realistic directions for factory rationalization that small and medium-sized firms in regional areas can implement.

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## 2. Definition of Factory Rationalization

Even though factory rationalization has generally been accepted in Korea for several years, many businesses do not accept the concept fully, so there has not yet been many successful cases. The concept's lack of success was primarily due to incorrect application of the concept, not misinterpretation.

As the domestic business environment changes rapidly, the introduction of factory rationalization is becoming more important. This concept can be broken down into subgroups of factors: external factors, customer needs factors, machinery factors, product factors, and human resource factors.

External factors include continuous increases in the international price of raw materials and labor costs, and the sudden development of the new phenomena of globalization. Customer needs factors include short delivery periods, low prices, and high product standards. Machinery factors include speed maximization, enlargement, and automation.

Product factors can shorten the life cycle of the product, and pursue variety through improving living standards. Human resource factors include the reduction of labor costs, increasing labor efficiency, shortening working hours, and improve working conditions.

As we can see, there are several factors involved in operating a business, so factory rationalization is necessary. For businesses to survive, and create profits at a pre-determined market price, they must rationalize their plants.

In factory rationalization involves changing the thinking of all employees, from upper management to the factory floor. The only thing more important than employing the best executives is continually improving the attitudes and behavior of employees. This can result in reduced wastage and higher efficiency.

A company's internal activities can be divided into the following three categories:

- 1) Adding value to products
- 2) Activities that are necessary, but do not add value
- 3) Totally unnecessary and irrelevant matters

Factory rationalization involves trying to eliminate the third category, and also largely reduce the second category.

Previous activities were in part sporadically implemented, focused on manufacturing, lacked proper concepts about systems, had insufficient divisions of responsibility, and needed more incentives and motivation. Now, activities are characterized by participation by all staff members, adequate incentives & motives, clear divisions of responsibility, and continual implementation. This shows that a lot of changes have occurred.

The general flow of factory rationalization is: Prepared diagnosis education controlling waste, increasing the target improving improving tool's installment & application follow up. Normally, businesses try to follow this flow pattern.

In the research outlined above, from basic idea of factory rationalization, the question of how to maximize efficiency in practice has been discussed.

## 3. Research into the Process of Factory Rationalization

### 3.1 Company Outline

For over 10 years, the sound company D has been responsible for the manufacturing of ceramic products. This company possesses eight highly educated employees at the R & D center, a coating factory, and a manufacturing plant, which is located at Won-ju. D company is somewhat proud of the special and rare skills that their company possesses a somewhat special ability to produce (unlike other companies). With this though comes the increasing possibility of some of this know how being leaked to other companies.

But seeing the company's location is located some distance from the capital city, Seoul, it is a true that there are many difficulties in obtaining progress of the researchers, management information, and also about new technology or process of the production of goods.

Seeing this company is preparing to receive 'ISO 9001', the various systems which are prepared are a little weak, and they are remaining unsettled where they are damaged.

The country's mid-small businesses ideology can be seen, compared to the size of sales the profit ratio is quite low, so through factory rationalization so there is

more testing into the reduction of basic prices. Last year alone leakages were about 200 million won, so measures are now being taken so this does not happen again.

### **3.2 The aim of factory rationalisation**

Within the factory, the weakest section is the coating factory's equipment, so this was the first area which underwent factory rationalization.

The aim was to reduce wastage by 5%, which is currently 5.5%, and also productivity by 30%, where it presently stands at 45 million won per worker per year.

### **3.3 an explanation into the direction of factory rationalisation :**

1st level: rationalization of human resources, material, and space facilities at the coating factory.

2nd level: rationalization of human resources, material, space facilities, inspection of wastage, design of effective production system for whole coating factory.

3rd level: establish mid long term strategies for the management department, and research and development center in relation to the rationalization of human resources, material, space facilities.

1st level: seeing this is the first level in rationalization, education, organisation, and early cleaning of facilities is focused on the 5 S method, and 2nd level: total rationalization of human, material, and space at the place of production, and the reduction of the various causes of wastage.

Also, in order to reduce the amount of wastage, through a detailed diagnosis the company can ascertain which improvements would be most appropriate for that company.

This involves rationalization of the office, and go through this level the general idea of office reformation is implemented, and also the removal of the causes of wastage.

Also there is preparation of basic documents to aid the business, along with detailed mid long term business plans for each department / section.

### **3.4 Process of Factory Rationalization**

Firstly, the details of the implementation of factory rationalization in the area of overall management of the coating factory are as follows.

#### **① Formulation of Team**

In order to carry out the factory rationalization project efficiently, the company appointed the assistant manager of the research institute as team leader. The remainder of the team consisted of the director, assistant manager, and assistant manager of the production department, and the deputy administrator of the administrative department.

The team formulated a master monthly plan until December 2000, and gathered detailed information about the company. To make the process of rationalization tangible, the team presented a list of improvements for each part of the firm, and put this on the firm's internal notice board.

#### **② Consultations about Rationalization Activities**

Deliberations about the process of factory rationalization were held every Tuesday afternoon in the conference room of the research institute, and experts from outside the company were invited for discussions when necessary. The factory manager and executive director read the results of all consultations from the minutes of the meetings.

#### **③ Education**

In order to ensure that upper level management was fully committed to the process of rationalization, the company implemented a computer education program.

The program was held in the company's education center, and featured videos about the need for rationalization and analysis of firms in both domestic and overseas markets, general information about the process of rationalization and its role, and the results of rationalization projects in other companies. Except for management, most employees were unfamiliar with the concept of factory rationalization, but this program clearly had an impact on the terminology and perspective of every employee.

The employees of the overall management facilities department, the initial object of the rationalization project, also received separate education programs. By explaining in detail what each employee was to do in the future in his or her area of work, these programs provided an opportunity for employees to become fully conscious of their responsibilities. The company

listened to employees' suggestions and opinions about bottlenecks on the factory floor, and this was reflected during the process of rationalization. When necessary, education programs were held more frequently.

#### ④ Management and Initial Cleaning

Most manufacturers in small and medium-sized cities are still confused about the concepts of management and order. Several sectors of the factory are full of areas for improvement because employees have insufficient understanding of these new concepts.

We can define the basic concept of management as distinguishing between the necessary and unnecessary, and getting rid of the latter, and that of order as putting those things which are necessary for operation in an easy-to-reach location. Another concept which is easy to confuse is array, which can be explained as placing items uniformly.

D Corp. began the management project for items scattered about the area of the overall management facilities. After securing a fixed area and marking it with yellow tape, the project team got rid of unnecessary items in that area. The team made management tags and stuck them directly on to the remaining items that were to be managed. After the basic management project, the team began an overall clean up operation of equipment, floor, walls, and the ceiling. They paid particular attention to areas that caused pollution due to the nature of the overall management. Next, they carried out intensive cleaning operations of both inside and outside of the equipment in order to discover the source of pollution and to inspect the equipment fully. As a result, the team found the main sources of pollution, such as the input/output areas, the duct areas, and lower exhaust outlets, and carried out intensive projects to improve these areas.

One key decision was to discontinue the previous practice of cleaning the floor with water at least once a day, after considering environmental aspects, and the project team also considered alternatives to this practice.

#### ⑤ Proper positioning

After the management and clean up projects, the project team began putting the necessary items in order. As a result of an initial survey of the items to be put in order, twelve categories were decided:

transport tools (pallets, cranes, etc); fire extinguishers; tool boxes; storage boxes for raw materials and supplies; sanding loaders ; notice boards; cleaning tools; electrical equipment; doorway signs; glass windows; various area signs; and equipment and oil level indicators.

On this basis, the team formulated methods to decide the proper position for items in each category, and this took about two months. The team took care to draw up these positions so that employees could properly clean all the areas and work comfortably and easily, and regular inspections could be carried out. Another important point in relation to rationalization was that employees should make improvements themselves, and not rely on outside help if possible.

After the positioning project was completed, the most important thing was to instill the attitude that employees must keep things in place by following the rules, and if these rules were not kept, positioning would return to its former state sooner or later.

#### ⑥ Improvement of Machinery

After the organizing and cleaning process is completed, the largest problem still remaining is the removal of the causes of pollution. Company D used 3 out of the 7 TPM methods of decreasing the causes of pollution from machinery.

The first method is the continual practice of maintaining and caring for machinery, which includes the cleaning of equipment, create an oil maintenance table, and a fixed time inspection of machinery table.

This will not only change the attitudes of the employees, but also be very important factor in preventing the overheating of equipment

The second item is the preventing the dispersion of dust. Although there is already the installation of basic duct equipment, the size of the dust filtration equipment is not just insufficient, but also when the machinery breaks down the dust also escapes. The way to overcome this problem is the repairing of the ducts, then it is possible to minimize the dust dispersion by placing curtain type transparent polyvinyl on the input and output areas.

Also, the dust that comes out of the bottom can be corrected by placing a connection pipe to the filtration plant, Comparing this method with the basic standard method, it does not just stop interruption, but also

saves time in cleaning,

Both of these factors assist in increasing productivity.

Thirdly, by both improving the working attitude and the performance of the equipment, it is possible to totally eliminate the dispersion of dust which is presently being used in this company.

⑦ Improvement of plant process and product wastage  
Information relating to the improvement of plant process and product wastage is not totally accurate. At the manufacturing plant and coating factory, there are a number of items which are being inspected, and also are being inspected when leaving the warehouse for delivery.

Up to now, there was much doubt regarding the validity of the reports due to the formality of the inspection standard and the report's findings.

In order to improve these problems, the results of the inspection were placed close to the factory so the workers can see. When there are new work operations, the inspection standards are explained to the workers, and information about the work operations are kept within the worker's area so they can easily see the results.

Also, bia-callipers if there is a survey that needs to be done, or any there is a board located in a central location, so anyone can place suggestions there, along with any other comments or suggestions that they may have

⑧ Improvement of the production system (Introduction to report)

The company, with the help of the production senior manager, research assistant manager firstly studied, analyzed, and finally reported on how they could improve the production system. The result was that they reduced the number of levels from 13 down to 5, thus increasing the productivity of the company. In order to protect the continuity of the production system, continual research is being conducted.

⑨ Investigation into the aims, some investigations, and recommendations into factory rationalization  
Actions are continually being taken to improve the precision of the machinery and the work assembly method. Up to now, the results of the investigation are as follows:

The method of production increased by 15.5%.

Compared to the average work quantity per day, investigating at the same time per day, and also the same number of staff. The product wastage as recorded at '0'. It is also thought that there is an elimination of the product wastage by workers' care.

In the model's levels, the first level is finished and whilst the improvement of the second level's parts are wastage and production system improvement progression was happening, the manufacturing factory's rationalizing was being deployed. Seeing the first level of rationalization has been experienced, the customer is able to compare, and their opinion is that they found it to be efficient, so they recommend rationalization.

### 3.5 Aftermath of the plan

In the case of D company, by the end of 2000 they should complete up the third level of rationalization, and now the first level is finished, and now are at the point of beginning the second level. The reason for the first level's success is due to the project team's hard work and management's hard desires, and because there was much enthusiasm for factory rationalization.

Hereafter there will still be a continual interest in trying to improve the equipment, and also to try and make the second and third levels of factory rationalization effective and incorporated fully, so they can provide a model for others can follow, but for this to happen, the company may need some assistance

## 4. Conclusion

In Korea's case, many small and middle sized businesses are scattered everywhere, so there has been many bad cases in business, so many companies are not enthused about adopting factory rationalizing.

When compared to a large city, there are many additional problems relating to human resources, business bankruptcy and supply of materials.

Especially, there is a large difference in the accessibility of important information, with the smaller areas being at a large disadvantage. This difference is believed to becoming larger.

In this paper, D company has overcome difficulties

like this, and has accomplished factory rationalization.

To prepare for the 21st century, company D has a long term vision about rationalization, which will be successful to some extent. For the continual development, and master plan to become successful, strong support in the areas of 'closeness within the business', and 'highly educated employees'.

In cases similar to company D's model, to accomplish factory rationalization there must be provision for the continual development of this field.

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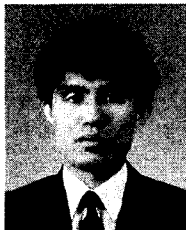
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