Study on Equipment Quality Chain Management

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Abstract. This thesis starts with the domino phenomenon which sometimes happens in the equipment quality management, analyzes the definition of equipment quality chain management. What's more, this thesis puts forward the way to realize the equipment quality chain management in terms of 3 aspects, that is, the establishment of equipment quality chain management framework, the study on the key technology of equipment quality chain management and the quality culture development of each member in the equipment quality chain management.

Keywords: Equipment management, quality chain, quality manage

1. Introduction

Nowadays the equipment has become more and more complex, large and informationized, and its overall quality control has to cover several phases, such as the demonstration, research, production, use and maintenance. If logistic equipment quality is viewed as products, then the phases concerning quality control can be accordingly viewed as processes of production, and the previous process is regarded as the supplier of the next process. It is not difficult for us to figure out that the process of quality control is just similar to the supply chain in the enterprise production. And the quality flow consists of the quality of demonstration, quality of research, quality of production, quality of use, quality of maintenance, other factors and measures for quality control. These parts involved in this chain are to be performed in a particular sequence, and the previous part will produce an effect on the next one, therefore they interact with each other, and finally chain reaction comes into being. The interrelation among each part and five parts (quality of demonstration, quality of research, quality of production, quality of use and quality of maintenance) are interlinked, forming a quality chain, and its ultimate goal is to improve the quality of equipment.

2. The Domino Phenomenon in Equipment Quality Management

Quality of preparation, quality of research, quality of production, quality of use and quality of maintenance are of great significance to the total quality of equipment. Besides there is a causal relationship among them and they are interlinked and follow a particular sequence. These parts can form equipment quality dominoes in a particular sequence in the perspective of improving the quality of equipment by making full use of the interrelations among these parts.

The first piece of equipment quality dominoes represents the quality of equipment demonstration, and in this order the last piece of equipment quality dominoes represents the quality of equipment. According to the domino theory, if one falls, it knocks down the next one, which will knock down the next one and so on. In this sense, if the demonstration is poor (the first piece representing the quality of demonstration falls), it will produce an impact on the following pieces and result in the failure of providing the equipment that fits in with the needs of future warfare. Similarly, if the demonstration is feasible, reaching the required standard, other parts on the chain, that is, research, production, use or maintenance, found to have some problem (the piece representing it falls), probably will knock down the last piece which represents the quality of equipment, thus resulting in unqualified equipment.

If we want to improve the quality of equipment and also avoid unqualified equipment, strengthening the quality management will be vital to realize that. And the chain structure determines that equipment quality chain management is an undoubted choice for improving the equipment

quality management. In this sense, by focusing on the equipment quality, controlling the quality information flow and connecting all the parts related to the equipment quality, we can therefore have a quality network pattern so as to have the equipment of high quality and constantly improve the quality of the equipment.

3. The Definition of Equipment Quality Chain Management

The equipment quality chain management is in fact a system in which the division of responsibility is made clear. And it aims at realizing better quality of equipment by taking advantage of its chain structure and focusing on the whole process concerning the quality. It is a kind of quality management pattern with chain structure, and the core of this pattern lies in the equipment quality.

3.1 The scope of equipment quality chain management

It refers to the whole process related to the equipment, or rather, all the activities concerning the equipment, including the demonstration, research, production, use and maintenance as well as the supply of raw materials for equipment and spare parts (stand pieces which can be directly purchased from the manufacturer and outsourcing pieces which can only be purchased from the supplier instead of the manufacturer), belong to the category of equipment quality chain management.

3.2 The object of equipment quality chain management

It refers to all the personnel related to the equipment quality, that is, from personnel engaged in the demonstration at the very beginning to the personnel in charge of the last part on the quality chain. And even the supplier providing the raw materials for the production of equipment should be included in the chain and be regarded as the one of the object.

3. 3 The content of equipment quality chain management

The chain structure of equipment quality management is complex and if we want this chain or this system to be well-organized, then we have to make the quality management both feasible and successful. In order to achieve that, to define the individual's responsibilities, or the division of labor, becomes very crucial. Every one engaged in the process concerning the quality should be aware of their own responsibilities, in this sense, it can eliminate the adverse effects to the maximum.

3.4 The aim of equipment quality chain management

The quality of the equipment determines the logistic support capability in the future warfare and then it will finally have an impact on the ending of the war. If we carry out quality chain management and pay attention to management of each part on the chain, which will definitely promote the sustained improvement of the equipment quality.

4. The Measures to Carry Out the Equipment Quality Chain Management

Nowadays the quality chain management concept has been widely used by many industrial manufacturers in China but it is still new for us to carry out the quality chain management in the equipment quality management. We need to use the experience from the enterprises concerned for reference and start with the establishment of framework for implementation, the research of the key technology and quality culture and only by doing so can we have a very good chance of realizing the goal of integral quality optimization of the equipment quality chain.

4.1 To establish a feasible framework for the implementation of equipment quality chain management

Due to the differences in function, interests, quality culture and the scattered distribution, each member of the equipment quality chain probably cannot reach a consensus sometimes, which renders the equipment quality management a complex system, involving several aspects such as technology and management. In order to make it function well, all members' involvements as well as the feasible framework for the implementation of equipment quality chain management are required. Now we plan to use the experience from the civilian enterprises for reference, and suppose that the framework for the implementation of equipment quality chain management consists of 4 levels, that is, foundation, technology, execution and aim.

The foundation level, which is indispensable when the quality chain management has been carried out, at the bottom of this framework in terms of structure, is also the basis for the implementation of equipment quality chain management. It mainly covers the following 4 parts:

Information, such as smooth channels for information, communication environment and effective data management required by the quality chain management implementation;

Standardization, such as consistent or compatible quality system standard, technical specification and information interface standard;

Organization, such as multifunctional work team and flat flexible organization structure;

Quality culture, such as the mutual attractiveness and acceptance in the aspect of quality culture and management concepts among members of equipment supply chain.

The technology level, including comprehensive management mechanism, information sharing mechanism and collaborative work mechanism, is not only the core for the implementation of equipment quality chain management, but also the technology platform used for carrying out the equipment quality chain management. The comprehensive management mechanism consists of the assessment and appraisal of the quality system of members of quality chain, the supervisory control of the fluctuation and abnormal performance of quality chain; the information sharing mechanism helps all the members within the quality chain can share the information and it mainly includes activities such as training and seminars on equipment quality; the collaborative work mechanism is of great help to members of quality chain in exchanging opinions with each other and working together to solve the quality problems so as to improve the equipment quality.

The execution level, between the foundation level and technology level, shows the process of equipment quality chain management. It aims at establishing an agile and efficient equipment quality chain system consisting of organization, management, process and information through the smooth quality flow information.

The aim level, obviously, it is the aim that the equipment quality chain framework is supposed to achieve. The reason why we plan to carry out the equipment quality chain management is to realize the smooth, quick, continuous and stable quality flow which includes the quality information flow, design quality flow, demand feedback flow, quality plan flow, quality improvement flow and quality control flow, etc.

4.2 To carry out an in-depth research on the key technology needed by the equipment quality chain management

Equipment quality chain management is an advanced management concept incorporating many aspects, such as technology and management. And what's more, various kinds of sophisticated technology are applied. In this sense, it is a must for us to make a deep analysis about the key technologies used for equipment quality chain management.

First, it is the coordination service technology. The equipment in the future will tend towards larger size, complexity and IT-based development. Users will pay much more attention to the quality and at the same time every part of equipment quality management will become more and more complicated. And if we want to improve the equipment quality and adapt the market demand, every member of the quality chain needs to work with coordination and finally accomplish the logistic support task perfectly.

Second, it is the technology concerning appraisal and selection of supplier. The appraisal and selection of suppliers are an important to the quality chain management. A large number of spare parts, outsourcing pieces and standard pieces are provided by suppliers and other outsourcing companies during the process of research, production or maintenance. The quality of these spare parts or semifinished products will definitely have an impact on the final quality of the finished product (equipment), therefore, the suppliers, outsourcing companies become major object of management. In this sense, we have to strengthen the management of suppliers in the equipment quality chain management, accurately appraise the supplier and select the excellent suppliers who are supposed to be helpful to the improvement of equipment quality.

Third, it is the process modeling technology, which is composed by a series of processes concerning quality and it is complex and dynamic. In order to deepen the understanding of these

processes and strengthen the control of them, we need to produce a model helping us to better observe and guide its operation. At present, the method for the processing modeling used by the civilian enterprises can be adopted, such as the method based on rule, process programming method and the method based on function.

Fourth, it is the demand acquisition and analysis technology for future warfare. Equipment demand acquisition and analysis is an important part in the equipment quality chain management. The market demand will determine the design and production, which is a decisive factor to the equipment quality, therefore, to both obtain this kind of demand and understand it very accurately becomes crucial.

4.3 To enhance the quality culture development of each member of the equipment quality chain

In 1993 the World Conference on Quality and International Academy for Quality reached a consensus that the quality management was no longer the pursuit of total quality management and the enterprise quality culture became the focus. This just indicates that the quality culture is now the core of enterprise culture of quality chain member. And when we introduce the quality chain management, a kind of work needs to be done first, that is, enhancing the quality culture development of each member of the equipment quality chain.

The quality culture here refers to a kind of value, aim and belief which can be found in the process of pursuing the best products in an activity in which people are supposed to exert themselves in pursuing high quality. And for all the members of equipment quality chain, they are required to transform the quality value into the working style so as to improve their work and finally produce the equipment of high quality.

Because of the significance of quality culture, on the one hand, we need to make it clear that the quality culture has a special status. Once the superior quality culture takes shape, it will have profound impact on all the members of equipment supply chain. The quality culture and iceberg are similar to some extent, we cannot get the full view of the iceberg in that main body is hidden under the sea, and just because of that the iceberg has enormous power to make it hardly shakable. In the equipment quality chain, people's influence on the quality always exists and if we don't have quality culture as a solid foundation, then it is hard for us to guarantee the quality. In this sense, it is extremely necessary for the equipment manufacturers to attach great importance to the quality culture if they want to strengthen their competitive power and deepen the quality management.

On the other hand, we need to develop the quality values. The quality values are the key element of enterprise quality culture, which are both the consensus reached by all the members in the enterprise on quality and their value judgment of the quality; What's more, it concerns the future of an enterprise. Therefore, the quality values should be thoroughly introduced to all the members of equipment quality chain so that they will be fully aware of their responsibilities and understand the significance and status of quality in the equipment improvement. It is expected that every member will agree with the following concepts, that is, the quality is the life of equipment manufacturer, the quality reflects that whether the equipment producers are qualified or not, the quality can guarantee the success of equipment research and production, or the quality equals the logistic support capacity. Meanwhile, we also hope that it is clear to every member that they are responsible for the customers and the quality of the products, volunteer to pay much attention to the quality and finally make themselves both active and creative.

5. Conclusion

It can be easily figured out that it is far from enough to focus on only one part of quality chain, instead, we have to pay attention to quality control of each part in this chain. Only when it is carried out in this way can we meet the demand required by the user with equipment of high quality. In this sense, quality chain management plays an important role in the equipment quality management. This thesis puts forward the way to realize the equipment quality chain management in terms of 3 aspects, that is, the establishment of equipment quality chain management framework, the study on the key technology of equipment quality chain management and the quality culture development of each member in the equipment quality chain management.

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