

Feasibility Research on Quality Management Technique with Deming's Management Principles to Heavy Industries in Mainland China

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Abstract. This research aims at exploring new quality management techniques for application to heavy industry enterprises by Deming's management principles which would be evaluated in several aspects such as enterprise's vision and mission, supply chain management, human resource and operational management in a typical heavy industry enterprise ZPMC under current condition to verify the feasibility of transformation. Expected difficulties and opportunities to apply Deming's management principles would be illustrated and analyzed for the purpose of transformation from common to best practice according to analysis of potential risks evaluation. And for further study on more quality management techniques application for more industries through Deming's management principles to overcome the current issues of high cost, low-efficiency and quality matters during the entire process of production.

Keywords: Quality management technique; Deming's management principles; Heavy industry.

1. Introduction

As ZPMC is a fully reinforced heavy-duty equipment manufacturer with a state-owned holding company in mainland China listed on A and B shares in Shanghai Stock Exchange with diverse range of business. In its production section, its main services vary from equipment manufacturing, financial service, construction contract and heavy machine production such as large-scale container machinery, marine construction equipment bulk cargo handling machine, offshore heavy-duty products, heavy-duty steel structures, energy-conservative and environment-friendly equipment and relative accessories.

As a state-owned company like others in this industry, ZPMC's manufacturing quality management techniques are highly relied on inspection in traditional situation. The production process is relative time-consuming as well as with low-efficiency for transportation. Moreover, the leading time from processing orders to transferring which seems longer than average level, which seriously affects customer satisfaction. To contrapose its operational process in ZPMC, it is found that the cost in quality management is much higher and delivery term which is comparing to other major manufacturers is longer. For the financial statement from 2015-2018, it spent large amount money on its sales channel and logistics, and except for marketing factors and policy, what makes high cost and long leading time remains to be a problem. As a consequence, to apply for Deming's management principles would be the key to this.

ZPMC concentrates on developing customer satisfaction and value as enterprise responsibility, which is guided by innovation, BPR and value realization. In recent years ZPMC focuses on offering highly advanced quality and competitive solutions for global customers. As a matter of fact, more than 40,000 employees in ZPMC and subsidiary corporation, such as engineers, administration staff, salesmen, levels of managers and even shop floor workers, which is extremely difficult to guarantee that not every component would be aware of mission establishment, which would be a problem that constancy of purpose could be successfully transited from top to floor layer. Another issue is that skilled employees who want permit pride of workmanship during their works who are running off year by year lack of sensitivity to accept new management principles in work.

2. Application of Deming's Management Principles in ZPMC

2.1 Expected Difficulties for Deming's Management Principles Application

2.1.1 Supply Chain Management Reengineering

Generally speaking, upper supplier management is depending on the one who are in charge of procurement makes the final decision and list price with lack of systematic evaluation. In specific situation, raw material quality is hard to be controlled at the beginning stage, the strategy of ZPCM is acting MTP to satisfy market in recent years which is trapping into downturn market, which drives ZPMC has owned a high inventory level with low interests leading a quality failure, which is a great of wastage.

At the end of their supply chain. The core competitiveness of low price is no longer suitable for nowadays. Quality oriented strategy is a continuous improvement method to fulfil the requirement of market. With the market shrink situation, to establish a flexible supply chain with quick response ability to process orders and manufacture to order is the precondition to apply for Deming's management principles. The transition from MTP to ETO is a vital step for realization. Above all, a systematic suppliers' evaluation method and flexible manufacturing strategies with high marketing adaptive capacity are the vital conditional step to Deming's management principles.

2.1.2 Human Resource Management Drawbacks

HRM is another factor to achieve the purpose, as a quality technique, Deming's management principles are highly related with human resource management. In ZPMC the shop labors are lowly educated, which commonly exists and influences Deming's management principles implementation. For the reason that basic workers are paid much less than high-skilled technicians, their initiatives are hard to motivate. The shop workers are slow to receive principles accurately, which is difficult for training. It is found that barriers are easy to be established among with layers, according to their own experience, which would produce a deviation for product R&D. On the other hand, ZPMC's reward mechanism is inappropriate, only the outstanding employee could be permitted pride of his workmanship with material rewards which is lack of teamwork spirit.

2.1.3 Quality Management Cognition Bias

ZPMC's 300% quality inspection mode leads to low efficiency and high cost in recent market shrink. First of all, the right cognition of quality management which requires better quality management technique rather than inspection, which is not necessary to detect quality flaws. For another word, quality management is not only about products quality, but also labor and manufacturing process. Through enhanced training program, not only the products flaws, but also lower costs, short leading-time and high-quality services to develop customer satisfaction.

The formation of product quality has a close relationship with each step during Deming's management principles. It is suggested that ZPMC eliminates potential flaws instead of products inspection, which requires general market survey, R&D, procurement, manufacturing process and sales. General quality development requires technique of Deming's management principles with science and technology to assemble a comprehensive quality improvement system.

2.2 Opportunities and Benefits to Apply for Deming's Management Principles

2.2.1 Methods to Apply for Deming's Management Principles

"Quality comes first" which should be rooted in mind at the first step. The issue of recognition is accepted by all degrees of knowledge group as well as educated for baseline workers. Periodically training seems essential with training courses. To remove the barriers between functional department by establishing a channel for information transferring seems necessary, which makes it easier for accurate information. In addition, a systematic ranking mechanism is established for supplier assessment and the supplier selection should be decided by professional technique team rather than one call. There are kinds of difficulties for ZPMC to apply Deming's management principles. Basically, the concept of mission for ZPMC might be difficult for shop floor workers to fully

understand due to their education level, but the basement workers are directly contacted with production line concerning with quality. In their thought, a good quality is only about normal working or passing inspection, which takes more efforts to be a tiny improvement. To assess particular staff training should firmly combine with constancy of purpose, with the process of training, employees can acquire information and gain knowledge to realize Deming's management principles through regular training courses periodically, which is an important component for quality management and control.

2.2.2 Expected Benefits and Discussions to Apply for Deming's Management Principles

First of all, through relative methods staffs in ZPMC would strengthen their awareness and working abilities during Deming's management implementation, moreover, enterprise's vision and mission would be correctly understood by staffs and employees with a common purpose. Under Deming's management principles, operational effectiveness would be obviously developing in a short period. A truly excellent supplier selection system could be entering into ZPMC's view by professional assessment through Deming's management principle. The technicians' management awareness would be increased by training system as a result of being easily accepted. Moreover, the whole enterprise would be operated smoothly under application of Deming's management principles from top to base, which means that to improve quality by management principles and techniques is the key factor.

It can be predicted that Deming's management principles to apply for is a method for quality development, but it would encounter some several potential resistances in the way. As is known that Deming's management principle is a reformation from top to bottom, which recognizes the advantages and competitiveness of this industry clearly.

3. Common Practice to Best Practice of Deming's Management Principle

3.1 Beginning Stage of Design Under Deming's Management Principles

At the beginning stage, the product design is connected with the marketing analysis through Deming's theory. The executors understand the needs and develop customer's satisfaction then give a quick response to designing group. The designing group should judge that which functional is truly required in market with applications. For ZPMC, this stage could lower the inventory to deal with excess production capacity issues. Otherwise, the product would be a failure or restricted by others' blockade with techniques, which impedes the prices and marketing damage. It is necessary to analyze the data from market and customer objectively to adjust to more different customers. Another issue to be aware of is that customers would never purchase a product with low quality specification in the long run.

The professional marketing group is responsible for processing the orders from market, which consists of profile, product condition, as well as market saturation. A report would objectively reflect the actual situation. With a deep investigation on characteristics of development to identity core competitiveness, the market split into pieces to reorganize production lines, moreover, feedback from the customers no matter their complaints or suggestions, these should be dig out the real demand. Honestly speaking, the missions for this stage are complicated for the marketing men with high level of professional knowledge as well as realizations about enterprise common goal which is the key step for quality improvement technique implementation.

3.2 Developing Stage of Development under Deming's Management Principles

For the stage of production development along with best practice, which is treated as key part during the process, there are several concerns should be taken into consideration and processed by specific technical and designing group at the beginning of product life cycle. The purpose and continuous development of product should be identified at the beginning, which makes engineers set about processing the data from practice, as well as the general idea of product should be separated into several aspects including manufacturing process, convenient maintenance and debugging. In

detail, in the stage of development, these should be combining with outcome. When these considerations could be organized well enough, which decreases the cost largely to the end. Although more investment would be in this stage, the big picture we figure would gain more than common practice.

A professional research team would be established for production development which consists of high level of designers, safety engineers, systematic engineers and machinery engineers who are responsible for carrying out Deming's management principles. Moreover, through processing massive data, the designers are able to work in a cost-effective way. Production process and service development, which consists of standardized manufacturing process with eliminating defects for baseline workers, simplified production assembly for skilled technicians, machinery maintenance to lower cost with diagnostics, which are based on enhancing effectiveness. As a result, the decreasing cost would be monitored by these steps. Safety engineers are in charge of safety and quality production, who make a procedure for particular line. A good quality production means development with lower cost. Engineers in system are responsible for creating a system for manufacturing, which guarantees continuous quality controlling to remain at a stable level.

3.3 Ending Stage of Service Under Deming's Management Principles

Comparing with common practice, the investment still remains at a high level. With an increasing trend, it is totally different from common practice in the stage of production service. It illustrates obviously that manufacturer start to contribute more efforts to subsequent service and after sales business process.

To show confidence in quality control, this service contract is established that the customer could pay 30% fees for procurement to complete the delivery, the rest 70% will be paid year by year with additional service charge in quality guarantee period, which would highly attract customers' attention and produce value-added fees as well as strengthen brand effect, which are based on Deming's management principles. The ending stage is a link of quality management that is beneficial for business operation. In addition, value-added products make more profit by services quality improvement. For instance, ZPMC aligned with Import and Export Bank of China to offer ZIRP service, which attracts the third-world countries to place orders to expand overseas market successfully. This stage includes strategic purpose, after-sales and follow-up services. To find out service quality improvement is the main task for Deming's management principles adaption. With the rapid marketing development, the variational customer demand should be considered carefully as well.

The law related personnel are responsible for sales contracts with manager to avoid risks, which is getting more and more urgent. When the scale of business is expanding too fast, the overseas market becomes difficult to handle. As culture differences, service strategy is going to be international. With follow-up service connected with development stage, the information is periodically received to monitor product condition. Through information process, there is a quick response for upgrading products with high level of performance. For the purpose of satisfying with demands, the contract management team would offer feasible proposals like loan service, quality guarantee credit and disposal recycle service to realize a win-win situation. On the other side, it promotes best practice with Deming's management principles due to ending stage.

4. Summary

In conclusion, Deming's management principle application is proven to be appropriate for ZPMC's future development, which concentrates on new techniques application for quality control to extend to the whole scale of business. ZPMC is systematic organized through Deming's management principles and providing with a new perspective on improving operational effectiveness through quality management techniques, which is recognized that a good quality relies on a good management instead of inspection through unexpected difficulties and potential risks.

Then, for the deeper application of Deming's management principles is proven that best practice mode is adjust to ZPMC. For my perspective, Deming's management principle is the right quality management technique for implementation of ZPMC, especially for its operational business management effectiveness, which strengthens quality management with all the aspects are perfectly matching with the current situations to make a breakthrough.

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