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**TRANSFORMATION OF COMPANY MANAGEMENT  
SYSTEMS IN CZECH CHEMICAL INDUSTRY**

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*In relation to companies entering the global market environment, the need to carry out the company management with regard to the quality, environment and health and safety has been increasing. To provide for this requirement, companies implement the management systems (i.e. quality management systems, environmental management systems and health and safety management systems). The authors of the paper carried out a research in the second half of 2005 to analyze the current state of the management systems implementation at enterprises of the selected industry sector (including the options of their integration). They focused on chemical enterprises in the Czech Republic. The research realized in cooperation with the Association of Chemical Industry of the Czech Republic aimed at the types of management systems, at the reasons for their implementation and at their real effects and drawbacks. Furthermore, the attitudes of the chemical company management to building or transfer to the integrated management systems were the centre of attention. The paper summarizes the objectives, methodology and main conclusions of the primary research.*

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## Introduction

As the result of social changes in the Czech Republic in the 90s of the 20 century, the business environment significantly changed. The development of Czech business environment has been influenced by the progressing globalization and by the accession to the European Union. Companies of chemical industry had to cope with the new conditions. Economic statistics in this branch demonstrate that the companies successfully accommodate their business to the new trends. Economic results of 2004 in terms of the annual dynamics and the position of chemical industry within the Czech economy make evidence of positive trends in the growth of chemical companies' performance (see Table I).

The results have been positively influenced by numerous internal and external factors in 2004. Increased competitiveness of most chemical branches in the Czech Republic had positive impact, despite relatively strong rate of the Czech currency (CZK) and the price growth of raw oil as the primary raw material in chemical industry.

Another factor to influence the Czech chemical industry is the change in the attitudes to company management. The aspects of quality, environment protection and occupation health and safety have been significantly enforced within the last ten years. The tools for integration of the above-mentioned principles appear to be the Quality Management System (QMS), the Environmental Management System (EMS) and the Health and Safety Management System (HSMS).

Table I Basic indicators of Czech chemical industry in 2004

Indicator	Unit	Year 2003	Year 2004	Index 04/03, %	
				Chemical industry	Industry in total
Revenues in current prices	bil. CZK	278.6	318.5	114.3	114.3
Revenues in constant prices	bil. CZK	306.6	326.5	106.5	109.8
Number of employees	Thousand persons	101.4	103.2	102.0	99.5
Export	bil. CZK	153.0	196.0	128.1	124.0
Import	bil. CZK	259.8	312.5	120.3	119.0
Value added	bil. CZK	56.4	66.9	118.7	113.7
Income before tax	bil. CZK	12.3	21.7	175.6	136.1

Source: The Czech Statistical Office, the Ministry of Trade and Industry, customs statistics, own expert estimates and findings

Note: The Czech chemical industry includes three aggregations: refinery oil processing, chemical and pharmaceutical industry, rubber and plastic processing industry.

## **Management Systems – their Subject-Matter and Functioning**

Quality presents a significant factor for a company growth. The QMS oriented companies have good preconditions for the achievement of better economic result and for sustainable growth of their performance [1]. Czech and world-recognized organizations often use the international ISO 9000 standards for building QMS. Based on the standards, the company's ability to comply with its customers' requirements can be assessed as well as the internal company demands. The standards enforce the process attitude to quality management. Their main objective is to increase a customers' loyalty by satisfaction of their requirements. The product realization process cannot be carried out unless the customers' requirements are systematically monitored. Successful and effective product realization requires responsible human resources management, supported by active approach and fair-minded decision making of top management in completion of the company policy, strategy and quality targets. Resource-based activity controlled with the aim to transfer the input into an output is considered a process. An output of one process frequently presents an input of another one. The scope of a customers' satisfaction with the product delivery — a key measuring procedure in each quality system — has to be measured at the process realization output. Together with other measuring types, this procedure provides the information and data for sustainable analysis that helps the company management to identify the options for continual improvement.

Another important factor to be respected by chemical companies is the environment protection. EMS presents significant activities in the field of environment protection on the company level. Environmental management conveys systematic approach to the protection of environment in all aspects of business, serving as an integration means of the environmental issues into the company strategy, as well as into their common operation. The EMS introduction results in sustainable economic growth and, at the same time, to gradual reduction of the negative impacts of the company activities, products and services on the environment [2]. The systems have been implemented in compliance with the international standard ISO 14001 and in compliance with the EU Regulation (Environmental Management and Audit Scheme – EMAS).

Obviously, company managements have to make the occupation health and safety regulations an integral part of their decision-making processes and to take such measures so as not to be controversial to the accepted standards. The HSMS introduction should facilitate the stipulated requirements. The companies can use the manual OHSAS 18001 (Occupation Health and Safety Management Systems) for this purpose. The OHSAS 18001 standard has been developed to be compatible with the ISO 9000 and ISO 14001 management system standards to facilitate integration of QMS, EMS and HSMS in the organizations who expressed their interest in their introduction. One of the manuals helping to introduce HSMS in

the Czech Republic is the program "Safe Company". The Czech Institute of Occupation Health and Safety offered the option to introduce this system. The program "Safe Company" complies with the requirement for a management system covering occupation health and safety, environment and fire protection in a limited scope.

### **Methodology and Findings**

In the second half of 2005, research was carried out covering the management systems in chemical industry. The research was realized by the University of Pardubice in cooperation with the Association of Chemical Industry of the Czech Republic. The objective of the research was the analysis of existing state of management systems implementation in chemical businesses and the opportunities for its integration. To complete this aim, the following objectives were determined:

- To analyze current stage of the management system implementation.
- To specify the reasons leading to the implementation of such systems and to assess the benefit of such implementation.
- To identify the problems relating to the management systems introduction.

Upon finding the primary information, a questionnaire was used addressing 107 companies, members of the Association of Chemical Industry of the Czech Republic. Out of the addressed companies 29 questionnaires were returned (i.e. 27 % return). Companies involved in the research produced 60 % of total turnover of chemical industry. The analyzed sample represents large companies (500 plus employees), medium-sized companies (100-499 employees) as well as small companies (0-99 employees). Among the respondents were the top management representatives (34 %) as well as middle-level management. The results of the research were processed by common mathematic and statistic methods. The results are summarized in the following chapter.

### **Research Results in the Field of QMS**

In the period of global market and companies entering the world competition, the company products and processes quality is of extreme importance. The respondents are aware of this fact; 100 % of them indicated that increase in the company outputs quality is important. The attempt to increase the products quality forces the companies to build the QMS. Primary research demonstrated that all the respondents have already introduced QMS and, except for one, their systems had already been certified.

QMS were firmly consolidated in Czech chemical businesses (see Fig. 1).

72 % respondents stated that their systems had been in use for 7 years already. 21 % of the respondents had been using the QMS for longer than 3 years and less than 7 years. Only 7 % of the respondents used the system for less than 3 years. Also, large companies operating at world market started using QMS first (all of them had the system in operation for over 7 years), followed by medium-sized companies and gradually by small companies.

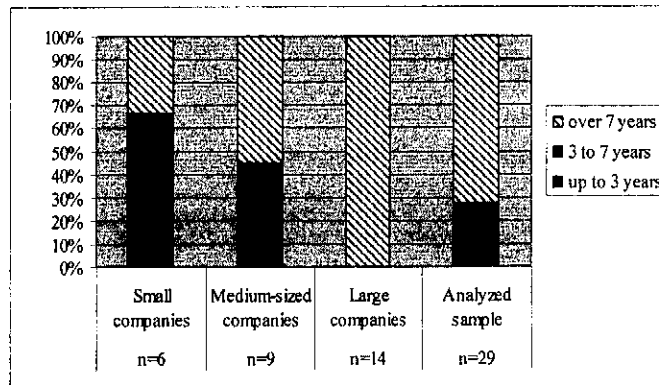


Fig. 1 Period of QMS use

The most frequently used methodologies for QMS introduction obviously are ISO 9000 standards. 93 % of the respondents stated that their system followed this methodology, while 10 % of them used two methodologies to introduce the system. The second methodology always had certain relation to specific company business and to certain type of customers. The Good Manufacturing Practice (in pharmaceutical companies) or the quality system NATO n. AQAP 2110 (in an industrial explosives producing company) had been in use.

In the implementation of QMS, the companies often search for the assistance of external firms (81 % of the respondents stated that they needed the assistance; 24 % of the respondents needed the assistance only in certain stages of the implementation). Two main areas were mentioned in terms of the assistance: determination of the compliance with the methodology requirements (both in the implementation stage and in pre-certification audit stage) and in the area of human resources (i.e. referring to the lack of labor, employees working time and internal experts for the implementation). Primary research has proved that large companies especially needed the assistance in determination of the compliance with the standards and in pre-certification audits. Small companies refer to the lack of time their employees can spend on the implementation, and to the lack of the internal experts. The respondents state that in order to introduce QMS, they searched for specialized consultants (62 % of the respondents), or they used the certification authorities assistance (38 % of the respondents). Medium-sized companies were also making use of the government financial support (33 % of medium-sized

companies). Small companies used the assistance of trade and enterprise associations.

The most frequently indicated problems in QMS introduction appeared to be the requirements for the documentation system (65 % of the respondents) and insufficient practical manuals (62 % of the respondents). Medium-sized companies indicate the requirements for the documentation system while the small ones see the insufficient number of manuals as the biggest problem as well as the lack of employees' time.

The main reasons for QMS implementation as stated by the respondents are the following:

- Business partners requirements, i.e. the customers (93 % of the respondents);
- Improving or maintaining the market position (86 % of the respondents);
- Higher quality of company processes (79 % of the respondents) and products (68 %) and
- Continual improvement (76 % of the respondents).

The subject matter of the research was to investigate the QMS implementation benefit as viewed by the company representatives. 97 % of the respondents indicated that the benefits exceed the cost for the implementation. Over 50 % of the respondents indicated the following as being the main benefit for the company:

- Improvement of the company processes management and relations between them (76 % of the respondents);
- Improved position on foreign markets (72 % of the respondents);
- Improved satisfaction of the customers (59 % of the respondents);
- Improved activity and involvement of the employees in quality management (59 % of the respondents).

Primary research has demonstrated that 62 % of the respondents perceive the QMS as an effective tool for the quality improvement. It is explicit namely at large companies and at those who especially operate on world markets. Medium-sized companies and those operating within European territory have basically the same opinion: QMS presents a real tool for quality improvement, being a more or less formal matter, but contributing to the increase in company order. Top managers perceive QMS as a formal matter (60 % of the top managers). Middle management (78 %) has the opinion that QMS is a real tool of the quality improvement. All the companies stated that they are going to maintain the QMS in the future.

## Results of the Research in the Field of EMS

All the respondents explicitly confirm that the environmental performance has significant influence on company achievements. Numerous organizations implement EMS with the regard to the need of management of company impacts on the environment (i.e. the company environmental performance). The state of EMS implementation in chemical industry businesses involved in the research is presented in Fig. 2.

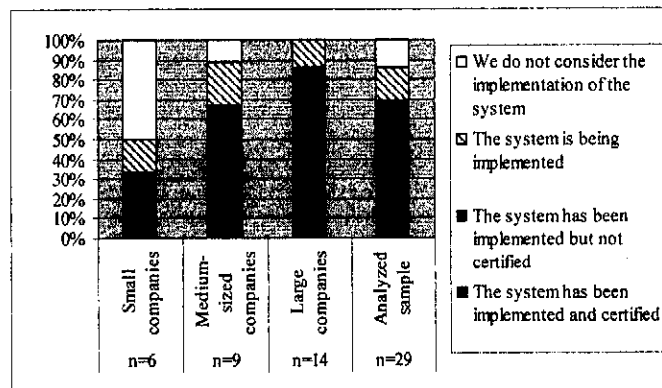


Fig. 2 Implementation of EMS in chemical businesses

Almost 59 % of the respondents have their systems certified. It concerns especially large companies. The system was being implemented by 17 % of the respondents when the research was carried out; the representatives of small, medium-sized and large companies operating at world markets. 14 % of the respondents (mainly the small companies) do not intend to implement the system. The main reason as indicated by them is that EMS would not improve the environmental performance; the system is not required by their business partners and the costs for the implementation are extremely high.

Large- and medium-sized companies were the first to start the implementation of EMS. Only 8 % of the respondents had been using the system for over 7 years; i.e. the companies operating on world markets. 44 % of the respondents had been using the system for over 3 years and less than 7 years (especially large Europe-operating firms). 48 % of the respondents had been using the system for up to 3 years. Chemical businesses develop EMS in compliance with ISO 14000.

In the implementation of EMS, all the chemical enterprises used the external bodies' assistance. All the small companies depended on the external subjects. Half of the medium-sized companies used the external subjects while the other 50 % used their assistance only in certain stages of the implementation. Large

companies used the assistance only at some stages (72 % of the respondents in this group). The respondents sought for the assistance mainly due to the initial audit (64 % of the respondents) and pre-certification audit (60 % of the respondents). The research demonstrated that the lack of labor was the main reason why the small companies looked for the assistance. Medium-sized companies used the external help mainly for the pre-certification audit. Non existence of internal expert capacities to introduce EMS and determination of environmental aspects and their impact were presented as the reason for the assistance by one half of the medium-sized companies. The assistance had been used for the realization of initial audit. Large companies used external service in relation to the initial and pre-certification audit. To support the introduction of EMS, the companies looked mainly for the help of specialized consulting organizations (88 % of the respondents), or they used a certifying organization's consultancy (48 % of the respondents). Medium-sized companies used financial support of government institutions.

The subject matter of the research was to investigate the problems that the companies had to cope with in EMS implementation. More than a half (52 % of the respondents) refers to the lack of practical manuals. More than a quarter of the respondents mentioned the exigency of ISO 14000, extensive requirements to maintain the documentation and the lack of time, as well as the lack of trained staff and human resources.

The main reason for EMS implementation was the improvement of company image and trustworthiness, improvement of the environmental performance and deeper involvement of the employees in environment protection (over 80 % of the respondents indicated the above mentioned reasons). More than one half of the respondents consider the environment-friendly approach, compliance with the environmental laws and improvement of the relations of the company with its surroundings the most important reason for the EMS implementation. Middle management sees EMS as the tool for better access to markets and an instrument contributing to their economic results. These reasons apply also to those operating on world markets. Top management considers EMS a tool for the improvement of the relations to the state and local administration authorities. Medium-sized companies see the EMS as a significant instrument for the improvement of market position and economic results.

The research further examined the benefit to the companies coming from EMS implementation. More than a half of the respondents perceive the following advantages:

- Improving the company image and trustworthiness (92 % of the respondents);
- Deeper involvement of the employees in environment protection (72 % of the respondents);
- Improving the environmental performance (60 % of the respondents);
- Improving the relations with state and local administration bodies (60 % of the



- respondents);
- Reaching the compliance with the corresponding environmental laws (52 % of the respondents).

Increase of the economic results was mentioned by only 28 % of the respondents (medium-sized and large companies operating on world markets). The system's benefit is viewed similarly as that of middle and top management. 72 % of the respondents stated that implementation and maintaining of the EMS are significant tools for the environment protection (see Fig. 3), which is clearly seen in small- and medium-sized companies. Medium-sized companies generally perceive EMS as a formal matter; however the system contributes to the company order.

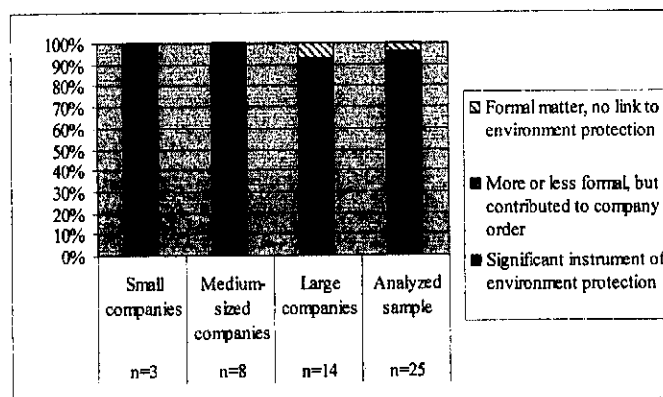


Fig. 3 Significance of EMS

The research has proved that EMS comes up to the respondents' expectations (the benefit of EMS implementation corresponds with the reasons for its implementation). 92 % of the respondents agreed that the advantages exceeded the costs for implementation and maintenance of EMS. The companies that already operate an EMS, plan to keep it in the future as it has been confirmed by 96 % of the respondents.

### Research Results in the Field of HSMS

Increasing occupation health and safety is viewed as a very important issue by all the respondents. Numerous chemical businesses started to implement HSMS in relation to the need of proper company management. The state of its implementation in chemical companies is demonstrated in Fig. 4.

Almost 21% of the respondents have already implemented and certified the system. It concerns especially large companies. The system was being implemen-

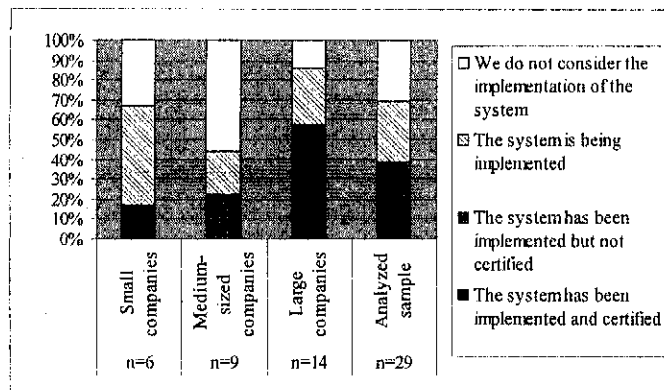


Fig. 4  
of HSMS in chemical businesses

Implementation

ted by 31 % of the respondents when the research was carried out (representatives of small-, medium-sized and large companies). 31 % of the respondents do not intend to implement any system (mainly medium-sized companies); the respondents believe that the system would not contribute to the increase of occupation health and safety, and moreover, the system implementation has not yet been required by their business partners.

HSMS implementation was started by large companies. However, only one company had been using the system for over 7 years. 20 % of the respondents had had the system for 3 up to 7 years, which concerns large companies especially operating in Europe.

Out of the respondents 75 % had been using the system for a shorter period. Small-, medium-sized and large companies are represented in this group. 60 % of the respondents applied the OHSAS 18001; 40 % followed the program "Safe Company." The companies operating within Europe mostly use the OHSAS 18001. The companies operating on world markets use both the systems almost equally.

In the system implementation, 55 % of the respondents made use of external subjects (25 % in certain stages only). Especially medium-sized companies needed the assistance. The respondents sought for help mainly due to the initial and pre-certification audit. The research has proved that the main reason for the assistance was to determine the concordance with the methodology, the lack of labor and the risk assessment in terms of occupation health and safety. The respondents used the certification authority assistance (82 % of the respondents), or the service of special consulting firms (55 % of the respondents). Large companies also used the assistance of government institutions.

HSMS implementation faced some problems. More than a quarter of the respondents refers to the extensive requirements for maintaining the documentation, lack of human resources, trained staff and time, as well as non existence of practical manuals. Top management representatives and small companies see the

non existence of practical manuals as the problem. Medium-sized company representatives consider the lack of human resources the main problem. Demanding documentation presents the problem for large companies (58 % of the respondents).

The main reason for HSMS implementation is continual improvement of occupation health and safety (90 % of the respondents), higher level of occupation health and safety (85 % of the respondents) and deeper involvement of the employees in the processes (75 % of the respondents). The effort to reduce the number of work injuries seems to be a significant reason, too (65 % of the respondents). The reasons for the system implementation had been viewed equally, regardless of the size, market field and owner of the company.

HSMS implementation resulted in demonstrable effects. More than a half of the respondents stated the following advantages of the system introduction:

- Compliance with occupation health and safety requirements (90 % of the respondents);
- Improving occupation health and safety management (75 % of the respondents);
- More employees involved in occupation health and safety issues (75 % of the respondents);
- Improving the relations with the state administration authorities (65 % of the respondents).

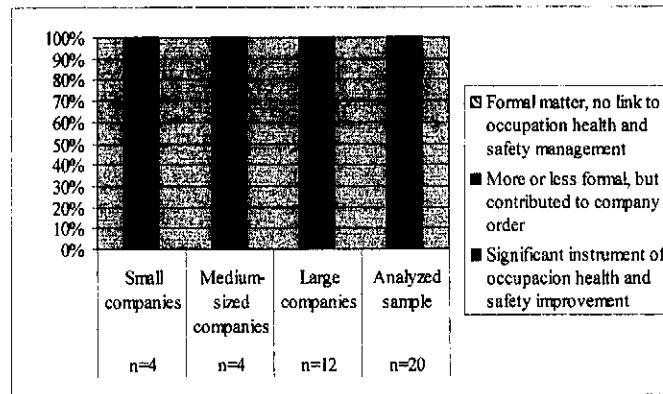


Fig. 5 Significance of HSMS

Only 15 % of the respondents indicated the increase in their economic results. Both middle and top management reflect the benefit of the system implementation. Medium-sized companies refer to the improved access to foreign markets (besides the above mentioned advantages) (50 % of the respondents). 83 % of the respondents of large companies see better relations to the state administration authorities as the significant benefit.

Out of the respondents 90 % confirmed that the implementation as well as maintaining the system appears the real tool for improving the occupation health and safety (see Fig. 5). 10 % of the respondents see the system as a formal matter while referring to the improved company order.

The research has proved that the systems comply with the expectations of the respondents (the benefits of the systems implementation correspond with the reason for their implementation), 95 % of the respondents assert that the system benefits prevail over the costs for the implementation and its maintaining. 95 % of the companies, that had been using the system for quite some time, planned to use it in the future.

## **Discussion**

In the period of global market environment and the companies entering the world competition, the care for the products and processes quality seems to be of a very high importance as well as the company environmental performance and improvement of the occupation health and safety. The chemical businesses gradually implemented the individual management systems providing for complex care in the given field.

Individual management systems had been or were being implemented in chemical companies (100 % of the respondents implemented QMS, 86 % had implemented or they were just about to introduce EMS, 69 % had implemented, or they were recently implementing HSMS). QMS had been used in the companies for the longest period, followed by EMS and in the preceding three years, the HSMS started to be introduced in quite a large extent. The management systems were firstly used in the large companies operating on world markets, gradually medium-sized and small companies follow.

The research has proved that there exist two reasons for the systems implementation:

1. Implementation of the systems represents a tool for retaining the market position or for gaining new markets (QMS is required by business partners, i.e. customers; EMS is perceived as a tool for improving the image and company trustworthiness).
2. The systems are considered to be an instrument to control the aspects whose significance in terms of company performance is growing (i.e. the tool for ensuring higher quality of the products and processes; a tool for control and improvement of the environmental performance, provision for higher quality of occupation health and safety and for continual improvement).

The research has also proved that the management systems fulfill the expectations of the respondents (the benefit of the system implementation

corresponds with the reasons for the implementation). The respondents are aware of the fact that the benefit exceeds the cost of implementation and maintaining the systems. The companies that have already implemented some of the systems plan to keep them in the future.

## **Conclusion**

Chemical businesses in the Czech Republic gradually implemented the individual management systems. The existence of three individual systems to control the company processes naturally raised the idea of joining them into one integrated system. Such integrated system should help to complex management, i.e. the management involving the aspects of quality, environment protection and occupation health and safety. The unified system should facilitate the functioning of management systems and continual improvement.

The integrated system enables the top management and the individual process managers (owners of the processes) to plan, regulate and control the processes with the aim to assess them as being of prime quality, environmentally oriented and safe from the employees' point of view. The system should help such a course of the company processes in which the customers are satisfied and their loyalty to the company is growing, while respecting the principles of sustainable development in regard to the environment and tolerance to the staff. This should provide the management with mutually compatible information needed for the streamlining of controlling processes and for elimination of uselessly multiplied activities. Low level of management is also aware of the advantages following from the integration of partial systems. Higher effectiveness and better organization of documents and information for everyday activities should directly influence the company's performance.

The integrated system is viewed by the managers of Czech chemical businesses as being very useful. The most significant element is the improvement of company management, smoother control of company processes, better implementation and certification procedure, as well as the maintenance of company documentation. This attitude probably results in direct trend of the Czech chemical companies to integrate the company management systems (72 % of the respondents had already made and attempt to integrate the systems, especially the large- and medium-sized companies). The integration aims at:

- Integration of QMS and EMS or
- Integration of all the three systems (i.e. QMS, EMS and HSMS).

As 67 % of the respondents assert, the experience of the system integration is quite positive, they reckon the results as fully effective. The research proved that the companies have the integrated systems certified by independent organizations.

Over 50 % of the firms that started the integration have already had the systems certified by an independent institution.

The research has proved that in the last ten years, the Czech companies have strongly been enforcing the aspects of quality, environment protection and occupation health and safety by means of the implementation of the management systems (QMS, EMS, and HSMS). The systems represent a significant tool for maintaining the position of a company on the market, or contribute to the achievement of new markets and they are, at the same time, a significant tool for controlling the aspects, whose importance in terms of the performance has been constantly growing.

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