1. Introduction

The automotive industry is a highly developed network of suppliers providing components direct for OEM. The suppliers cooperate with one another in various areas of activity and under diverse contracts e.g. providing supplies for production lines, service stations or the aftermarket of spare parts and equipment. In each case, the supplier has to meet strict requirements related not only to product quality, but also, above all, to management system. Companies make efforts to obtain the status of an OE/OES [17] supplier, since this type of references makes it possible for them to expand on the OEM market. Quality management can play a key role here. It is based on different sets of requirements which vary in respect of how detailed they are and how difficult it is to implement them. Without any doubts QMS requirements which should be met by suppliers play a key role when their success on the market is concerned. The scope of requirements themselves is considerably wide – from those determined by economic aspects to all elements of a standardised Quality Management System to industry specific and customer specific requirements.
2. Research objectives

To explain any scientific problem, a research objective has to be determined and realised. In this very case the objective is narrowed down identifying methods and techniques which are used in the automotive industry by OEM/OSM suppliers and assessing how significant each one of them is for the QMS to be effective.

In order to realise the general research objective, the following tasks need to be carried out:

- Surveying reference literature on quality management in the automotive industry, its specificity literature which is directly related to the formulated research problem,
- Gathering documents, standards, procedures which are set of required methods and techniques which are determined in particular in customer specific requirements (CSR),
- Identifying requirements which are not formalised and have the nature of "know-how" used by OEM suppliers,
- Discovering key methods and techniques for quality management which are used in the automotive industry,
- Studying the significance of requirements on a sample of companies which undergo a comprehensive assessment both from the perspective of supplying bodies and customers, as well as companies which realise own priorities aimed at improving the effectiveness and efficiency of their management systems and the overall business efficiency,
- Drawing conclusions in the form of recommendations both specifically for actual and potential suppliers in the automotive industry and more generally for all organisations aiming at improving their QMS.

The following scientific hypothesis (and more specifically in working version) is to be verified as to realise the research objective: The most significant methods and techniques for quality management used by suppliers in the automotive industry are the "PDCA" and "8D".

The results of the conducted research and conclusions resulting from it shall make it possible to identify the directions for effective development and improvement of QMS for actual and potential OEM suppliers (both 1st and 2nd tier). Taken into consideration the universal character of the methods and techniques used by the companies taking part in the research, its results can also be universal for all organisations which utilise the TQM strategy.
4. State of knowledge regarding the use of quality management methods and techniques in the automotive industry

Research conducted by the authors as part of the scientific project is of precisely that character. This particularly applies to the objectives specified for the proper research, i.e. assessing the significance of QM methods and techniques (with regard to the effectiveness of QMS) (used by OCHRE suppliers in the automotive industry). An research objectives were defined and the research scenario was prepared in consultation with the company. The initial intention of the authors was to gather information concerning assessment methods and techniques of quality management which are implemented by suppliers in the automotive industry. After that, the analysis of literature was beyond the automotive industry and was not limited to standardized management systems.

Literature was gathered with the use of the following key words (e.g. QMS & automotive, automotive components industry, automobile & automotive specific requirements, automotive & supply chain management, auto parts industry & management, DEFTE 1040, QS 9000, core tools, automotive industry, QM courses, audit criteria, critical factors, critical success factors, CSS, quality management tools, BS, PMPA, PMPA, PMIA, DITIS, 20844 diagram, Process analysis, SPC, GQIP, and searching the following databases: WDX (World Development Indices), GMD (GLOBAAL MARKET INFORMATION DATABASE), PhOQUS, ECOSITE, ACADEMIC SEARCH PREMIER, BUSINESS SOURCE COMPLETE, MASTER FILE PREMIER, EMERALD, together with library collections of numerous Polish and American universities. The authors have not come across any papers in which the significance of QM methods and techniques would be discussed, not only in the automotive industry, but also in other branches of industry.

5. Research methodology

The following tools are to be used within the research project:

- comprehensive query of literature performed at the planning stage; its results were used to specify the objectives and research hypothesis, as well as to prepare the queries which are parts of the research; some contributions were also drawn based on the query,
- a preliminary survey (S1) conducted in cooperation with a group of experts, in which the authors was the moderator (research method: the Delphi method, in-depth interviews, tool: updated list of quality management methods and techniques; data collection method: the interview, meetings, telephone conferences, video-conferences).
- a survey of the whole population (all companies which certified their QMS system (ROHS 10649) methods: structured questionnaire; data collection method: the internet),
- data analysis – study statistical inference

In the preparatory survey (S1) a questionnaire consisting of a full list of methods and techniques for quality management used in the automotive industry together with an evaluation scale was presented. The purpose of the survey was to be used as a tool in the proper survey (S2) and shall be prepared in a way which will enable it as part of the research to be performed with the use of the Internet. The proper survey will be performed by pilot research. This research is to be done when account when S2 is planned and prepared.

The results of the proper survey will be verified by e.g. evaluating the confidence intervals and precision of errors and calculating the coefficient of variation. The significance analysis will be performed by calculating mean values both for the whole scope of data and for fixed intervals. Reference will also be based on values of specific statistical measures (mean, median, range, and standard deviation). Two statistical methods, i.e. correlation and regression will be used to compile the results of the research and verify the formulated research hypothesis. The said methods will also help to analyze the relation between the use of particular methods and techniques and the function of QMS. The directions of research will, first of all, allow verifying the research hypothesis. Second, it will help to rank quality management methods and techniques according to their significance (influence on the effectiveness of QMS). Last but not least, it will point out to the possibility and usefulness of combining particular methods in an efficient and effective way and using them to the benefit of an organization.

6. Conclusions

The main source of knowledge on diverse methods and techniques of quality management are above all methods which provide a wide scope of information in this matter. However, the role of guidelines, standard interpretations and corporate materials concerning in this respect should not be underestimated. Unfortunately, in practice shows the said tools are not always well-known. Moreover, if they are used, they are used to document rather than to motivate action and do not serve the purpose of achieving specific objectives. Numerous quality management methods and techniques are described in literature. However, when the market is analyzed, it can be calculated that for many of them are used in practice. The results of this research will allow us to assess how particular tools are used and what motivates organizations to implement them. The results will also lead to a number of conclusions which can be found useful by actual and potential suppliers in the automotive industry when designing a QMS. What is more, the conclusions may be used by any company willing to develop its management system.

7. Literature


[17] OB/OES – original equipment/original equipment service contracts in contrast to the AM (after market) contracts

[18] Pande P S., Neuman R P., Cavanagh R R.: Six Sigma. sposób poprawy wyników nie tylko dla takich firm jak GE czy Motorola [Sigma. a way of improving the results not only of companies like GE or Motorola], K.E Liber, Warszawa 2003


