

# ISO STANDARDS AND QUALITY COSTS AS INSTRUMENTS OF COMPANIES' COMPETITIVE ADVANTAGE

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## 1. Introduction

The theory and practice of operation of modern enterprises shows that the quality is the most efficient instrument to achieve a competitive advantage over the market rivals [1, p.151]. A new approach to management involves verification of a company's policies and objectives, changes in the structure of the whole organization and that company's management principles. The implementation of the quality policy and instruments for its deployment makes it easy to create and link the activities undertaken at a strategic and operational level with their economic viability. Establishing these relationships is only possible when an enterprise information system provides data on the costs and effects of quality-oriented activities undertaken and management tools used in enterprise enable the planning, monitoring, analysis and evaluation of these parameters.

ISO standards are one of the key factors in building the competitiveness of companies and necessary to operate in the international market [2, p.21]. The companies that have introduced a quality management system should demonstrate the effectiveness of all actions taken. As the efforts to achieve the desired level of quality (effectiveness intended) are constantly improved, the efficiency can be considered as a process, generally treating it as the ability to implement the business strategies and achieve the assumed objectives.

The efficiency improvement oriented companies need the changes in their management structure because the properly selected management structure considerably affects the overall efficiency of the company. The quality assurance system as an effective tool to organize all areas of the company activities is a proven instrument for productivity and competitiveness growth. It guarantees the production monitored in specified standards and confirmation of the company preparation to the production according to specified levels of reliability. The production monitoring and standardization systems give the opportunity for large and medium-size enterprises to participate and compete in the market gambling of international scale. ISO standards, their implementation and certification have become a tool for monitoring the technical and consumer quality. ISO standards under the basic and industry standards have become one of the key conditions for placing products on the international markets. Enterprises wishing to develop business are forced to implement and standardize the production by certain guidelines, namely ISO 9001 – Guidelines for the construction of a quality assurance system, focusing directly on the quality of processes, ISO 13485 – Quality Management System for Medical Devices, developed in accordance with the requirements of the ISO 9001, ISO 14001 – a standard determining the method of the implementation of effective environmental management systems, ISO 22000 – standard for the food industry, "Food Safety Management Systems-Requirements for all participants in the food chain," ISO 27001 – standard for standardization of information security management systems, ISO/TS 16949 – is the ISO Technical Specification, which unifies the existing American (QS-9000), German (VDA6.1.), French (EAQF) and Italian (AVSQ) standards of quality systems in the automotive industry within the global automotive industry, in order to eliminate the need for multiple certification to meet customer requirements.

The quality system is an opportunity to reduce costs of production and cost of non-quality, tool to improve the liquidity, efficiency and financial autonomy, possibility of creating the market offer quality and the ability of continuous improvement form an important advantage in the competitive

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battle. In economic terms it is one of the most important conditions for success in the market and therefore it must be a strategic goal, an issue of particular importance for the management staff of the companies.

The effectiveness of the quality management systems should also be measured from the financial stand point and from the point of view of economic impact [3, p.21; 4, p.22]. To evaluate the effectiveness of the quality assurance system, among other things, the quality cost analysis is used, which can be read from ISO 9004-1:1994 [5, p.47]. Cost of quality or cost accounting is essential for a quality management system, of which it is the most important element. On the basis of the cost of quality and functioning of the whole quality management system, you can determine whether the company achieves the intended benefits in reducing the cost of quality in relation to expenditures incurred on the implementation and functioning of the system, as well as the increase in efficiency of the company activity in the market.

There are three main types of approaches to collecting and analyzing financial data on quality.

The first is the cost of quality approach, which distinguishes between four types of costs. The cost elements of internal operations are analyzed according to the model PAF (Prevention, Appraisal, Failure). The components of these costs are the costs of prevention, the cost of evaluation – related to investigations, inspections and checks whether the quality requirements are met, internal inconsistencies - costs resulting from non-compliance with the quality requirements of the product, which have been detected prior to delivery of the product to the customer (related for example, to re-execution, alteration, re-test), external non-compliance – costs resulting from the failure to satisfy the quality requirements of the product, which were detected upon delivery to the customer (for example, product service and its repair, costs of guarantees and refunds, direct costs and overheads, withdrawal costs, the cost of liability).

The second is the cost of production (process) approach; it refers to the analysis of the costs of compliance and non-compliance of the process, which are defined as follows: compliance costs – are the costs of meeting all fixed and assumed customer needs, at normal process course, whereas the costs of non-compliance – are the costs caused by improper process course.

Another approach is by the quality losses. This approach focuses on the internal and external losses due to the poor quality in the following system: measurable loss (loss on shortcoming), and intangible losses: a) external, such as customer dissatisfaction, b) internal, lower efficiency due to corrective actions, poor ergonomics, unused opportunities.

## **2. Scope of studies**

The main purpose of the deliberations in this article is to indicate selected instruments of quality policy such as ISO standards and to identify quality costs which are necessary to reach competitive advantage in the overseas markets.

Thesis:

- the increase in attractiveness of overseas markets results into dynamic changes in the range of competitiveness improvement of the companies in developing countries as Poland and Ukraine (for example, the increase in number of companies where ISO standards are implemented).
- the assessment of economic efficiency of quality management systems in a company is possible when implementing and monitoring of quality costs take place.

The secondary data concerning the quantity of standards such as ISO 9001, ISO 14001, ISO 22000, ISO 27001, ISO 13485, ISO TS 16949 implemented in the years 1993-2010 in Poland and Ukraine were used in the research. The data were given by the company SGS Polska. The data have been gathered by International Organization for Standardization. In the second part of the article the data concerning the type of quality costs and their dynamics of changes in the years

2005-2010 were used. The data were given by a Polish production company.

The main problems raised in the article are:

- indication of the dynamics of selected ISO standards implementing in Polish and Ukrainian companies;
- the description of quality costs and the assessment of quality costs in an overseas production company – case study.

### **3. Results**

The latest edition of The ISO Survey of Certifications, for 2010, underlines the global market relevance of ISO's management system standards for quality, environment, medical devices, food safety and information security revealing an increase in certificates of 6.23 %, a worldwide total of 1 457 912 certificates and users of one or more of the standards in 178 countries. The biggest increases in certification are to the sector-specific ISO 22000:2005 food safety management system standard which is up by 34 % and to the issue-specific ISO/IEC 27001:2005 information security management system standard which has risen by 21 %. ISO Secretary-General Rob Steele comments, "Indicating nearly a million and a half users at the end of 2010, these figures illustrate the continuing attraction of the ISO management system model pioneered by ISO 9001 for quality management and since extended to meet other challenges faced by public and private sector organizations." ISO 9001:2008, which gives the requirements for quality management systems, remains firmly established as the globally implemented standard for providing assurance about the ability to satisfy quality requirements and to enhance customer satisfaction in supplier-customer relationships. Up to the end of December 2010, at least 1 109 905 ISO 9001 certificates had been issued in 178 countries and economies. The 2010 total represents an increase of 45 120 (+4 %) over 2009, when the total topped one million for the first time with 1 064 785 certificates. China retains its number one position at the head of countries for the total number of ISO 9001 certificates, with Italy in second place and the Russian Federation taking the 3<sup>rd</sup> position. Highest growth in the number of certificates was also in China, followed by the Russian Federation and then Italy.

ISO 14001:2004, which gives the requirements for environmental management systems, retains its global relevance for organizations wishing to operate in an environmentally sustainable manner. Up to the end of December 2010, at least 250 972 ISO 14001:2004 certificates had been issued in 155 countries and economies, a growth of 27 823 (+12 %). China, Japan and Spain are the top three countries for the total number of certificates, while China, the United Kingdom and Spain are the top three for annual growth.

ISO/TS 16949:2009 gives the requirements for the application of ISO 9001:2008 by suppliers in the automotive sector. There is 43 946 ISO/TS 16949:2009, which certificates a growth of 7 % up to the end of December 2010. It had been issued in 84 countries and economies. The top three countries with the highest totals of certificates were China, the Republic of Korea and the USA, while the top three for growth were China, India and the Republic of Korea.

ISO 13485:2003 gives quality management requirements for the medical device sector for regulatory purposes. Up to the end of December 2010, at least 18 834 ISO 13485:2003 certificates had been issued in 93 countries and economies. The 2010 total represents an increase of 2 410 (+15 %) over 2009. The top three countries for the total of certificates were the USA, Germany and Italy and the top three for growth since the 2009 survey were Italy, the USA and the United Kingdom.

ISO/IEC 27001:2005 gives the requirements for information security management systems. At the end of 2010, at least 15 625 ISO/IEC 27001:2005 certificates had been issued in 117 countries and economies. The 2010 total represents an increase of 2 691 (+21 %) over 2009. The three countries with the highest total of certificates are Japan, India and the United Kingdom, while the top three for growth in 2010 were Japan, China and the Czech Republic.

ISO 22000:2005 gives the requirements for food safety management systems. Up to the end of December 2010, at least 18 630 ISO 22000:2005 certificates had been issued in 138 countries and economies. This total represents an increase of 4 749 (+34 %) over 2009 when the total was 13 881 in 129 countries and economies. The top three countries for number of certificates were China, Greece and Turkey and the top three for growth in 2010 were China, Japan and Greece.

In Poland, the most of companies implement ISO 9001 standard;. In 2010, as compared to 2005, the number of certified companies increased by 125% and in 2010 this is a number of 12,195 companies (Table 1).

**Tab. 1. Number of companies certified in the scope of the production conformity by ISO standards selected in Poland**

Types of ISO standards	2005	2006	2007	2008	2009	2010
	Number of companies receiving certificates					
<b>ISO 9001</b>	9718	8115	9184	10965	12707	12195
<b>ISO 13485</b>	25	70	76	76	144	158
<b>ISO 14001</b>	948	837	1089	1544	1500	1793
<b>ISO 22000</b>	-	-	137	268	549	629
<b>ISO 27001</b>	-	11	45	75	187	229
<b>ISO/TS 16949</b>	191	297	392	436	445	468

\*The figures include certificates accredited by national accredited bodies not members of the IAF.

Source: International Organization for Standardization. The ISO Survey of Certifications

In 2009 and 2010 in Poland, the most intensively growing interest in implementation of ISO standards among entrepreneurs concerned ISO 14001 and ISO 22000.

In the analysis of the dynamics of the phenomena occurring in the implementation of quality management systems in Poland an upward trend can be seen that indicates the fact that large and medium-size enterprises are involved in building competitiveness and willing to participate in the competition for segments of international customers (Table 2).

**Tab. 2. Chain index of the number of companies in the scope of the production conformity by ISO standards selected in Poland**

Types of ISO standards	2005	2006	2007	2008	2009	2010
	Chain index of the number of companies receiving certificates					
<b>ISO 9001</b>	-	84	113	119	116	96
<b>ISO 13485</b>	-	280	109	100	189	110
<b>ISO 14001</b>	-	88	130	142	97	120
<b>ISO 22000</b>	-	-	-	196	205	115
<b>ISO 27001</b>	-	-	409	167	249	122
<b>ISO/TS 16949</b>	-	155	132	111	102	105

\*The figures include certificates accredited by national accredited bodies not members of the IAF.

Source: Own study based on data from International Organization for Standardization. The ISO Survey of Certifications.

Taking into account the aspect of creating a competitive advantage among the enterprises operating in Ukraine, the structure of the standards implemented popularity is similar to the Polish market. Analyzing the market of companies operating in Ukraine, the most of them have implemented the ISO 9001 standard and the dynamics in 2005–2010 is increasing (Table 3).

In 2010, the number of companies with the implemented ISO 22000 standards in Ukraine increased by ca.140% of (Table 4.)

**Tab. 3. Number of companies certified in the scope of the production conformity by ISO standards selected in Ukraine**

Types of ISO standards	2005	2006	2007	2008	2009	2010
	Number of companies receiving certificates					
<b>ISO 9001</b>	1808	2150	2453	3252	2592	1808
<b>ISO 13485</b>	-	2	6	5	6	2
<b>ISO 14001</b>	55	37	90	123	126	206
<b>ISO 22000</b>	-	-	32	64	51	121
<b>ISO 27001</b>	-	1	1	3	5	1
<b>ISO/TS 16949</b>	4	8	12	16	19	26

\*The figures include certificates accredited by national accredited bodies not members of the IAF.

Source: International Organization for Standardization. The ISO Survey of Certifications

**Tab. 4. Chain index of the number of companies in the scope of the production conformity by ISO standards selected in Ukraine**

Types of ISO standards	2005	2006	2007	2008	2009	2010
	Chain index of the number of companies receiving certificates					
<b>ISO 9001</b>	-	131	119	114	133	80
<b>ISO 13485</b>	-	0	300	83	120	33
<b>ISO 14001</b>	-	67	243	137	102	163
<b>ISO 22000</b>	-	-	-	200	80	237
<b>ISO 27001</b>	-	-	100	300	167	20
<b>ISO/TS 16949</b>	-	200	150	133	119	137

\*The figures include certificates accredited by national accredited bodies not members of the IAF.

Source: Own study based on data from International Organization for Standardization. The ISO Survey of Certifications

The main conclusion of analyze is the fact that companies in Poland and Ukraine have taken the effort to build their own individual quality management systems, which are based mainly on industry quality certificates or ISO standards. This is due to the dynamic growth of international competitiveness and the needs and expectations of customers in the domestic market.

Evaluation of the effectiveness of the quality-oriented actions taken by the company, should be based on the analysis of the level of quality costs incurred, including an analysis of their structure, which are useful in the creation of effective management systems. Therefore, the next part of the study is devoted to the structure of quality costs incurred by the company operating in the general construction, housing and building engineering industry.

The solutions presented were obtained from the company with a long tradition in providing construction services in Poland and experienced in the international market, which has a quality management system since 2000. In the described company the classification of quality costs has been made, which are described as a case study and are presented in Tables 5, 6 and 7.

Report on the quality costs incurred is drawn up by the accounting department on the basis of the accounting records and data submitted by individual organizational units. It is developed on a quarterly basis, by the end of the first month of the next quarter, for the previous quarter.

**Tab. 5. Classification of the cost of the quality assessment in the company**

<b>Name</b>	<b>Interpretation</b>
Qualification (certificate of approval, quality marks)	<ul style="list-style-type: none"> <li>▪ cost of obtaining a certificate of quality, quality marks, safety marks and required national and international markings</li> </ul>
Control of purchases - supplies	<ul style="list-style-type: none"> <li>▪ costs of inspection control of quality and quantity of purchased products for the compliance with the applicable documents;</li> <li>▪ costs of approving tests at the suppliers;</li> <li>▪ cost of laboratory tests to assess the quality of purchased goods including tools and equipment;</li> <li>▪ cost of specialized tests carried out by the specialized units;</li> </ul>
Inter-op control	<ul style="list-style-type: none"> <li>▪ costs of inter-operational checks and tests of products and processes;</li> <li>▪ costs of checks and tests of semi-finished products, own and purchased;</li> <li>▪ costs of internal control for the release of the product;</li> <li>▪ cost of self-control and surveillance;</li> </ul>
Quality control of finished products	<ul style="list-style-type: none"> <li>▪ control costs before delivery of the product to the customer or store;</li> <li>▪ control costs before handover of the customer's product;</li> </ul>
Documentation of control and qualitative test	<ul style="list-style-type: none"> <li>▪ administration costs; preparation and filling the product inspection and test documentation, processes, with particular emphasis on the requirements for liability of the contractor;</li> <li>▪ costs of preparing the documentation provided with the product to the customer (eg, certificate of quality);</li> </ul>
Control, measurement and testing equipment	<ul style="list-style-type: none"> <li>▪ equipment acquisition costs;</li> <li>▪ equipment repair costs;</li> <li>▪ depreciation of equipment;</li> <li>▪ costs of equipment maintenance in full working order (inspections, maintenance, consumables))</li> </ul>

Source: Own study based on data from the examined company X

**Tab. 6. Classification of the costs of internal errors in the company**

<b>Name</b>	<b>Interpretation</b>
Corrective actions, repairs, alterations	costs of labor and, material;
Machinery and equipment downtime	<ul style="list-style-type: none"> <li>▪ costs resulting from product defects and interrupted processes;</li> </ul>
Correction of construction and technology documentation due to quality defects	<ul style="list-style-type: none"> <li>▪ costs incurred after the product approval for manufacturing;</li> </ul>
Sorting - selection	<ul style="list-style-type: none"> <li>▪ 100% control costs, above and beyond the planned quality control to select defective products;</li> </ul>
Re-examinations and tests	<ul style="list-style-type: none"> <li>▪ cost of carried out re-checks;</li> </ul>
Investigations of the causes and effects	<ul style="list-style-type: none"> <li>▪ cost of detecting and determining the causes of non-compliance;</li> </ul>
Corrective actions	<ul style="list-style-type: none"> <li>▪ costs of measures taken to eliminate recurring non-compliance;</li> </ul>
Reducing product class	<ul style="list-style-type: none"> <li>▪ costs arising from differences between the normal sale price and the reduced price due to non-compliance with the required quality;</li> </ul>
Replacement of defective products from the supplier	*cost of replacing the defective products from the purchase

Source: Own study based on data from the examined company X

**Tab. 7. Classification of costs of preventing "bad quality" in the examined company**

Name	Interpretation
Quality Management	<ul style="list-style-type: none"> <li>▪ costs of supervision and administrative work;</li> <li>▪ development and documentation of quality control systems and product control;</li> <li>▪ costs of collecting, analyzing and reporting data on quality;</li> </ul>
Planning and implementation of the studies in the field of quality	<ul style="list-style-type: none"> <li>▪ costs of tests in the field of quality at each stage of the manufacturing process</li> <li>▪ quality system software costs; cost of improving the quality of manufactured products</li> <li>▪ costs of testing the reliability and durability of the product;</li> <li>▪ cost of benefit and risk analysis;</li> <li>▪ costs of standardization;</li> <li>▪ cost of purchasing standards, publications in the field of quality;</li> <li>▪ costs of statistical control;</li> </ul>
Analysis and verification of new projects and improved products in terms of quality	<ul style="list-style-type: none"> <li>▪ cost of the analysis/verification of design and technological documentation of a newly launched and improved products (objects);</li> <li>▪ costs of assessment of a model, informational series of product, related to the assurance of the assumed level of quality;</li> <li>▪ costs of tests of material and raw material usefulness;</li> <li>▪ costs of quality expertise carried out by external units</li> </ul>
Selection, evaluation and approval of suppliers	<ul style="list-style-type: none"> <li>▪ cost of assessment, verification and audits at suppliers</li> </ul>
Maintaining a constant efficiency of the equipment for inspections and tests	<ul style="list-style-type: none"> <li>▪ costs of legalization, authentication and verification of equipment;</li> <li>▪ equipment supervision and administration costs;</li> </ul>
Internal audit of the quality system	<ul style="list-style-type: none"> <li>▪ costs of internal audits of products, processes and quality system;</li> </ul>
Training in quality assurance	<ul style="list-style-type: none"> <li>▪ costs of organizing training in quality;</li> <li>▪ cost of the campaign to raise personal awareness about the quality.</li> </ul>

Source: Own study based on data from the examined company X

**Tab. 8. The structure of selected categories of quality costs in the examined company in 2005-2010 (in %)**

Cost group	Years					
	2005	2006	2007	2008	2009	2010
Costs of prevention	12,9	11,1	12,8	13,7	12,5	13,4
Evaluation costs	63,2	63,1	62,2	62,3	63,0	64,8
Costs of rejects	23,9	25,8	25,1	24,1	24,5	21,8
Total quality costs	100	100	100	100	100	100

Source: Own study based on data from the examined company X

**Tab. 9. Chain factors of the total cost of quality in 2005-2010 (in%)**

Cost group	Years					
	2005	2006	2007	2008	2009	2010
Costs of prevention	-	73,21	118,80	102,83	88,03	97,75
Evaluation costs	-	84,89	101,63	96,23	97,79	93,56
Costs of rejects	-	91,79	100,00	92,28	98,46	80,76
Total quality costs	-	85,04	103,12	96,08	96,61	90,95

Source: Own study based on data from the examined company X

Report on the quality costs incurred performs the informational and control functions in the company.

The feature of the right quality cost structure is a low-share of poor quality coats due to external and internal errors, as well as the high proportion of the costs of prevention, which should be spent on detecting and removing the causes of improper quality of products. Misunderstood saving and reduction of total costs in the long term is a destructive action, which could bring more losses than profits.

#### 4. Summary

As a result of the analysis, the following recommendations can be formulated for the company: to maintain the downward trend of the total cost of quality, reduce the cost of rejects, prevention and assessment costs, maintain a low level of complaints, reduce the cost of staff dealing with complaints and warranty service. In the case of consolidation of the small number of complaints' phenomenon, consider the possibility of reducing the costs of maintenance of the staff dealing with complaints and warranty service, with the possible shift of funds to finance the prevention and evaluation.

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#### Summary

This article examines the selected instruments of quality policy. The importance of quality changes over time, because nowadays it is seen not as a target but as a way of functioning of the entire organization. The company, which can operate in a competitive market, must invest in quality. Evaluation of the effectiveness of the quality management system can be developed by analyzing the cost of a quality that can draw attention to the prevention of deficiency.

**Key words:** ISO standards; competitiveness; quality costs.

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