

ANALYSIS OF CAUSES AND EFFECTS OF IMPLEMENTATION OF THE QUALITY MANAGEMENT SYSTEM COMPLIANT WITH ISO 9001

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Abstract: The main purpose of the study is to analyze the causes and benefits of implementing a quality management system in a group of Small and Medium-sized Enterprises in developing and innovative regions on the example of enterprises from South-Eastern Poland. In the research, targeted surveys were conducted using the CAWI and CAPI methods extended by an expert interview with key people responsible for quality was used. In the present paper, the results of research related to the assessment of achieving the assumed system objectives in the field of quality in the aspect of a developing region characterized by a turbulent environment were presented. In the paper, original research into the analysis of the causes, expectations and effects of implementing quality management systems in accordance with ISO 9001 in the SMEs group were also displayed.

Key words: quality management, ISO 9001, implementation of quality management systems, systems engineering, SME

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Introduction

Quality management systems are supported by increasing globalization. The increasing variety and quantity of products, the decreasing number of necessary machines and devices, as well as the shortening of production time and product life cycle guarantee development only for organizations that can meet the expectations of their customers. Therefore, organizations compete with one another for sales markets, applying, among other things, greater importance to quality (Wolniak, 2020). It forced testing the quality of products and processes to improve them (Malindzak, et al., 2017; Pacana et al., 2014). With time, it appeared that this is not the only beneficial solution. It turned out that organizations that want to be competitive should also manage systemically. This was quickly understood by large organizations that implemented quality management systems (QMS) compliant with the ISO 9001 standard (Ulewicz, 2016). Smaller organizations that wanted to be suppliers to those who have ISO 9001 certification were forced to submit their quality systems to audits of the other party. Another solution was and

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is the implementation of QMS in accordance with ISO 9001. This is a fact that, but also the desire to improve in the area of management, more and more organizations obtain the ISO 9001 certificates every year. Currently, the largest number of organizations that are certified are Small and Medium-sized Enterprises (SMEs). The certificate for compliance with ISO 9001 has more than one million organizations in 170 countries, and the average annual growth in the world is around 15%. Owning a QMS certificate has become a kind of obligation (although the standard is optional). According to Angheluta et al. (2012), implementation of the Quality Management System can support integrated development in SMEs, and also has a positive impact on the sustainable development of organizations. The most crucial issue is to have a direct understanding of quality initiatives, the attributes of quality used for day to day operations, and the sort of performance-driven indicators that are developed to measure quality (Ibrahim and Yaacob 2014). Depending on the country, there are various factors that dominate the implementation of ISO in the SMEs. In Romania (Angheluta et al., 2012), it is sustainable development; in Portugal (Santos and Millán, 2013), the main motivations for the ISO 9001 certification are the improvement of quality, corporate image, commercial advantages; globally, that the certification of Portuguese companies is due to internal factors – efficiency, and external factors -- reaction, political reasons and marketing. Industry 4.0 is also a major challenge for ISO 9001 (Ślusarczyk, 2018) as well as a reversible supply chain (Drljača, 2019; Kot, 2020; Deja et al., 2019). ISO also plays an important role in terms of competitive advantage and sustainable business results (Mesjasz-Lech, 2014; Haseeb et al., 2019). Additionally, an ISO-based QMS usually results in the implementation of modern diagnostic methods (Pietraszek et al., 2014) based on scientific approaches (Pietraszek et al., 2016) and advanced statistical methods (Korzekwa et al., 2016). As it can be noticed, the implemented and certified system can bring many benefits. However, it should be noted that these benefits can only be seen if the QMS is skillfully targeted. Theoretically, the introduction of QMS should be in accordance with minimal costs and significant benefits. Unfortunately, in organizational practice, there are many obstacles that destroy this ideal image of an organization operating on the basis of the ISO 9001 management model. Therefore, it seems advisable to analyze implementations and propagate good implementation patterns. This is particularly important for SMEs that currently implement quality management systems. This study contains an analysis of the original research results of SMEs in South-Eastern Poland. Knowledge of these results, which are similar to those gained in adequate organizations in other countries, can aid in adopting rational premises and expected benefits from the implementation of the QMS.

Literature review

The literature resource covering the issues of systemic quality management is relatively extensive. The issues of implementing systems compliant with ISO 9001 presented in it are usually limited to one type of industry or type of activity. Many reasons have contributed to this situation. One of the main was the dominance of implementation models based on an approach that facilitates the implementation of an ISO 9001-compliant system to organizations, but from a specific industry (Fonseca, 2016; Nováková, 2016; Nowicka-Skowron and Ulewicz, 2015). However, due to the universal character of the standard, it is not the best solution. High interest in the issues of quality management systems in SMEs took place only around 2000. The amendment of the ISO 9001 standard and the change of the formula to the process approach contributed to this. Examples of publications confirming this phenomenon may be Dowlatshahi and Urias (2004), Jovanovic and Jovanovic (2008) and Vannier et al. (2002). Such research results, although in much smaller numbers, are still met today (Biasini, 2012; Naveh and Marcus, 2005; Sampaio, et al., 2011). At the same time, research on QMS analyzes and syntheses continued, which was also reflected in the literature on the subject. An example of this can be found in the following studies Heras-Saizarbitoria et al. (2012), Makkonen (2009), Psomas et al. (2013) and Singh (2008). This situation makes it legitimate to investigate current implementations and the benefits from them mainly in SMEs, as they are the ones that are implementing these systems now. Therefore, the aim of the conducted research was to determine the main determinants affecting the causes and effects of the implementation of the quality management system compliant with ISO 9001. It is possible to narrow down the currently wide list of reasons to trigger the effective implementation of the QMS while demonstrating the typical benefits observed after implementation.

Main research assumptions

While entering into the research, the following assumptions were made:

- the research population consists of organizations located mainly in south-eastern Poland,
- the research sample consists of organizations with various types of activities and different numbers of employees,
- any form of the organization's property is also allowed,
- research is directed at organizations that already have the ISO 9001 certificate (ISO 9001:2015),
- the survey is dedicated to representatives of the highest management for QMS (QMS plenipotentiary) or experienced internal auditors, as the most competent.

Figure 1 shows the stages of the research.

The questionnaire questions were evaluated in terms of quality parameters: ease and differentiating power. Ease is an indicator of the level of positive attitude to QMS implementation, and the value of this parameter allows classifying questions on a simplified three-grade scale of ease: easy - moderately difficult - difficult. However, the differentiating power determines the co-variability of individual questions, which means that for high values of this parameter, the measurement of knowledge in a given domain is differentiating.

Both qualitative factors allow an assessment of the extent to which the questions proposed in the questionnaire regarding the implementation of QMS have a diagnostic value (Ingaldi, 2019). For each of the static tests used, $\alpha = 0.05$ was assumed as the default level of static significance. The overall ease of the questions was 0.54, with an average differential power of 0.23. The Cronbach's α coefficient determined reached the level of 0.762.

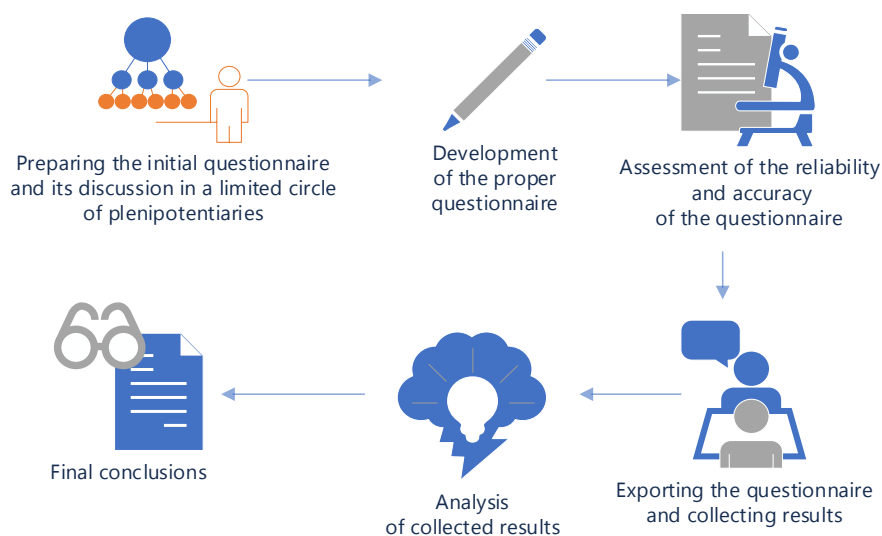


Figure 1: Stages of surveys carried out

SMEs with a certified quality assurance system from the region of South-Eastern Poland were qualified for the survey. The research used the CAWI and CAPI survey research techniques (Ingaldi and Czajkowska, 2019). It was addressed directly to the management representatives for quality, general management and experienced internal auditors because their competences and knowledge necessary to complete the survey. 112 correctly completed questionnaires collected from September to December 2019 were qualified for further research, 70% are surveys collected using the CAPI technique. This represents approx. 22.4% of all questionnaires sent and approx. 6.5% of the population of certified organizations in the region. It can be roughly assumed that the number of obtained results is small

but represents a sample of the population of organizations with a quality management system in Poland. Assuming this claim is primarily feasible because the surveys have been directed to management representatives for quality who know and understand the philosophy of system quality management and are committed to its improvement in a proper way. With some probability, it can be assumed that the system-negative organizations were not willing to complete the survey. This condition is favourable from the point of view of the credibility of the survey. Information on implementation and improvement comes from competent people and is not garbled by extremely negative, biased opinions from organizations that could not skilfully implement such systems. Owing to this, the conclusions drawn from the study and the resulting recommendations will be more useful for organizations that want to effectively and efficiently implement a quality management system in accordance with standard ISO 9001.

Research part

The decision to initiate activities implementing quality management systems should be knowledge-based. The upsides of implementing a quality management system compliant with ISO 9001 are in principle only in organizations, where it was carried out in a thoughtful manner, with the active participation of the staff, following management principles, and not only to obtain a certificate print. Costs connected with the implementation of the system play a significant role in implementation, and they depend on many factors. In organizations with great system-based management, these costs can, in extreme cases, be limited even to the costs related to certification. In most cases, however, they are larger. The costs should be minimized, but without undue exaggeration. The determinant of a well-implemented system is not minimal costs. It is important that the implemented system was effective. Due to considerable differences among organizations, it seems to be advisable to analyze what premises trigger the implementation of quality management systems in organizations, and what obstacles make this decision difficult. A separate issue concerns costs, the analysis of which is difficult due to the reluctance of the organizations to disclose information of a financial nature. Therefore, the attention was focused on the overall effectiveness of the implemented system. The sample organizations in the survey are mostly manufacturing companies (43%). A similar percentage applies to organizations providing services (approx. 28%) and dealing with trade (20%). The slightly lower percentage of the "other" group (around 9%) includes primarily local government organizations, public administration and one cooperative. They were not included in the group of services due to the specific, non-commercial and uncompetitive nature of conducting business. The distribution resulting from the survey is in general consistent with the organization distribution presented by Poland's statistical yearbooks.

Results

During the research, an attempt was made to determine the premises that were followed by organizations implementing quality management systems. The obtained results are presented in Table 1. Experts from the organization pointed to the most important answers to the questions contain in Table 1 and the following ones. They had the opportunity to add their answers; however, they did not use this option.

Table 1: Reasons (motives) for deciding on the implementation of the quality management system

Reasons (motives) of deciding on the implementation of QMS:	Percentage share [%]
willingness to improve productivity	6.2
willingness to use as part of the fight against competition	7.0
requirement from clients / contractors	15.6
willingness to improve the quality of products and services	20.7
willingness to improve the organizational and management system	23.3
marketing goal, improvement of the company's prestige	18.7
because it is a necessity, a requirement of the current market	6.6
encouragement through professional literature	0.0
command by a company that has already implemented it	1.9
Other.....	0.0

Each manager, while making decisions concerning the implementation of the system, regardless of the reasons inclining him to do so, expects benefits both external and within the organization (Table 2 and 3).

Table 2: Collective list of responses regarding internal benefits from the implementation of quality management systems that were expected in organizations

What internal benefits from the implementation of the QMS were expected:	Percentage share [%]
management improvements	11.0
ordering the organizational structure	8.0
reduction of internal quality costs	4.9
improving the flow of information	6.6
enabling continuous improvement	9.7
increase of efficiency and productivity	7.9
reduction of the number of mistakes and complaints made,	9.0
ensuring timely and constant deliveries	3.1
simplifying the implementation procedures for new employees	1.4
reduction of the other party's audits	1.4

improving the quality and safety of work	7.1
change of approach to quality	4.8
quick identification and troubleshooting	5.8
improvement of internal communication of the company	3.9
rationalization of development, approval, updating and archiving of documents	1.9
improving the efficiency of the organization	5.8
organizing the procedures and techniques of the organization's work	5.5
ordering the organizational structure	2.2
Other	0.0

Table 3: Summary statement of responses regarding external benefits from the implementation of management systems that were expected in organizations

What external benefits from the implementation of the QMS were expected:	Percentage share [%]
build customer trust	14.8
facilitating contacts with clients	7.3
reducing the number of complaints and increasing the company's credibility	8.5
increase sales with lower own costs	2.4
achieving a more reliable position on the market owing to a better image of the company	4.5
improving cooperation with suppliers	3.6
increase in competitiveness	8.2
getting international recognition	2.1
reduction of client audits (second party)	2.4
better access to the domestic market	1.6
increase in market share	2.7
increase in the number of tenders won	1.5
increase in the number of customers	5.7
sales growth	3.6
better access to the foreign market	2.4
export growth	1.6
gain a competitive advantage	4.8
increase in credibility and trust in the opinion of clients	9.7
changes in the company's image	2.4
prestige improving	5.4
the possibility of joining a larger number of tenders for deliveries and orders	3.0
the certificate had become a valuable marketing strategy tool	1.8
Other	0.0

The expected benefits seem to be typical of modern organizations. What is important for those preparing for implementation is whether the implemented system can bring the expected benefits. The results of the survey in this respect are presented in Figure 2.

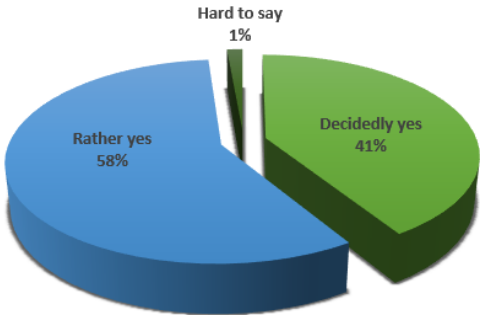


Figure 2: A summary statement of the answers regarding the question whether the system brought benefits

However, in order to look more closely at the implementation effects, questions were asked, the answers of which are presented in Tables 4 and 5.

Table 4: A list of answers indicating the most important observed internal effects from the implementation of the management system in the organization

The most important internal effects from the implementation of the management system:	Percentage share [%]
Reducing/eliminating organizational problems	34.2
Reduction/elimination of deficiencies / non-compliant products	29.0
Reduction/elimination of employee conflicts	11.6
Reduce/eliminate problems with suppliers	16.1
Reduction/elimination of other factors	7.2
I do not know/I cannot determine	1.9
Others	0.0

Table 5: A list of answers indicating the most important observed external effects from the implementation of the management system in the organization

The most important external effects from the implementation of the quality management system	Percentage share [%]
Acquiring new customers	33.1
Maintaining existing customers	31.8
Improving the image of local administration bodies	10.3
Better cooperation with subcontractors and suppliers	20.4
Instilling the idea of environmental protection among subcontractors and suppliers	2.5
Better contact with local media	1.3
I do not know/I cannot determine	0.6
Others	0.0

Looking at the effects of implementation of quality management systems, it seems to be purposeful to confront these statements with a general assessment of the system implementation effectiveness, as shown in Figure 3.

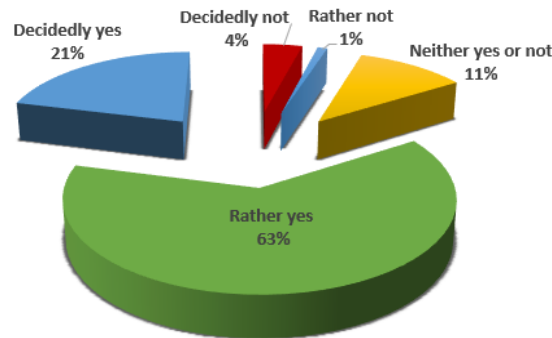


Figure 3: Summary results of responses indicating how organizations evaluate the effectiveness of the implemented quality management system

The presented research results have some limitations related to the size of the research sample, research periods, as well as geographical limitations. However, research results can be a valuable source of information about the role of quality assurance systems in developing and key regions due to the degree of innovative projects such as the aviation valley in Poland.

Discussion of results

As it can be observed in Table 1, the primary reasons for system implementation are different. As the main reason for the implementation of the quality management system, the respondents stated "the willingness to improve the organizational and management system". Other reasons for implementing the system were

"willingness to improve the quality of products and services" and "marketing goal, improvement of the company's prestige". It is extremely constructive that the managers are aware of the need to improve the organization, management and the need to continuously improve the organization's management, also in terms of quality understood as customer satisfaction.

While analyzing the answers of the respondents regarding the benefits that were expected after the implementation of the QMS, a variety of responses can be observed. This applies to both the expected external and internal benefits. In the case of internal benefits (Table 2), the respondents most often paid attention to enabling continuous improvement and improving management. What is also interesting is the reduction in the number of errors, complaints, and this is the prospective goal of implementing QMS.

As far as external benefits (Table 3) are concerned, the most expected one is building trust. The next one, which is also an external benefit, is to observe an increase of credibility in the eyes of customers.

While analysing the answers of the respondents regarding the benefits expected from the implementation of QMS (Fig. 2), it can be seen that the overwhelming majority of responses in terms of expected benefits (around 98.6%) confirm that the expected benefits are present. However, most of the answers are protective corresponding to the answer "rather yes". Nevertheless, this information is probably favoured by people related to management systems, but it should primarily be seen as positive by the organizations in which these systems have been implemented.

While Analyzing the internal benefits observed in the examined organizations (Table 4), attention should be paid to the fact that, first of all, the number of organizational problems decreased and the number of deficiencies and non-compliant products was not completely eliminated; however, it also decreased. In the case of external benefits (Table 5), it was mainly observed that new customers were acquired and, above all, the existing customers were maintained. Another interesting phenomenon is the fact that, with respect to both internal and external benefits, the answer "I do not know, I cannot determine" is rare, which indicates visible effects of implementations in organizations.

Based on Figure 3, it can be concluded that the largest number of surveyed organizations believe that the implemented system is effective (about 84%), but only about 21% are convinced by this fact. Most of the answers are "rather yes" that inspires the need for further improvement of the system. It is striking that about 4% of organizations recognize that the management system is not effective.

Based on these studies, key premises leading to the implementation of the QMS can be identified. They were associated with the expected benefits of implementing management systems, which benefits were expected in organizations. Thanks to the research results, the problem of organization uncertainty related to expected benefits was solved, indicating the most common benefits. Most organizations

considered these systems to be effective. Moreover, the results obtained are similar to those observed in other countries. These facts indicate that especially SMEs, while applying for the implementation of the ISO 9001 management system, can expect a reduction in the number of organizational problems and, as a consequence, improvement in the quality of products, which will probably translate into maintaining or increasing the number of customers.

Summary

Organizational management patterns play a significant role in creating competitive advantages of organizations. Having a certified management system ceases to be seen only as an aspect of competitiveness, and is slowly becoming a necessity resulting from customer pressure. More and more organizations are starting to treat such a system not only as a mechanism to achieve the assumed organizational performance but also as a starting point for the construction of more complex, integrated management systems. The international ISO 9001: 2015 standard favors this. As a large number of organizations have already implemented a quality management system based on ISO 9001, it seems advisable to re-evaluate the implementation conditions as well as the planned and achieved benefits to enable the skillful implementation of such a system in other, mainly SMEs. For this purpose, pilot studies were carried out to collect information from the expertly surveyed organizations, mainly in south-eastern Poland. Based on the research, it turned out that:

- competent people in the form of representatives of top management believe that the quality management systems that have been implemented in their organizations prove to be effective. Consequently, the planned goals have been achieved.
- While planning the implementation of quality management systems, the prerequisites related to the desire to improve the organizational and management system prevail. The second goal is to improve the quality of products, while the third is the marketing goal associated with enhancing the company's prestige. The premise shows the willingness to be a well-managed organization, which, as research has shown, is possible to achieve.
- The expected internal benefits are mainly the desire to improve management and as internal benefits achieved in the responses mentioned: reduction/elimination of organizational problems and reduction/elimination of deficiencies and non-compliant products.
- The expected external benefits are mainly building trust and credibility in the eyes of clients. The external effect of implementation of the system was maintaining the existing customers and attracting of new ones. It is in the current competitive environment very positive information for the implementation of QMS.

- The majority of the Plenipotentiaries surveyed believe that the implemented system is effective, which supports the implementation of such systems.

The presented survey results can become the basis for SMEs to plan training, but also to plan the skillful implementation of quality management systems in accordance with ISO 9001. Efforts were made to ensure that the results of the research based on a 112-element sample reflect, to some extent, the structure of the organization's activities. However, while analyzing the results in the context of a particular organization, its specificity should be taken into account. Therefore, further research will be carried out in the context of not only the size of the organization, but also the specifics of their activities.

Quality management systems are undoubtedly a beneficial element of changing organizations in the aspect of management. It is advisable to obtain knowledge on how to build these systems. Acquiring such knowledge is possible, among others, by analyzing the presented results. Using this information, the likelihood of skillfully building an integrated quality management system can be increased.

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ANALIZA PRZYCZYŃ I EFEKTYWNOŚCI WDROŻEŃ SYSTEMU ZARZĄDZANIA JAKOŚCIĄ ZGODNEGO Z ISO 9001

Abstract: Sformalizowane systemy zarządzania są we współczesnych organizacjach standardem. W zasadzie większość myślących konkurencyjnie organizacji co najmniej jeden taki system posiada wdrożony. Najczęściej posiadanym przez organizacje systemem jest system zarządzania jakością zgodny z ISO 9001. Mimo, że wiele organizacji posiada wdrożony taki system to jest jeszcze wiele takich, które dopiero planują takie wdrożenia. Niekiedy wdrożenie ISO 9001 jest wymagane przez klientów. Aby to umiejętnie zrobić wskazanym jest korzystać z doświadczeń innych organizacji. Uzasadnionym jest więc analizowanie przyczyn i korzyści wdrożeń systemu zarządzania jakością. Taki też cel postawiono sobie w badaniach, których wyniki prezentuje to opracowanie. Dzięki znajomości wyciągniętych wniosków organizacje przygotowujące się do wdrożenia ISO 9001 będą mogły zrobić to w sposób umiędzynowy. Przyczyni to się z pewnością do lepszych ich wyników, co jest jednym celów wdrożenia wymagań normy ISO 9001.

Key words: jakość, system jakości, ISO 9001, wdrażanie systemu zarządzania, inżynieria systemów

分析符合ISO 9001的質量管理體系的原因和影響

摘要:本研究的主要目的是分析東南波蘭的企業在發展中和創新地區的一組中小企業中實施質量管理體系的原因和好處。在研究中,使用CAWI和CAPI方法進行有針對性的調查,並通過專家訪談擴展了對質量負責的關鍵人員。在本文中,提出了與在以動盪環境為特徵的發展中地區實現質量領域中假定的系統目標的評估有關的研究結果。本文還展示了對中小型企業集團根據ISO9001實施質量管理體系的原因,期望和效果進行分析的原始研究。

關鍵詞:質量管理, ISO 9001, 質量管理體系的實施, 系統工程, 中小企業