

From Slum to Star Factory: A Journey towards a Global Level Manufacturer

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Abstract

Thai Metro Industry (1973) Co., Ltd., is a family-owned Thai SME company with 40 years experiences of manufacturing chain for industrial and motorcycle used. Initially, there were more than 400 employees producing low cost ordinary quality chains supplied to the export and domestic markets. The company was established in 1973 with US\$ 1.3 million of capital investment. As of present, the major products are transmission chain with the brand ICM and motorcycle chain with the brand SK. Total production is 2 million feet per annum out of which 40% export to Japan and ASEAN. A total sale is US\$ 3.3 million annually with 100 employees in 4200 sq.m. factory. Major domestic customers are Siam Kubota, Thai Kawasaki Motorcycle, TATA Steel (Thailand), Toshiba (Thailand), Bangkok Expressway PCL., BFC, Thai President Food PCL. Major overseas customer is Kubota Co., Ltd. in Japan. The economic downturns in 1997 propelled the company into serious deficit with large amount of loan to the bank. In order to revive the business and increase competitiveness to sustainable position, the company has embarked on a long and difficult journey towards quality excellent. A series of techniques, namely, 5S, suggestion system, ISO 9000, Toyota Production System (TPS), and Lost Reduction Process (LRP), have been applied consecutively. Strong commitment from executive, managers, supervisors, and fully collaboration from operators are the key ingredients for success. Lead time reduction of 82 % and more than 80% of productivity improvement are among favorable outcomes of the quality and productivity improvement initiatives. With the support from Thailand Automotive Institute (TAI), Thai Metro entered the TPS program with pilot line for several high volume products.

The initial achieved targets were 50% reduction of WIP and lead time, 30% reduction of working space, and 30% improvement of effectiveness.

Introduction

Many family own company all over the world always face the same problem of sustainability especially when the management passed from the founder to the second and third generation ones. Some would say that success in the past is the main reason for failure along the road. Anyway, the most important factor for survival and sustainable are flexibility and adaptability to the changing environment especially the ever changing demand from the customer. (Bhandhubanyong, 2000) Thai Metro Industry (1973) or TMI, had been in the same situation several decades ago when the present managing director, Mr. Pipob Vivattanaprasert, a mechanical engineering graduated and MBA took over the company from his father who was the founder. The company used to produce standard chain for motorcycle and agricultural machines for domestic and overseas such as USA and European markets since the establishment in 1973 with more than 400 employees. Severe competition from the low cost overseas manufacturers on the one hand and high quality overseas manufacturers on the other hand resulted in business loss for quite long years with large amount of loan from the bank. Mr.Pipob started to correct the situation with the product paradigm shift as followed:-

“We will manufacture high quality product for high quality market. We aim to make better quality than Japanese product. Consequently, we emphasize on research and development (R&D) and continuous improvement or Kaizen for better quality, lower cost, 100% timely delivery, to achieve customer satisfaction.”

The journey towards global level manufacturer is an ongoing process. At present TMI is one of the global chain manufacturing leaders. The major customers are Siam Kubota, Thai Kawasaki Motorcycle, TATA Steel (Thailand), Toshiba (Thailand), Bangkok Expressway PCL., Bangkok Feedmill Company Ltd., Thai President Food PCL Siam Kubota Corporation (Thailand), and major overseas customer is Kubota Corpora Corporation, Japan. Total production is 2 million feet per annum out of which 40% export to Japan and ASEAN. A total sale is US\$ 3.3 million annually with 80 employees in 4200 sq.m. factory.

Vision and Thai Metro Way

TMI vision 2014-2020 is ***“To be a world class chain and conveyor system manufacturer with environmental conservation and social responsible working process”***. In order to realize this vision, the so-called “Thai Metro Way” is announced as

- 1. Research and Development to achieve global best quality level*
- 2. TPS (Toyota Production System) and LRP (Loss Reduction Process) practitioner*
- 3. Management By Walking Around (MBWA) to create total commitment*
- 4. Problem Solving by Gemba, Gembutsu, and Genjitsu*
- 5. Continuous Human resources Development*

The mission 2014-2020 is *to manufacture global quality chain and transportation equipment focusing on*

1. *Continuous Research and Development*
2. *Toyota Production System (TPS)*
3. *Loss Reduction Process (LRP)*
4. *5M towards excellent in Manpower, Machine, Materials, Method, and Measurement*

Productivity Improvement Activities

The first impression of the visit to the company in 1980s was the place of dirty and untidy or “slum” factory. Loose spare parts, garbage, oil spilled, broken tools, machines and equipment were everywhere. The effect of the environment of the moral of the operators has been obvious with minor and major accidents and absenteeism. So, the first step to achieve productivity improvement is the practices of the Japanese 5S, or *seiri, seiton, seiso, seiketsu, and shitsuke* which is the effective tool to create a tidy workplace and simultaneously instill discipline in the operators. (Bhandhubanyong, 1984) Then suggestion system was introduced to train the operator to understand and be able to detect the problems in the workplace. (Bhandhubanyong, 1986)

The Thailand Automotive Institute (TAI) created the program to introduce the Just-In-Time (JIT) or Toyota Production System (TPS) for the small and medium enterprise (SME) in 2010s. TMI applied for the program with the support of training and consultation by the expert of TPS from Toyota Motor Company Ltd., Thailand. There are 4 steps in the TPS implementation, namely, (Bhandhubanyong, 1986, 1995)

- *Step 1: Worksite Control or the combination of 5S and visual control (as shown in Fig.1)*
- *Step 2: Continuous Flow or one-piece transfer*
- *Step 3: Standardized Work or operate with standard operation procedure (SOP)*
- *Step 4: Pull System or product pull by after process*



Fig.1 The area of the furnace section before (left) and after (right) the application of worksite control with 2S resulted in the introduction of Flow Rack to facilitate FIFO system.

The successful implementation of the first TPS program led to the following phases of TPS in the overall factory. Productivity (quality, cost, and delivery) improvement has been achieved with remarkable results. For example, the manpower reduction of line 100G product has been from 11 persons before application of TPS to 7 persons after the application to 4 persons for the follow up application. Fig. 2 shows the outcomes of TPS application in the follow up phases which achieved more than the established targets in every index.

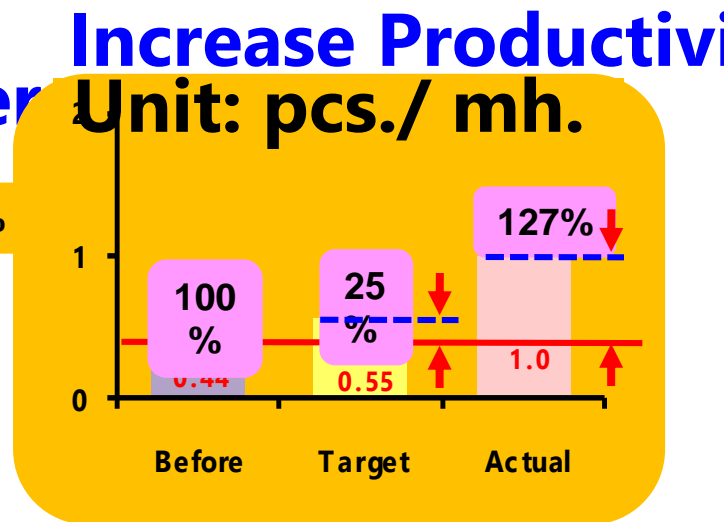
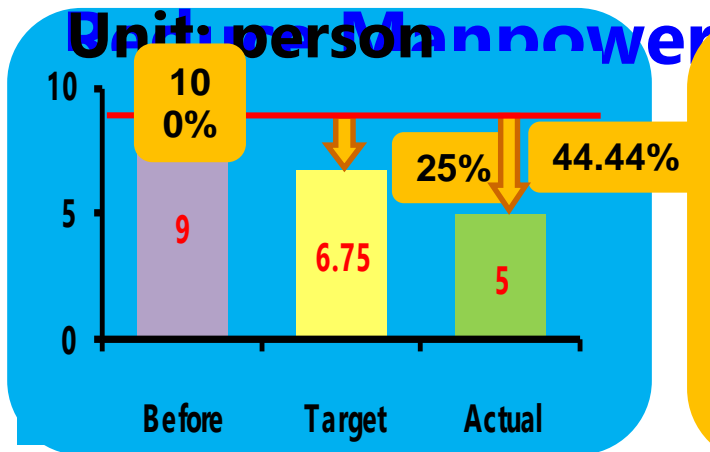
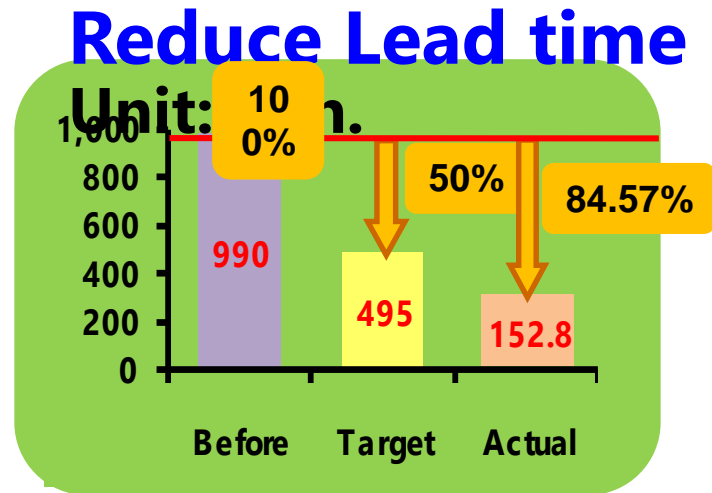
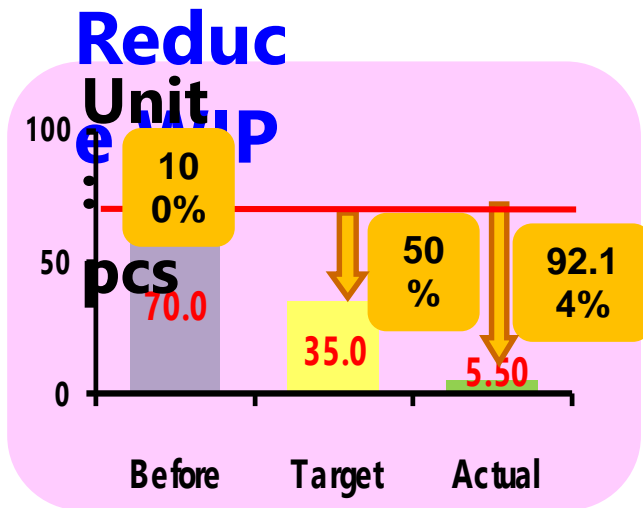


Fig. 2 Overall TPS results in Phase 20 (follow up phases) in which all outcomes were more than to established targets

Small group activity or Quality Control Circle (QCC) has also been introduced to all operators in the production line and in the office or administrative units. This is the activity that creates teamwork, problem solving ability, and facilitates standardization process. Training has been implemented every Saturday afternoon with presentation attended by Mr.Pipob, Managing Director, and all employees. The number of Kaizen (suggestion) is also set as an index to reflect the moral of employees. Fig. 3 shows the number of Kaizen case for the year 2017. It can be seen that the target for the months and quarter has been achieved and sometimes the number was above the set up targets.

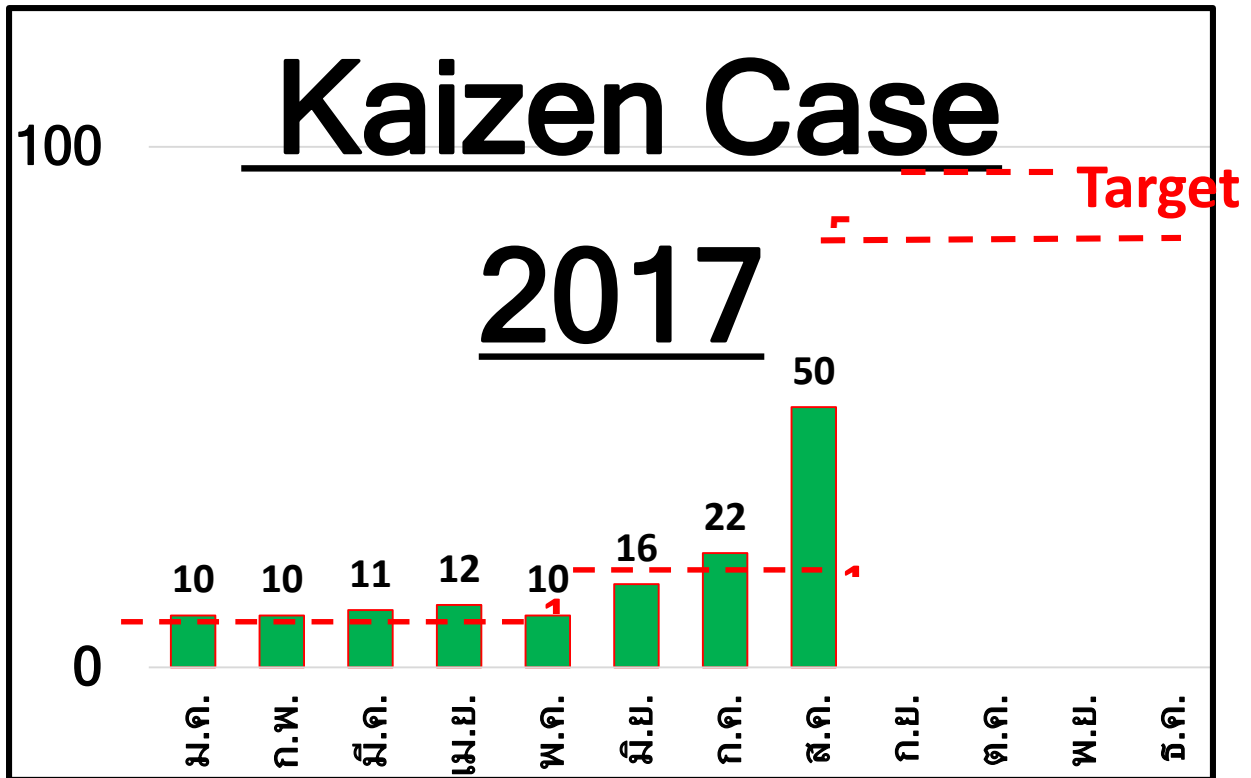


Fig. 3 Kaizen or Continuous Improvement Activity in TMI. The number of case could reflect the moral of the employee. Each bar reflected the number of case starting from January to December.

Fig. 4 shows the example of the result of the Loss Reduction Process or LRP which is a methodology in the Statistical Process Control or SPC. The process capability indices, namely, Cp and Cpk, has been calculated from the measurement of the dimensions of each part samples. Cp and Cpk of over 1.33 means nearly zero defects. Defective parts and abnormality of processes would be detected and corrected before large lot production. Defective parts and wastes have been tremendously reduced by this early warning system.

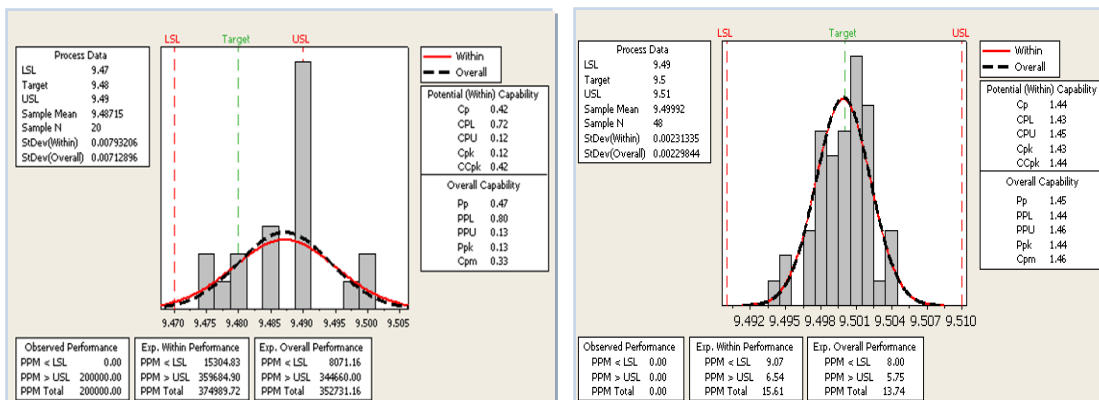


Fig. 4 Example of LRP for the production of PIN. Left side is before the correction with Cp and Cpk of 0.42 and 0.12, respectively. After correction of the process, Cp and Cpk of 1.44 and 1.43, respectively were achieved with zero defective parts.

Research and Development for Product Development

Research and Development has been done continuously for high quality materials selection suitable for production of high tensile strength, high resistant to shock and impact load, and high wear resistant. Various measuring and testing equipment has been developed in-house for ease of operation, maintenance, and cost reduction. Example of developed product is C2060H chain with o-ring to improve the lube oil retention. The service life was three times extended compared to the previous ones without o-ring. Table 1 shows the results of materials selection and process improvement resulted in chain with clearly higher strength than competitive products.

Table 1 Tensile Strength of TMI chain (ICMs) compared with other competitive products

| | | | Tensile Strength (kN) | | | |
|----------|--------------|-------------|-----------------------|----------|---------|----------|
| N0 | ICM 120G (1) | ICM 120G(2) | A.Co.120 | B.Co.120 | C.Co120 | D.Co.120 |
| 1 | 190.91 | 190.40 | 146.87 | 167.06 | 167.22 | 165.30 |
| BREAKAGE | PIN | PIN | PIN | PIN | PIN | PIN |
| | SLIP | SLIP | BROKEN | BROKEN | SLIP | SLIP |

Human Resources Development (HRD) and Corporate Social Responsibility (CSR)

Human resources are crucial factor to achieve productivity improvement and sustainable organization. TMI promote various HRD processes such as morning exercise, sport, and planting of trees and vegetable in the factory public area. Fig. 5 shows an example of morning exercise which perform daily before workplace cleaning and machine inspection.



Fig. 5 Morning exercise perform daily before workplace cleaning and machine inspection

Once every year, all employees will get a paid day leave to help the nearby secondary schools in site cleaning, needed equipment donation, repair of broken light and equipment,

friendly sport competition with students, and lunch party. These HRD and CSR processes clearly improve moral of employees resulted in zero accident and very low absenteeism.

Conclusion

The turnaround of the company/factory from “slum” environment with serious operating lost could be done efficiently and effectively through productivity improvement activities such as 5S, Kaizen, QCC, and TPS. LRP could help to stabilize quality and R and D could be implemented to improve the competitiveness of products and processes. HRD and CSR are other two keys factors in moral improvement. However, it could be stated that these activities alone could not lead to favorable outcomes without the commitment of the number one of the company who exhibit relentless efforts day-in and day-out with MBWA and swift decision making. With the strong belief in employees, top management could create favorable environment to achieve global level company/factory with sustainability as the outcomes.

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