

ISO/TS 16949 among Latvian production companies focused on automotive industry

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Abstract. Nowadays vehicle spare parts and materials manufacturers more than ever need a system approach which makes it possible to become a part of global supply-chain in the automotive industry. Such system approach could be implemented by developing a quality management system. The ISO/TS 16949 is particular requirements for the application of ISO 9001:2008 for automotive and automotive-related products production. The aim of this study is to analyze the diffusion of certified quality management systems ISO/TS 16949 and ISO 9001. The ISO survey of certifications has been a source for the analysis conducted for the data within a four-year period. Three main topics are discussed in this paper: the ISO 9001 and ISO/TS 16949 certificates diffusion in the world and in Latvia; the fundamental requirements in the ISO/TS 16949; an applicable tool for reviewing customer complaints in automotive production. This study has been focused on automotive industry therefore it highlights issues relating to industry-specific standard.

Key words: automotive, standard, quality management systems.

INTRODUCTION

The automotive industry is the biggest industry in the world (Hoyle, 2005) and there are few industries more global than the automotive sector (ISO, 2012). The total number of produced vehicles tends to increase year by year. The world motor vehicle production statistics shows that there were over 61 million vehicles in 2009, but there were 84 million vehicles in 2012 in the world (OICA, 2013).

The International Standardization Organization (ISO) developed the ISO 9000 family of quality management systems (QMS) standards more than 25 years ago, so enterprises might apply a quality management approach. The ISO 9001 is the most well-known standard of certification to ISO management systems. Application of ISO 9001 is not limited as regards the type of economic activity, industrial sector or the size of organization. ISO 9001 requirements should be regarded as additional complementary to requirements for products (ISO, 2008). The ISO 9001 standard is widely recognized throughout the world up to now more than one million and one hundred thousand organizations certificates were issued (ISO, 2013).

The ISO/TS 16949 is particular requirements for the application of ISO 9001:2008 for automotive and automotive related products production; it has

interpreted them and added specific requirements (Nicolson, 2007). The actual version of the ISO/TS 16949 was published in 2009 and this is the third edition of this standard. This edition cancels and replaces the second edition (2002), but the first edition was published in 1999. The ISO/TS 16949:2009 was prepared by the International Automotive Task Force (IATF), with support from ISO/TC 176, Quality management and quality assurance (ISO, 2009) for the automotive sector. The ISO/TS 16949 includes all requirements of ISO 9001:2008 which are appear within closed boxes, but does not replace ISO 9001. To understand ISO/TS 16949 fully, the ISO 9001 requirements shall be understood (Kymal, 2004). ISO/TS 16949 certificate of conformity is often required of suppliers by the automobile manufacturers (ISO, 2011) and it could be explained by the fact that in many cases over 70% of the vehicles' contents from supply organizations (Bransky, 2008).

Despite the fact that Latvia is not a country of vehicle manufacturing (road vehicle assembling), thus at first it seems that it has nothing common with the ISO/TS 16949 standard. However, if we look closer, it becomes clear that there are companies which manufacture components for the automotive industry. The most used standards are ISO 9001, ISO 14001 (environmental management system) and ISO 18001 (occupational health and safety management system) in Latvian production industries (Lazdiņa, 2012). Among the observed trends, there is a growing interest in sector-specific standards, for instance ISO/TS 16949:2009 (Mežinska, 2011; Lazdiņa, 2012).

Taking into account amount of automotive industry, it is very important to satisfy the needs of customers and other stakeholders (Hoyle, 2005). Customers play a significant role in QMS and there is emphasis on customer satisfaction by meeting customer requirements. Although customer satisfaction is included in ISO 9001 but ISO/TS 16949 is more customer-focused and goes beyond (Kymal, 2004), additional requirements are aimed at strengthening the customer (Nicoloso, 2007).

MATERIALS AND METHODS

This study is focused on an automotive industry standard implementation. Both quantitative and qualitative research methods are used in this study: analysis of statistical data, analysis of absolute and relative statistical quantities, literature review, document (standard) analysis, comparative analysis as well as Cause-and-Effect diagram. A comparative analysis has been applied to determine the implementation of certified QMS in the world and Latvia. This study presents the implementation of QMS during a four-year (2009–2012) period. Statistical data are obtained from ISO management system standard certification surveys and International Organization of Motor Vehicle Manufacturers (OICA) database. The Cause-and-Effect diagram is designed in MS Visio.

The Cause-and-Effect diagram also called Ishikawa diagram and the fishbone diagram was developed by Japanese Professor Kaoru Ishikawa (Juran & Blanton Godfrey, 1998; Charantimath, 2003; Hoyle, 2005) in the last century, 1950-ies years. This diagram is considered as one of seven basic tools of quality (Targue, 2004; Hoyle, 2005). The Cause-and-Effect diagram is a graphical method to list cause of particular problems (Charantimath, 2003) and to show the relationship between cause and effect

(Hoyle, 2005). Ishikawa diagrams were first applied to manufacturing problems (Juran & Blanton Godfrey, 1998) and are still often used in quality management in the manufacturing firms (Rajkumar et al., 2013). In this study, the Cause-and-Effect diagram was used to demonstrate how it is applied to solving the problem of customer complaints in particular industry.

The Technical Specification ISO/TS 16949 defines the quality management system requirements for the design and development, production and, when relevant, installation and service of automotive-related products (ISO, 2009). The requirements in the ISO/TS 16949 are covered within Clause 4 through Clause 8:

- Clause 4 contains an overall general and documentation requirements for establishing QMS;
- Clause 5 contains requirements regarding the commitment of top management to the development and implementation of the QMS and continually improving its effectiveness through management reviews and for the fulfilment of customer satisfaction;
- Clause 6 contains resource management issues and for the ones all requirements related with resources;
- Clause 7 (the largest clause with most of the sub-clauses) contains all aspects of product realization, starting from the planning of product realization, customer-related processes, design and development, as well as covers purchasing process, production and service provision and control of monitoring and measuring devices;
- Clause 8 contains monitoring and measurement, data analysis and continual improvement requirements.

In this study, the clauses of ISO/TS 16949 were explored to determine the requirements related to the customer complaints.

RESULTS AND DISCUSSION

This section of the article describes the results of an analysis that was carried out to compare the number of certificates issued to ISO 9001 and ISO/TS 16949 in the world and in the Latvia. An explanation of requirements particularly related to the customer complaints is also given according to the requirements of ISO/TS 16949. An example of practical application, the one of quality tools: Cause-and-Effect diagram is presented by analyzing customer complains.

According to the data of ISO survey, at least 50,071 ISO/TS 16949:2009 certificates had been issued in 83 countries/ economies up to the end of 2012 (ISO, 2013). When average number of ISO 9001 certificates issued during the period 2009–2012 worldwide total have been compared to yearly issued ISO/TS 16949 certificates (Fig. 1), it can be concluded that ISO/TS 16949 certificates had been issued about 24 times less.

Despite this fact, certification to ISO/TS 16949 shows increased tendency in the four-year period. In 2009 there had been issued 41,240 certificates of ISO/TS 16949, but up to the end 2012, the number of issued certificates has increased up to 21%.

According to the latest survey of ISO (ISO, 2013) and calculations made by the authors (Fig. 2), at the end of 2009 there were 708 ISO 9001:2008 certificates issued, while at the end of 2012, there were 791 certificates issued in Latvia. In 2012, the number of issued ISO 9001 certificates has grown by 12% (+ 83) comparing to 2009. The number of ISO/TS 16949:2009 certificates were nearly unchanged during 2009–2012, only 7 enterprises in Latvia had this certificate. After evaluating the statistical data one can conclude that the first three companies received ISO/TS 16949 (automotive sector) certificates in Latvia in 2007.

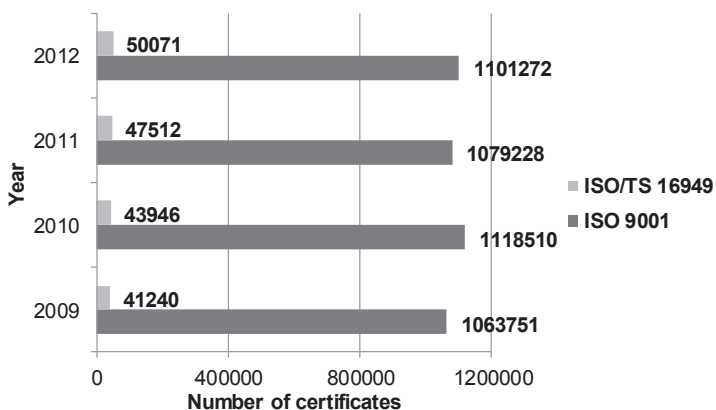


Figure 1. Number of QMS certificates worldwide during 2009–2012. Source: authors’ calculation from ISO data, 2013.

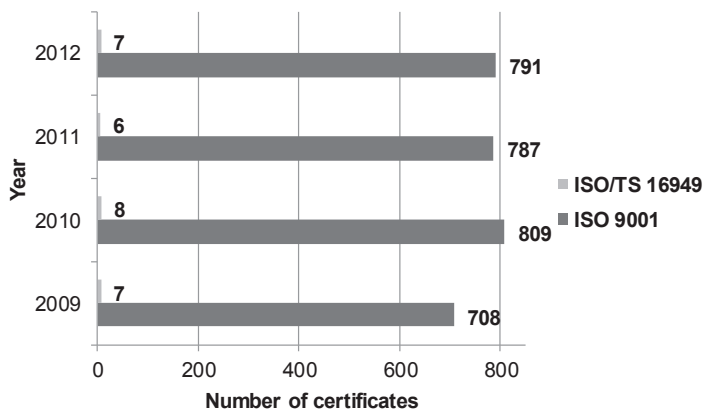


Figure 2. Number of QMS certificates in Latvia during 2009–2012. Source: authors’ calculation from ISO data, 2013.

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The analysis of ISO/TS 16949 standard diffusion reveals some common conclusions. The largest number of certificates of conformity to ISO/TS 16949 in the end of 2012 has been issued in the East Asian and Pacific (26,985) and European (11,017) regions. Germany (3,184) and Italy (1,147) are the leading industry players in Europe and takes 5th and 8th position respectively in the world’s top ten countries for certificates; while the absolute leader of the issued certificates is China (17,975) (ISO, 2013).

ISO 9001 also ISO/TS 16949 specify requirements to enhance customer satisfaction. From literature review it has been revealed that ISO/TS 16949 is more customers driven if compared to ISO 9001:2008. Sub-clauses related to customer satisfaction have been compared to analyze correspondences and differences in both ISO 9001:2008 and ISO/TS 16949:2009. The results of analysis are presented in Table 1.

Table 1. Clauses related to the customer satisfaction within ISO 9001:2008 and ISO/TS 16949:2009

ISO 9001:2008	Sub-clause	Sub-clause	ISO/TS 16949:2009
Process approach	0.2	0.2	Process approach
General	1.1	1.1	General
Customer focus	5.2	4.2.4.1	Records retention
		5.2	Customer focus
Provision of resources	6.1	5.6.1.1	Quality management system performance
		6.1	Provision of resources
		6.2.2.2	Training
Determination of requirements related to the product	7.2.1	6.3.2	Contingency plans
		7.2.1	Determination of requirements related to the product
Customer satisfaction	8.2.1	8.2.1	Customer satisfaction
		8.2.1.1	Customer satisfaction — Supplemental
Analysis of data	8.4	8.4	Analysis of data

The analysis of ISO 9001:2008 standard has shown that customer satisfaction has been mentioned in seven sub-clauses. As ISO/TS 16949 is written consistent to the ISO 9001:2008 standard, the same seven sub-clauses plus five supplemental specific requirements related to customer satisfaction are included. All these supplemental requirements of the automotive standard specified in the column ISO/TS 16949 of Table 1 are discussed further. Sub-clause 4.2.4.1, records retention, requires control of records regarding regulatory and customer requirements. Sub-clause 5.6.1.1 requires that management reviews should reflect how satisfaction of customers is reached regarding with supplied product. Sub-clause 6.2.2.2, training, puts extra emphasis on competent personnel to satisfy requirements of customer. In sub-clause 6.3.2 the

standard requires preparation of contingency plans for emergency situations. Plus one extra sub-clause is added for gaining supplemental customer satisfaction. It is the 8.2.1.1 sub-clause, where indicators of performance are required for evaluation realization processes.

Customer complaints are indicator of low customer satisfaction, although requirements have been agreed by customer, this does not constantly ensure high customer satisfaction. Both standards contain requirements relating to review of customer complaints. Sub-clause 7.2.3 c), customer feedback, including customer complains, requires that an organization should introduce activities and communication with customers for obtaining feedback information and customer complaints. Sub-clause 8.5.2 a), reviewing nonconformities (including customer complaints), requires that an organization should establish a documented procedure to define requirements for reviewing customer complaints. One additional requirement relating customer complaints is in ISO/TS 16949. Sub-clause 8.2.2.4, requires that internal audit frequency should be increased if customer complaints occur.

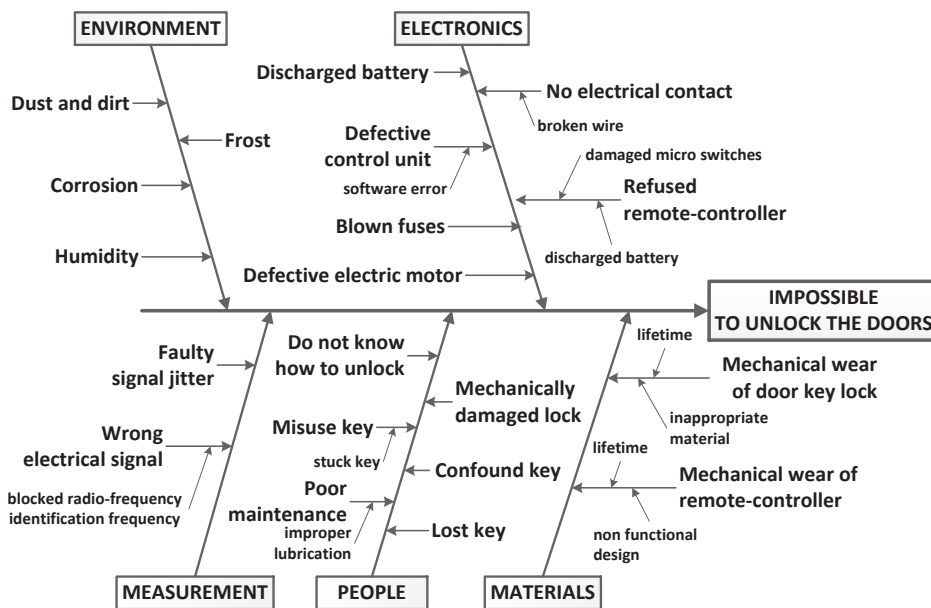


Figure 3. An example of Cause-and-Effect diagram in automotive industry.

In the example shown above, the constriction and possible application of Cause-and-Effect diagram has been demonstrated. This method is good with the graphical visibility of the relationship between cause and effect. A Cause-and-effect diagram is a well-known tool for identifying possible causes for an effect or problem. As it is shown in the Fig. 3, it could be used in automotive industry as a quality control tool at manufacturing processes in accordance with ISO/TS 16949. Since automotive production is multi step technological process involving many operations in several technological plants, a cause-and-effect diagram could provide easy and fast solution and be very useful tool for identifying and organizing the known or possible causes of the specific defect.

CONCLUSIONS

This study is valuable for providing information about the diffusion of ISO/TS 16949 certificates in automotive industry worldwide and in Latvia during the four-year period. Additionally, the implementation of standards ISO 9001 and ISO/TS 16949 are also compared. The main objective for the analysis of the standard ISO/TS 16949 was to found requirements where customer complaints are emphasized. With the specific example from the automotive sector, the potential solution for analyzing customer complaints is presented.

The first conclusion is that, obtained results show that the certification to ISO/TS 16949 in automotive industry in the world is widely diffused and should be characterized by a growing trend, while it should be characterized as unchanged in Latvia.

The second conclusion to be drawn from this study is that there are three particular requirements regarding customer complaints in the requirements of ISO/TS 16949 and the whole system should be characterized as customer-focused. At first, the customer is emphasized in one of the eight quality management principles and then through the whole system in order to monitor its satisfaction.

The third conclusion is regarding to one requirement (8.5.2.1) in the standard ISO/TS 16949 where is stated that an organization should define process for problem solving. Certainly, there many tools have been used to determine the root cause with the aim to implement corrective and preventive actions. The potential causes can be collected either by speaking with customers or from complaints recorded by customers (Hoyle, 2005). The use of Cause-and-Effect diagram is one of possible technique in the field of quality management for analyzing customer complaints or any others nonconformities.

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