HENRIETTA PETHŐ – TIBOR CSIZMADIA

CHANGES IN STANDARD MANAGEMENT SYSTEM PRINCIPLES IN A CRISIS SITUATION

VÁLTOZÁSOK A SZABVÁNYOS IRÁNYÍTÁSI RENDSZER ALAPELVEIBEN VÁLSÁGHELYZETBEN

Organizations are characterized by continuous improvement, both in terms of meeting customer expectations and in their commitment to quality. This paper presents the findings of a Hungarian questionnaire-based survey examining how quality management principles supported organizations during the COVID-19 crisis. Nearly three hundred organizations responded to questions about their experiences during the pandemic. Descriptive statistics and correlation analysis were applied to assess which quality management principles had the strongest positive impact on organizational management systems in a crisis context. The results highlight the importance of people engagement, relationship management, and customer focus. These quality principles gained increased importance during the crisis. The findings may support organizations seeking to respond to future crises through standardized management systems.

Keywords: **ISO, standard management system, crisis situation, engagement of people, relationship management, customer focus**

A szervezeteket a folyamatos fejlesztés jellemzi mind az ügyfelek elvárásai, mind a minőség iránti elkötelezettség tekintetében. A tanulmány egy magyarországi kérdőíves felmérés eredményeit mutatja be. Az alábbiakban a COVID-19 pandémiára adott közel háromszáz válaszadó szervezet válaszait elemzik a szerzők. Kérdésük az volt, hogy mely minőségirányítási elvek erősítették leginkább a szervezet irányítási rendszerét válsághelyzetben. Az elemzésekhez leíró statisztikát és korrelációelemzést használtak. Az eredmények azt mutatják, hogy a megkérdezett szervezetek többek között az emberek bevonását, a kapcsolatkezelést és az ügyfélközpontúságot hangsúlyozták. A minőségirányítási elvek fontossága válsághelyzetben megnőtt. A kutatás eredményeit a mindennapi gyakorlatban alkalmazhatják azok a szervezetek, amelyek a jövőbeni válságokra szabványos irányítási rendszerekkel kívánnak reagálni.

Kulcsszavak: **ISO, szabványos irányítási rendszer, krízishelyzet, emberek bevonása, kapcsolatkezelés, ügyfélközpontúság**

Funding/Finanszírozás:
The authors did not receive any grant or institutional support in relation with the preparation of the study.
A szerzők a tanulmány elkészítésével összefüggésben nem részesültek pályázati vagy intézményi támogatásban.

Authors/Szerzők:
Henrietta Pethő[a] (petho.henrietta@gtk.uni-pannon.hu) master lecturer; Dr. Tibor Csizmadia[a] (csizmadia.tibor@gtk.uni-pannon.hu) professor

[a]University of Pannonia (Pannon Egyetem) Hungary (Magyarország)

The article was received: 24. 07. 2024, revised: 26. 02. 2025, 01. 03. 2025 and 04. 05. 2025, accepted: 21. 05. 2025.
A cikk beérkezett: 2024. 07. 24-én, javítva: 2025. 02. 26-án, 2025. 03. 01-jén és 2025. 05. 04-én, elfogadva: 2025. 05. 21-én.

The COVID-19 pandemic, which began in 2020, presented organizations with unprecedented challenges. The pandemic had a powerful impact on the global economy, the national economy, large corporations, small and medium-sized enterprises, and especially entrepreneurs, who faced significant consequences (Castro & MGG Zermeño, 2020). According to Singh (2020), the impact of the pandemic was perceived in all sectors; this event caused harm to millions of businesses, and it has been viewed as a "major crisis" that affected several continents simultaneously and generated social, economic and health disruptions that require urgent solutions and that remain largely unclear (Bacq et al., 2020).

The concept of crisis pertains mainly to an extreme, unexpected and unforeseeable event to which organizations must respond (Doern et al., 2019). Therefore, a crisis, for which companies must prepare, requires the use of a system of tools that can enable companies to react quickly and efficiently to unexpected situations in the future. All the long-term effects of the crisis are not yet known, but there is a strong probability that companies must prepare for similar crises in the future through quick response, risk management, and, when necessary, rethinking and rethinking their processes. The global influence of companies that recognize this phenomenon will continue to increase in the future (Liguori & Winkler, 2020). According to Sawalha (2020), it is advisable to review the lessons learned from past events and understand how those lessons can be adapted to new situations to ensure that organizations can benefit from them and mitigate future impacts.

At the organizational level, standard management systems can help organizations adapt to these crisis situations and the corresponding processes of rethinking. According to Faragó (2021), different standard management systems can also help organizations overcome crises. According to Singh (2020), the International Organization for Standardization (ISO) standards can be a solution in this context by helping prevent crises from disrupting businesses and normal life. He further noted that such a crisis can be limited by the introduction of various management systems developed by the ISO. This approach, which is based on standard management systems, can be used in any organization, regardless of their size and scope of activity, both in terms of quality management principles and requirements; however, priorities may differ depending on the field in which the organization operates.

During and after a crisis, organizations must rethink their strategic objectives, e.g., those pertaining to customers, suppliers and employees. The framework prOVIDed by the quality management principles and requirements established by the ISO standard can help them manage these challenges, facilitate management and strategic planning, and ensure organizational sustainability and continuous development. These standards require, among other things, measurement, analysis and performance evaluation, and the development of effective implementation methods with regard to the organization's management systems.

The ISO 9001 standard, which is the international standard for quality management systems (QMS), helps organizations become more efficient and improve; it also helps them exceed customer expectations and promote satisfaction through continuous development, as noted by Singh (2020). According to Singh (2020), unpredictable situations emerge in the context of crises, and organizations must develop guidelines and strategies to respond to such crises.

The present study contributes to this empirical research, among other contributions, by conducting a national survey, in which context we asked organizations about, among other topics, changes in the basic principles of the standard management system before and during the pandemic. The purpose of the investigation is to enable organizations to respond appropriately to similar crisis situations in the future on the basis of previous experience.

The principles of quality management represent the basis of the standard systems on which the requirements of the standards are based, and certified organizations must comply with these principles during their operations.

Standard management principles and systems have a raison d'être in crisis management. A quality management system prepares the organization to manage crises more effectively (UNIDO, 2020). In the postpandemic period, organizations must devote financial resources not only to the daily conduct of their business activities but also to the protection of both employees and customers (Biå et al., 2020).

Our goal is therefore to examine the basic principles underlying the standard management system, in relation to which standard principles have been strengthened. We can draw conclusions concerning the management of similar crisis situations in the future by identifying which management system principles became important and were strengthened for organizations during the crisis situation as well as which principles are connected and how strong such principles were before and during the crisis.

The importance of the topic is due to the fact that standard management systems were examined in the context of a crisis situation; namely, the basic principles of quality management have not yet been examined from this perspective based on a national survey of this magnitude. Additionally, previous researchers have not examined the relationship among these principles in the context of a crisis situation. Examining how these principles are related to each other can help organizations by revealing which relationships should be areas of focus or strengthened in a crisis situation. It is advisable not only to treat these relationships as a priority in the daily lives of organizations during a crisis.

Literature review

Before presenting the quality management principles in detail, we briefly introduce the standard management systems to ensure that even readers who are not yet familiar with the quality management principles can understand how these principles prOVIDe a foundation for the operation of the standard management systems.

Standard management systems

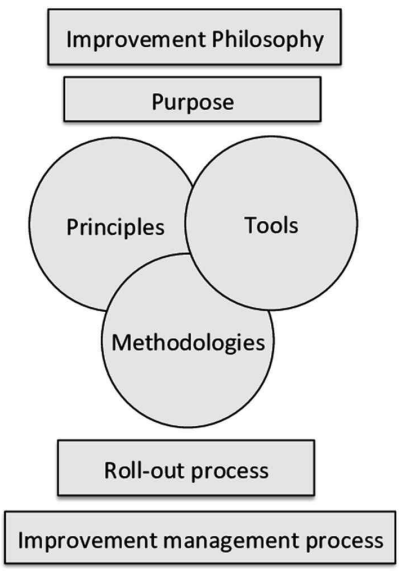
To present the specific topic on which this research focuses, it is necessary to present the standard management systems in brief. Quality is no longer a source of competitive advantage but rather the starting point of business (Rebelo et al., 2016). Among standard management systems, the ISO 9001 standard for quality management system requirements is the most widespread and has undergone significant changes in recent decades (Bernardo et al., 2015). This standard is the first to be applied by organizations seeking to operate in accordance with the requirements of a standard management system.

Advantages of the ISO 9001 quality management system

Isaksson and Taylor (2014) claimed that the basic principles underlying quality management are included among the elements of the quality philosophy, which are illustrated in Figure 1.

Figure 1

Elements of a quality philosophy according to Isaksson and Taylor (2014)



Source: own compilation based on Isaksson and Taylor (2014)

These authors emphasized the fact that, at the system level, methodologies and tools must be considered alongside basic principles. On the basis of the model presented in Figure 1, these quality management principles serve as a foundation for a development management process involving appropriate tools and methodology. It is important to know and use the basic principles in the systems approach because the requirements of the management system standards are based on the basic principles of quality management. Organizations that are familiar with these basic principles are able to meet the standard requirements entailed by the certification process.

These quality management principles are presented in detail below.

Standard management system in a COVID-19 crisis situation

All the long-term effects of the COVID-19 crisis are not yet known, but it can be said with high probability that companies must prepare for such and similar crises in the future, with quick response, resilience, risk management and, where necessary, rethinking and rethinking their processes. At the organizational level, standard management systems contribute to adapting to these crisis situations and rethinking processes. According to Faragó (2021), different standard management systems can also help in overcoming crisis situations.

ISO 45001: 2015 standard in a COVID-19 crisis situation

According to Csizmadia and Ködmönné Pethő (2020), one of the most important consequences of the emerging COVID-19 crisis is the protection of employees and the health and safety of employees at work. The COVID-19 crisis resulted in the emergence of a new function: the preparation and implementation of the corporate pandemic plan (workplace hygiene, health protection, isolation) became an area of strategic importance (Poór et al., 2021). According to Faragó (2021), the importance of the health and safety of employees increased during the pandemic, because it became one of the main pillars of the sustainable operation of companies, and therefore occupational health protection and health preservation received a prominent role in a short time as one of the strategic issues of overcoming the COVID-19 crisis, as well as the related ISO 45001 standard, which defines the requirements of occupational safety and health protection for organizations. According to De Vires (2020), the goal of companies is to protect the health of their employees and customers while maintaining their operations. In connection with this, the creators of the standard recognized the importance of the occupational health and safety management system requirement standard in a COVID-19 crisis situation, which is why the ISO/PAS 45005:2020 standard belonging to the family of standards was issued, which contains general guidelines for safe work during the COVID-19 crisis situation, as well as the ISO 45003:2021 occupational health and safety management – psychological health and safety in the workplace – Guidelines for psychosocial risk management standard.

Quality management principles

In the following, we present the quality management principles that serve as a foundation for standard management systems, thereby illustrating their importance in crisis management.

The set of "quality management principles" refer to the basic accepted beliefs, norms, rules and values that provide a foundation for quality management, according to a publication from the ISO that presents the basic principles of quality management. According to this publication, the principles of quality management can serve as a foundation for the management of the organization and help improve performance. To facilitate the operation of

a quality management system, the standard defines basic principles that summarize the basic rules regarding the management and operation of organizations with the goal of continuously improving organizational performance while ensuring a focus on customers and taking into account the needs of other interested parties (Csizmadia, 2022).

The quality management principles according to the ISO 9000 standard are as follows:

- Customer focus
- Leadership
- Engagement of people
- Process approach
- Improvement
- Evidence-based decision making
- Relationship management

The proper application of the seven principles of quality management encourages organizations no operate and develop their management systems in accordance with the current requirements of standard systems.

Customer focus

According to the ISO 9000:2015 standard, the primary focus of quality management is on the fulfilment of customer requirements and the goal of exceeding customer expectations. According to these basic principles, management must ensure that customer needs are defined, transformed into requirements and fulfilled with the goal of ensuring customer satisfaction. These basic principles highlight both stakeholders and customers, and they posit that meeting both the current and future needs of customers and other stakeholders can help the organization achieve lasting success. In summary, organizations can achieve lasting success when they are able to obtain and maintain the trust of customers and other important stakeholders by meeting requirements and striving to exceed expectations.

Leadership

The ISO 9000:2015 standard requires managers at all levels to establish conditions in which employees are committed to achieving the organization's quality goals. According to the basic principles, the role of the management in the task of increasing employee commitment is strongly emphasized. According to the standard, by promoting employee engagement, leaders enable the organization to align its strategies, policies, processes and resources to achieve its goals. Management must coordinate the organization's goals, thus rendering them a unified whole, and establish the conditions in which employees become committed to achieving the organization's quality goals. In addition to facilitating the engagement of people, the basic principle of leadership involves the establishment of a culture of trust and honesty, the creation of common values and ethical standards for behaviour at the organizational level, and the promotion of exemplary behaviour among managers (ISO 9000:2015).

Engagement of people

The ISO 9000:2015 standard describes, facilitates, and authorizes the engagement of people who play important roles at all levels of the organization. In this context, the standard highlights the important role played by such people in the organization's ability to create and provide value. To operate an organization effectively and efficiently, it is important to ensure that all employees at all levels are valued and involved. The recognition, empowerment, and development of preparedness on the part of such people promote the engagement of people in the achievement of the organization's quality goals, thereby increasing the organization's ability to create and provide value. Employee commitment does not refer solely to static 'loyalty' but rather to a higher level of attachment. Such commitment establishes relationships in which employees can identify with the organization, including in terms of its philosophy and goals. The effective implementation of quality management requires both affective (organizational culture and teamwork) and normative commitment (education and further training, leadership and senior managers' commitment, customer focus) on the part of employees (Krajcsár, 2019).

Process approach

The process approach highlighted by the ISO 9000 standard emphasizes the fact that organizations interpret and manage activities in the form of interconnected processes that can thus function as a unified system. In many cases, however, the organization and the stakeholder system do not match this process logic but rather exhibit a functional structure. Therefore, the processes are interrupted in some places, the operations associated with some processes lack real owners, and the participants in the process take responsibility only for their own area of work and have the appropriate authority and information only in this context; thus the processes in question are insufficiently efficient. The quality management requirement standard requires process connection points to be defined and processes to be connected into process networks (Turcsányi, 2014), thus facilitating the implementation of the process approach. In the process approach, cross-functional, activity and process operations and the management of processes in the form of a unified system are emphasized. Furthermore, the application of the process approach helps people understand the relationships among individual activities and thus identify the roots of problems (Csizmadia, 2022); it also facilitates the more effective and reliable discovery and management of risks in organizations (Kosztyán et al., 2020).

In the current standards for quality management requirements, the risk approach has become a fundamental characteristic of the planning, operation and development of processes (Pačaiová et al., 2018). Similarly, the ISO 9001 standard specifically addresses the application of risk-based thinking to the planning and implementation of quality management system processes. The ISO 9001

standard requires organizations to manage risk in relation to processes but allows organizations to choose how to accomplish this goal.

Improvement

According to the ISO 9000 standard, the principle of improvement can be characterized as follows: "successful organizations constantly pay attention to improvement". It is essential for an organization to exhibit comprehensive development throughout its operations to maintain its current level of performance, respond to changes in both internal and external conditions, and generate new opportunities. Improvement can include, for example, correction, continuous development, breakthrough change, innovation (Birkner & Máhr, 2016) and reorganization. Furthermore, in the context of improvement, the organization's quality policy and goals must be closely related to strategic decisions.

Evidence-based decision making

Factuality and evidence-based decisions play key roles in quality management from the outset. According to the ISO 9000 standard, the basic principle of evidence-based decision making is that efficient and effective decisions are made based on the analysis and evaluation of data and information. Namely, such decisions are more likely to achieve the desired results. The analysis of facts, evidence and data leads to greater objectivity in decision making and greater confidence in the decisions made. In its practical implementation, this approach requires the organization to collect, analyse and evaluate data that are suitable for determining the adequacy and effectiveness of the quality management system as well as for implementing development measures.

Relationship management

The ISO 9000 standard highlights the principle of relationship management, which entails that, to achieve lasting success, organizations nurture their relationships with key stakeholders. According to the basic principle, it is important for organizations to know who their most important stakeholders are, what those stakeholders expect from the organization (i.e., what is necessary for their satisfaction), and what the organization expects from those stakeholders (i.e., how they can contribute to organizational performance and satisfaction). Thus, essential stakeholders impact the performance of the organization; these parties are mutually dependent on each other, and their ability to create value can be increased through mutually beneficial relationships. Managing interactions with these stakeholders, managing the corresponding relationships, and even paying attention to the relationships and networks among them can impact organizational competitiveness and performance. Sustained success is more likely to be achieved if an organization nurtures its relationships with its stakeholders in a way that optimizes their impact on performance. In addition to their own performance, the success of organizations is therefore strongly influenced by the performance of relevant stakeholders (e.g., suppliers, subcontractors, intermediaries, and customers) as well as by the effectiveness and efficiency of the relationships between these parties.

According to Luburić (2015), quality management principles are the quality principles that top management uses as guidelines with respect to the organization's management systems. In his opinion, noncompliance with any of these principles and requirements threatens the entire management system. Furthermore, in his opinion, quality management principles can help prevent crisis situations, as illustrated in Figure 2.

Figure 2

Quality management principles pertaining to crisis prevention

Source: own compilation based on Luburić (2021)

Figure 2 illustrates the measures necessary to implement the quality management principles from the perspective of crisis prevention.

The principles of quality management are included in the crisis prevention model, which is based on the effective management of changes. Crises can rarely be resolved via predetermined procedures and plans. They require changes and innovations as well as a flexible, creative, strategic and lasting response (Luburić, 2021), to which quality management principles contribute through their efficient and effective application.

The model associates competence and personal integrity with the basic principle of the engagement of people, which is employed as a crisis prevention measure. The integrated organization operates on the basis of clarified values, goals and rules, which employees know, accept and apply. For an organization to achieve its goals and ensure that employees follow the rules, it is necessary to develop the behaviour of employees consciously, at this

point including their internal motivation, which is influenced by the organization's culture, values, norms and practices. Employees must perceive all of these factors even in a crisis situation because of their participation in the process of change and their commitment.

On this basis, it is important to evaluate the relationships among the principles on which this study focuses.

The purpose of the research

The research objective is the examination of quality management systems in relation to which quality management principles have changed in the importance of the organizations operating quality management systems in the COVID-19 crisis.

Neither domestic nor international research has yet been done in this subject, so this research is considered unique in this regard, addressing this research gap.

Materials and methods

The first subsection describes the data used in this research, and the second subsection describes the analytical methods we employed.

Data

The data used in the analysis were collected from primary sources. The survey was conducted in June and July 2023. The first version of the questionnaire was tested via a trial test. The questionnaire survey was conducted online through the ORBIS database. Responses were voluntary. The questionnaire was completed by the managers of the selected companies. The central theme of the questionnaire was the changes that occur in the role of standard management systems in a crisis situation. Respondents from nearly two thousand, five hundred organizations completed the questionnaires. This survey yielded 859 evaluable surveys that had been completed in their entirety (n=859). With respect to the principles and requirements of the standard management system, 271 evaluable samples were obtained (n=271), which represents the number of organizations that had implemented a standard management system among the organizations whose members completed the questionnaire. In the anonymous questionnaire, we asked the respondents to answer the following closed question: Please indicate how important the following standard management system principles were for your organization before and during COVID-19 (i.e., March 2020 – December 2021). Answer options: 1- does not appear, 2- not significant, 3- moderately significant, 4- significant, 5- extremely important.

Data analysis method

Descriptive statistics and relationship test analyses were the methods used in this research.

Focusing on the relationship between two variables, I used relationship test (Kendall's Tau) and hypothesis test (paired sample t-test).

A total of (7·(7-1)/2=) 21 relationship tests can be performed among the answers to the 7 closed questions. The measurement level of the questions determines the indicator that can be used to quantify the relationships that may exist among them. All the questions can be measured on an ordinal scale. The rank correlations among them can be revealed by the Kendall's tau (τ) indicator, which ranges within the [-1, 1] interval.

All relationship tests are interpreted at a 5% significance level (i.e., at a significance level of 0.05) with the assistance of SPSS software. If the p value for the study is < 0.05, it indicates a significant relationship between the two parameters under investigation. In cases involving significant relationships, the absolute value of the indicator indicates the strength of the relationship (Sajtos – Mitev, 2007):0: no relationship,[0, 0.2]: weak relationship, [0.2, 0.7]: moderate relationship, [0.7, 1]: strong relationship, 1: deterministic relationship.

Since the τ indicator can take both positive and negative values, the sign of this indicator (i.e., the rank correlation coefficient) can also be interpreted in this context as indicating the direction of the relationship. A negative (positive) τ indicates that the higher the rank of one variable is, the lower (higher) the rank of the other variable is expected to be.

Results

In this section, we present descriptive statistics, followed by the results of the relationship analysis.

Descriptive statistics

Distribution by organizational form

77.1% of the responding organisations, or 662 organisations, were limited liability companies. This was followed by joint stock companies with 7.9% of the respondents, representing 68 respondents, and deposit companies with 6.6% of the respondents, representing 57 organisations. On the basis of the distribution of the filling organizations according to organizational form, it can be said that the questionnaire was filled in by organizations operating in an organizational form, which are familiar with standard management systems, systems approach, operation with processes and use them in daily practice.

Distribution of organizations by economic sector

It is typical of the economic sector distribution of the responding organizations that 18.7% of the organizations came from the Other sector, followed by the Construction Industry with 13.3%, and Wholesale and Retail Trade with 11.2%. Organizations providing accounting, management, architecture, engineering, scientific research, consulting and other administrative and support activities and services account for 9.4% of the respondents.

Changes in the importance of quality management principles

I examine the change in the significance of the principles of quality management before and during COVID-19, and then I present the relationship of the principles of quality management to each other in the examined periods.

I used the paired sample t test for the analysis.

Table 1

Changes in the importance of quality management principles in the examined period – paired sample t test

	Significance p-value
Customer focus	0.166
Leadership	**0.000**
Engagement of people	**0.029**
Process approach	**0.002**
Improvement	0.365
Evidence-based decision making	0.830
Relationship management	**0.003**

Source: own compilation

The results show (Table 1) that there is a significant difference between principles 2,3,4,7 at the 5% significance level.

2. Leadership
3. Engagement of people
4. Process approach
7. Relationship management

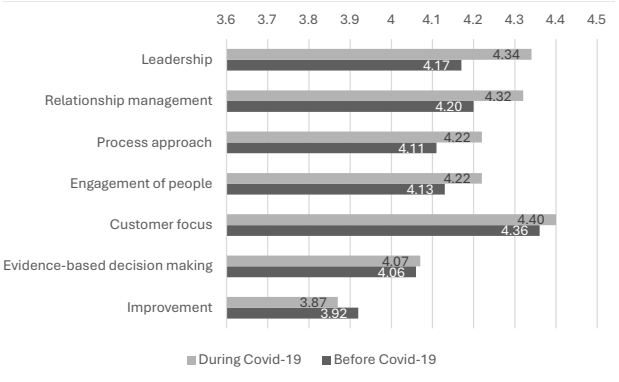
In the case of principles 1 and 5, 6, there is no significant difference.

1. Customer focus (0.166)
5. Improvement (0.365)
6. Evidence-based decision making (0.830)

In Figure 3 illustrate the average results of the study in relation to the importance of the principles.

Figure 3

Changes in the importance of quality management principles in the examined periods



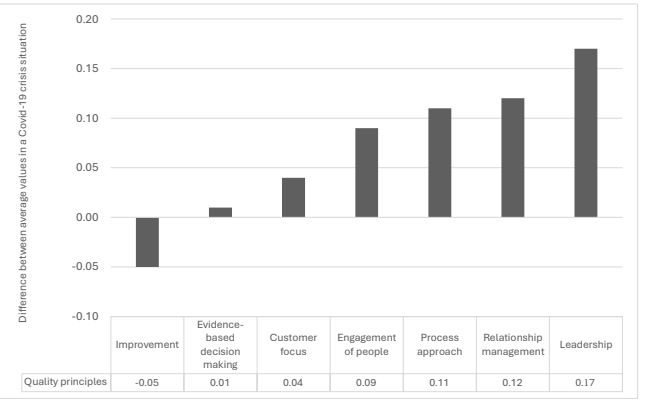
Source: own compilation

In all cases, during the COVID-19 period, the importance of the principles increased when examining the average values given to the principles, with the exception of the Development principle. It is not surprising that the importance of the Development quality management principle has decreased. As a result of the restrictive measures due to the COVID-19 crisis, strategic investments were frozen by almost a third of the companies, and innovation projects by a quarter (Poór et al., 2021).

Figure 4 shows the difference between the average values during and before COVID-19 regarding the answers to the importance of the principles.

Figure 4

The difference between the average values in the case of organizational responses to the basic principles in the examined periods



Source: own compilation

The biggest change was in the case of Leadership involvement during COVID-19 regarding the importance of the principle, followed by the Relationship Management principle.

In the next chapter, I present the results of the research on the relationship between the principles of quality management.

Relationship analysis

In our opinion, an examination of the relationships before COVID-19 and during COVID-19 with respect to the basic principles is necessary to answer questions regarding how the organizations experienced this crisis situation, whether their priorities regarding the basic principles of the management system were stable, or, if they were not, which relationships during COVID-19 were the most important, which basic principles were emphasized by the organizations, what changes occurred and how those changes occurred. The analysis is also important because organizations can prepare themselves to address similar crisis situations by relying on the basic principles of the management system. Understanding which principles are prioritized and which constitute areas of focus can facilitate effective crisis management, thus allowing organizations to learn from reactions to previous crises. After obtaining the descriptive statistics, section we examined the answers provided to the question regarding quality management principles with a focus on how strong the relationships among the quality management principles that serve as a foundation for standard management systems were, according to the responding organizations, before and during COVID-19. In this section, on the basis of the organizations' answers to this question, we examined the strength and direction of the relationships among

these principles. For this purpose, we use the correlation calculation, which describes the strengths and directions of the linear relationships among variables. All the questions can be measured on an ordinal scale. The rank correlations among them can be revealed by the Kendall's tau (τ) indicator, which ranges within the [-1, 1] interval. All relationship tests are interpreted at a 5% significance level (i.e., at a significance level of 0.05) with the assistance of SPSS software. Since the τ indicator can take both positive and negative values, the sign of this indicator (i.e., the rank correlation coefficient) can also be interpreted here to indicate the direction of the relationship. A negative (positive) τ indicates that the higher the rank of one variable is, the lower (higher) the rank of the other variable is expected to be.

The relationships that exhibit the highest value in terms of the quality management principles among the moderately positive relationships are presented against a background of dark grey. A light grey background indicates the least strong moderately positive relationships, which are presented at a later point.

In the following, we first describe the strength and direction of the relations regarding the basic principles during the before-COVID-19 period and present the two strongest of these relations in detail. In another section, we focus on the COVID-19 period (March 2020 – December 2021) and present the strongest relationship among the principles on the basis of the responses provided by the responding organizations. The two strongest connections are presented in further detail in this case as well.

Table 2

The results of the relationship analysis in terms of correlation coefficients and Kendall's tau Principles before /during COVID-19

Kendall's tau_b	Customer focus	Leadership	Engagement of people	Process approach	Improvement	Evidence-based decision making	Relationship management
Customer focus (before/during)	1.000	.517**	.444**	.388**	.353**	.404**	.512**
		.438**	.373**	.345**	.283**	.401**	.504**
Leadership (before/during)	.517**	1.000	.514**	.459**	.372**	.446**	.507**
	.438**		.440**	.439**	.290**	.333**	.471**
Engagement of people (before/during)	.444**	.514**	1.000	.532**	.402**	.376**	.443**
	.373**	.440**		.485**	.293**	.343**	.407**
Process approach (before/during)	.388**	.459**	.532**	1.000	.520**	.440**	.367**
	.345**	.439**	.485**		.439**	.456**	.320**
Improvement (before/during)	.353**	.372**	.402**	.520**	1.000	.370**	.427**
	.283**	.290**	.293**	.439**		.391**	.345**
Evidence-based decision making (before/during)	.404**	.446**	.376**	.440**	.370**	1.000	.462**
	.401**	.333**	.343**	.456**	.391**		.469**
Relationship management (before/during)	.512**	.507**	.443**	.367**	.427**	.462**	1.000
	.504**	.471**	.407**	.320**	.345**	.469**	

Source: own compilation

Table 2 presents the results of these correlation tests in matrix form, in which context the same 7 quality management principles can be seen in the rows and columns of the table.

In the table, the top row of the given square presents the beforeCOVID-19 value, whereas the bottom row of the given square presents the relationship results regarding the given principles during the COVID-19 period.

In the diagonal of the relationship analysis matrix, the cells with a black background indicate deterministic relationships because they present the relationship of each variable with itself, in which context the value of tau is by definition 1. The results are duplicated symmetrically on this black diagonal. All the tau values are significant and positive, thus indicating that, on the basis of their previous experience, those who consider a given principle of the management system to be strong in the responding organizations also consider the principle related to it to be strong. All relationships are at least moderately strong ($0.2 < \tau$).

Examining the relationships among the principles before COVID-19

An examination of the strength of the relationships among the quality management principles in the before-COVID-19 period reveals a moderately positive relationship, with a value of 0.532, between the engagement of people and the process approach. With respect to the relationship between these two variables, one foundation of standard management systems is the process approach. The moderately positive relationship between the engagement of people and the process approach can therefore be attributed to the fact that a standard management system cannot be imagined without committed employees who can implement these processes even in a crisis situation. The results of the analysis presented here similarly support this relationship, as described by Luburić (2015), in which context the commitment of top management in relation to management systems, who should set an example

for employee commitment, cannot be imagined without a process approach. The process approach is one of the most important requirements of management systems. In the process approach, the principle of the management system determines that consistent and predictable results can be achieved more effectively and efficiently if activities are interpreted and managed through interconnected relationships that function as a unified system. It is unsurprising that the process approach was prioritized in relation to the engagement of people by organizations operating responsive management systems, since it is not possible to operate processes or adopt a systems perspective without committed employees.

In organizations operating a management system, employee commitment does not refer solely to static "loyalty" but rather to a higher level of attachment, namely, a management system approach that enables employees to identify with the organization, including in terms of its philosophy and goals. Accordingly, employee commitment plays an important role in relation to the basic principles linked to a process approach, which is related to the operation of quality management systems, as Csizmadia (2022) noted. This finding was followed by a finding indicating the existence of a moderate strength positive relationship with a value of 0.520 between the improvement principle and the process approach as quality management principles during the period before COVID-19. According to the preceding information, the process approach remained a priority among the responding organizations as the second strongest link, but the principle of improvement ranked second (i.e., after the engagement of people) based on a moderately positive relationship with a value of 0.520. According to the rationale underlying the quality management principle, improvement is essential for an organization's ability to maintain its current level of performance as well as to respond to changes in both internal and external conditions, thereby generating new opportunities. From a practical perspective, change indicates that improvements cannot be made without the engagement of people; thus, it is understandable that the principle of employee commitment was prioritized over the principle of improvement in terms of the strength of relationships in the before-COVID-19 period, even among the responding organizations. Without dedicated employees, the system approach and process approach cannot function in the long term–much less can improvements be made.

In the following section, on the basis of the answers given by the responding organizations during COVID-19, we present the relationship tests regarding the basic principles.

Examining the relationship among the principles during COVID-19

Regarding the investigations of the relationships among the quality management principles during COVID-19, we also present the two strongest relationships, as identified numerically on the basis of the analyses.

During the COVID-19 period, among the moderately strong relationships identified in this research, the relationship between management and customer focus was the strongest, with a value of 0.504. According to the guidelines for the quality of relationship management, lasting success is more likely to be achieved if the organization nurtures its relationships with stakeholders in such a way as to optimize their impact on performance. In a crisis situation, maintaining contact with interested parties and determining when and how to react to the signals and comments of interested parties appropriately are extremely important. Relevant factors include official comments, changes in relevant regulations and compliance during a crisis situation. The owners must perform activities related to meeting the owner's expectations, since some segments grew stronger, whereas other organizations faced bankruptcy or closure, especially in cases in which the virus did not allow for personal presence and contact with external and internal stakeholders. In these organizations, the owners responded to the changed circumstances wherever and however they could

The extraordinary crisis situation, such as the change in job opportunities, the closing of borders, and the reorganization of supply chains, presented organizations with new challenges with regard to relationship management. With respect to relationship management, supply chains based exclusively on unique and mostly exclusively international relationships were damaged. In several places, these -supply chains were replaced by domestic suppliers in this crisis situation; these domestic suppliers were able to respond to the crisis quickly and to provide products and services of the appropriate quality. In this way, the organizations were able to serve their customers despite the disruption of international supply chains. In cases in which customer relationships were damaged, supply chains were unable to respond to changed circumstances, conditions and expectations. The organizations that completed the questionnaire also prioritized maintaining contact in a crisis situation, since maintaining contact with important stakeholders also affects the operation and performance of the organization.

Relationship management is connected to the quality management principle, which exhibited a moderately positive relationship with customer focus in organizations, which involves maintaining contact with customers. The relationship between relationship management and customer focus was also confirmed by Luburić (2015), according to whom customer focus is a fundamental quality management principle and vital to successful businesses. In his opinion, customer focus can lead to significant results based on identifying customer needs and meeting their expectations. The mutual relationships among all these principles are therefore important for organizations, since organizations must serve their customers even in crisis situations; in this context, changes in and the reorganization of suppliers and supply chains appeared to be issues that must be solved separately. A related point was highlighted by Singh (2020), according to whom the impact of the pandemic was felt in all sectors and affected millions of businesses, including in terms of their customer focus and relationship management.

With respect to the COVID-19 period, the responding organizations considered the relationship between the commitment of employees and the principles of the process approach to be moderately positive at a value of 0.485, thus identifying it as the second strongest of the relationships among the principles of quality management.

The commitment of employees is important because, in a crisis, attention to employees is the first step in the process approach that must be adapted to changed circumstances. As a result, compliance with these principles is also a priority in management systems. Relationship management with external and internal customers as well as interested parties was considered to represent the strongest relationship by the employees, as internal stakeholders, who were able to play this role in the management of the changed processes, and it represented the second strongest relationship for responding organizations during the COVID-19 pandemic. The strength of this relationship is also understandable because in a crisis situation, in which quick reactions and decision making are required, working according to processes helps organizations respond to crisis situations more effectively, despite the fact that such situations were not previously considered in their processes by reconsidering these approaches.

In the next section, we briefly present the relationships among the principles that were associated with the weakest relationships based on the analysis of the answers provided by the responding organizations.

In the following, the weakest relationships in the periods under examination are presented. Investigations of the relationships among the principles of quality management before and during COVID-19 revealed that in both periods, the relationships between improvement and customer focus were the weakest, obtaining the smallest value among the moderately positive relationships. Even before COVID-19, the responding organizations did not rate this principle as very significant – i.e., in the assessment, the strength of the relationship was 0.353 – but during COVID-19, this value decreased even further to a value of 0.283, thus indicating that the organizations do not consider improvements in responsiveness to be significant in terms of customer focus. In a crisis situation, the organization's primary goals are to respond to the crisis, maintain the continuity of operations, and adapt to changed circumstances. Organizations use resources for all these purposes rather than for improvement. In this case, one primary goal of organizations is to focus on the customer and to provide products and services at a suitable quality.

In the following section, we explore whether this change occurred and, if so, which principles and their relationships were affected by comparing the before-COVID-19 period with the COVID-19 period.

Summary

The results of the survey presented in the current study reveal that with regard to the quality management principles of the before-COVID-19 period, the responding organizations emphasized the principles of customer focus and relationship management. During COVID-19, customer focus was also ranked first among the principles in terms of importance, followed by leadership, which was identified as the primary responsibility of the leader in the context of responding to and managing the crisis. The principle of improvement was identified as the least important by the responding organizations before COVID-19, and this importance decreased even further during COVID-19. During this period, the organizations focused mostly on responding appropriately to changed circumstances and addressing crisis situations rather than on improvements. Moreover, with the exception of the improvement principle, the importance of all principles increased in a crisis situation. Organizations operating management systems consider the importance of quality management principles to be foundational for standard systems and to provide a good basis for the operation of organizations, even in such an altered situation. The results of the studies regarding the relationships among these principles reveal that before COVID-19, the relationship between the engagement of people and the principles of the process approach was the strongest, and this relationship remained strong in the subsequent period. During the COVID-19 period, this relationship was preceded by the relationships between the principles of relationship management and customer focus, which played a significant role in organizations' responses to the changed circumstances emerging after the onset of such a crisis, such as relationships with both internal (employees) and external (customers, service providers, authorities, owners) stakeholder contacts. In terms of the relationships among the principles, the greatest change and increase was observed in the relationship between the process approach and evidence-based decision making, which grew significantly stronger during COVID-19. In a crisis situation, organizations must make decisions that also affect their processes. A significant decrease was observed in the relationship between improvement and customer focus. During this period, the organizations did not focus on meeting customers' needs in terms of improvements but rather on addressing the crisis situation. The research is unique in that the quality management principles of standard management systems in a crisis situation have not yet been examined in the organizations that apply these standards.

On the basis of the results obtained thus far, the conclusions of this research can be utilized as follows. The theoretical importance of this research lies in the fact that it represents an investigation of standard-setting organizations with respect to the changes in the principles of the management system that occur in a crisis situation, and standard-setting organizations can rely on these results in the future when issuing new standards. The practical importance of this research is due to the fact that its results can be used in the future by professionals and organizations in the context of operating their management systems in similar crisis situations. A limitation may be whether all information from the responding organizations will be accurate, but since it is a matter of

standard management systems, documented information related to the processes is required, so this limitation is overcome. In the future, we aim to continue this trend by relying on the opinions provided by the organizations whose members completed the questionnaire to investigate the relationships among the standard requirements in the before-COVID-19 period and the during COVID-19 period.

References

Bacq, S., Geoghegan, W., Josefy, M., Stevenson, R., & Williams, T. A. (2020). The COVID-19 virtual idea blitz: Marshaling social entrepreneurship to rapidly respond to urgent grand challenges. *Business Horizons*, *63*(6), 705-723. https://doi.org/10.1016/j.bushor.2020.05.002

Berényi, L. (2017). A minőségirányítás fejlődése és jövőbeli lehetőségei. *Vezetéstudomány/Budapest Management Review*, *48*(1), 48-60. http://doi.org/10.14267/VEZTUD.2017.01.05

Bernardo, M., Simon, A., Tarí, J.J., & Molina-Azorín, J.F. (2015). Benefits of management systems integration: a literature review. *Journal of Cleaner Production*, *94*, 260-267. https://doi.org/10.1016/j.jclepro.2015.01.075

Biå, G.E., Olaru, S.M., Hassani, Y., & Costache, I.C. (2020). Approach to development of an integrated plan to ensure business continuity in the post-pandemic period, based on international management systems standards. *Ecoforum Journal*, *9*(3).

Birkner, Z. & Máhr, T. (2016). Interpreting innovation – in another way. *Vezetéstudomány/Budapest Management Review*, *47*(10), 39-50. https://doi.org/10.14267/VEZTUD.2016.10.04

Csizmadia, T. (2022). A minőségirányítási alapelvek változása az ISO 9000:2015 szabványsorozatban – fókuszban az emberi tényező és a folyamatok. In Szentes, B. (Eds.), *Ember és technológia – a karbantartás jelene és fenntartható jövője: Nemzetközi Konferencia Kiadványa* (pp. 145-155). Pannon Egyetem, Gazdaságtudományi Kar. https://nkk.gtk.uni-pannon.hu/2022/KarbKonf2022_kotet_ebook.pdf

Csizmadia, T. (2022). *Innováció versus Minőségmenedzsment – Az oximoron feloldása*. Akadémiai Kiadó.

Csizmadia, T., & Ködmönné Pethő, H. (2020). Súlyponti változások válsághelyzetben a szabványos irányítási rendszerekben. *Magyar Minőség*, *29*(11), 49-55. https://quality-mmt.hu/magyar-minoseg-xxix-evfolyam-2020/

Doern, R., Williams, N., & Vorley, T. (2019). Special issue on entrepreneurship and crises: business as usual? An introduction and review of the literature. *Entrepreneurship & Regional Development*, *31*(5-6), 400-412. https://doi.org/10.1080/08985626.2018.1541590

Faragó, F. (2021). COVID-19 és munkavédelem. *Biztonságtudományi Szemle*, *3*(4), 113-131. https://biztonsagtudomanyi.szemle.uni-obuda.hu/index.php/home/article/view/186/170

Fogarasi, A., & Szűcs, E. (2021). A szabványos irányítási rendszerek fejlődése, integrációja. *Biztonságtudományi Szemle*, *3*(2), 1-13. https://biztonsagtudomanyi.szemle.uni-obuda.hu/index.php/home/article/view/154/125

Fonseca, L.M. (2015). ISO 9001 Quality Management Systems through the Lens off Organizational Culture. *Quality Management*, *16*(148), 63-78. https://doi.org/10.1515/picbe-2017-0097

Isaksson, R., & Taylor, N. (2014). Lean Six Sigma for Cement Processes-CemLean6S. In *17th Toulon-Verona Conference Excellence in Services* (pp. 197-210). Liverpool John Moores University. https://sites.les.univr.it/eisic/wp-content/uploads/2018/07/Isaksson-Taylor.pdf

Kamarási, V., & Mogyorósy, G. (2015). Szisztematikus irodalmi áttekintések módszertana és jelentősége. Segítség a diagnosztikus és terápiás döntésekhez. *Orvosi Hetilap*, *156*(38), 1523-1531. https://doi.org/10.1556/650.2015.30255

Kosztyán, Z.T., Csizmadia, T., Kovács, Z. & Mihálcz, I. (2020). Total risk evaluation framework. *International Journal of Quality & Reliability Management*, 37(4), 575-608. https://doi.org/10.1108/IJQRM-05-2019-0167

Liguori, E., & Winkler, C. (2020). From offline to online: Challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. *Entrepreneurship Education and Pedagogy*, *3*(4), 346-351. https://doi.org/10.1177/2515127420916738

Luburić, R. (2015). Quality management principles and benefits of their implementation in central banks. *Journal of Central Banking Theory and Practice*, *4*(3), 91-121. https://doi.org/10.1515/jcbtp-2015-0013

Pačaiová, H., Markulik, Š., Turisová, R., & Nagyová, A. (2018). How to build risk-based thinking methodology based on process approach. *Acta Mechanica Slovaca, 22*(1), 24-33. https://doi.org/10.21496/ams.2018.005

Portuguez Castro, M., & Gómez Zermeño, M.G. (2021). Being an entrepreneur post-COVID-19 – resilience in times of crisis: a systematic literature review. *Journal of Entrepreneurship in Emerging Economies, 13*(4), 721-746. https://doi.org/10.1108/JEEE-07-2020-0246

Rebelo, M.F., Santos, G., & Silva, R. (2016). Integration of management systems: towards a sustained success and development of organizations. *Journal of Cleaner Production, 127*, 96-111. https://doi.org/10.1016/j.jclepro.2016.04.011

Sajtos, L., & Mitev, A. (2007). *SPSS kutatási és adatelemzési kézikönyv.* Alinea Kiadó.Sawalha, I.H. (2020). A contemporary perspective on the disaster management cycle. *Foresight, 22*(4), 469-482. https://doi.org/10.1108/FS-11-2019-0097

Shadrin, A. (2020). COVID-19 & ISO 9001. *Standarty i Kachestvo, 9*, 64-69.

Singh, G., & Singh, J. (2020). Corona virus pandemic – are ISO standards the answers to the organisations?

International Journal for Research in Applied Science and Engineering Technology, *8*(6), 449-451. https://doi.org/10.22214/ijraset.2020.6068

Turcsányi, K. (2014). *Minőségelmélet és –módszertan*. Nemzeti Közszolgálati Egyetem.

Standards

ISO 9000:2015 Quality management systems. Fundamentals and vocabulary.

ISO 9001:2015 Quality management systems. Requirements.