Development of Hybrid Quality Management System for Construction Equipment Part Industry

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Abstract

By combining the advantages of a packaged system that increases the recyclability of a system while decreasing the time required for system building, with the advantages of a customized system that improves the suitability of enterprise’s work process, this study is to development the hybrid quality management system (QMS) containing the advantages of the two systems. In system design, the common functional requirements that are used in all companies are packaged as quality management platform (QMP) and combined with the specialized functional requirements preferred by individual company to build a hybrid QMS. This study implements the prototype hybrid QMSs as proposed in study and applies them to two parts manufacturers to show their positive effects.

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1. Introduction

Korean construction equipment part enterprises (CEPEs) are very dependent on finished product enterprises and play a role core of mainly producing modules and parts. Because most CEPEs lack the ability to develop modules and parts and are small, they have make-to-order production that depends on obtaining an order from finished product enterprises [1]. Due to the aforementioned characteristics of construction equipment part (CEP) industry, quality management of part enterprises focuses on dealing with customers. Few CEPEs have organized quality control process and even if they have the process, it quite differs from actual business. When comparing the actual status of quality management of Korean CEP industry with that of Japanese CEP industry, it was found that fraction defective in Korean CEP industry is 18 percent higher than fraction defective in Japanese CEP industry while quality certification in Korean CEP industry is 20 percent lower than quality certification in Japanese CEP industry [2].

This study aims to establish quality management system (QMS) of Korean CEP industry and develops customized type QMS. Most CEPEs try to build packaged type information system first to prepare their own QMS but success rate of introducing the information system is 15% or fewer [3]. The main reason for which CEPEs fail in building the information system is that actual status of quality management task by relevant enterprises is not reflected properly [4]. In order to solve the problem, it is necessary to analyze the requirements and business process of CEPEs, develops the customized type information system and applies it. However, it is very difficult for small and medium enterprises (SMEs) to build up the customized type information system because it requires lots of time and cost. In order to overcome aforementioned difficulty, this study aims to develop hybrid type QMS that has the strong points of packaged type QMS and customized type QMS. The basic idea of this study is to analyze the quality task standard and procedure of CEPEs and to develop quality management platform (QMP) based on the analysis result. This study aims to collect and analyze additional requirements of individual enterprise to elicit customized functions and to combine such functions to QMP in order to build a customized QMS. QMS proposed in this study is a hybrid QMS that customized functions of individual part enterprise are equipped based on packaged type QMP.

Chapter 2 examines basic concept of QMS and existed studies related to QMS, and Chapter 3 elicits the functions of QMS. Chapter 4 describes design and implementation of QMS, and Chapter 5 describes cases that QMS was applied to CEP industry. And the last chapter summarizes the result of this study.

2. Concept of quality management system

This chapter examines types of information system, development of QMS and application cases. Information system is generally classified into packaged type system and customized type system [5]. Packaged type is the information system developed by standardized task and process and is quick to be applied to task of the same line of business. The strength of packaged type system is high reusability of the system, and less time and cost to build it [6]. On the contrary, because customized type system is a dedicated system to meet tasks, process, and requirements of an enterprise, it has low reusability of the system, and takes at least six months and costs much to build it. However, the strong point of the customized type system is capable of building a specialized information system taking into account enterprise’s business. Table 1 shows a comparison between packaged type system and customized type system with respect to the reusability, building period, and building cost of the information system.

Generally, QMS is developed and built by enterprises. Relevant existing cases include a case that design QMS and production QMS are integrated for quality history management [7], a case that QMS development was made by reflecting characteristics of batch process [8], and a case that collection of quality information is considered significantly for correct quality inspection [9]. In short, the cases are application cases of existing QMS to individual enterprise and development cases to specify quality management tasks of enterprises.

QMS proposed in the study is different from existed studies in that it targets at whole part industry not individual part enterprises. This study is to propose hybrid QMS combining a common packaged system whose strong points
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